

Five species belonging to this section of *Violeæ* occur in Aublet's History of the Plants of Guiana, where each of them is considered as forming a separate genus. Of three of these genera, namely, *Conohoria*, *Rinorea*, and *Riana*, the flowers alone are described; the two others, *Passura* and *Piparea*, were seen in fruit only.

From the examination of flowers of Aublet's original specimens of the three former genera, in Sir Joseph Banks's herbarium, and of the fruit of *Conohoria*, which entirely agrees with that of *Passura*, and essentially with that of *Piparea*, I have hardly a doubt of these five plants, notwithstanding some differences in the disposition of their leaves, actually belonging to one and the same genus: and as they agree with *Physiphora* in every respect, except in the texture and form of the capsule, and with the *Passalia* of Sierra Leone and Congo, except in having their stamina nearly or entirely distinct, it appears that all these genera may be referred to *Alsodeia*.

I have also examined, in Sir Joseph Banks's herbarium, a specimen of *Pentaloba sessilis* of the Flora Cochinchinensis, which was sent so named, by Loureiro himself, and have found it to agree in every important point with *Alsodeia*, even as to the number of parietal placentæ. Loureiro, however, describes the fruit of *Pentaloba* as a five-lobed, five-seeded berry, and if this account be correct, the genus ought to be considered as distinct; but if, which is not very improbable, the fruit be really capsular, it is evidently referable to *Alsodeia*; with the species of which, from Madagascar and the west coast of equinoctial Africa, it agrees in the manifest union of its filaments.

It appears therefore that the ten genera now enumerated, and perhaps also *Lauradia* of Vandelli, may very properly be reduced to one; and they all at least manifestly belong to the same section of *Violeæ*, though at present they are to be found in various, and some rather distant, natural orders.

M. de Jussieu, in adopting Aublet's erroneous description of the stamina of *Rinorea* and *Conohoria*, has referred both these genera to *Berberides*,* to which

The genera belonging to *BERBERIDEÆ* are *Berberis* (to which *Ilex Japonica* of Thunberg belongs); *Leontice* (including *Caulophyllum*, respecting which see *Linn. Soc. Transac.* 12, p. 145) *Epimedium*; and *Diphylleia* of Michaux. *Jeffersonia* may perhaps differ in the internal structure of its seeds, as it does in their arillus, from true *Berberideæ*, but it agrees with them in the three principal characters of their flower, namely, in their stamina being equal in number and opposite to the petals; in the remarkable dehiscence of antheræ; and in the structure of the ovarium. *Podophyllum* agrees with

he has also annexed Riana, adding a query whether Passura may not belong to the same genus. With M. de Beauvois, he refers Ceranthera to Meliaceæ; and Pentaloba of Loureiro he reduces also to the same order.* Pipareá is, together with Viola, annexed to Cistinæ in his Genera Plantarum, and is therefore the most correctly placed, though its structure is the least known, of all these supposed genera.

An unpublished genus of New Holland, which I have named *Hymenanthera*, in Sir Joseph Banks's herbarium, agrees with Alsodeia in its calyx, in the insertion, expansion, and obliquely imbricate æstivation of its petals, and especially in the structure of its antheræ, which approach more nearly to those of ~~Viola~~ properly so called. It differs, however, from this order in having five squamæ alternating with the petals; and especially in its fruit, which is a bilocular berry, having in each cell a single pendulous seed, whose internal structure resembles that both of *Viola* and *Polygalæ*, between which I am inclined to think this genus should be placed.

CHAILLETEÆ. The genus *Chaillertia* was established by M. de Candolle† from a plant found by Martin in French Guiana, and which, as appears by specimens in Sir Joseph Banks's herbarium, had been many years before named *Patrisia* by Von Rohr, who discovered it in the same country. At a still earlier period, Solander, in his manuscripts, preserved in the library of Sir Joseph Banks, described this genus under the name of *Mestotcs*, from several species found by Smeathman at Sierra Leone. Both *Dichapetalum* and *Leucosia* of M. du Petit Thouars‡ appear to me, from the examination of authentic specimens, to belong to the same genus: and in Professor Smith's herbarium there is at least one additional species of *Chaillertia* different from those of Sierra Leone.

Diphylleia inhabit, and in the fasciculi of vessels of the stem being irregularly scattered; essentially in the floral envelope, and in the structure of the ovarium; its stamina, also, though numerous, are not altogether indefinite, but appear to have a certain relation both in number and insertion to the petals: in the dehiscence of antheræ, and perhaps also in the structure of seeds, it differs from this order, to which, however, it may be appended. *Nandina* ought to be included in *Berberideæ*, differing only in its more numerous and densely imbricate bractæ, from which to the calyx and even to the petals, the transition is nearly imperceptible; and in the dehiscence of its antheræ.

* *Mém. du Mus. d'Hist. Nat.* 3, p. 440.

† *Annal. du Mus. d'Hist. Nat.* 17, p. 153.

‡ *Nov. Gen. Madagasc.* n. 78 et 79.

Of the two generic names given by M. du Petit Thouars, and published somewhat earlier than M. de Candolle's Memoir, *Leucosia* will probably be considered inadmissible, having been previously applied by Fabricius to a genus of Crustacea; and *Dichapetalum* is perhaps objectionable, as derived from a character not existing in the whole genus, even allowing it to be really polypetalous. It seems expedient therefore to adopt the name proposed by M. de Candolle, who has well illustrated the genus in the memoir referred to. It appears to me that *Chaillertia*, a genus nearly related to it from India with capsular fruit, and *Tapura* of Aublet (which is *Rohria* of Schreber,) form a natural order, very different from any yet established. The principal characters of this order may be gathered from M. de Candolle's figure and description of *Chaillertia*, to which, however, must be added that the cells of the ovarium, either two or three in number, constantly contain two collateral pendulous ovula; and that in the regular flowered genera there exist within, and opposite to, the petal like bodies an equal number of glands, which are described by M. du Petit Thouars in *Dichapetalum*, but are unnoticed by him in *Leucosia*, where, however, they are equally present.

It may seem paradoxical to associate with these genera *Tapura*, whose flower is irregular, triandrous, and apparently monopetalous. But it will somewhat lessen their apparent differences of structure to consider the petal-like bodies, which, in all the genera of this order, are inserted nearly or absolutely in the same series with the filaments, as being barren stamina; a view which M. de Candolle has taken of those of *Chaillertia*, and which M. Richard had long before published respecting *Tapura*.* It is probable also that M. de Candolle at least will admit the association here proposed, as his *Chaillertia sessiliflora* seems to be merely an imperfect specimen of *Tapura guianensis*.

The genera to which *Chaillertia* most nearly approach appear to me to be *Aquilaria* of Lamarck† and *Gyrinops* of Gærtner. But these two genera themselves, which are not referable to any order yet established, may either be regarded as a distinct family, or perhaps, to avoid the too great multiplication of families, as a section of that at present under consideration, and to which I

* *Dict. Elem. de Botanique par Bulliard, revu par L. C. Richard, ed. 1802, p. 34.*

† Or *Ophiospermum* of the Flora Cochinchinensis, as I have proved by comparison with a specimen from Loureiro himself.

should then propose to apply the name of *AQUILARINÆ* in preference to *Chailletæ*.

The genus *Aquilaria* itself has been referred by Ventenat to *Samydææ*. From this order, however, it is sufficiently distinct, not only in the structure of its ovary and seeds, but in its leaves being altogether destitute of glands, which are not only numerous in *Samydææ*, but consisting of a mixture of round and linear pellucid dots, distinguish them from all the other families* with which there is any probability of their being confounded.

Sir James Smith† has lately suggested the near affinity of *Aquilaria* to *Euphorbiaceæ*. But I confess it appears to me at least as distinct from that order as from *Samydææ*: and I am inclined to think, paradoxical as it may seem, that it would be less difficult to prove its affinity to *Thymelææ* than to either of them; a point however which, requiring considerable details, I do not mean to attempt in the present essay.

Of *EUPHORBIACEÆ* there are twenty species in the collection, or one twenty-eighth part of its *Phænogamous* plants. This is somewhat greater than the intratropical proportion of the order as stated by Baron Humboldt, but rather smaller than that of India or of the northern parts of New Holland.

The most remarkable plants of *Euphorbiaceæ* in the Congo herbarium are; a new species of the American genus *Alchornea*; a plant differing from *Ægopricon*, a genus also belonging to America, chiefly in its capsular fruit; two new species of *Bridelia*, which has hitherto been observed only in India; and an unpublished genus that I have formerly alluded to,‡ as in some degree explaining the real structure of *Euphorbia*, and from the consideration of which also it seems probable that what was formerly described as the hermaphrodite flower of that genus, is in reality a compound fasciculus of flowers.§ From the same species of this unpublished genus a substance resembling Caoutchouc is said to be obtained at Sierra Leone.

According to Mr. Lockhart a frutescent species of *Euphorbia*, about eight

* The only other genus in which I have observed an analogous variety of form in the glands of the leaves, is *Myroxylon*, (to which both *Myrospermum* and *Toluifera* belong,) in all of whose species this character is very remarkable, the pellucid lines being much longer than in *Samydææ*.

