Fig. 3. *Cœlastrum verrucosum*, Reinsch. Familia sphaerica ex cellulis 16 constituta.

4. *Cosmarium Hammeri*, Reinsch, var. Specimen majus, a fronte, $\times \frac{720}{1}$.
5. *C. abnorme*, Nordstedt. Specimen a fronte, $\times \frac{720}{1}$.
6. *C. abnorme*, var. *trigonum*, $\times \frac{720}{1}$. Aliud specimen, a vertice.
7. *C. punctulatum*, Brébisson. Specimen a fronte, $\times \frac{720}{1}$.
8. *C. pulcherrimum*, Nordst. Specimen a fronte, $\times \frac{720}{1}$.
9. *C. asperulum*, Reinsch. Specimen cum cytoplasmate, $\times \frac{720}{1}$.
10. *Cosmarium*, spec. nov. Specimen formæ minoris cellula in statu divisionis, $\times \frac{720}{1}$.
11. *Idem*. Specimen formæ majoris, $\times \frac{720}{1}$.
12. *Euastrum subincisum*, Reinsch. Cellula vacua, a fronte, $\times \frac{720}{1}$.
13. *Staurostrum margaritaceum*, Ehrenberg. Specimen, a fronte, $\times \frac{720}{1}$.
14. Aliud specimen, a vertice, $\times \frac{720}{1}$.
15. *S. exiguum*, Reinsch. Specimen a fronte, $\times \frac{720}{1}$.
16. Aliud specimen, a vertice, $\times \frac{720}{1}$.
17. *Zygnema tetraspermum*, Reinsch. Fila duo in statu secundo copulationis, zygosporæ modice evolutæ; cum cystiodermate distincto limitato simpliciter striato; limina cellularum copulatarum cystioplasmate perfecte vacua, $\times \frac{360}{1}$.
18. *Z. tetraspermum*. Ultimus status cellularum fili copulatione laterali zygosporis in lumine processuum copulativorum subevolutis cystiodermate distincto limitatis, $\times \frac{360}{1}$.
19. *Z. tetraspermum*. Fili steriles pars, $\times \frac{360}{1}$.
20. *Z. tetraspermum*. Zygospora evoluta magis aucta, nucleis chlorophyllaceis sphaericis regulariter positis, $\times \frac{720}{1}$.
21. *Lymnodietyon*, spec. nov., Reinsch. Specimen majus ex cellulis cytoplasmate repletis constitutum, $\times \frac{720}{1}$.

On the Peculiarities and Distribution of Rubiaceæ in Tropical Africa. By W. P. HIERN, M.A., F.L.S., &c.

[Read June 21, 1877.]

(PLATES VII. & VIII.)

PRELIMINARY REMARKS.

THE only general account of the Rubiaceæ of Tropical Africa that has hitherto appeared, professing to deal with the general bear-

ings of the Order in this region and comparing the more remarkable points here with those in other parts of the world, is to be found in the fifth volume of the *Memoirs of the Society of Natural History of Paris*, from the pen of Mons. A. Richard. This is a memoir on Rubiaceæ, and contains a general description of the family for the whole world and the characters of the genera which compose it. The paper was read before the Royal Academy of Sciences of Paris on July 7, 1829, and was printed in the year 1829 or not later than 1830, but was not actually published until the year 1834; on pages 116–118 he gives a special account of the geographical distribution and general characters with the predominant genera of Rubiaceæ in the middle or intertropical region of Africa. Only a small proportion, however, of the species which are now known to occur in Tropical Africa appear to have been known to Richard. The genera of Rubiaceæ, as well for Tropical Africa as for the rest of the world, have been latterly set in order and described in the first part of the second volume of Bentham and Hooker's '*Genera Plantarum*,' published in the year 1873. The new genera, described for the first time therein, have been all credited to Sir J. D. Hooker, with the exception of two genera, which have been taken up from Welwitsch's manuscripts. This work has been for the most part followed by me for the purposes of classification; the few departures that I have felt obliged to make from this main guide to the Order are not necessary to detail in this place.

Having recently drawn up descriptions of the plants of this Order for the third volume of the '*Flora of Tropical Africa*,' this portion of the volume having already been printed off, I propose to lay before the Society a general sketch of the principal results, and to give at the same time some particulars which the plan of the '*Flora*' does neither require nor allow.

There are described in the '*Flora*' 478 species arranged under 80 genera, besides a species of *Vaillantia* and a few species which are either imperfectly known or only incidentally mentioned. To this number must also be added one old and two new species (which are herein described and figured), but which I was not acquainted with in time to include them in the volume, and also a considerable number of new species collected by Welwitsch in Lower Guinea, most of which, though seen by me, it has been found impossible to include. When these additions have been made, it will result that the species of Rubiaceæ already in our

collections amount to no less a number than 550. The materials that have served for the base of my investigations as illustrative of and supplementary to the information derivable from botanical books, were the herbaria of Kew and of the British Museum, the collection of Afzelius, made at Sierra Leone and belonging to the University of Upsala, and the greater part of the Rubiaceæ collected by Dr. Peters in Mozambique, kindly lent from the Berlin herbarium for the purpose of the 'Flora.' The specimens available from these sources are the results of the labours of above a hundred collectors, and the sum of the number of species gathered by each of the collectors amounts to above thirteen hundred. The largest number of species collected by any one person is 175, that is, $\frac{1}{2}$ of the whole number of species hitherto known to occur in Tropical Africa, all of these species having been obtained in Upper Guinea by Gustav Mann.

On comparing the number of species belonging to Rubiaceæ with the numbers already ascertained to belong to other large natural Orders, it appears that in Tropical Africa Rubiaceæ is the Order of flowering plants second in size, it being rather more numerous in species than Compositæ and exceeded only by Leguminosæ. It must, however, be borne in mind that when the specimens of Compositæ gathered by Welwitsch in Angola have been determined, they will perhaps augment the number of species of the latter Order so as to outnumber Rubiaceæ. At the same time, from my acquaintance with these natural Orders in Tropical Africa, I should expect that the results of future collections to be made in this region will be likely to add more species to Rubiaceæ than to Compositæ; indeed this expectation is confirmed by the fact that three additional species of Rubiaceæ require to be included in these pages, whereas I should at this time have not even one such species to add if I were writing similar notes on Compositæ. The variations evidenced in the organs of our Rubiaceæ are very numerous, and though often by no means conspicuous, yet are dependent on such characters that it seems impossible to disregard their specific importance; and in this manner the number of species, many of them apparently quite local, is quickly increased. Dr. Schweinfurth, in his book of travels in the interior of Africa, speaks of "the endless varieties of the Rubiaceæ" (vol. i. p. 506, English edition), and there is no doubt but that many more species remain to be discovered in that country.

The number of Gramineæ in Tropical Africa has not been as-

certained, and is difficult to estimate, but I believe that it will not exceed that of Rubiaceæ.

GENERAL GEOGRAPHICAL DISTRIBUTION OF RUBIACEÆ.

On comparing the number of species of Rubiaceæ in Tropical Africa with that in other important or isolated regions, the following interesting summaries and estimates may be given.

We find that in the Cape Flora there are about 106 species; see Harv. & Sond. Fl. Cap. vol. iii. (1864-1865). In the 'Flora Orientalis' there are about 182 species; see Boiss. Fl. Orient. vol. iii. (1875). In Algeria, Mumby gives in his 'Catalogus' (1859) 39 species, which include 21 species of the critical genus *Galium*.

In Spain, Wilkomm and Lange (1870) give 78 species, of which 53 are *Galium*; in Britain there are 14-17 species, of which 10-13 are *Galium*; and in the whole of Europe 171 species (Nyman, 1865), 110 being *Galium* and 43 *Asperula*.

In the Deccan peninsula of India, Wight and Arnott (1834) give 155 species, including some obscure or doubtfully native species; in Ceylon, Dr. Thwaites (1864) gives 129 species.

In British India it may be estimated that there are about 550 species.

In Dutch India it appears that there are also about 550 species.

In Australia, Mr. Bentham (1866) gives 110 species.

In New Zealand, Sir J. D. Hooker gives (1864) 31 species, 24 belonging to the genus *Coprosma*.

In the British West Indies, Grisebach (1864) gives 173 species.

In Brazil there may be estimated about 1100-1200 species; for this estimate I am indebted to Dr. Müller, of Geneva, who is at present engaged upon part of the Order for the 'Flora Brasiliensis.'

In Mauritius and the Seychelles, where *Filices* have more than double the number of species as compared with any Natural Order of Flowering Plants, Rubiaceæ occupies the fourth place among the latter, while Compositæ holds the sixth place. In the Seychelles, out of 60 (the total number of endemic genera), 14 belong to Rubiaceæ.

There is, of course, great probability that the standard of specific value varies much in the different books from which, and with the different authors from whom, the above numbers are taken, and therefore any conclusions deduced from their comparison must be held subject to this consideration. In my own work the standard has been intended to be kept high, so that plants have

been regarded as conspecific unless some good botanical character or marked difference in general aspect fairly separated them; it is quite possible that some of my species will subsequently require division, and, on the other hand, when fuller material is available, some of my specific distinctions will perhaps be found to be bridged over.

ORGANIC PECULIARITIES.

In order that it may be easy to form an opinion as to the comparative value of the various characters, I here give a general view of the more conspicuous differences which Tropical African Rubiaceæ, whether in the tribes, genera, or species, present in each of the organs and in some of the morphological or physiological conditions.

1. *As to the Flowers.*

The flowers, at least within our geographical range, with the sole exception of the common Levant weed *Vaillantia hispida*, appear to be uniformly hermaphrodite; even though the genus *Psychotria* has, in the New World, some species with polygamodiceous flowers, none of our species possess this peculiarity.

2. *Frequency of Dimorphism.*

Dimorphism occurs commonly or at least in some species in the genera *Pentas*, *Virecta*, *Otomeria*, and *Dirichletia*, all of which belong to the tribe Hedyotideæ, also in *Pentanisia*; perhaps a like condition exists in some species of *Tricalysia* and probably also in other genera.

3. *Differences in the Pistil.*

The ovary is usually 2-celled, but in many genera deviations, either occasional or characteristic, occur; it is only 1-celled in *Gardenia*, but incomplete partitions are found in this genus, due to the production of 2 or more parietal placentas; it is also sometimes 1-celled in *Mitriostigma*, *Amaralia*, *Pouchetia*, *Lamprothamnus*, and *Rubia*.

The ovary is 2-3-celled in *Siphomeris* and in one species of *Rutidea*, and by exception the same increase in the usual number of cells is said to occur in *Pentas*, *Tricalysia*, and *Pentanisia*, and it is 2-4-celled in *Cephaelis*. It is 3-celled in *Richardia*, 4-celled in *Morelia* and *Morinda*, and very rarely so in one species of *Pavetta*, 3-5-celled in *Stipularia*, *Vangueria*, *Fadogia*, and *Cuviera*, 4-5-celled in *Urophyllum* and *Sabicea*, 5-celled in *Temnopteryx*, *Pentaloncha*, and *Ancylanthos*, 5-7-celled in *Triainolepis*, 10-12-

celled in *Lasianthus*. The number of lobes or teeth of the style or stigma usually agrees with the number of cells, whether complete or incomplete, in the ovary. The style is usually of moderate length, that is, about as long as the corolla or shortly exserted; and the upper or stigmatic portion is usually oblong, fusiform, linear, clavate, or often subcapitate. There are, however, globose, mitriform, or calyptriform stigmas in *Canthium*, *Vangueria*, *Eudogia*, *Cuviera*, and *Ancylanthos*, and they are much dilated in *Macrosphyra* and in one doubtful species of *Oxyanthus*; and the style is far exserted in *Tarenna*, *Macrosphyra*, and *Pavetta*.

The ovules are numerous or several (2 or more) in each cell of the ovary throughout the first great series of the Order, comprising half the number of our genera, while in the other series, comprising the remaining half of the genera, the ovules are always solitary. Their insertion varies considerably in different genera, and is important for the purposes of classification. They are pendulous in the genera *Adina*, *Zygoon*, *Galiniera*, and *Guettarda*, and in the tribes Alberteæ and Vanguerieæ. They are ascending in the genera *Uncaria*, *Hymenodictyon*, *Corynanthe*, and *Hekistocarpa*, and in the tribe Galieæ, while they are erect in the genera *Morinda*, *Siphomeris*, and *Anthospermum*, as well as in the tribe Psychotrieæ. They are peltately attached in the genera *Crossopteryx*, *Dictyandra*, *Leptactina*, *Tarenna*, and *Mitracarpum*, as well as in nearly the whole of the tribe Ixoreæ. The ovules are anatropous in most of the genera, but are amphitropous in the tribes Ixoreæ (except *Morinda*) and Spermacoceæ and in the genus *Rubia*.

The placentas are fleshy in several genera of the tribes Musændeæ and Gardenieæ, and the ovules are immersed in or impressed on them in *Randia*, *Amaralia*, &c. The disk at the top of the ovary is not usually important in its characters; it varies from the form of an elevated hemisphere, sometimes lobed, to a mere ring, which is sometimes almost obsolete; in *Virecta multiflora* the disk consists of two narrow cones.

4. Differences in the Fruit.

Corresponding with numerous, several, or solitary ovules in the ovary, so the fruit has numerous, several, few, or solitary seeds; the number of seeds, however, is often far fewer than that of the ovules, and occasionally, as, for instance, in *Oxyanthus macrophyllus*, we find solitary seeds to result in the fruit after numerous

ovules in the flower. Monospermous fruits are also common in the case of the genera with 2-celled and solitary-ovuled ovaries.

The fruit is a syncarpium in *Sarcocephalus* and *Morinda*, baccate and indehiscent in the tribes Mussændeæ, Hameliæ, and Gardeniæ. It separates into cocci in *Mitragyne*, *Dirichletia*, *Siphomeris*, and *Spermacocæ*. It consists of pyrenes in the tribes Guettardæ, Vangueriæ, Ixoreæ, and Psychotriæ; and it is capsular in the tribes Cinchoneæ and Hedyotideæ and in some genera of Naucleæ, being septicial in the genera *Adina*, *Uncaria*, *Otomeria*, and *Hekistocarpa*, and loculicidal in *Hymenodictyon*, *Corynanthe*, *Crossopteryx*, *Pentas*, and *Virecta*; it bursts irregularly at the apex in *Argostemma*, and dehisces variously in *Oldenlandia*. In the genus *Virecta* one valve of the capsule is deciduous, whilst the other valve is persistent.

The fruit splits up from the base in *Siphomeris* and *Hypodematum*; the latter genus differs only by this peculiarity from *Spermacoce*, the fruit of which is dicoccous, splitting down the middle from the apex. In the genus *Siphomeris* the epicarp is membranous and bursts in a valvate manner from the base, and each of the compressed pyrenes hangs from the apex of a filiform exterior column, and the general appearance of the fruit much resembles that of Umbelliferae.

In *Guettarda* the endocarp is very hard and woody and more or less lobed; in *Triainolepis* the pyrenes are bony.

The form of the fruit is commonly globular; it is pisiform in several genera of Mussændeæ, Gardeniæ, and Ixoreæ; it is large in *Amaralia* and some species of *Randia* and *Gardenia*, fusiform or pyriform in *Macrosphyra* and in some species of *Oxyanthus* and *Mitriostigma*. It is more or less didymous or dimidiate in *Canthium* and *Mitracarpum* and in the tribe Galieæ.

The fruit is more or less ribbed longitudinally in the genera *Pentas*, *Otomeria*, *Dirichletia*, *Mussænda*, *Bertiera*, *Oxyanthus*, many species of *Psychotria*, and *Cephaëlis*.

The seeds usually afford valuable characters for the determination of genera, but not so good for the higher divisions of the Order. In *Oldenlandia Peltospermum*, however, the seeds are orbicular and discoid, whereas in the other species of the genus they are angular. The seeds are furnished at both ends with wings (being extensions of the testa) in the genera *Adina*, *Mitragyne*, and *Uncaria*, and in the tribe Cinchoneæ; in *Uncaria* the wings are produced as capillary appendages, in *Hymenodictyon* and *Corynanthe* the wings are undivided at one end and bipartite

at the other, while in *Crossopteryx* the peltate seeds have cut membranous wings. Numerous small angular seeds occur in *Pentas*, *Virecta*, and *Otomeria*, and in the tribe Hameliæ; they are more usually globose in *Mussaendæ* and *Gardeniæ*, but the exceptions are too frequent for this distinction to be taken alone for a diagnostic character.

The seeds are convex on the back and concave with a central depression on the face in the genera *Ixora* and *Pavetta*; they are marked on the face with a longitudinal furrow, which is entered by the placenta, in *Coffea*. In *Psychotria* they are in most cases longitudinally ribbed or furrowed on the back, and they are marked on the ventral face with a diagonally placed depressed cross in the genus *Mitracarpum*.

A small aril occurs only in the genus *Galiniera*.

The testa is more or less fibrous or fibrous-sulcate in the genera *Oxyanthus*, *Mitriostigma*, *Poukhetia*, and *Polysphæria*.

Albumen is always present in the seeds except in the case of the genus *Guetarda*; it is usually uniform, but is distinctly ruminated in the genera *Enterospermum*, *Galiniera*, *Polysphæria*, *Rutidea*, and *Grumilea*.

5. Differences in the Andræcium.

There is very little variation in the structure of the andræcium in Rubiaceæ; the typical form of the anthers is oblong or linear, and though a few genera, especially in the tribes Naucleæ and Spermacocæ, exhibit a more ovate or lanceolate or shortly oblong form, yet as this matter is one that is seen only by degrees, it does not afford good distinguishing characters; in the tribe Galieæ, especially in the genus *Galium*, however, the anthers are short.

In the genus *Argostemma* the anthers are connivent and dehisce by lateral pores at the apex. In *Dictyandra* the cells of the anthers are divided into small compartments by a few longitudinal and by many transverse septa, and are therefore termed locellate.

In several species of *Tricalysia* the connective is produced beyond the anther-cells into apiculate appendages; in our species of the genus *Gaillonia* two of the anthers are subsessile, while the remaining anthers are furnished with short but distinct filaments. In *Spermacoce* the number of stamens is rarely reduced to 3 or even to 2.

6. Differences in the Corolla.

The corolla is regular, or very nearly so, in all of our species;

it varies in form from rotate, as in *Argostemma*, to long, slender, and narrowly salver-shaped, as in *Oxyanthus*; it is subrotate in *Rhabdostigma* and *Cuviera*, and rather less so, having a short funnel-shaped tube, in *Lamprothamnus*; it is calyptriform in *Cephaelis clausa*. The tube is curved in some species of *Psychotria*, especially in the section *Chasalia*. The lobes are crisped in *Heinsia jasminiflora*, caudate-acuminate in some species of *Canthium*, *Vangueria*, and *Cuviera*, and each lobe is furnished at the apex with a quasi-dorsal horn in some species of *Fadogia* and *Psychotria*, and with an elongated club-shaped appendix at the back near the apex in *Corynanthe*. The lobes are reduced to 3 in number in a few species of *Spermacoce*. The æstivation is valvate in the genera *Adina*, *Mitragyne*, *Uncaria*, *Hymenodictyon*, and *Corynanthe*, and in the tribes Hedyotideæ, Mussændeæ, Vanguerieæ, Morindeæ, Psychotrieæ, Pædericæ, Anthospermeæ, and Galieæ; it is reduplicative-valvate in *Hekistocarpa*, and induplicate-valvate in *Trichostachys*; it is imbricate in the genera *Sarcocephalus*, *Heinsia*, and doubtfully so in *Lepipogon*; and it is dextrosely contorted, as seen from the axis of the flower, in the genera *Crossopteryx* and *Bertiera*, and in the tribes Gardenieæ, Alberteæ, and Ixoreæ.

7. Differences in the Calyx.

There is perhaps greater variation in the calyx than in any other organ; and the calyx furnishes good characters in some cases for the discrimination of genera, but more usually for that of species; it is, however, of but little value for higher groups.

The tubes of the contiguous calyces cohere in the genus *Sarcocephalus*, and become confluent in fruit in *Morinda*. In all the genera the calyx is inferior; but in many the tube is extended above the ovary. The tube is ribbed, at least in fruit, in *Pentas*, *Otomeria*, and some other genera; more or less compressed in *Stipularia*, &c.

The limb is developed into a large, dilated, oblique, reticulated lamina in *Dirichletia*; it is unequally lobed in *Pentas*, *Virecta*, *Otomeria*, *Temnopteryx*, *Stipularia*, *Pentanisia*, *Anthospermum*, *Gaillonia*, and in some species of *Spermacoce*. One lobe is frequently much enlarged as a conspicuous coloured lamina in *Mussænda*; in one species of *Sarcocephalus* there is a filiform clavate appendage between the several calyx-teeth, which is soon torn up from its attachment as the corolla grows to its full length. The limb is furnished inside at the base with some fleshy setæ in the genera *Dictyandra* and *Leptactina*; in some species of *Tricalysia*

it is split down two opposite sides ; and in a species of each of the genera *Randia* and *Cephaëlis* the limb is spathaceous. The lobes are more or less accrescent or foliaceous in *Temnocalyx*, *Pentaloncha*, *Heinsia*, *Dictyandra*, *Leptactina*, *Amaralia*, *Pentanisia*, *Cuviera*, *Anthospermum*, and *Gaillonia*, and in some species of the genera *Randia*, *Gardenia*, *Fadogia*, and *Psilanthus*. The limb of the calyx is, in some genera, reduced to little more than a slightly lobed ring.

The æstivation of the calyx is various, but most frequently open ; the principal exceptions are as follows :—In the genus *Lamprothamnus* and in a species of *Pavetta* the calyx-lobes are imbricated in æstivation ; in the latter case, however, they are occasionally contorted. The æstivation is contorted in the same direction as in the corolla (homotropous) in the genera *Dictyandra*, *Leptactina*, and in two species of the genus *Tarenna* (*T. nitidula*, var. *Afzelii*, and *T. congensis*) ; it is contorted in the reverse direction (heterotropous) in the genus *Amaralia*.

8. Differences in the Inflorescence and Bracts.

There is considerable variation in the inflorescence. The primary division of the tribe Gardenieæ depends upon the nature of the inflorescence, that is to say, whether it is terminal or axillary ; among the former division of the tribe, however, are some genera with the inflorescence terminating in abbreviated, lateral branches. Again, the genera of the tribe Mussandææ are classified on the same principle ; and one genus of this latter tribe is remarkable for having its inflorescence enclosed in one or two campanulate or connate bracts. The tribe Naucleææ is characterized by flowers confluent or collected in compact heads ; and some of the genera of this tribe are mutually distinguished by the presence or absence of paleaceous bracteoles between the several flowers. The structure of the inflorescence also determines to a great extent the classification of the genera of the tribe Psychotriææ ; and involucrate flowers occur in two of the genera of this tribe.