† *Linn. Soc. Transact.* 11, p. 230.

‡ *Flinders's Voy.* 2, p. 557.

§ *Linn. Soc. Transact.* 12, p. 99.

feet in height, with cylindrical stem and branches, was observed, planted on the graves of the natives near several of the villages; but of this, which may be what Captain Tuckey has called *Cactus quadrangularis* in his Narrative (p. 115) there is no specimen in the herbarium.

COMPOSITÆ. It is unnecessary here to enter into the question whether this family of plants, of which upwards of 3000 species are already known, ought to be considered as a class or as an order merely; the expediency of subdividing it, and affixing proper names to the divisions, being generally admitted. The divisions or tribes proposed by M. Cassini, in his valuable dissertations on this family appear, to be the most natural, though as yet they have not been very satisfactorily defined.

The number of Compositæ in the collection is only twenty-four, more than half of which are referable to *Heliantheæ* and *Vernoniaceæ* of M. Cassini. The greater part of these are unpublished species, and among them are five new genera. The published species belong to other divisions, and are chiefly Indian: but one of them, *Ageratum conyzoides*, is common to America and India; the *Struchium* (or *Sparganophorus*) of the collection does not appear to me different from that of the West Indies; and *Mikania chenopodiifolia*, a plant very general on this line of coast, though perhaps confined to it, belongs to a genus of which all the other species are found only in America.

Baron Humboldt has stated* that Compositæ form one sixth of the Phænogamous plants within the tropics, and that their proportion gradually decreases in the higher latitudes until in the frigid zones it is reduced to one thirteenth. But in the herbarium from Congo Compositæ form only one twenty-third, and both in Smeathman's collection from Sierra Leone and in Dr. Roxburgh's *Flora Indica*, a still smaller part, of the Phænogamous plants. In the northern part of New Holland they form about one sixteenth; and in a manuscript catalogue of plants of equinoctial America, in the library of Sir Joseph Banks, they are nearly in the same proportion.

In estimating the comparative value of these different materials, I may, in the first place, observe that though the herbarium from Congo was collected in the dry season of the country, there is no reason to suppose on that account that the proportion of this family of plants, in particular, is materially or even in

* In *op. citat.*

any degree diminished, nor can this objection be stated to the *Sierra Leone* collection, in which its relative number is still smaller.

To the *Compositæ* in Dr. Roxburgh's *Flora Indica*, however, a considerable addition ought, no doubt, to be made; partly on the ground of his having apparently paid less attention to them himself, and still more because his correspondents, whose contributions form a considerable part of the *Flora*, have evidently in a great measure neglected them. This addition being made, the proportion of *Compositæ* in India would not differ very materially from that of the north coast of New Holland, according to my own collection, which I consider as having been formed in more favourable circumstances, and as probably giving an approximation of the true proportions in the country examined. Baron Humboldt's herbarium, though absolutely greater than any of the others referred to on this subject, is yet, with relation to the vast regions whose vegetation it represents, less extensive than either that of the north coast of New Holland, or even of the line of the Congo. And as it is in fact as much the *Flora* of the Andes as of the coasts of intratropical America, containing families nearly or wholly unknown on the shores of equinoctial countries, it may be supposed to have several of those families which are common to all such countries, and among them *Compositæ*, in very different proportion. At the same time it is not improbable that the relative number of this family in equinoctial America, may be greater than in the similar regions of other intratropical countries; while there seems some reason to suppose it considerably smaller on the west coast of Africa. This diminished proportion, however, in equinoctial Africa would be the more remarkable, as there is probably no part of the world in which *Compositæ* form so great a portion of the vegetation as at the Cape of Good Hope.

RUBIACEÆ. Of this family there are forty three species in the collection, or about one fourteenth of its *Phænogamous* plants. I have no reason to suppose that this proportion is greater than that existing in other parts of equinoctial Africa; on the contrary, it is exactly that of Smeathman's collection from *Sierra Leone*.

Baron Humboldt, however, states the equinoctial proportion of *Rubiaceæ* to *Phænogamous* plants to be one to twenty-nine, and that the order gradually diminishes in relative number towards the poles.

But it is to be observed that this family is composed of two divisions, having very different relations to climate; the *first*, with opposite, or more rarely verticillate leaves and intermediate stipules, to which, though constituting the great mass of the order, the name *Rubiaceæ* cannot be applied, being chiefly equinoctial; while the *second*, or *Stellatæ*, having verticillate or very rarely opposite leaves, but in no case intermediate stipules, has its maximum in the temperate zones, and is hardly found within the tropics, unless at great heights.

Hence perhaps we are to look for the minimum in number of species of the whole order, not in the frigid zone, but, at least in certain situations, a few degrees only beyond the tropics.

In conformity to this statement, M. Delile's valuable catalogue of the plants of Egypt* includes no indigenous species of the equinoctial division of the order, and only five of *Stellatæ*, or hardly the one hundred and sixtieth part of the Phænogamous plants. In M. Desfontaines' *Flora Atlantica*, *Rubiaceæ*, consisting of fifteen *Stellatæ* and only one species of the equinoctial division, form less than one ninetieth part of the Phænogamous plants, a proportion somewhat inferior to that existing in Lapland.

In Professor Thunberg's *Flora* of the Cape of Good Hope, where *Rubiaceæ* are to Phænogamous plants, as about one to one hundred and fifty, the order is differently constituted; the equinoctial division, by the addition of *Anthospermum*, a genus peculiar to southern Africa, somewhat exceeding *Stellatæ* in number. And in New Holland, in the same parallel of latitude, the relative number of *Stellatæ* is still smaller, from the existence of *Opercularia*, a genus found only in that part of the world, and by the addition of which the proportion of the whole order to the Phænogamous plants is there considerably increased.

More than half the *Rubiaceæ* from Congo belong to well known genera, chiefly to *Gardenia*, *Psychotria*, *Morinda*, *Hedyotis*, and *Spermacoce*.

Of the remaining part of the order, several form new genera.

The *first* of these is nearly related to *Gardenia*, which itself seems to require subdivision.

The *second* is intermediate between *Rondeletia* and *Danais*, and probably includes *Rondeletia febrifuga* of Afzelius.†

* *Flor. Egypt. illustr. in Descript. de l'Egypte, Hist. Nat. v. 2. p. 49.*

† *In Herb. Banks.* This is the "New sort of Peruvian Bark" mentioned in his Report, p. 174; which is probably not different from the *Bellenda* or African Bark of Winterbottom's Account of Sierra Leone, vol. 2, p. 243.

The *third* has the inflorescence and flowers of *Nauclea*, but its ovaria and pericarpia are confluent, the whole head forming a compound spherical fleshy fruit, which is, I suppose, the country-fig of Sierra Leone, mentioned by Professor Afzelius.*

The *fourth* is a second species of *Neurocarpæa*, a genus which I have named, but not described, in the catalogue of Abyssinian plants appended to Mr. Salt's Travels.†

The *fifth* genus is intermediate between Rubiaceæ and Apocineæ. With the former it agrees in habit, especially in its interpetiolar stipules; and in the insertion and structure of its seeds, which are erect, and have the embryo lodged in a horny albumen forming the mass of the nucleus; while it resembles Apocineæ in having its ovary entirely distinct from the calyx: its capsule in appearance and dehiscence is exactly like that of Bursaria.

The existence of this genus tends to confirm what I have formerly asserted respecting the want of satisfactory distinguishing characters between these two orders, and to prove that they belong to one natural class: the ovary superum approximating it to Apocineæ; the interpetiolar stipules and structure of seeds connecting it, as it appears to me, still more intimately with Rubiaceæ.

The arguments adduced by M. de Jussieu‡ for excluding *Usteria* from Rubiaceæ and referring it to Apocineæ, are, its having ovary superum, an irregular corolla, fleshy albumen, and only one stamen; there being no example of any reduction in the number of stamens in Rubiaceæ, (in which *Opercularia* and *Pomax* are not included by M. de Jussieu,) while one occurs in the male flowers of *Ophioxylum*, a genus belonging to Apocineæ. From analogous reasoning he at the same time decides in referring *Gærtnera* of Lamarck§ to Rubiaceæ, though he admits it to have ovary superum; its flowers being regular, its albumen more copious and horny, and its embryo erect. But all these characters exist in the new genus from Congo. These two genera therefore, together with *Pagamea* of Aublet, *Usteria*, *Geniostoma* of Forster (which is *Anasser* of Jussieu) and *Logania*,¶ might, from their mere agreement in the situation of ovary, form a tribe intermediate between Rubiaceæ

* *Sierra Leone Report for 1794*, p. 171, n. 32.

† *Voyage to Abyssinia*, append. p. lxxvi.

‡ *Annal. du Mus. d'Hist. Nat.* 10, p. 323.

§ *Illustr. Gen. tab.* 167.

¶ *Prodr. Flor. Nov. Holl.* 1, p. 455.

and Apocineæ. This tribe, however, would not be strictly natural, and from analogy with the primary divisions admitted in Rubiaceæ, as well as from habit, would require subdivision into at least four sections: but hence it may be concluded that the only combining character of these sections, namely, ovarium superum, is here of not more than generic value: and it must be admitted also that the existence or absence of stipules is in Logania * of still less importance.

APOCINEÆ. There are only six plants in the collection belonging to this order:

The *first* of these, together with some other species from Sierra Leone, constitutes an unpublished genus, the fruit of which externally resembles that of *Cerbera*, but essentially differs from it in its internal structure, being polyspermous. The Cream fruit of Sierra Leone mentioned by Professor Afzelius,† probably belongs to this genus, of which an idea may be formed by stating its flower to resemble that of *Vahea*, figured, but not described by M. Lamarck,‡ and its fruit, that of *Voacanga*§ of M. du Petit Thouars, from which bird lime is obtained in Madagascar, or of *Urceola*|| of Dr. Roxburgh, the genus that produces the caoutchouc of Sumatra.

The *second* belongs to a genus discovered at Sierra Leone by Professor Afzelius, who has not yet described it, but has named it *Anthocleista*. This genus, however, differs from *Potalia* of Aublet (the *Nicandra* of Schreber) solely in having a four celled berry; that of *Potalia* being described both by Aublet and Schreber as trilocular, though according to my own observations it is bilocular. M. de Jussieu has appended *Potalia* to his *Gentianeæ*, partly determined, perhaps, from its being described as herbaceous. The species of *Anthocleista* from Congo, however, according to the account given me by Mr. Lockhart, the gardener of the expedition, is a tree of considerable size, and its place in the natural method is evidently near *Fagraea*.

Whether these genera should be united with Apocineæ, or only placed near them, forming a fifth section of the intermediate tribe already proposed, is somewhat doubtful.

In the perfect hermaphrodite flowers of Apocineæ, no exception occurs either

* *Prodr. Flor. Nov. Holl.* 1, p. 455.

† *Sierra Leone Report*, 1794, p. 173, n. 47.

‡ *Illustr. Gen. tab.* 169.

§ *Nov. Gen. Madagasc.* n. 32.

|| *Asiat. Resear.* 5, p. 169.

to the quinary division of the floral envelopes and corresponding number of stamina, or to the bilocular or double ovarium: and in *Asclepiadeæ*, which are generally referred by authors to the same order, something like a necessary connection may be perceived between these relative numbers of stamina and pistilla, and the singular mode of fecundation in this tribe. But in *Potalia* and *Anthocleista* there is a remarkable increase in the number of stamina and segments of the corolla, and at the same time a reduction in the divisions of the calyx. The pistillum in *Potalia*, however, if my account of it be correct, agrees in division with that of *Apocineæ*: and the deviation from this division in *Anthocleista* is only apparent; the ovarium, according to the view I have elsewhere given of this organ,* being composed of two united ovaria, again indeed subdivided by processes of the placenta, but each of the sub-divisions or partial cells containing only one half of an ordinary placenta, and that not originating from its inner angle, as would be the case were the ovarium composed of four confluent organs.

Of ASCLEPIADEÆ there are very few species in the collection, and none of very remarkable structure. The *Periploca* of equinoctial Africa alluded to in my essay on this family,† was one of the first plants observed by Professor Smith at the mouth of the river; and a species of *Oxystelma*, hardly different from *O. cocculentum* of India,‡ was found, apparently indigenous, on several parts of its banks.

The ACANTHACEÆ of the collection, consisting of sixteen species, the far greater part of which are new, have a much nearer relation to those of India than to the American portion of the order. Among these there are several species of *Nelsonia*§ and *Hypoestes*;|| a new species of *Ætheilema*,¶ a genus from which perhaps *Phaylopsis* of Willdenow is not different, though its fruit is described by Wendland** as a legumen, and by Willdenow, with almost equal impropriety, as a silique; a plant belonging to a genus I have formerly alluded to as consisting of *Ruellia uliginosa* and *R. balsamea*;†† and

* Linn. Soc. Transact. 12, p. 89.

† Wernerian Nat. Hist. Soc. Trans. 1, p. 40.

‡ *Periploca esculenta*, Roxb. Coromand. 1, p. 13, t. 11.

§ Prodr. Flor. Nov. Holl. 1, p. 480.

|| Op. citat. 1, p. 474.

¶ Prodr. Flor. Nov. Holl. 1, p. 478.

** Micranthus, Wend. Botan. Boeobach. 38.

†† Loc. citat.

a few species of *Blepharis*. All these genera exist in India, and none of them have yet been found in America.

CONVOLVULACEÆ. The herbarium of Professor Smith contains twenty-two species of this order, among which however there is no plant that presents any thing remarkable in its structure; the far greater part belonging to *Ipomœa*, the rest to *Convolvulus*.

In the herbarium there is a single species of *Hydrolea*, nearly related to *Sagonea palustris* of Aublet, which would also be referred to this order by M. de Jussieu. But *Hydrolea* * appears, to me, to constitute, together with *Nama*, a distinct family (*Hydroleæ*) more nearly approaching to *Polemoniaceæ* than to *Convolvulaceæ*.

SCROPHULARINÆ. The collection contains only ten plants of this family, of which two form new genera, whose characters depend chiefly on the structure of antheræ and form of corolla.

The **LABIATÆ** of the herbarium consist of seven species, three of which belong to *Ocimum*, a genus common to equinoctial Asia and Africa, but not extending to America; an equal number to *Hyptis*, which is chiefly American, and has not been observed in India: the seventh is a species of *Hoslundia*, a genus hitherto found only on the west coast of Africa, and which in its inflorescence and in the verticillate leaves of one of its species, approaches to the following order.

VERBENACEÆ, together with *Labiatae* form one natural class,† for the two orders of which it has already become difficult to find distinguishing characters.

In the Congo herbarium there are seven *Verbenaceæ*, consisting of three beautiful species of *Clerodendron*; two new species of *Vitex*; *Stachytarpheta indica* of Vahl; and a new species of *Lippia*, which, from its habit and structure, confirms the union of *Zapania* with that genus, suggested by M. Richard.‡ This species from the Congo has its leaves in threes, and has nearly the same fragrance as *Verbena triphylla*, whose affinity to *Lippia*,

* *Vid. op. citat. p. 482.*

† *Flinders' Voy. 2, p. 565.*

‡ In *Michx. Flor. Bor.-Amer. 2, p. 15.*

notwithstanding the difference in calyx and inflorescence, is further confirmed by a peculiarity in the æstivation of its corolla, which extends only to *Lippia* and *Lantana*.

OLACINÆ. The herbarium contains a species of *Olax* differing from all the plants at present referred to that genus, in its calyx not being enlarged after fecundation, but in its original annular form surrounding the base only of the ripe fruit. The existence of this species, which agrees with those of New Holland, and with *Fissilia* of Commerson, in having only five petals, and in its barren stamina being undivided, while in habit it approaches rather more nearly to the original species *O. Zeylanica* and to *O. scandens* of Roxburgh, both of which I have examined, seems to confirm the union I have formerly proposed,* of all these plants into one genus. When I first referred *Fissilia* to this genus, I only presumed from the many other points of agreement that it had also the same structure of ovarium, on which, not only the generic character of *Olax*, but its affinities, seemed to me in a great measure to depend. M. Mirbel, however, has described the ovarium of *Fissilia* as trilocular.† I can only reconcile this statement with my own observations, by supposing him to have formed his opinion from a view of its transverse section; for on examining one of Commerson's specimens of *Fissilia disparilis*, communicated by M. de Jussieu, I have found its ovarium, like that of all the species of *Olax*, to be really unilocular; the central columnar placenta, at the top of which the three pendulous ovula are inserted, having no connection whatever with the sides of the cavity.

It was chiefly the agreement of *Olax* and *Santalacæ* in this remarkable, and I believe, peculiar structure of ovarium, that induced me to propose, not their absolute union into one family, but their approximation in the natural series. I at the same time,‡ however, pointed out all the objections that M. de Jussieu has since stated to this affinity.§

Of these objections the two principal are the double floral envelope, and ovarium superum of *Olax*, opposed to the simple perianthium and ovarium inferum in *Santalacæ*.

The first objection loses much of its importance, both on considering that

* *Prodr. Flor. Nov. Holl.* 1, p. 351.

† *Nouv. Bullet.* 3, p. 378.

‡ *Prodr. Flor. Nov. Holl.* 1, p. 351. *Flinders' Voy.* 2, p. 570.

§ *Mém. du Mus. d'Hist. Nat.* 2. p. 439.

Quinchamalium, a genus in every other respect resembling *Thesium*, has an outer floral envelope surrounding its ovarium, and having more the usual appearance of calyx than that of *Olax*; and also in adverting to the generally admitted association of *Loranthus* and *Viscum*, of which the former is provided with both calyx and corolla, the latter, in its male flowers at least, with only a single envelope, and that analogous to the corolla of *Loranthus*.*

The second objection seems to be equally weakened by the obvious affinity of *Santalaceæ* to *Exocarpus*, which has not only ovarium superum, but the fleshy receptacle of whose fruit, similar to that of *Taxus*, perfectly resembles, and may be supposed in some degree analogous to, the enlarged calyx of certain species of *Olax*.