The inflorescence is corymbose in numerous genera ; it is capitate in several, as, for instance, in addition to those already alluded to, *Sabicea*, *Cephaëlis*, *Trichostachys*, *Spermacoe*, *Hypodematum*, *Octodon*, *Richardia*, and *Mitracarpum*, as well as in a section of *Psychotria* and in certain species of other genera ; in *Rutidea* the capitula are arranged in brachiate terminal panicles ; it is spicate in *Hymenodictyon*, *Otomeria*, *Gaillonia*, and in some species of *Bertiera* (in one species of the last genus the spikes are

scorpioid); it is fasciculate or clustered in the axils of the leaves in *Temnopteryx*, *Pentaloncha*, *Morelia*, *Lasianthus*, and other genera; and solitary flowers occur in some species of *Randia*, *Gardenia*, *Psilanthus*, *Anthospermum*, and *Diodia*.

Precocious flowers occur in *Zygoon*, *Feretia*, and occasionally in *Tricalysia*. In many genera the flowers are small and inconspicuous, as in *Oldenlandia*, *Hekistocarpa*, *Pauridiantha*, most species of *Spermacoce*, &c.; but large and handsome flowers occur in *Mussaenda*, *Heinsia*, *Dictyandra*, *Leptactina*, *Randia* (§ *Euclinia*), *Gardenia*, *Oxyanthus*, *Amaralia*, *Ixora*, *Pavetta*, and *Coffea*.

Tetramerous and pentamerous flowers are by far the commonest, but hexamerous flowers are by no means uncommon in certain genera, as, for instance, *Tricalysia* and *Coffea*; octomerous flowers occur in one species of *Randia*, and as many as eleven divisions in the corolla occur in one species of *Gardenia*. The flowers are fragrant in many species, as, for example, in *Gardenia*, *Crossopteryx*, &c.; an opposite condition, in which the flowers have a very disagreeable smell, occurs in *Canthium foetidum*. The colour of the flower is various, and white flowers are not at all rare.

The bracts are involucrate in *Sabicea*, *Stipularia*, and *Cephaelis*; in *Hymenodictyon* they are foliaceous, reticulated, marcescent, and long-stalked, and form a very conspicuous addition to the flowers. The bracteoles are connate at the base and become calyculate in *Tricalysia*, *Polysphæria*, *Lamprothamnus* and *Coffea*; one lobe of the epicalyx often becoming foliaceous in one species of *Tricalysia*. Numerous filiform bracteoles surround the flowers in *Octodon*; and bracteoles are altogether absent from *Galium*. The position of the bracteoles in *Pavetta* is useful in separating this genus from its near ally *Ixora*.

9. Differences in the Leaves and Stipules.

The variation in the foliage is limited by the condition that the leaves are uniformly opposite or verticillate and quite entire; the only exception within the range of our flora that has come under notice is that a barren shoot of *Randia malleifera* (Schweinfurth, no. 1877) had alternate leaves. In the majority of genera the leaves are opposite; in some cases the internode between contiguous pairs of opposite leaves is so abbreviated as to give the appearance of quaternate leaves; examples of this occur in *Argostemma* and in *Vangueria tetraphylla*. Ternate leaves occur rarely in *Sarcocephalus Russegeri* and *Randia*, more frequently in *Gardenia*, and regularly so in *Pavetta ternifolia*. Quaternate leaves

occur in our species of *Adina* and in some species of *Gardenia*; and there are whorls of three to five leaves in the genus *Eadogia*. Leaves, more rounded in figure and smaller in size than the rest of the leaves on the plant, occur at the base of the branches in the genera *Cremaspora* and *Polysphaeria*. A few species, especially in the genus *Psychotria*, have punctate leaves.

The stipules are either persistent or deciduous; they are undivided in the majority of genera, and are often connate at the base, so as to be intrapetiolar; they are geminate in some species of *Mussaenda* and in two out of the three species of *Heinsia*; they are 2-4-cuspidate in some species of *Oldenlandia*, *Psychotria*, and *Anthospermum*, and in *Triainolepis*; they are 2- ∞ -setose in *Virexia setigera*, in *Otomeria*, *Dirichletia*, in some species of *Oldenlandia* and in *Diodia*, *Spermacoce*, *Octodon*, and *Gaillonia*; they are multipartite in *Pentas*, and multifid in *Temnopteryx*. The stipules are glumaceous in *Leptactina senegambica*, *Randia marantha*, and *Macrosphyra*; and they sheathe the stem in *Trichostachys vaginalis*. In the tribe Galieæ either the stipules are to be considered foliaceous and like the leaves, or the leaves are to be regarded as verticillate and the stipules as wanting.

10. Differences in Habit and Stature.

Except the tribe Galieæ, which is but sparingly represented in Tropical Africa, and except also the tribe Spermacocæ, the prevailing habit of Rubiaceæ consists of shrubs, often small, sometimes scandent, and occasionally arborescent. The tribe of Hedyotideæ, however, is made up almost wholly of herbs, though some species of *Pentas* and the genus *Dirichletia* are undershrubs or more or less bushy. Moreover the genera *Temnopteryx*, *Pentaloncha*, and *Geophila* consist of herbs, the last-named genus consisting of small, slender, creeping, rooting plants.

Several genera and species are climbing-shrubs, as *Rutidea*, *Siphomeris*, *Sabicea*, &c., and a few are spinous, as *Uncaria*, *Randia dumetorum*, some species of *Canthium*, and some states of *Gardenia Thunbergia*. *Anthospermum* is heath-like, and *Morelia* sometimes produces aerial roots.

A few species constitute trees, such as the species of *Belonophora*, *Mitragyne*, *Corynanthe*, &c. Dr. Schweinfurth remarks that in Niamniam-land the large, slim-stemmed Rubiaceæ, by their regularity of growth and symmetry of leaf, appear to imitate and, in a measure, supply the absence of arborescent ferns.

Clinging prickles occur only in some species of Galieæ.

ECONOMIC AND SUPERSTITIOUS USES.

Edible fruits are supplied by the genus *Sarcocephalus* and by species of *Vanqueria* and *Oxyanthus*. *Sarcocephalus Russeggeri* produces a gum; and, according to Dr. Schweinfurth, from the wood of the latter plant, which is called "damma," little four-legged stools are made and employed in Niamniam-land on occasions when the augury is consulted.

According to a note of Afzelius, the bark of *Canthium Afzelianum* is employed at Sierra Leone in the case of swelled legs. The bark of *Crossopteryx* is employed as a febrifuge; for an account of the medicinal virtues of this plant, see Winterbottom, 'Account of Sierra Leone,' vol. ii. pp. 45, 46, 243-253 (1803).

In Niamniam-land and Monbuttu-land, and in other interior parts of Africa explored by Schweinfurth, the sap of *Randia mal-leifera*, locally called "blippo," is employed to dye the human body with black marks in stripes or elaborate patterns. A red dye is derived from *Urophyllum rubens* by the natives in the island of Fernando Po; and madder, *Rubia tinctorum*, is cultivated in Abyssinia for economic purposes.

A resinous secretion issues from *Gardenia resiniflua*. The wood of *Mitragyne africana* is good for carving, and in the country of the Niger is used for writing-tablets. The timber is good of *Corynanthe* and *Gardenia Jovis-tonantis*. Lances in Bongo-land are made from *Randia dumetorum*, the wood of which is very hard, so much so that it has been designated by the name of ebony: see the figure given in Petherick's 'Travels in Central Africa,' vol. i. p. 164 (1869). The last-named species and *Morelia* are said to be used as fish-poisons. *Gardenia Thunbergia* forms capital fences, which are sufficient to resist the inroads of elephants, according to Colonel Grant; and a decoction of its root, boiled in *Sorghum* flour, is used by the native doctors at Madi to cure hæmaturia.

The following note with regard to *Gardenia Jovis-tonantis* is taken from Welwitsch, 'Apontamentos,' p. 579 (1859). This little tree enjoys a great reputation among the natives of Angola because it is regarded as a preventive against thunderbolts; and they usually, on this account, put branches of it on the top of their dwellings. The name which the natives give to it is "N-day" or "Unday;" and its wood, which borders a little upon yellow, is of

a very fine grain, very compact, heavy, and of extraordinary strength; and it is perhaps on account of the latter quality that the Negroes attribute to it the preventive virtue referred to. It rarely exceeds 7 or, at the most, 9 feet in height; its trunk, however, comes up to $1\frac{1}{2}$ –2 feet in circumference, offering thus sufficient diameter to render this precious wood useful for all works of turnery, such as in Europe are usually made with box-wood. Dr. Welwitsch further explains that this plant is remarkable for the large number of lobes into which the various parts of the flower are divided; and on this account he proposed the generic name *Decameria*; the specific name *Jovis-tonantis* he selected in allusion to the supposed influence in time of thunder.

Mungo Park, in his 'Travels in the Interior Districts of Africa,' has the following passage:—"On the first attack of a fever, when the patient complains of a cold, he is frequently placed in a sort of vapour-bath. This is done by spreading branches of the *Nauclea orientalis* upon hot wood embers, and laying the patient upon them wrapped up in a large cotton cloth. Water is then sprinkled upon the branches, which, descending to the hot embers, soon covers the patient with a cloud of vapour, in which he is allowed to remain until the embers are almost extinguished. This practice commonly produces a profuse perspiration, and wonderfully relieves the sufferer."

Nauclea orientalis is a name which has been long known to science as an East-Indian plant, but which unfortunately had, even by Mungo Park's time, been employed to designate two different species which now are placed in two different genera, neither of which is *Nauclea*, though both belong to the tribe Naucleæ. It is therefore uncertain what species or genus Mungo Park took his plant to be; but it is nearly certain that he was treating of either *Sarcocephalus esculentus* or *Mitragyne africana*: and inasmuch as I have seen a specimen of the former species collected by Mungo Park and now in the department of botany at the British Museum, and as I have seen no such specimen of the latter species, I conclude that it is most likely that *Sarcocephalus esculentus* afforded the febrifuge spoken of by Mungo Park. The medicinal qualities of this same species are alluded to by T. Winterbottom in his 'Account of the Native Africans in the Neighbourhood of Sierra Leone,' vol. ii. p. 45, under the name of *Nauclea sambucina*.

Coffee * is indigenous, as well as cultivated, in Tropical Africa; *Coffea arabica* is native in Abyssinia, and, according to Welwitsch, in Angola. Colonel Grant (Trans. Linn. Soc. Lond. xxix. p. 87) states that near the Victoria Nyanza lake at Witchroo it grows wild and certainly never introduced; he adds that the inhabitants do not use the berry in decoction, but chew the undeveloped beans to soothe and allay hunger and thirst: he saw it in flower and fruit; but as specimens do not exist in his collection, I think that some little doubt must remain as to the scientific determination of the plant. Other species produce coffee, as *C. liberica* (Liberian coffee), *C. stenophylla* (the highland coffee of Sierra Leone), *C. racemosa*, and others; also *Feretia apodanthera* in Abyssinia, a species of *Tricalysia* in Angola, and *Randia genipæflora* (the wild coffee of Fernando Po) produce fruits which can be used as substitutes for coffee.