To these objections M. de Jussieu has added a third, which, were it well founded, would be more formidable than either of them, namely, that the ovarium of *Santalaceæ* is monospermous;† a statement, however, which I conclude must have proceeded from mere inadvertency.

URTICÆ. In the collection the plants of this family, taking it in the most extensive sense, and considering it as a class rather than an order, belong chiefly to *Ficus*, of which there are seven species. One of these is very nearly related to *Ficus religiosa*; and like that species in India, is regarded as a sacred tree on the banks of the Congo.

A remarkable tree, called by the natives *Musanga*, under which name it is repeatedly mentioned in Professor Smith's Journal, forms a genus intermediate between *Coussapoa* of Aublet and *Cecropia*; agreeing with the latter in habit, and differing from it chiefly in the structure and disposition of its monandrous male flowers, and in the form of its female amenta.

In the inflorescence, and even in the structure of its male flowers, *Musanga* approaches very nearly to *Myrianthus* of M. de Beauvois,‡ which it also resembles in habit. But the fruit of *Myrianthus*, as given in the *Flore d'Oware*, is totally different, and, with relation to its male flowers, so remarkable, that a knowledge of the female flowers is wanting to fix our ideas both of the structure and affinities of the genus. This desideratum the expedition to Congo has not supplied, the male plant only of *Myrianthus* having been observed by Professor Smith.

* *Prodr. Flor. Nqv. Holl.* 1, p. 352.

† *Mém. du Mus. d'Hist. Nat.* 2, p. 439.

‡ *Flore d'Oware*, 1, p. 16, tabb. 11 et 12.

was established, concluded it to be, though from less satisfactory evidence.* It was first described as dioecious by Gærtner, whose account has been adopted, probably without examination, by Schreber, Willdenow, and Persoon.

In Sir Joseph Banks's collection, however, from which Gærtner received the fruits he has described and figured, and where he may be supposed to have likewise obtained all the original information he had on the subject, there is no proof of the male and female spadices of *Elæis guineensis* belonging to different individuals.

Gærtner has fallen into a still more important mistake respecting the structure of the fruit of *Elæis*, the foramina of whose putamen, which are analogous to those of the Cocoa nut, being, according to his description, at the base, as in that genus, whereas they are actually at the apex. It is probable that *Alfonzia oleifera* of Humboldt, Bonpland, and Kunth, belongs to *Elæis*, and possibly it may not even differ from the African species.

It is a remarkable fact respecting the geographical distribution of *Palmæ*, that *Elæis guineensis*, which is universally, and I believe justly, considered as having been imported into the West India colonies from the west coast of Africa, and *Cocos indica*, which there is no reason to doubt is indigenous to the shores of equinoctial Asia and its islands, should be the only two species of an extensive and very natural section of the order, that are not confined to America.

To this section, whose principal character consists in the originally trilocular putamen having its cells when fertile perforated opposite to the seat of the embryo, and when abortive indicated by foramina cæca, as in the cocoa nut, the name *Cocoinæ* may be given; though it has been applied by M. Kunth† to a more extensive and less natural group, which includes all palms having trilocular ovaria, and the surface of whose fruit is not covered with imbricate scales. I may also remark that from the fruits of *Cocoinæ* only, as I have here proposed to limit the section, the oil afforded by plants of this family, is obtained.

Professor Smith in his journal frequently mentions a species of *Hyphæne*, by which he evidently intended the Palm first seen abundantly at the mouth of the river, and afterwards occasionally in the greater part of its course, especially near the Banzas, where it is probably planted for the sake of the wine obtained from it.

According to the gardener's information, this is a Palm of moderate height

* *Hist. Stirp. Amer.* p. 281.

† *Nova Gen. et Sp. Orb. Nov.* 1, p. 241.

with fan-shaped fronds and an undivided caudex. It therefore more probably belongs to *Corypha* than to Gärtner's *Hyphæne*, one species of which is the *Cucifera* of Delile, the Doom of Upper Egypt; the second, *Hyphæne coriacea*, is a native of Melinda, and probably of Madagascar, and both are remarkable in having the caudex dichotomous, or repeatedly divided.

As the Palm on the banks of the Congo was seen in fruit only, it is not difficult to account for Professor Smith's referring it rather to *Hyphæne* than to *Corypha*; Gärtner having described the embryo of the latter as at the base of the fruit, probably, however, from having inverted it, as he appears to have done in *Elæis*. It is at least certain that in *Corypha Taliera** of the continent of India, which is very nearly allied to *C. umbraculifera*, the embryo is situated at the apex as in *Hyphæne*.

The journal also notices a species of *Raphia*, which is probably *Raphia vinifera* of M. de Beauvois,† the *Sagus Palma-pinus* of Gärtner.

The collection contains fronds similar to those of *Calamus secundiflorus* of M. de Beauvois,‡ which was also found at Sierra Leone by Professor Afzelius; and a male spadix very nearly resembling that of *Flate sylvestris* of India.

The Cocoa Nut was not observed in any part of the course of the river.

Only five species of Palms appear therefore to have been seen on the banks of the Congo. On the whole continent of Africa thirteen species, including those from Congo, have been found; which belong to genera either confined to this continent and its islands, or existing also in India, but none of which have yet been observed in America, unless perhaps *Elæis*, if *Alfonsia oleifera* of Humboldt should prove to be a distinct species of that genus.

CYPERACEÆ. In the collection there are thirty-two species belonging to this order, which forms therefore about one eighteenth of the Phænogamous plants. This is very different from what has been considered its equinoctial proportion, but is intermediate to that of the northern part of New Holland, where, from my own materials, it seems to be as 1:14; and of India, in which according to Dr. Roxburgh's Flora it is about 1:25.

In other intratropical countries the proportion may be still smaller; but I

Herb. Coromana, 3, tabb. 255 et 256. † *Flora d'Oware* 1, p. 75, tabb. 44, 45, et 46.
Op. citat. 1, p. 15, tabb. 9 et 10.

can neither adopt the general equinoctial ratio given by Baron Humboldt, namely, that of 1:60, nor suppose with him that the minimum of the order is within the tropics. For Cyperaceæ, like Rubiaceæ, and indeed several other families, is composed of tribes or extensive genera, having very different relations to climate. The mass of its equinoctial portion being formed of *Cyperus* and *Fimbristylis*, genera very sparingly found beyond the torrid zone; while that of the frigid and part of the temperate zones consists of the still more extensive genus *Carex*, which hardly exists within the tropics, unless at great heights. Hence a few degrees beyond the northern tropic, on the old continent at least, the proportion of Cyperaceæ is evidently diminished, as in Egypt, according to M. Delile's valuable catalogue;* and the minimum will, I believe, be found in the Flora Atlantica of M. Desfontaines and in Dr. Russel's catalogue of the plants of Aleppo.† It is not certain, however, that the smallest American proportion of the order exists in the same latitude. And it appears that in the corresponding parallel of the southern hemisphere, at the Cape of Good Hope and Port Jackson, the proportion is considerably increased by the addition of genera either entirely different from, or there more extensive than those of other countries.

Among the Cyperaceæ of the Congo herbarium there are fifteen species of *Cyperus*, of which *C. Papyrus*, appears to be one. The abundance of this remarkable species, especially near the mouth of the river, is repeatedly noticed in Professor Smith's journal, but from the single specimen with fructification in the collection, its identity with the plant of Egypt and Sicily, though very probable, cannot be absolutely determined. I perceive a very slight difference in the sheaths of the radii of the common umbel, which in the plant from Congo are less angular and less exactly truncated, than in that of Egypt; in other respects the two plants seem to agree. I have not seen *C. laxiflorus*, a species discovered in Madagascar by M. du Petit Thouars, and said to resemble *C. Papyrus* except in the vaginae of the partial umbels.‡

Among the species of Cyperaceæ in the collection, having the most extensive range, are *Cyperus articulatus*, which is common to America, India, and

* *Flor. Egypt. Illustr. in Descrip. de l'Egypte, Hist. Nat. 3, p. 49.*

† *Nat. Hist. of Aleppo, 2d. ed. vol. 2, p. 242.*

‡ *Encyc. Method. Botan. vol. 7, p. 270.*

Egypt; *Fuirena umbellata* and *Eleocharis capitata*,* both of which have been found in America, India, and New Holland; and *Cyperus ligularis* indigenous to other parts of Africa and to America.

Hypælyptum argenteum, a species established by Vahl from specimens of India and Senegal, and since observed in equinoctial America by Baron Humboldt, is also in the collection.

The name *Hypælyptum*, under which I have formerly described the genus that includes *H. argenteum*,† was adopted from Vahl, without enquiry into its origin. It is probably, however, a corruption of *Hypælytrum*,‡ by which M. Richard, as he himself assures me, chiefly intended another genus, with apparently similar characters, though a very different habit, and one of whose species is described by Vahl in *Hypælyptum*; his character being so constructed as to include both genera. M. Kunth has lately published *H. argenteum* under the name of *Hypælytrum*;§ but in adopting the generic character given in the *Prodromus Floræ Novæ Hollandiæ*, he has in fact excluded the plants that M. Richard more particularly meant to refer to that genus. It is therefore necessary, in order to avoid further confusion, to give a new name to *Hypælyptum* as I have proposed to limit it, which may be *Lipocarpus*, derived from the whole of its squamæ being deciduous.

In describing *Lipocarpus* (under the name of *Hypælyptum*) in the work referred to, I have endeavoured to establish the analogy of its structure to that of *Kyllinga*; the inner or upper squamæ being in both genera opposite to the inferior squama, or anterior and posterior, with relation to the axis of the spikelet: while the squamæ of Richard's *Hypælytrum* being lateral, or right and left with respect to the axis of the spikelet,|| were compared to those of the female flowers of *Diplazium*, to the utricle or nectarium of *Carex*, and to the lateral bractæ of *Lepcyrodia*, a genus belonging to the nearly related order Restiaceæ.¶ But as in *Hypælytrum*, according to M. Richard's description, and I believe also in his *Diplasia*,** there are sometimes more than two inner squamæ, which are then imbricate, they may in both these genera be considered as a spikelet reduced to a single flower, as in several other genera

Prodr. Flor. Nov. Holl. 1, p. 225. *Scirpus capitatus* Willd. *sp. pl.* 1, p. 294, exclus. syn. Gronovii.

† *Prodr. Flor. Nov. Holl.* 1, p. 219.

‡ *Persoon Syn. Plant.* 1, p. 70.

§ *Nov. Gen. et Sp. Plant.* 1, p. 218.

|| *Prodr. Flor. Nov. Holl.* 1, p. 219.

¶ *Flinders's Voy.* 2, p. 579.

** *Persoon Syn. Pl.* 1, p. 70.

of Cyperaceæ, and in *Lipocarpa* itself, from which, however, they are still sufficiently different in their relation to the including squamæ and to the axis of the spike.

This view of the structure of *Hypælytrum*, of which there is one species in the Congo herbarium, appears to me in some degree confirmed by a comparison with that of *Chondrachne* and *Chorizandra*;* for in both of these genera the lower squamæ of the ultimate spikelet are not barren, but monandrous, the central or terminating flower only being hermaphrodite.

GRAMINEÆ. Of this extensive family there are forty-five species from the Congo, or one twelfth of the Phænogamous plants of the collection. This is very nearly the equinoctial proportion of the order as given by Baron Humboldt, namely, one to fifteen, with which that of India seems to agree. On the north coast of New Holland, the proportion is still greater than that of Congo.

The two principal tribes which form the far greater part of Gramineæ, namely, *Poaceæ* and *Panicææ* have, as I have formerly stated,† very different relations to climate, the maximum both in the absolute and relative number of species of *Panicææ* being evidently within the tropics, that of *Poaceæ* beyond them.

I have hitherto found this superiority of *Panicææ* to *Poaceæ*, at or near the level of the sea within the tropics, so constant, that I am inclined to consult the relative numbers of these two tribes, in determining whether the greater part of any intratropical Flora belongs to level tracts, or to regions of such elevation as would materially affect the proportions of the principal natural families: and in applying this test to Baron Humboldt's collection, it is found to partake somewhat of an extratropical character, *Poaceæ* being rather more numerous than *Panicææ*. While in conformity to the usual equinoctial proportion, considerably more than half the Grasses in the Congo herbarium consist of *Panicææ*.

Among the *Panicææ* of the collection, there are two unpublished genera. The *first* is intermediate, in character, to *Andropogon* and *Saccharum*, but with a habit very different from both. The *second*, which is common to other

* *Prodr. Flor. Nov. Holl.* 1, p. 220.

† *Prodr. Fl. Nov. Holl.* 1, p. 169. *Obs. II.* *Flinders's Voy.* 2, p. 563.

parts of the coast and to India, appears to connect in some respects *Saccharum* with *Panicum*.

The remarks I have to make on the *Acotyledonous Plants* from Congo, relate entirely to

FILICES, of which there are twenty-two species in the collection. The far greater part of these are new, but all of them are referable to well established genera, particularly to *Nephrodium*, *Asplenium*, *Pteris*, and *Polypodium*. There are also among them two new species of *Adiantum*, a genus of which no species had been before observed on this line of coast. *Trichomanes* and *Hymenophyllum* are wanting in the collection, and these genera, which seem to require constant shade and humidity, are very rare in equinoctial Africa. Of *Osmundaceæ*, the herbarium contains only one plant, which is a new species of *Lygodium*, and the first of that genus that has been noticed from the continent of Africa.

Among the few species common to other countries, the most remarkable is *Gleichenia Hermanni*,* which I have compared and found to agree with specimens from the continent of India, from Ceylon, New Holland, and even from the Island of St. Vincent.

Acrostichum stemaria of M. de Beauvois,† which hardly differs from *A. alcornice* of New Holland, and of several of the islands of the Malayan Archipelago, was also observed; and *Acrostichum aureum*, which agrees with specimens from equinoctial America, was found growing in plenty among the mangroves near the mouth of the river.

I have formerly observed that the number of Filices, unlike that of the other Cryptogamous orders, (Lycopodiinæ excepted,) is greatest in the lower latitudes; and, as I then supposed, near or somewhat beyond the tropics. The latter part of this statement, however, is not altogether correct; the maximum of the order, both in absolute and relative number of species, being more probably within the tropics, though at considerable heights.

The degree of latitude alone being given, no judgment can be formed respecting the proportion of Filices: for besides a temperature somewhat

* *Prodr. Flor. Nov. Holl.* 1, p. 161. *Mertensia dichotoma* Willd. *Sp. Pl.* 5, p. 71.

† *Flora d'Oware* 1, p. 2, t. 2.

inferior, perhaps, to that of equinoctial countries of moderate elevation, a humid atmosphere and protection from the direct rays of the sun, seem to be requisite for their most abundant production.

When all these conditions co-exist, their equinoctial proportion to Phænogamous plants is probably about one to twenty, even on continents where the tracts most favourable to their production form only a small part, their number being increased according as such tracts constitute a more considerable portion of the surface.

Hence their maximum appears to exist in the high, and especially the well wooded, intratropical islands. Thus in Jamaica, where nearly two hundred species of Ferns have been found, their proportion to Phænogamous plants is probably about one to ten. In the Isles of France and Bourbon, from the facts stated by M. du Petit Thouars,* they appear to be about one to eight.

In Otaheite, according to Sir Joseph Banks's observations, they are as one to four. And in St. Helena, from Dr. Roxburgh's Catalogue,† they exceed one to two.

This high proportion extends to the islands considerably beyond the southern tropic. Thus in the collection formed by Sir Joseph Banks in New Zealand, they are about one to six: in Norfolk Island, from my friend Mr. Ferdinand Bauer's observations, they exceed one to three: and in Tristan Da Cunha, both from the Catalogue published by M. du Petit Thouars,‡ and the still more complete Flora of that Island, for which I am indebted to Captain Dugald Carmichael, they are to the Phænogamous plants as two to three.

The equinoctial proportion of Ferns in level and open tracts, is extremely different from those already given; and it is not improbable that as the maximum of this order is equinoctial, so its minimum will also be found either within or a few degrees beyond the tropics. Thus in several of the low Islands in the Gulf of Carpentaria, having a Flora of upwards of two hundred Phænogamous plants, not more than three species of Ferns were found, and those very sparingly. In Egypt it appears, both by Forskål's catalogue and the more extensive Flora of M. Delile, that only one Fern § has been observed.

* *Mélanges de Bot. Observ. add. à M. de Lamarck*, p. 6, et 38.

† *Beaton's Tracts relative to St. Helena*, p. 295.

‡ *Mélanges de Botanique*.

§ Named *Adiantum capillus veneris* by both these authors; but possibly a nearly related species that has often been confounded with it. Of the species I allude to,

In Russel's catalogue of the plants of Aleppo two only are noticed: and even in M. Desfontaines' Flora Atlantica not more than eighteen species occur, or with relation to the Phænogamous plants, about one to one hundred.

The Ferns in the herbarium from Congo, are to the Phænogamous plants as about one to twenty-six, which agrees nearly with their proportion in Forskål's catalogue of the plants of Arabia, with that of the north coast of New Holland, according to my own observations, and which is probably not very different from their proportion in India.

In concluding here the subject of the proportional numbers of the Natural Orders of plants contained in the herbarium from Congo, I may observe, that the ratios I have stated, do not always agree with those given in Baron Humboldt's learned dissertation, so often referred to. I have ventured, however, to differ from that eminent naturalist with the less hesitation, as he has expressed himself dissatisfied with the materials from which his equinoctial proportions are deduced. Whatever may be the comparative value of the facts on which my own conclusions depend, I certainly do not look upon them as completely satisfactory in any case. And it appears to me evident, that with respect to several of the more extensive natural orders, other circumstances besides merely the degrees of latitude and even the mean temperature must be taken into account in determining their relative numbers. To arrive at satisfactory conclusions in such cases, it is necessary to begin by ascertaining the geographical distribution of genera, a subject, the careful investigation of which may likewise often lead to important improvements in the establishment or sub-divisions of these groups themselves, and assist in deciding from what regions certain species, now generally diffused, may have originally proceeded.