NEW SPECIES OF AFRICAN RUBIACEÆ.

The two following species, of which I now add technical characters, are recent additions of material to the Rubiaceæ of Tropical Africa.

PENTAS PARVIFOLIA, *Hiern*, sp. n. Herba suffruticosa puberula ramis sulcato-striatis, foliis lineari-ovalibus vel lanceolatis oppositis vel (ramulis abbreviatis lateralibus efformatis) fasciculato-approximatis, apice vel obtusis vel subacutis vel mucronulatis, basi in petiolum brevem attenuatis, $\frac{1}{2}$ – $\frac{3}{4}$ -pollicaribus, subtus subpallidioribus, margine anguste revolutis, venis lateralibus utrinsecus 3–4 inconspicuis, stipulis e basi brevi truncata 3 2-setoso-cuspidatis, floribus pentameris $\frac{2}{3}$ -pollicaribus subsessilibus in densas pedunculatas vel subsessiles terminales cymas aggregatis, calycis longo lobo ovali-oblongo foliaceo $\frac{1}{6}$ – $\frac{1}{5}$ -pollicari, parvis lobis subulatis, corollæ tubo apice subinfundibulari gracili faucibus barbatis, antheris inclusis, stylo exserto gracili apice bilobo, fructibus $\frac{1}{6}$ -pollicaribus.

Habitat in insula "Mombassa" dicta ad Africæ oram Zanguebaricam; specimina a cl. J. M. Hildebrandt, no. 1994, mense Martio, anni 1876, lecta et in herbario Musei Britannici a me visa. (*Vide* Tab. VII.)

This differs from all previously known species of *Pentas* by the narrow shape and small size of the leaves.

* For further remarks on this subject, see my paper "On the African Species of the Genus *Coffea*, Linn.," Trans. Linn. Soc. Bot. (ser. 2), vol. i. pp. 169–176.

TRICHOSTACHYS VAGINALIS, *Hiern*, sp. n. *T. reptans*, caulis apice vel ramulis pubentibus, foliis ovalibus apice cuspidato-acuminatis basi obtuse angustatis petiolatis utrinque pilis crispis sparsis subtus subpallidioribus $3\frac{1}{2}$ –4 pollices longis 2–2 $\frac{1}{4}$ pollices latis, venis lateralibus utrinsecus 7–8 gracilibus, petiolo pubente $\frac{2}{3}$ – $\frac{3}{4}$ poll., stipulis $\frac{1}{2}$ – $\frac{2}{3}$ poll. bifidis, inferne connato-vaginantibus apice caudato-acuminatis extus pubentibus, floribus albidis pentameris $\frac{3}{8}$ poll. subsessilibus in capitula hemisphærica pollicaria dense aggregatis, pedunculo communi pollicari stipulaceo-bracteatis, bracteolis inter flores linearibus ciliatis calyces subæquantibus, calyce $\frac{1}{4}$ poll. limbo profunde lobato pubente lobis lineari-lanceolatis $\frac{1}{8}$ – $\frac{1}{6}$ poll., corollæ tubo cylindrico faucibus dense barbatis lobis patentibus $\frac{1}{8}$ poll. apice mucronato-cornutis, antheris exsertis glabris lineari-oblongis filamenta subæquantibus, disco globoso elevato.

Habitat in Guinea ad Mopanga (Cameroons): legit Kalbreyer, n. 153, alt. 2600 ped., die 30 mensis Martii anni 1877.

Herba 8–12-pollicaris in fruticum umbra crescens. (*Vide* Tab. VIII.)

TABULAR VIEW OF TROPICAL AFRICAN RUBIACEÆ.

The subjoined is a systematic list of the tribes, genera, and species of Rubiaceæ in Tropical Africa, with the distribution of the species in the six districts into which the geographical region is divided, and with the geographical range of the species which extend beyond.