To the foregoing observations on the principal Natural Orders of Plants from the banks of the Congo, a few remarks may be added on such families as are general in equinoctial countries, but which are not contained in the collection.

which may be called *Adiantum africanum*, I have collected specimens in Madeira, and have seen others from Teneriffe, St. Jago, Mauritius or Isle de Bourbon, and Abyssinia. *Adiantum africanum* has also been confounded with *A. tenerum* of Jamaica, and other West India Islands, and the latter with *A. capillus veneris*, which has in consequence been supposed common to both hemispheres, to the old and new continent, and to the torrid and temperate zones.

These are Cycadeæ, Piperaceæ, Begoniaceæ, Laurinæ (Cassytha excepted,) Passifloreæ, Myrsinæ, Magnoliaceæ, Guttiferæ, Hesperideæ, Cedreæ, and Meliaceæ.

Cycadeæ, although not found in equinoctial Africa, exist at the Cape of Good Hope and in Madagascar.

Piperaceæ, as has been already remarked by Baron Humboldt,* are very rare in equinoctial Africa; and indeed only two species have hitherto been published as belonging to the west coast: the first, supposed to be *Piper Cubeba*, and certainly very nearly related to it, is noticed by Clusius;† the second is imperfectly described by Adanson in his account of Senegal.‡ A third species, of *Piper*, however, occurs in Sir Joseph Banks's herbarium, from Sierra Leone: and we know that at least one species of this genus and several of *Peperomia*, exist at the Cape of Good Hope.

The extensive genus *Begonia*, which it is perhaps expedient to divide, may be considered as forming a natural order, whose place, however, among the Dicotyledonous families, is not satisfactorily determined. Of *Begoniaceæ*,‡ no species has yet been observed on the continent of Africa, though several have been found in Madagascar and the Isles of France and Bourbon, and one in the Island of Johanna.

No genus of *Laurinæ*, is known to exist in any part of the continent of Africa, except the paradoxical *Cassytha*, of which the only species in the Congo collection can hardly be distinguished from that of the West Indies, or from *C. pubescens* of New Holland. The absence of *Laurinæ* on the continent of Africa is more remarkable, as several species of *Laurus* have been found both in Teneriffe and Madeira, and certain other genera belonging to this family exist in Madagascar and in the Isles of France and Bourbon.

Passifloreæ. A few remarkable plants of this order have been observed on the different parts of the west coast of Africa, especially *Modecca* of the Hortus Malabaricus and *Smeathmania*, an unpublished genus already mentioned in treating of *Homalinæ*.

Myrsinæ. No species of any division of this order, has been met with in equinoctial Africa, though several of the first section, or *Myrsinæ*,

* *Nov. Gen. et Sp. Pl. Orb. Nov.* 1, p. 60.

† *Piper* ex Guinea, *Clus. exot.* p. 184, who considers it as not different from the *Piper caudatum*, figured on the same page, and which is no doubt *Piper Cubeba* of the Malayan Archipelago.

‡ *Bonpland Malmals.* 151.

properly so called, exist both at the Cape of Good Hope and in the Canary Islands.*

Magnoliaceæ and *Cedreleæ*, which are common to America and India, have not been found on the continent of Africa, nor on any of the adjoining Islands.

Guttiferæ and *Hesperideæ* exist, though sparingly, on other parts of the coast.

A few plants really belonging to *Meliaceæ* have been found on other parts of western equinoctial Africa, and a species of *Leca* (or *Aquilicia*, for these are only different names for the same genus) which was formerly referred to this order, occurs in the herbarium from Congo.

M. de Jussieu, who has lately had occasion to treat of the affinity of *Aquilicia*,† does not venture to fix its place in the system. Its resemblance to *Viniferæ* in the singular structure of seeds, in the valvular æstivation of the corolla, in the division of its leaves, the presence of stipules, and even in inflorescence, appears to me to determine, if not its absolute union, at least its near affinity to that order. Of *Viniferæ*, *Vitis* is at present the only certain genus; for *Cissus* and *Ampelopsis* having, as Richard has already observed, exactly the same structure of ovary, namely, two cells with two erect collateral ovula in each, should surely be referred to it; nor is there any part of the character or description of *Botria* of Loureiro, which prevents its being also included in the same genus.

Lusianthera of M. de Beauvois,‡ referred by us author to *Apocineæ*, but

* To the first section belong *Myrsine*, *Ardisia*, and *Bladhia*. The second, including *Embelia*, and perhaps also *Othera* of Thunberg, differs from the first merely in its corolla being polypetalous. *Egiceras* may be considered as forming a third section, from the remarkable evolution of its embryo and consequent want of albumen. In the æstivation of calyx and corolla it agrees with *Jacquinia*, which together with *Theophrasta*, (or *Clavijsa* of the Flora Peruviana,) forms the fourth section; characterised by the squamæ, more or less distinct, of the fæux of the corolla, and by generally ripening more than one seed. The fifth, includes only *Bæobotrys* of Forster (the *Mæsa* of Forskål) which, having ovary inferum and five barren filaments alternating with the segments of the corolla, bears the same relation to the other genera of this order, that *Samolus* does to *Primulaceæ*. On the near affinity, and slight differences in fructification, between this family and *Myrsineæ*, I have formerly made a few remarks in the Prodr. Flor. Nov. Holl. 1, p. 533.

† *Mém. du Mus. d'Hist. Nat.* 3, p. 437 et 441.

‡ *Flore d'Oware*, 1, p. 85.

which M. de Jussieu has lately suggested may belong to *Viniferae*,* is too imperfectly known to admit of its place being determined.

III. In the third part of my subject I am to compare the vegetation of the line of the river Congo with that of other equinoctial countries, and with the various parts of the continent of Africa and its adjoining Islands.

The first comparison to be made, is obviously with the other parts of the *West coast of equinoctial Africa*.

The most important materials from this coast to which I have had access are contained in the herbarium of Sir Joseph Banks, and consist chiefly of the collections of Smeathman from Sierra Leone, of Brass from Cape Coast (Cabo Corso), and the greater part of the much more numerous discoveries of Professor Afzelius already referred to. Besides these, there are a few less extensive collections in the same herbarium, especially one from the banks of the *Gambia*, made by Mr. Park in returning from his first journey into the interior; and a few remarkable species brought from Suconda and other points in the vicinity of Cape Coast, by Mr. Hove. The published plants from the west coast of Africa are to be found in the splendid and interesting *Flore d'Oware et Benin* of the Baron de Beauvois; in the earlier volumes of the Botanical Dictionary of the *Encyclopedie Methodique* by M. Lamarck, chiefly from Sierra Leone and Senegal; in the different volumes of Willdenow's *Species Plantarum* from Isert; in Vahl's *Enumeratio Plantarum* from Thonning; a few from Senegal in the *Genera Plantarum* of M. de Jussieu; and from Sierra Leone in a memoir on certain genera of *Rubiaceæ* by M. de Candolle, in the *Annales du Museum d'Histoire Naturelle*. Many remarkable plants are also mentioned in Adanson's *Account of Senegal*, and in Isert's *Travels in Guinea*.

On comparing Professor Smith's herbarium with these materials, it appears that from the river Senegal in about 16° N. lat. to the Congo which is in upwards of 6° S. lat. there is a remarkable uniformity in the vegetation, not only as to the principal natural orders and genera, but even to a considerable extent in the species of which it consists. Upwards of one third part of the plants in the collection from Congo had been previously observed on other parts of the coast, though of these the greater part are yet unpublished.

* *Lec. cit.*

Many of the Trees, the Palms, and several other remarkable plants, which characterise the landscape, as *Adansonia*, *Bombax pentandrum*, *Anihocleista*, *Musanga* of the natives (the genus related to *Cecropia*,) *Elæis guineensis*, *Raphia vinifera*, and *Pandanus Candelabrum*, appear to be very general along the whole extent of coast.

Sterculia acuminata,* the seed of which is the *Cola*, mentioned in the earliest accounts of Congo, exists, and is equally valued, in Guinea and Sierra Leone, and what is remarkable, has the same name in every part of the west coast.

The *Ordeal Tree* noticed in Professor Smith's journal under the name of Cassia; and in Captain Tuckey's narrative erroneously called a species of Cassia, if not absolutely the same plant as the *Red Water Tree* of Sierra Leone,† and as it is said also of the Gold Coast, belongs at least to the same genus.

A species of the *Cream Fruit*, mentioned by Professor Afzelius,‡ remarkable in affording a wholesome and pleasant saccharine fluid, used by the natives of Sierra Leone even to quench their thirst, though the plant belongs to *Apocineæ*, a family so generally deleterious, was also met with.

The *Sarcocephalus* of the same author,§ which is probably what he has noticed under the name of the country-fig of Sierra Leone,|| was found, and seems to be not uncommon, on the banks of the Congo.