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
Tribe I. Naucleææ.							
1. SARCOCEPHALUS, <i>Afz.</i>							
1. <i>S. esculentus</i> , <i>Afz.</i>	*						
2. <i>S. Russeggeri</i> , <i>Ky.</i>		*	*				
2. ADINA, <i>Salisb.</i>							
1. <i>A. microcephala</i> , <i>Hn.</i>			*				
3. MITRAGYNE, <i>Korth.</i>							
1. <i>M. africana</i> , <i>Korth.</i>	*		*				
2. <i>M. macrophylla</i> , <i>Hn.</i>	*		*	*			
4. UNCARIA, <i>Schreb.</i>							
1. <i>U. africana</i> , <i>G. Don</i>	*	*					? Comoro Islands.
Tribe II. Cinchonææ.							
5. HYMENODICTYON, <i>Wall.</i>							
1. <i>H. Kurria</i> , <i>Hochst.</i>			*	*			
2. <i>H. biafranum</i> , <i>Hn.</i>	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
6. <i>CORYNANTHE</i> , <i>Welw.</i>							
1. <i>C. paniculata</i> , <i>Welw.</i> ...				*			
7. <i>CROSSOPTERYX</i> , <i>Fenzl.</i>							
1. <i>C. Kotschyana</i> , <i>Fenzl.</i> ...	*		*	*		*	
Tribe III. Hedyotideæ.							
8. <i>ARGOSTEMMA</i> , <i>Wall.</i>							
1. <i>A. pumilum</i> , <i>Benn.</i>	*						? Nipal, North-west Hima-
9. <i>PENTAS</i> , <i>Bth.</i>							layas, to Burmah, and
1. <i>P. Schimperiana</i> , <i>Vatke.</i>			*				mountains of the Deccan
2. <i>P. occidentalis</i> , <i>B. et H.f.</i> ..	*						peninsula of India.
3. <i>P. carnea</i> , <i>Bth.</i>			*	*		*	Tropical Arabia and Comoro
4. <i>P. purpurea</i> , <i>Oliv.</i>			*			*	Islands.
5. <i>P. arvensis</i> , <i>Hn.</i>			*				
6. <i>P. parviflora</i> , <i>Bth.</i>	*						
10. <i>VIRECTA</i> , <i>Afz.</i>							
1. <i>V. multiflora</i> , <i>Sm.</i>	*			??			
2. <i>V. procumbens</i> , <i>Sm.</i>	*			*			
3. <i>V. angustifolia</i> , <i>Hn.</i>	*						
4. <i>V. setigera</i> , <i>Hn.</i>	*						
11. <i>OTOMERIA</i> , <i>Bth.</i>							
1. <i>O. guineensis</i> , <i>Bth.</i>	*						
2. <i>O. madiensis</i> , <i>Oliv.</i>		*	*				
3. <i>O. dilatata</i> , <i>Hn.</i>	*						
4. <i>O. lanceolata</i> , <i>Hn.</i>				*			
12. <i>DIRICHLETIA</i> , <i>Kl.</i>							
1. <i>D. pubescens</i> , <i>Kl.</i>						*	
2. <i>D. glabra</i> , <i>Kl.</i>						*	
3. <i>D. glaucescens</i> , <i>Hn.</i>			*				
13. <i>OLDENLANDIA</i> , <i>Plum.</i>							
1. <i>O. peltospermum</i> , <i>Hn.</i>	*						
2. <i>O. Bojeri</i> , <i>Hn.</i>					*	*	Madagascar and Comoro
3. <i>O. globosa</i> , <i>Hn.</i>			*				Islands.
4. <i>O. decumbens</i> , <i>Hn.</i>	*			*		*	Natal and Madagascar.
5. <i>O. lasiocarpa</i> , <i>Hn.</i>						*	
6. <i>O. rigida</i> , <i>Hn.</i>				*			
7. <i>O. Schimper</i> , <i>T. And.</i>			*				Upper Egypt, Arabia, Sinai,
8. <i>O. obtusiloba</i> , <i>Hn.</i>						*	Beloochistan, and Scinde.
9. <i>O. senegalensis</i> , <i>Hn.</i>	*		*				
10. <i>O. noctiflora</i> , <i>Hn.</i>			*				
11. <i>O. grandiflora</i> , <i>Hn.</i>	*		*				
12. <i>O. abyssinica</i> , <i>Hn.</i>	*		*				
13. <i>O. strumosa</i> , <i>Hn.</i>			*				Cape de Verde, India and
14. <i>O. caffra</i> , <i>E. et Z.</i>				*		*	? East India.
15. <i>O. virgata</i> , <i>DC.?</i>	*					*	Cape districts and Natal,
16. <i>O. effusa</i> , <i>Oliv.</i>	*				*	*	also ? Madagascar.
17. <i>O. Heynei</i> , <i>Miq.</i>	*		*				India, Natal, and ? Mada-
18. <i>O. parviflora</i> , <i>Oliv.</i>	*		*				gascar.
19. <i>O. flosculosa</i> , <i>Hn.</i>						*	
20. <i>O. monanthos</i> , <i>Hn.</i>			*				
21. <i>O. cæspitosa</i> , <i>Hn.</i>	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
13. OLDENLANDIA (<i>continued</i>).							
22. <i>O. tenuissima</i> , <i>Hn.</i>					*		
23. <i>O. lancifolia</i> , <i>Schw.</i>	*	*	*				
24. <i>O. corymbosa</i> , <i>L.</i>	*		*	*		*	A common Tropical weed.
25. <i>O. capensis</i> , <i>L. f.</i>	*		*			*	Cape flora and Madagasc-
							car, Syria.
26. <i>O. trinervia</i> , <i>Retz.</i>	*		*			*	India, Madagascar, Mauri-
							tius, &c.
27. <i>O. macrophylla</i> , <i>DC.</i> ...	*		*	*		*	Natal, Seychelles, and Co-
							mor Islands.
28. <i>O. wauensis</i> , <i>Hn.</i>			*				
29. <i>O. hedyotoides</i> , <i>Boiss.</i>			*				Upper Egypt and Armenia.
14. HEKISTOCARPA, <i>Hk. f.</i>							
1. <i>H. minutiflora</i> , <i>Hk. f.</i> ...	*						
Tribe IV. Mussændeæ.							
15. MUSSENDA, <i>Ray.</i>							
1. <i>M. Afzelii</i> , <i>G. Don</i>	*			*			
2. <i>M. Isertiana</i> , <i>DC.</i>	*						
3. <i>M. polita</i> , <i>Hn.</i>	*						
4. <i>M. stenocarpa</i> , <i>Hn.</i>		*					
5. <i>M. arcuata</i> , <i>Poir.</i>	*		*	*		*	Mauritius and Madagascar.
6. <i>M. tenuiflora</i> , <i>Bth.</i>	*						
7. <i>M. erythrophylla</i> , <i>S. et T.</i>	*	*	*	*			
8. <i>M. elegans</i> , <i>S. et T.</i>	*	*		*			
9. <i>M. ? heinsoides</i> , <i>Hn.</i>				*			
10. <i>M. ? platyphylla</i> , <i>Hn.</i>		*					
11. <i>M. grandiflora</i> , <i>Bth.</i>	*						
12. <i>M. luteola</i> , <i>Del.</i>			*				
16. PAURIDIANTHA, <i>Hk. f.</i>							
1. <i>P. canthiifolia</i> , <i>Hk. f.</i> ...	*						
17. UROPHYLLUM, <i>Wall.</i>							
1. <i>U. hirtellum</i> , <i>Bth.</i>	*						
2. <i>U. callicarpoides</i> , <i>Hn.</i> ...	*						
3. <i>U. insulare</i> , <i>Hn.</i>	*						
4. <i>U. rubens</i> , <i>Bth.</i>	*						
5. <i>U. Afzelii</i> , <i>Hn.</i>	*						
6. <i>U. paucinerve</i> , <i>Hn.</i>	*						
7. <i>U. micranthum</i> , <i>Hn.</i> ...	*						
8. <i>U. viridiflorum</i> , <i>Schw.</i>		*					
18. SABICEA, <i>Aubl.</i>							
1. <i>S. ferruginea</i> , <i>Bth.</i>	*						
2. <i>S. calycina</i> , <i>Bth.</i>	*						
3. <i>S. pilosa</i> , <i>Hn.</i>	*						
4. <i>S. Vogelii</i> , <i>Bth.</i>	*						
5. <i>S. capitellata</i> , <i>Bth.</i>	*			*			
6. <i>S. venosa</i> , <i>Bth.</i>	*						
7. <i>S. ? segregata</i> , <i>Hn.</i>	*						
8. <i>S. ? cauliflora</i> , <i>Hn.</i>	*						
9. <i>S. ? geantha</i> , <i>Hn.</i>	*						
19. TEMNOPTERYX, <i>Hk. f.</i>							
1. <i>T. sericea</i> , <i>Hk. f.</i>	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
20. PENTALONCHA, <i>Hk. f.</i>							
1. <i>P. humilis, Hk. f.</i>	*						
21. STIPULARIA, <i>Beauv.</i>							
1. <i>S. africana, Beauv.</i>	*						
2. <i>S. elliptica, Schwf.</i>	*		*				
3. <i>S. gabonica, Hn.</i>	*						
Tribe V. Hamelieæ.							
22. HEINSIA, <i>DC.</i>							
1. <i>H. jasminiflora, DC.</i> ...	*			*		*	
2. <i>H. densiflora, Hn.</i>						*	
3. <i>H. benguelensis, Welw.</i>				*			
23. BERTIERA, <i>Aubl.</i>							
1. <i>B. æthiopica, Hn.</i>			*				
2. <i>B. subsessilis, Hn.</i>	*						
3. <i>B. montana, Hn.</i>	*						
4. <i>B. africana, A. Rich.</i> ...	*						
5. <i>B. macrocarpa, Bth.</i> ...	*						
6. <i>B. bracteolata, Hn.</i>	*						
7. <i>B. laxa, Bth.</i>	*			*?			
8. <i>B. breviflora, Hn.</i>	*						
Tribe VI. Gardenieæ.							
24. DICTYANDRA, <i>Welw.</i>							
1. <i>D. arborescens, Welw.</i>	*			*			
2. <i>D. involucrata, Hn.</i>	*						
25. LEPTACTINA, <i>Hk. f.</i>							
1. <i>L. Mannii, Hk. f.</i>	*						
2. <i>L. densiflora, Hk. f.</i> ...	*						
3. <i>L. senegambica, Hk. f.</i>	*						
4. <i>L. heinsioides, Hn.</i>					*		
26. TARENNA, <i>Gærtn.</i>							
1. <i>T. angolensis, Hn.</i>				*			
2. <i>T. mossambicensis, Hn.</i>						*	
3. <i>T. nilotica, Hn.</i>			*				
4. <i>T. conferta, Hn.</i>	*						
5. <i>T. nitidula, Hn.</i>	*						
6. <i>T. congensis, Hn.</i>				*			
7. <i>T. pallidula, Hn.</i>	*						
8. <i>T. tetramera, Hn.</i>	*						
9. <i>T. grandiflora, Hn.</i>	*						
10. <i>T. nigrescens, Hn.</i>						*	
27. ENTEROSPERMUM, <i>Hn.</i>							
1. <i>E. littorale, Hn.</i>						*	? Inhambane.
28. RANDIA, <i>Houst.</i>							
1. <i>R. dumetorum, Lam.</i>			*			*	East Indies and Hongkong.
2. <i>R. acuminata, Bth.</i>	*	*					
3. <i>R. genipæflora, DC.</i>	*						
4. <i>R. rubens, Hn.</i>	*						
5. <i>R. pallens, Hn.</i>	*						
6. <i>R. gambica, Hn.</i>	*						
7. <i>R. ? caudata, Hn.</i>	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
28. <i>RANDIA</i> (<i>continued</i> .)							
8. <i>R. maculata</i> , <i>DC.</i>	*	*					
9. <i>R. macrantha</i> , <i>DC.</i>	*						
10. <i>R. macrocarpa</i> , <i>Hn.</i>	*						
11. <i>R. malleifera</i> , <i>B. et H. f.</i>	*	*	*	*			
12. <i>R. octomera</i> , <i>B. et H. f.</i>	*						
13. <i>R. Munsæ</i> , <i>Schw.</i>		*					
29. <i>GARDENIA</i> , <i>Ellis.</i>							
1. <i>G. Thunbergia</i> , <i>L. f.</i> ...	*	*	*	*	*	*	South of the tropic.
2. <i>G. Jovis-tonantis</i> , <i>Hn.</i>				*			
3. <i>G. resiniflua</i> , <i>Hn.</i>						*	
4. <i>G. assimilis</i> , <i>Afz.</i>	*						
5. <i>G. nitida</i> , <i>Hk.</i>	*						
6. <i>G. Vogelii</i> , <i>Hk. f.</i>	*		*	*			
7. <i>G. Manganjæ</i> , <i>Hn.</i>						*	Seychelles Islands.
8. <i>G. Annæ</i> , <i>P. Wr.</i>						*	
9. <i>G. Abbeokutæ</i> , <i>Hn.</i>	*						
10. <i>G. konguensis</i> , <i>Hn.</i>	*						
11. <i>G. urcelliformis</i> , <i>Hn.</i>			*				
12. <i>G. fernandensis</i> , <i>Hn.</i>	*						
13. <i>G. ? zanguebarica</i> , <i>Hn.</i>						*	
30. <i>MACROSPHYRA</i> , <i>Hk. f.</i>							
1. <i>M. longistyla</i> , <i>Hk. f.</i> ...	*		*				
31. <i>OXYANTHUS</i> , <i>DC.</i>							
1. <i>O. ? Smithii</i> , <i>Hn.</i>				*			
2. <i>O. tubiflorus</i> , <i>DC.</i>	*						
3. <i>O. ? sulcatus</i> , <i>Hn.</i>	*						
4. <i>O. rubriflorus</i> , <i>Hn.</i>	*						
5. <i>O. speciosus</i> , <i>DC.</i>	*						
6. <i>O. querimbensis</i> , <i>Kl.</i>						*	
7. <i>O. formosus</i> , <i>Hk. f.</i>	*						
8. <i>O. breviflorus</i> , <i>Bth.</i>	*						
9. <i>O. gracilis</i> , <i>Hn.</i>	*						
10. <i>O. ? platystylis</i> , <i>Hn.</i>	*						
11. <i>O. unilocularis</i> , <i>Hn.</i>	*						
12. <i>O. macrophyllus</i> , <i>Schw.</i>			*				
32. <i>MITRIOSTIGMA</i> , <i>Hochst.</i>							
1. <i>M. ? subpunctatum</i> , <i>Hn.</i>	*						
2. <i>M. Barteri</i> , <i>Hk. f.</i>	*						
33. <i>AMARALIA</i> , <i>Welw.</i>							
1. <i>A. bigoniaeflora</i> , <i>Welw.</i> ...	*	*	*	*			
34. <i>MORELIA</i> , <i>A. Rich.</i>							
1. <i>M. senegalensis</i> , <i>A. Rich.</i>	*		*				
35. <i>ZYGOON</i> , <i>Hn.</i>							
1. <i>Z. graveolens</i> , <i>Hn.</i>						*	
36. <i>GALINIERA</i> , <i>Del.</i>							
1. <i>G. coffeoides</i> , <i>Del.</i>			*				
37. <i>EMPOGONA</i> , <i>Hk. f.</i>							
1. <i>E. Kirkii</i> , <i>Hk. f.</i>						*	
38. <i>FERETIA</i> , <i>Del.</i>							
1. <i>F. apodanthera</i> , <i>Del.</i>			*				
2. <i>F. ? canthioides</i> , <i>Hn.</i> ...	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
39. <i>POUCHETIA</i> , <i>A. Rich.</i>							
1. <i>P. africana</i> , <i>DC.</i>	*			*			
2. <i>P. parviflora</i> , <i>Bth.</i>	*						
40. <i>TRICALYSIA</i> , <i>A. Rich.</i>							
1. <i>T. Sonderiana</i> , <i>Hn.</i>						*	Natal.
2. <i>T. ovalifolia</i> , <i>Hn.</i>						*	
3. <i>T. buxifolia</i> , <i>Hn.</i>				*			
4. <i>T. syrmanthera</i> , <i>Hn.</i>	*						
5. <i>T. bracteata</i> , <i>Hn.</i>	*						
6. <i>T. congesta</i> , <i>Hn.</i>					*		
7. <i>T. coriacea</i> , <i>Hn.</i>	*			*			
8. <i>T. Nyassæ</i> , <i>Hn.</i>						*	
9. <i>T. reticulata</i> , <i>Hn.</i>	*			*			
10. <i>T. pallens</i> , <i>Hn.</i>	*						
11. <i>T. gabonica</i> , <i>Hn.</i>	*						
12. <i>T. okelensis</i> , <i>Hn.</i>			*				
13. <i>T. biafrana</i> , <i>Hn.</i>	*						
14. <i>T. micrantha</i> , <i>Hn.</i>	*						
15. <i>T. microphylla</i> , <i>Hn.</i>						*	
16. <i>T. niamniamensis</i> , <i>Schf.</i>			*	* ?			
17. <i>T. djurensis</i> , <i>Schw.f. &c.</i>			*				
18. <i>T. jasminiflora</i> , <i>B. et H.f.</i>						*	
19. <i>T. crassifolia</i> , <i>B. et H.f.</i>						*	
20. <i>T. Kirkii</i> , <i>Hn.</i>						*	
21. <i>T. angolensis</i> , <i>A. Rich.</i>				*			
Tribe VII. Guettardeæ.							
41. <i>GUETTARDA</i> , <i>Osb.</i>							
1. <i>G. speciosa</i> , <i>L.</i>						*	Madagascar, Seychelles, and Comoro Islands; also East Indies to the Pacific Islands and Australia.
Tribe VIII. Alberteæ.							
42. <i>CREMASPORA</i> , <i>Bth.</i>							
1. <i>C. africana</i> , <i>Bth.</i>	*	*	*			*	
2. <i>C. ? Thomsoni</i> , <i>Hn.</i>	*						
43. <i>POLYSPLERIA</i> , <i>Hk.f.</i>							
1. <i>P. multiflora</i> , <i>Hn.</i>						*	
2. <i>P. lanceolata</i> , <i>Hn.</i>						*	
3. <i>P. parvifolia</i> , <i>Hn.</i>						*	
4. <i>P. Schweinfurthii</i> , <i>Hn.</i>			*			??	
44. <i>BELONOPHORA</i> , <i>Hk.f.</i>							
1. <i>B. coffeoides</i> , <i>Hk.f.</i> ...	*						
45. <i>AULACOCALYX</i> , <i>Hk.f.</i>							
1. <i>A. jasminiflora</i> , <i>Hk.f.</i> ...	*						
46. <i>LAMPROTHAMNUS</i> , <i>Hn.</i>							
1. <i>L. zanguebaricus</i> , <i>Hn.</i>						*	
47. <i>RHABDOSTIGMA</i> , <i>Hk.f.</i>							
1. <i>R. Kirkii</i> , <i>Hk.f.</i>						*	
Tribe IX. Vanguerieæ.							
48. <i>PENTANISIA</i> , <i>Harv.</i>							
1. <i>P. Schweinfurthii</i> , <i>Hn.</i>			*				