Anona Senegalensis, whose fruit, though smaller than that of the cultivated species of the genus, has, according to Mr. Lockhart, a flavour superior to any of them, was every where observed, especially above Embomma, and appears to be a very general plant along the whole extent of coast:

And *Chrysobalanus Icaco*, or a species very nearly related to it, which is equally common from Senegal to Congo, was found abundantly near the mouth of the river.

The remarks I have to make on *Esculent Plants*, my knowledge of which is chiefly derived from the journals of Captain Tuckey and Professor Smith,

* *De Beauvois. Flore d'Oware* 1, p. 41, t. 24.

† *Winterbottom's Sierra Leone* 1, p. 129.

‡ *Sierra Leone Report for 1794*, p. 173, n. 47.

§ *In Herb. Banks.* || *Op. cit.* p. 171, n. 32.

and the communications of Mr. Lockhart, may be here introduced; the cultivated as well as the indigenous species being very similar along the whole of the west coast.

On the banks of the Congo, as far as the expedition proceeded, the principal articles of vegetable food were found to be Indian Corn or Maize (*Zea Mays*) Cassava, both sweet and bitter, (*Tatropa Manihot L.*); two kinds of Pulse, extensively cultivated, one of which is *Cytisus Cajan* of Linneus, the other not determined, but believed to be a species of *Phaseolus*; and Ground Nuts (*Arachis hypogæa L.*)

The most valuable fruits seen were Plantains (*Musa sapientum*;) the Papaw (*Carica papaya*) Pumpkins (*Cucurbita Pepo*;) Limes and Oranges (*Citrus medica et aurantium*;) Pine Apples (*Bromelia Ananas*;) the common Tamarind (*Tamarindus indica*;) and *Safu*, a fruit the size of a small plum, which was not seen ripe.

One of the most important plants not only of Congo, but of the whole extent of coast, is *Elæis guineensis* or the *Oil Palm*, from which also the best kind of Palm Wine is procured. Wine is likewise obtained from two other species of Palms, which are probably *Raphia vinifera*, and the supposed *Corypha*, considered as an *Hyphæne* by Professor Smith.

Among the other Alimentary Plants which are either of less importance or imperfectly known, may be mentioned the "*Shrubby Holcus*," noticed by Captain Tuckey (p. 138); the common *Yam*, which Mr. Lockhart informs me he saw only near Cooloo; and another species of *Dioscorea* found wild only, and very inferior to the *Yam*, requiring, according to the narrative, "four days boiling to free it from its pernicious qualities." On the same authority, "Sugar Canes of two kinds" were seen at Embomma, and Cabbages at Banza Noki: a kind of Capsicum or Bird Pepper, and Tobacco, were both observed to be generally cultivated: and I find in the herbarium, a specimen of the *Malaguetta Pepper*, or one of the species of *Amomum*, confounded under the name of *A. Granum Paradisi*.

Mr. Lockhart believes there was also a second kind of Ground Nut or **Pea*, which may be that mentioned by Merolla, under the name of *Incumba*,* and the second sort perhaps noticed in Proyard's account of Loango,† which is

* *Piccardo Relaz. del Viag. nel Reg. di Congo*, p. 119.

probably *Glycine subterranea* of Linneus, the Voandzeia of M. du Petit Thouars,* or Voandzou of Madagascar, where it is generally cultivated.†

Of the indigenous fruits, *Anona senegalensis*, *Sarcocephalus*, a species of Cream fruit, and *Chrysobalanus Icaco*, have been already mentioned, as trees common to the whole line of coast.

A species of *Ximenia* was also found by Professor Smith, who was inclined to consider it as not different from *X. americana*: its fruit, which, according to his account, is yellow, the size of a plum and of an acid, but not disagreeable taste, is in the higher parts of the river called Gangi, it may therefore probably be the *Ogheghe* of Lopez,‡ by whom it is compared to a yellow plum, and the tree producing it said to be very generally planted.

An *Antidesma*, probably like that mentioned by Afzelius, as having a fruit in size and taste resembling the currant, is also in the herbarium.

It is particularly deserving of attention, that the greater part of the plants now enumerated, as cultivated on the banks of the Congo, and among them nearly the whole of the most important species, have probably been introduced from other parts of the world, and do not originally belong even to the continent of Africa. Thus it may be stated with confidence that the Maize, the Manioc or Cassava, and the Pine Apple, have been brought from America, and probably the Papaw, the Capsicum, and Tobacco; while the Banana or Plantain, the Lime, the Orange, the Tamarind, and the Sugar Cane, may be considered as of Asiatic origin.

In a former part of this essay, I have suggested that a careful investigation of the geographical distribution of genera might in some cases lead to the determination of the native country of plants at present generally dispersed. The value of the assistance to be derived from the source referred to, would amount to this; that in doubtful cases, where other arguments were equal, it would appear more probable that the plant in question should belong to that country in which all the other species of the same genus were found decidedly indigenous, than to that where it was the only species of the genus known to exist. It seems to me that this reasoning may be applied with advantage

* *Nov. Gen. Madagasc.* n. 77.

† *Flacourt Madagasc.* pp. 114 et 118.

‡ *Pigafetta, Hartwell's Translat.* p. 115.

towards determining the original country of several of the plants here enumerated, especially of the *Banana*, the *Papaw*, the *Capsicum*, and *Tobacco*.

The *Banana* is generally considered to be of Indian origin: Baron Humboldt, however, has lately suggested * that several species of *Musa* may possibly be confounded under the names of *Plantain* and *Banana*; and that part of these species may be supposed to be indigenous to America. How far the general tradition said to obtain both in Mexico, and Terra Firma, as well as the assertion of Garcilasso de la Vega respecting Peru, may establish the fact of the *Musa* having been cultivated in the new continent before the arrival of the Spaniards, † I do not mean at present to enquire. But in opposition to the conjecture referred to, it may be advanced that there is no circumstance in the structure of any of the states of the *Banana* or *Plantain* cultivated in India, or the islands of equinoctial Asia, to prevent their being all considered as merely varieties of one and the same species, namely *Musa sapientum*; that their reduction to a single species is even confirmed by the multitude of varieties that exist; ‡ by nearly the whole of these varieties being destitute of seeds; and by the existence of a plant indigenous to the continent of India, § producing perfect seeds; from which, therefore, all of them may be supposed to have sprung.

To these objections to the hypothesis of the plurality of species of the *Banana*, may be added the argument referred to as contributing to establish its Asiatic origin; for we are already acquainted with at least five distinct species of *Musa* in equinoctial Asia, while no other species has been found in America; nor does it appear that the varieties of *Banana*, cultivated in that continent, may not equally be reduced to *Musa sapientum* as those of India: and lastly, it is not even asserted that the types of any of those supposed species of *American Banana*, growing without cultivation, and producing perfect seeds, have any where been found.||

* *Nouv. Espag.* vol. 2, p. 360.

† *Op. cit.* p. 361. It may be observed, however, that this is not the opinion in every part of the continent of South America, for with respect to Brazil, Marcgraf and Piso assert that both the *Banana* and *Plantain* are considered as introduced plants, and the latter apparently from Congo. (*Marcg.* p. 137, et *Piso Hist. Nat. Bras.* p. 154.)

‡ *Musa sapientum*, *Rôx. Corom.* tab. 275.

§ M. Desvaux, in a dissertation on the genus *Musa* (*in Journ. de Botanique appl.* vol. 4,

That the Bananas now cultivated in equinoctial Africa, come originally from India, appears to me equally probable, though it may be allowed that the *Ensete* of Bruce * is perhaps a distinct species of this genus, and indigenous only to Africa.

The *Papaw* (*Carica papaya*), from analogous reasoning, may be regarded as of American origin; there being several other decidedly distinct species natives of that continent, while no species except the cultivated *Papaw*, nor any plant nearly related to this singular genus, is known to exist either in Asia or Africa. But in the present case, the assistance derived from the argument adduced, may perhaps be considered as unnecessary; for the circumstance of there being no Sanscrit name for so remarkable a plant as the *Papaw*,† is nearly decisive of its not being indigenous to India. And in the Malay Islands, the opinion of the inhabitants, according to Rumphius,‡ is that it was there introduced by the Portuguese.

The same argument may be extended to *Capsicum*, of which all the known species probably belong to the new continent; for the only important exception stated to this genus being wholly of American origin, namely *C. frutescens*,

p. 1), has come to the same conclusion respecting the original country of the cultivated Banana, and also that its numerous varieties are reducible to one species. In this dissertation he takes a view of the floral envelope of *Musa* peculiar to himself. The perianthium in this genus is generally described as consisting of two unequal divisions or lips. Of these, one is divided at top into five, or more rarely into three segments, and envelopes the other, which is entire, of a different form and more petal-like texture. The enveloping division M. Desvaux regards as the calyx, the inner as the corolla. It seems very evident to me, however, that the deviation in *Musa* from the regular form of a Monocotyledonous flower, consists in the confluence of the three divisions of the outer series of the perianthium, and in the cohesion, more or less intimate, with these of the two lateral divisions of the inner series; the third division of this series, analogous to the labellum in the Orchidæ, being the inner lip of the flower. This view seems to be established by the several modifications observable in the different species of *Musa* itself, especially in *M. superba* of Roxburgh, (*Plants of Coromand.* 3, tab. 223) and in the flower of *Musa* figured by Plumier, (*Nov. gen.* t. 34.), but still more by the irregularity confined to the inner series in *Strelitzia*, and by the near approach to regularity, even in this series, in *Ravenala* (or *Urania*), both of which belong to the same natural order.