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
49. <i>CANTHIUM, Lam.</i>							
1. <i>C. glaucum, Hn.</i>			*			*	
2. <i>C. Thonningii, Bth.</i> ...	*						
3. <i>C. setiflorum, Hn.</i>						*	
4. <i>C. nitens, Hn.</i>	*						
5. <i>C. neglectum, Hn.</i>			*				
6. <i>C. Schimperianum, A. Rh.</i>			*				
7. <i>C. Vatkeanum, Hn.</i>			*				
8. <i>C. anomocarpum, DC.</i>	*						
9. <i>C. acutiflorum, Hn.</i>	*						
10. <i>C. caudatiflorum, Hn.</i>	*						
11. <i>C. horizontale, Hn.</i>	*						
12. <i>C. discolor, Bth.</i>	*						
13. <i>C. oligocarpum, Hn.</i>			*				
14. <i>C. zanzibaricum, Kl.</i>			*			*	
15. <i>C. gracile, Hn.</i>				*			
16. <i>C. Heudelotii, Hn.</i>	*						
17. <i>C. polycarpum, Schwf.</i>			*				
18. <i>C. glabriflorum, Hn.</i> ...	*						
19. <i>C. Cornelia, Ch. et Schl.</i>	*						
20. <i>C. hispidum, Bth.</i>	*			*			
21. <i>C. setosum, Hn.</i>	*						
22. <i>C. subcordatum, DC.</i> ...	*						
23. <i>C. congense, Hn.</i>				*			
24. <i>C. rubens, Hn.</i>	*						
25. <i>C. fœtidum, Hn.</i>					* ?		
26. <i>C. Afzelianum, Hn.</i>	*						
27. <i>C. Barteri, Hn.</i>	*						
28. <i>C. nervosum, Hn.</i>	*						
29. <i>C. Mannii, Hn.</i>	*						
30. <i>C. lividum, Hn.</i>						*	
31. <i>C. venosum, Hn.</i>	*		*				
32. <i>C. ? multiflorum, Hn.</i> ...	*						
33. <i>C. bibracteatum, Hn.</i> ...						*	
34. <i>C. crassum, Hn.</i>			*				Madagascar, Sevechelles, and Comoro Islands.
35. <i>C. vangeroides, Hn.</i> ...	*						
36. <i>C. lanciflorum, Hn.</i>					*		
50. <i>VANGUERIA, Comm.</i>							
1. <i>V. infausta, Burch.</i> ...						*	} South of the tropic, Madagascar.
2. <i>V. edulis, Vahl</i>	*		*		* ?		
3. <i>V. abyssinica, A. Rich.</i>			*				
4. <i>V. senegalensis, B. et H. f.</i>	*						
5. <i>V. canthioides, Bth.</i> ...	*						
6. <i>V. euonymoides, Schwf.</i>	*		*	*			
7. <i>V. umbellulata, Hn.</i> ...	*						
8. <i>V. concolor, Hn.</i>	*			* ?			
9. <i>V. membranacea, Hn.</i>	*						
10. <i>V. velutina, Hn.</i>					*	*	
11. <i>V. pauciflora, Schwf.</i> ...			*				
12. <i>V. tetraphylla, Schwf.</i>			*				
51. <i>FADOGIA, Schwf.</i>							
1. <i>F. leucophlœa, Hn.</i>			*				
2. <i>F. Zeyheri, Sond.</i>					* ?		Transvaal.

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
51. FADOGIA (<i>continued</i>).							
3. <i>F. agrestis</i> , Schwf.	*		*				
4. <i>F. Cienkowskii</i> , Schwf.	*	*	*	*			
5. <i>F. glaberrima</i> , Schwf.			*				
6. <i>F. stenophylla</i> , Welw.				*			
7. <i>F. fuchsoides</i> , Welw.			*	*			
8. <i>F. ancylantha</i> , Schwf.			*				
9. <i>F. lactiflora</i> , Welw.				*			
52. CUVIERA, DC.							
1. <i>C. acutiflora</i> , DC.	*						
2. <i>C. subuliflora</i> , Bth.	*						
3. <i>C. longiflora</i> , Hn.	*						
4. <i>C. trilocularis</i> , Hn.	*						
53. ANCYLANTHOS, Desf.							
1. <i>A. rubiginosa</i> , Desf.				*			
2. <i>A. fulgidus</i> , Welw.				*			
3. <i>A. cinerascens</i> , Welw.				*			
4. <i>A. cistifolius</i> , Welw.				*			
5. <i>A. Bainesii</i> , Hn.					* ?		
54. CRATERISPERMUM, Bth.							
1. <i>C. laurinum</i> , Bth.	*						
2. <i>C. cerinanthum</i> , Hn.	*						
3. <i>C. brachynematum</i> , Hn.	*						
4. <i>C. Schweinfurthii</i> , Hn.			*				
5. <i>C. montanum</i> , Hn.	*						
Tribe X. IXOREÆ.							
55. IXORA, L.							
1. <i>I. radiata</i> , Hn.	*		*				
2. <i>I. odorata</i> , Hk.						*	Madagascar.
3. <i>I. laxiflora</i> , Sm.	*						
4. <i>I. Thomsoni</i> , Hn.	*						
5. <i>I. riparia</i> , Hn.	*						
6. <i>I. breviflora</i> , Hn.	*						
7. <i>I. brachysiphon</i> , Hn.	*						
8. <i>I. guineensis</i> , Bth.	*						
9. <i>I. foliosa</i> , Hn.	*						
10. <i>I. Soyauxii</i> , Hn.				*			
11. <i>I. inundata</i> , Hn.	*						
12. <i>I. minutiflora</i> , Hn.	*						
13. <i>I. modesta</i> , Hn.	*						
56. PAVETTA, L.							
1. <i>P. brachycalyx</i> , Hn.	*						
2. <i>P. Mannii</i> , Hn.	*						
3. <i>P. monticola</i> , Hn.	*						
4. <i>P. bidentata</i> , Hn.	*						
5. <i>P. owariensis</i> , Beauv.	*						
6. <i>P. glaucescens</i> , Hn.	*						
7. <i>P. puberula</i> , Hn.	*						
8. <i>P. crebrifolia</i> , Hn.						*	
9. <i>P. macrosepala</i> , Hn.						*	

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
56. <i>PAVETTA</i> (<i>continued</i>).							
10. <i>P. neurocarpa</i> , <i>Bth.</i> ...	*						
11. <i>P. subcana</i> , <i>Hn.</i>			*				
12. <i>P. gracilis</i> , <i>Kl.</i>						*	
13. <i>P. abyssinica</i> , <i>Fres.</i>			*				
14. <i>P. Oliveriana</i> , <i>Hn.</i>			*				
15. <i>P. mollis</i> , <i>Afz.</i>	*						
16. <i>P. dolichosepala</i> , <i>Hn.</i>				*			
17. <i>P. hispida</i> , <i>Hn.</i>	*						
18. <i>P. genipæfolia</i> , <i>Schum.</i> ..	*						
19. <i>P. Baconia</i> , <i>Hn.</i>	*		*	*			
20. <i>P. Hookeriana</i> , <i>Hn.</i>	*						
21. <i>P. ternifolia</i> , <i>Hn.</i>			*				
22. <i>P. gardiniaefolia</i> , <i>Hochst.</i> ..			*				
23. <i>P. canescens</i> , <i>DC.</i>				*			
24. <i>P. rigida</i> , <i>Hn.</i>	*						
25. <i>P. gracilipes</i> , <i>Hn.</i>	*						
57. <i>COFFEA</i> .							
1. <i>C. arabica</i> , <i>L.</i>	*		*	*		*	? Arabia.
2. <i>C. liberica</i> , <i>Bull.</i>	*			*			
3. <i>C. stenophylla</i> , <i>G. Don</i> ..	*						
4. <i>C. Zanguebariæ</i> , <i>Lour.</i> ..						*	
5. <i>C. brevipes</i> , <i>Hn.</i>	*						
6. <i>C. melanocarpa</i> , <i>Welw.</i> ..				*			
7. <i>C. hypoglaucia</i> , <i>Welw.</i> ..				*			
8. <i>C. ? microcarpa</i> , <i>DC.</i> ...	*						
9. <i>C. Afzelii</i> , <i>Hn.</i>	*						
10. <i>C. subcordata</i> , <i>Hn.</i>	*						
11. <i>C. rupestris</i> , <i>Hn.</i>	*						
12. <i>C. jasminioides</i> , <i>Welw.</i> ..	*			*			
13. <i>C. racemosa</i> , <i>Lour.</i>						*	
58. <i>PSILANTHUS</i> , <i>Hk. f.</i>							
1. <i>P. Mannii</i> , <i>Hk. f.</i>	*						
2. <i>P. ? ebracteolatus</i> , <i>Hn.</i> ...	*						
3. <i>P. ? tetramerus</i> , <i>Hn.</i> ...	*						
59. <i>RUTIDEA</i> , <i>DC.</i>							
1. <i>R. rufipilis</i> , <i>Hn.</i>	*						
2. <i>R. parviflora</i> , <i>DC.</i>	*						
3. <i>R. olenotricha</i> , <i>Hn.</i>	*	*					
4. <i>R. ferruginea</i> , <i>Hn.</i>	*						
5. <i>R. hispida</i> , <i>Hn.</i>	*						
6. <i>R. Smithii</i> , <i>Hn.</i>				*			
7. <i>R. decorticata</i> , <i>Hn.</i>	*						
8. <i>R. membranacea</i> , <i>Hn.</i> ...	*						
9. <i>R. glabra</i> , <i>Hn.</i>	*						
10. <i>R. fuscescens</i> , <i>Hn.</i>						*	
Tribe XI. <i>Morindeæ</i> .							
60. <i>MORINDA</i> , <i>Vaill.</i>							
1. <i>M. citrifolia</i> , <i>L.</i>	*	*		*			Old-World Tropics.
2. <i>M. longiflora</i> , <i>G. Don</i> ...	*	*	*	*			

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
Tribe XII. Psychotrieæ.							
61. PSYCHOTRIA, <i>L.</i>							
1. <i>P. pauciflora</i> , <i>Hn.</i> ...	*						
2. <i>P. brachyantha</i> , <i>Hn.</i> ...	*						
3. <i>P. setacea</i> , <i>Hn.</i> ...	*						
4. <i>P. Mannii</i> , <i>Hn.</i> ...	*						
5. <i>P. foliosa</i> , <i>Hn.</i> ...	*						
6. <i>P. lophoclada</i> , <i>Hn.</i> ...	*						
7. <i>P. cornuta</i> , <i>Hn.</i> ...	*						
8. <i>P. humilis</i> , <i>Hn.</i> ...	*						
9. <i>P. bifaria</i> , <i>Hn.</i> ...	*						
10. <i>P. umbellata</i> , <i>Thonn.</i> ...	*						
11. <i>P. monticola</i> , <i>Hn.</i> ...	*						
12. <i>P. calva</i> , <i>Hn.</i> ...	*						
13. <i>P. leptophylla</i> , <i>Hn.</i> ...	*						
14. <i>P. Domiana</i> , <i>Bth.</i> ...	*						
15. <i>P. konguensis</i> , <i>Hn.</i> ...	*						
16. <i>P. subpunctata</i> , <i>Hn.</i> ...	*						
17. <i>P. brunnea</i> , <i>Schw.</i> ...		*					
18. <i>P. longevaginalis</i> , <i>Schw.</i> ...		*					
19. <i>P. gabonica</i> , <i>Hn.</i> ...	*						
20. <i>P. arborea</i> , <i>Hn.</i> ...	*						
21. <i>P. sciadephora</i> , <i>Hn.</i> ...	*						
22. <i>P. punctata</i> , <i>Vatke</i> ...						*	
23. <i>P. obtusifolia</i> , <i>Poir.</i> ...						*	Madagascar.
24. <i>P. zambesiana</i> , <i>Hn.</i> ...						*	
25. <i>P. Kolly</i> , <i>Schum.</i> ...	*						
26. <i>P. Benthamiana</i> , <i>Hn.</i> ...	*						
27. <i>P. owariensis</i> , <i>Juss.</i> ...	*						
28. <i>P. Brassii</i> , <i>Hn.</i> ...	*						
29. <i>P. Afzelii</i> , <i>Hn.</i> ...	*						
30. <i>P. cristata</i> , <i>Hn.</i> ...		*	*				
31. <i>P. abrupta</i> , <i>Hn.</i> ...						*	
32. <i>P. anetoclada</i> , <i>Hn.</i> ...	*						
33. <i>P. Kirkii</i> , <i>Hn.</i> ...						*	
34. <i>P. recurva</i> , <i>Hn.</i> ...	*						
35. <i>P. subobliqua</i> , <i>Hn.</i> ...	*						
36. <i>P. pumila</i> , <i>Hn.</i> ...						*	
37. <i>P. nigropunctata</i> , <i>Hn.</i> ...				*			
38. <i>P. bracteosa</i> , <i>Hn.</i> ...	*						
39. <i>P. globosa</i> , <i>Hn.</i> ...	*						
40. <i>P. insidens</i> , <i>Hn.</i> ...	*						
41. <i>P. subherbacea</i> , <i>Hn.</i> ...	*						
42. <i>P. infundibularis</i> , <i>Hn.</i> ...	*						
43. <i>P. subnuda</i> , <i>Hn.</i> ...	*						
44. <i>P. longistylis</i> , <i>Hn.</i> ...	*						
45. <i>P. bidentata</i> , <i>Hn.</i> ...	*						
46. <i>P. Vogeliana</i> , <i>Bth.</i> ...	*						
47. <i>P. latistipula</i> , <i>Bth.</i> ...	*						
48. <i>P. Schweinfurthii</i> , <i>Hn.</i> ...			*				
49. <i>P. lucens</i> , <i>Hn.</i> ...	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
61. PSYCHOTRIA (<i>continued</i>).							
50. <i>P. reptans</i> , <i>Bth.</i>	*						
51. <i>P. mucronata</i> , <i>Hn.</i>			*				
52. <i>P. stictophylla</i> , <i>Hn.</i>	*						
53. <i>P. obscura</i> , <i>Bth.</i>	*						
54. <i>P. crispa</i> , <i>Hn.</i>	*						
55. <i>P. trachystyla</i> , <i>Hn.</i>	*						
56. <i>P. Soyauxii</i> , <i>Hn.</i>				*			
57. <i>P. virens</i> , <i>Hn.</i>	*						
58. <i>P. Ansellii</i> , <i>Hn.</i>	*						
59. <i>P. zanguebarica</i> , <i>Hn.</i>						*	
60. <i>P. umbraticola</i> , <i>Hn.</i>						*	
61. <i>P. nubica</i> , <i>Del.</i>			*				
62. GRUMILEA, <i>Gærtn.</i>							
1. <i>G. psychotrioides</i> , <i>DC.</i> ..	*						
2. <i>G. succulenta</i> , <i>Hn.</i>			*				
3. <i>G. Kirkii</i> , <i>Hn.</i>						*	
4. <i>G. macrocarpa</i> , <i>Hn.</i>	*						
5. <i>G. venosa</i> , <i>Hn.</i>	*						
6. <i>G. micrantha</i> , <i>Hn.</i>	*						
7. <i>G. sphærocarpa</i> , <i>Hn.</i>	*						
8. <i>G. articulata</i> , <i>Hn.</i>	*						
9. <i>G. sulphurea</i> , <i>Hn.</i>			*				
63. TRIAINOLEPIS, <i>Hk. f.</i>							
1. <i>T. africana</i> , <i>Hk. f.</i>						*	
2. <i>T. Hildebrandtii</i> , <i>Vatke</i>						*	Madagascar.
64. GEOPHILA, <i>D. Don.</i>							
1. <i>G. reniformis</i> , (?) <i>D. Don</i> ..	*						? America and India.
2. <i>G. hirsuta</i> , <i>Bth.</i>	*						
3. <i>G. lancistipula</i> , <i>Hn.</i>	*						
4. <i>G. uniflora</i> , <i>Hn.</i>	*		*				
5. <i>G. Afzelii</i> , <i>Hn.</i>	*						
6. <i>G. obvallata</i> , <i>F. Didr.</i> ..	*						
7. <i>G. involucrata</i> , <i>Schwef.</i> ..		*	*				
65. CEPHÆLIS, <i>Sw.</i>							
1. <i>C. peduncularis</i> , <i>Salisb.</i> ..	*			*			
2. <i>C. suaveolens</i> , <i>Schwef.</i> ..			*				
3. <i>C. cornuta</i> , <i>Hn.</i>	*						
4. <i>C. fuscescens</i> , <i>Hn.</i>	*						
5. <i>C. rubescens</i> , <i>Hn.</i>	*						
6. <i>C. clausa</i> , <i>Hn.</i>	*						
7. <i>C. spathacea</i> , <i>Hn.</i>	*						
8. <i>C. Mannii</i> , <i>B. et H. f.</i>	*						
9. <i>C. latifolia</i> , <i>Hn.</i>	*						
10. <i>C. congensis</i> , <i>Hn.</i>				*			
66. TRICHOSTACHYS, <i>Hk. f.</i>							
1. <i>T. longifolia</i> , <i>Hn.</i>	*						
2. <i>T. petiolata</i> , <i>Hn.</i>	*						
3. <i>T. aurea</i> , <i>Hn.</i>	*						
4. <i>T. ciliata</i> , <i>Hn.</i>	*						
67. LASIANTHUS, <i>Jack.</i>							
1. <i>L. africanus</i> , <i>Hn.</i>	*						

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
Tribe XIII. Pædericæ.							
68. SIPHOMERIS, <i>Boj.</i>						*	
1. <i>S. foetens</i> , <i>Hn.</i>						*	
Tribe XIV. Anthospermeæ.							
69. ANTHOSPERMUM, <i>L.</i>							
1. <i>A. pachyrrhizum</i> , <i>Hn.</i>			*				
2. <i>A. muricatum</i> , <i>Hochst.</i>			*				
3. <i>A. asperuloides</i> , <i>Hk. f.</i>	*						
Tribe XV. Spermacoceæ.							
70. DIODIA, <i>Gron.</i>						*	
1. <i>D. Kirkii</i> , <i>Hn.</i>						*	
2. <i>D. rubricosa</i> , <i>Hn.</i>	*						
3. <i>D. arenosa</i> ?, <i>DC.</i>	*						? Brazil.
4. <i>D. maritima</i> , <i>Thonn.</i>	*			*			Tropical America.
5. <i>D. breviseta</i> , <i>Bth.</i>	*		*	*		*	Madagascar and Tropical America.
6. <i>D. vaginalis</i> , <i>Bth.</i>	*						
71. GAILLONIA, <i>A. Rich.</i>							
1. <i>G. calycoptera</i> , <i>Jaub. et Sp.</i>			*				Arabia Petræa.
72. SPERMACOCE, <i>Dill.</i>							
1. <i>S. tenuissima</i> , <i>Hn.</i>			*				
2. <i>S. filiformis</i> , <i>Hn.</i>	*						
3. <i>S. phyteuma</i> , <i>Schw.</i>			*				
4. <i>S. compressa</i> , <i>Afz.</i>	*						
5. <i>S. ? pilosa</i> , <i>DC.</i>	*						
6. <i>S. senensis</i> , <i>Hn.</i>			* ?			*	
7. <i>S. stricta</i> , <i>L. f. ?</i>	*		*			*	Old-World tropics.
8. <i>S. hebecarpa</i> , <i>Oliv.</i>	*		*				
9. <i>S. leucadea</i> , <i>Hochst.</i>			*				
10. <i>S. stachydea</i> ?, <i>DC.</i>	*	* ?					
11. <i>S. radiata</i> , <i>Sieb.</i>	*		*				
12. <i>S. ramisparsa</i> , <i>Pohl.</i>	*						A common tropical weed.
13. <i>S. Ruelliae</i> , <i>DC.</i>	*	*	*	*			Madagascar and Delagoa Bay.
14. <i>S. dibrachiata</i> , <i>Oliv.</i>			*			*	
15. <i>S. Kotschyana</i> , <i>Oliv.</i>			*				
16. <i>S. compacta</i> , <i>Hochst.</i>			*				
17. <i>S. globosa</i> , <i>S. et T.</i>	*					*	Cape de Verde Islands.
73. HYPODEMATICUM, <i>A. Rich.</i>							
1. <i>H. sphaerostigma</i> , <i>A. Rich.</i>			*				
74. OCTODON, <i>Thonn.</i>							
1. <i>O. filifolium</i> , <i>S. et T.</i>	*		*				
2. <i>O. setosum</i> , <i>Hn.</i>	*						
75. RICHARDIA, <i>Houst.</i>							
1. <i>R. scabra</i> , <i>L.</i>						*	Tropical America.
76. MITRACARPUM, <i>Zucc.</i>							
1. <i>M. scabrum</i> , <i>Zucc.</i>	*	*	*	*			Cape de Verde Islands.

Botanical Name.	Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique district.	External Range.
Tribe XVI. Galieæ.							
77. RUBIA, <i>Tourn.</i>							
1. <i>R. cordifolia, L.</i>			*				South Africa and Asia.
2. <i>R. discolor, Turcz.</i>			*				
78. GALIUM, <i>L.</i>							
1. <i>G. bialfræ, Hn.</i>	*						
2. <i>rotundifolium, L.</i>			*				Natal, Cape de Verde Is- lands, Europe, &c.
3. <i>G. Aparine, L.</i>	*		*				Widely spread over the world and reaching the Arctic regions.
4. <i>G. Mollugo, L.</i>			*				Widely distributed over Europe.
5. <i>G. simense, Hochst.</i>			*				
6. <i>G. Decaisnei, Boiss.</i>			*				The Levant and Persia.
[<i>Vaillantia hispida, L.</i>			*				The Levant.]
79. BENZONIA, <i>Schum.</i> -							
1. <i>B. corymbosa, Schum.</i>	*						
80. LEPIDOGON, <i>Bert. f.</i>							
1. <i>L. obovatum, Bert. f.</i>						*	Inhambane.
<i>Pentas parviflora, Hn.</i>						*	
<i>Ixora coccinea, L.</i>	* ?						East Indies.
<i>Trichostachys vaginalis, Hn.</i>	*						

The three last-named species have been added subsequently to the printing of the corresponding portion of the 'Flora of Tropical Africa.' Of the above enumerated 482 species, 238 occur in Upper Guinea, but not in the other districts of Tropical Africa, 6 in the North Central district only, 62 in Nile-land, 28 in Lower Guinea only, 7 in the South Central district only, and 55 only in the Mozambique district.

In comparing the numbers deducible from the tabular view, it must be borne in mind that the two central districts have been but very imperfectly explored, and that the greater part of Welwitsch's Angolan collection remains to be added, so that the number of species given as known to occur in Lower Guinea must be doubled.

The following genera are endemic:—*Corynanthe*, *Crossopteryx*, *Virecta*, *Otomeria*?, *Hekistocarpa*, *Pauridiantha*, *Temnopteryx*, *Pentaloncha*, *Stipularia*, *Heinsia*, *Dictyandra*, *Leptactina*, *Macrosphyra*, *Amaralia*, *Morelia*, *Zygoon*, *Galiniera*, *Empogona*, *Feretia*,

Summary of Preceding Distribution.

Tribes.	Number in Tropical Africa.				Number of Species.					
	Altogether.		Endemic.		Upper Guinea.	North Central.	Nile-land.	Lower Guinea.	South Central.	Mozambique District.
	Genera.	Species.	Genera.	Species.						
Nauclææ	4	6	0	5	4	2	4	1	0	0
Cinchonææ	3	4	2	4	2	0	2	3	0	1
Hedyotidææ	7	49	3	36	25	2	23	8	3	17
Mussandææ	7	35	4	34	30	5	4	6	0	1
Hamelææ	2	11	1	11	8	0	1	3	0	2
Gardeniææ	17	88	10	83	53	6	15	15	3	19
Guettardiææ	1	1	0	0	0	0	0	0	0	1
Albertææ	6	10	4	10	4	1	2	0	0	6
Vangueriææ	7	72	0?	68	33	1	22	13	6	7
Ixoreæ	5	65	1	62	47	1	8	10	0	8
Morindeæ	1	2	0	1	2	2	1	2	0	0
Psychotriææ	7	95	1	92	71	4	9	4	0	11
Pæderiææ	1	1	0	1	0	0	0	0	0	1
Anthospermeææ	1	3	0	3	1	0	2	0	0	0
Spermacocææ	7	29	2	19	18	3	16	4	0	7
Galieææ	3	9	0	3	2	0	8	0	0	0
dubiææ.....	2	2	1	1	1	0	0	0	0	1
Totals	81	482	29	433	306	27	117	69	12	82

Pouchetia, *Belonophora*, *Aulacocalyx*, *Lamprothamnus*, *Rhabdostigma*, *Psilanthus*, *Trichostachys*, *Hypodematium*, *Octodon*, and *Benzonia*.

In addition to these, 16 genera are confined to Africa and African Islands, including Madagascar and the Mascarene islands; 18 genera extend to Asia, the Indian Archipelago, Australia, or the Pacific islands, but do not reach either the West Indies or America; and 18 other genera have representatives in the New World.

RUBIACEÆ OCCURRING ELSEWHERE AS WELL AS IN
TROPICAL AFRICA.

The following species of our flora have a distribution outside the limits of Tropical Africa; there are altogether 49 such species, which may be grouped according to the parts of the world to which they respectively extend. In the following lists the names of some species will occur more than once in the event of the species being found in different parts of the world.

1. *South Africa.*

<i>Oldenlandia decumbens</i> ...	Natal.
<i>O. caffra</i>	Cape and Natal.
<i>O. Heynei</i>	Natal.
<i>O. capensis</i>	Cape.
<i>O. macrophylla</i>	Natal.
<i>Enterospermum littorale</i> ..	? Inhambane, Mozambique.
<i>Gardenia Thunbergia</i>	Cape and Natal.
<i>Tricalysia Sonderiana</i>	Natal.
<i>Vangueria infausta</i>	Cape, Natal, and Transvaal.
<i>Fadogia Zeyheri</i>	Transvaal.
<i>Spermacoce stricta</i> (var.) ..	Natal and Kafirland.
<i>S. Ruelliae</i>	Delagoa Bay.
<i>Rubia cordifolia</i>	Caffraria and Natal.
<i>Galium rotundifolium</i> ...	Cape and Natal.
<i>G. Aparine</i>	Cape, &c.
<i>Lepipogon obovatum</i>	Inhambane, Mozambique.

2. *Mascarene Islands, including Madagascar and the
Comoro Islands.*

<i>Uncaria africana</i>	? Comoro Islands.
<i>Pentas carnea</i>	Comoro Islands.
<i>Oldenlandia Bojeri</i>	Madagascar and Comoro Islands.
<i>O. decumbens</i>	Madagascar.

<i>Oldenlandia caffra</i>	? Madagascar.
<i>O. Heynei</i>	? Madagascar, &c.
<i>O. corymbosa</i>	Comoro Islands.
<i>O. capensis</i>	Madagascar.
<i>O. trinervia</i>	Madagascar, Mauritius, and Seychelles.
<i>O. macrophylla</i>	Seychelles and Comoro Islands.
<i>Mussænda arcuata</i> ..	Mauritius and Madagascar.
<i>Gardenia Annæ</i>	Seychelles.
<i>Guettarda speciosa</i>	Madagascar, Seychelles, and Comoro Islands.
<i>Canthium bibracteatum</i> ...	Mauritius, Seychelles, Comoro Islands, and Madagascar.
<i>Vangueria infausta</i>	Madagascar, &c.
<i>V. edulis</i>	Madagascar, &c.
<i>Ixora odorata</i>	Madagascar.
<i>Morinda citrifolia</i>	Seychelles.
<i>Psychotria obtusifolia</i> ...	Madagascar.
<i>Triainolepis Hildebrandtii</i>	North-west Madagascar.
<i>Diodia breviseta</i>	Madagascar.
<i>Spermacoce stricta</i>	Mauritius (<i>teste</i> Baker, Fl. Maurit. p. 159).
<i>S. ramisparsa</i>	Mauritius and Madagascar.
<i>S. Ruelliae</i>	Madagascar.

3. *North Africa, Madeira, Canary, and Cape de Verde Islands.*

<i>Oldenlandia Schimperii</i> ...	Upper Egypt.
<i>O. strumosa</i>	Cape de Verde Islands.
<i>O. corymbosa</i>	Cape de Verde Islands.
<i>O. hedyotoides</i>	Upper Egypt.
<i>Spermacoce globosa</i>	Cape de Verde Islands.
<i>Mitracarpum scabrum</i> ...	Cape de Verde Islands.
<i>Galium rotundifolium</i>	Cape de Verde Islands.
<i>G. Aparine</i>	North Africa, Madeira, and Canary Islands.
<i>Vaillantia hispida</i>	North Africa and Canary Islands.

In addition to these, P. B. Webb, in 'Spicilegia Gorgonea,' page 132, gives from the Cape de Verde Islands, *Hedyotis* (*Oldenlandia*) *Burmannia*, R. Br. in Wall. Cat. n. 868; *H. (Oldenlandia)* *virgata*, Willd.; and *H. (Kohantia)* *stricta*, Sm.

The only species of our flora which extends to the Arctic regions is *Galium Aparine*; *G. Mollugo*, var. (*G. erectum*), extends to many parts of Europe.

4. *South Europe, Asia Minor, Armenia, Persia, Arabia, Beluchistan, and Scinde.*

<i>Pentas carnea</i>	Tropical Arabia.
<i>Oldenlandia Schimperi</i>	Arabia Petræa, Beluchistan, and Scinde.
<i>O. capensis</i>	Syria (<i>teste</i> Boissier, Fl. Or. iii. p. 11).
<i>O. hedyotoides</i>	Armenia.
<i>Coffea arabica</i>	? Tropical Arabia.
<i>Gaillonia calycoptera</i>	Arabia Petræa.
<i>Galium rotundifolium</i>	The Levant and Armenia (<i>teste</i> Boissier, Fl. Or. iii. p. 49).
<i>G. Aparine</i>	Widely spread.
<i>G. Mollugo</i>	Widely spread.
<i>G. Decaisnei</i>	The Levant and Persia.
<i>Vaillantia hispida</i>	South Europe, the Levant, and Persia.

5. *Eastern and Tropical Asia, China, Pacific Islands, and Australia.*

<i>Argostemma pumilum</i>	? Nipal, North-west Himalayas to Burma, and mountains of the Deccan peninsula of India.
<i>Oldenlandia Heynei</i>	East Indies.
<i>O. corymbosa</i>	Widely spread.
<i>O. trinervia</i>	East Indies.
<i>Randia dumetorum</i>	East Indies and Hongkong.
<i>Guettarda speciosa</i>	East Indies and Australia.
? <i>Ixora coccinea</i>	East Indies.
<i>Morinda citrifolia</i>	Tropical Asia, Pacific Islands, and Queensland.
<i>Geophila reniformis</i> ?	East Indies and Pacific Islands.
<i>Spermacoce stricta</i>	East Indies and Hongkong.
<i>S. ramisparsa</i>	India.
<i>Rubia cordifolia</i>	Widely spread in Asia.
<i>Galium rotundifolium</i>	Common among the hills of India.
<i>G. Aparine</i>	Himalayas.

The Indian species, *Ixora coccinea*, which is often cultivated, has been sent to the British Museum by the Rev. A. Robb from Old Calabar, without any note stating that it was cultivated there or had been introduced into Africa.

6. *Tropical America.*

<i>Oldenlandia corymbosa</i> ...	Widely spread.
<i>Geophila reniformis</i> ?	Widely spread.
<i>Diodia arenosa</i> ?	Brazil.
<i>D. maritima</i>	Cuba, Guatemala, &c.
<i>D. breviseta</i>	West Indies, Guyana, and Panama.
<i>Spermacoce ramisparsa</i>	Brazil.
<i>Richardia scabra</i>	Widely spread.

Of the 482 species which have been described in the third volume of 'The Flora of Tropical Africa' or added in these notes, 250 are new or not previously described; and of the 81 genera amongst which the species are distributed, 3 genera are new.

DESCRIPTION OF THE PLATES.

PLATE VII.

Pentas parvifolia, Hiern.

- Fig. 1. An expanded flower, enlarged two diameters.
 2. Corolla, laid open, showing the interior with the included stamens.
 3. Diagram showing the valvate æstivation of the corolla.
 4. Vertical section of the pistil and calyx, enlarged five diameters.
 5. Horizontal section of the ovary, enlarged also five diameters.

PLATE VIII.

Trichostachys vaginalis, Hiern.

- Fig. 1. A flower-bud, enlarged four diameters.
 2. Diagram showing the induplicate-valvate æstivation of the corolla.
 3. An expanded flower, enlarged four diameters.
 4. Corolla laid open, with vertical section of the ovary, enlarged also four diameters.
 5. Stamens, front and side views, enlarged eight diameters.
-

D Blair del et lith.

Mintern Bros imp.

TRICHOSTACHYS VAGINALIS, *Hiern.*