* *Travels*, vol. 5, p. 36.

† *Fleming in Asiatic Resear.* II. p. 161.

‡ *Herb. Amboin.* I. p. 147.

seems to be set aside merely by the appellations of *Tchilli* and *Lada Tchilli*, as given to it in the Malay Islands; *Chilli*, either simply, or in composition, being the Mexican name for all the species and varieties of this genus.*

All the species of *Nicotiana* appear to be American, except *N. Australasica* (the *N. undulata* of Ventenat and Prod. Flor. Nov. Holl. but not of Flora Peruviana,) which is certainly a native of New Holland. The exception here, however, does not materially invalidate the reasoning, *N. Australasica* differing so much from the other species as to form a separate section of the genus.

The same argument might perhaps be applied to other plants of doubtful origin, as to *Canna indica*, which it would derive from America.

It is certainly not meant, however, to employ this reasoning in every case, and in opposition to all other evidence; and instances may be found, even among the alimentary plants, where it is very far from being satisfactory. Thus the Cocoa Nut, though it will probably be considered as indigenous to the shores and islands of equinoctial Asia, is yet the only species of its genus that does not belong exclusively to America.

Cytisus Cajan, may be supposed to have been introduced from India. This plant, which is very generally cultivated in the vicinity of the Congo, I conclude is the *Voando*, mentioned by Captain Tuckey as being ripe in October; and as Mr. Lockhart understood from the natives, that *Cytisus Cajan* continues to bear for three years, it is probably Merolla's *Ouvando*, of which he gives a similar account.†

Whether *Arachis hypogæa* be indigenous or introduced, cannot now perhaps be satisfactorily determined. This remarkable plant, whose singular structure and economy were first correctly described by M. Poiteau,‡ and which was every where seen in abundance, as far as the river was examined, appears to form an important article of cultivation along the whole of the west coast of Africa, and probably also on the east coast, on several parts of which it was found by Loureiro.§

According to the same author, it is also universally cultivated in China and Cochinchina.

* Hernandez, *Rer. Medic. Nov. Hispan. Thesaur.* p. 134, et *Nieremb. Hist. Nat.* p. 363.

† Piccardo *Relaz.* p. 120.

‡ *Mém. de l'Institut. Sc. Phys. Sav. Etrang.* 1, p. 435.

§ *Flor. Coch.* 430.

. From China it has probably been introduced into the continent of India, Ceylon, and the Malayan Archipelago, where, though now generally cultivated, there is reason to believe, particularly from the names given to it, that it is not indigenous. I think it not very improbable that it may have been carried from Africa to various parts of equinoctial America, though it is noticed in some of the early accounts of that continent, especially of Peru and Brazil.

According to Professor Sprengel,* it is mentioned by Theophrastus as cultivated in Egypt: but it is by no means evident that *Arachis* is the plant intended in the passage of Theophrastus referred to; and it is probable that had it been formerly cultivated in Egypt, it would still be found in that country; it is not, however, included either in Forskål's Catalogue, or in the more extensive *Flora Egyptiaca* of M. Delile.

There is nothing very improbable in the supposition of *Arachis hypogæa* being indigenous to Asia, Africa, and even America; but if it be considered as originally belonging to one of those continents only, it is more likely to have been brought from China through India to Africa, than to have been carried in the opposite direction.

Glycine subterranea, however, which is extensively cultivated in Africa, Madagascar, and several parts of equinoctial America, is probably of African origin; it is stated, at least both by Marcgraf and Piso, to have been introduced into Brazil from Angola or Congo.†

The *Holcus* noticed by Captain Tuckey, of which the specimens in the herbarium do not enable me to determine whether it be a distinct species, or a variety only of *H. sorghum* or *saccharatus*, may be considered as indigenous, or at least as belonging to Africa. According to Mr. Lockhart, it is very generally found wild, and it is only once mentioned as cultivated: it may, however, have been formerly cultivated, along with other species of Millet, to a much greater extent; its place being now supplied by the Maize, which gives probably both a more productive and a more certain crop.

The *Dioscorea* or bitter Yam, which was observed only in a wild state, may be presumed to be a native species; and if ever it has been cultivated, it may

* *Hist. Rei Herb.* 1, p. 98.

† Mandubi d'Angola. Marcg. *Hist. Nat. Brasil.* 43. Mandobi, Piso, *Hist. Nat. Brasil.* p. 256.

in like manner be supposed to have been superseded by the Manioc or Cassava.

The *Safu*,* which Mr. Lockhart understood from the natives was one of their most esteemed fruits, he observed to be very generally planted round the villages, especially from Embomma upwards, and to be carefully preserved from birds: its importance is perhaps increased from its ripening in October, a season when the general supply of vegetable food may be supposed to be scanty.

There seems no reason to doubt that this tree, whose probable place in the system I have stated in my remarks on Amyridæ, belongs originally to the west coast of Africa,

Elæis guineensis, of which the oil is distinctly described in the beginning of the sixteenth century by *Da Ca da Mosto*, in his account of Senegal,† is without doubt indigenous to the whole extent of this coast; as is *Raphia vinifera*, of which the remarkable fruit also very early attracted attention;‡ and the supposed species of *Corypha*.

Of Alimentary Plants, whether cultivated or indigenous, that are known or supposed to belong to the west coast of equinoctial Africa, but which were not seen on the banks of the Congo, a few of the more important may be mentioned.

Among these are the Cocoa Nut and Rice, the former, according to the natives, not being found in the country. The absence of these two valuable plants is the more remarkable, as the Cocoa Nut is said to exist in the neighbouring kingdom of Loango; and according to Captain Tuckey, a certain portion of land was seen on the banks of the river well adapted to the production of Rice, which is mentioned as cultivated in some of the earlier accounts of Congo.

The Sweet Potatoe (*Convolvulus Batatas*), also noticed by the Portuguese Missionaries, was not met with.

The Butter and Tallow Tree of Afzelius, which forms a new genus belonging to Guttiferæ; the Velvet-Tamarind of Sierra Leone (*Codarium acutifolium*;§) and the Monkey Pepper, or Piper Æthiopicum of the shops (*Unona æthiopica* of Dunal), which is common on many parts of the coast, were not observed.

* Probably the *Zaffo* of some of the earlier accounts of Congo, vide *Malte-Brun Précis de la Geogr.* 5, p. 9.

† *Ramusio* 1, p. 104. *Gryn. Nov. Orb.* 28. ‡ *Palma-Pinus*, *Lobel. advers.* p. 450.

§ *Afzel. Gen. Plant. Guincen. par. prim.* p. 23. *Codarium nitidum Vahl. enum.* 1, p. 302.

. Two remarkable plants, the *Akee** and the *Jamaica* or *American Nutmeg*,† now cultivated in the West India colonies; and the former undoubtedly, the latter probably, introduced from Africa by the Negroes, were neither met with on the banks of the Congo, nor have they been yet traced to any part of the west coast.

The relation which the vegetation of the *Eastern shores of equinoctial Africa* has to that of the west coast, we have at present no means of determining; for the few plants, chiefly from the neighbourhood of Mozambique, included in Loureiro's *Flora Cochinchinensis*, and a very small number collected by Mr. Salt on the same part of the coast, do not afford materials for comparison.

The character of the collections of *Abyssinian Plants* made by Mr. Salt in his two journeys, forming part of Sir Joseph Banks's herbarium, and amounting to about 260 species, is somewhat extratropical, and has but little affinity to that of the vegetation of the west coast of Africa.

To the *Flora of Egypt*, that of Congo has still less relation, either in the number or proportions of its natural families: the herbarium, however,

* *Blighia sapida*, König in *Annals of Bot.* 2, p. 571. *Hort. Kew. ed. 2da. vol. 2, p. 350.*

At the moment that this sheet was about to have been sent to the press, Sir Joseph Banks received a small collection of specimens and figures of plants, observed in the late Mission to Cummahee, the capital of Ashantee; and among them a drawing of the fruit and leaf of a plant, there called *Attueah* or *Attuah*, which is no doubt the *Akee*, whose native country is therefore now ascertained.

† *Monodora myristica*, Dunal *Annonac.* p. 80. *Decand. Syst. Nat. Reg. Veget.* 1, p. 477. *Anona myristica*, Gært. *Sem.* 2, p. 194, t. 125, p. 1. *Lunan Hort. Jamaic.* 2, p. 10. This remarkable plant is very properly separated from *Anona*, and considered as a distinct genus by M. Dunal in his monograph of *Anonacæ*. The character given of this new genus, however, is not altogether satisfactory, M. de Candolle's description, from which it is derived, having probably been taken from specimens which he had it not in his power to examine completely. Both these authors have added to this genus *Annona microcarpa* of Jacquin (*Fragm. Bot.* p. 40, t. 44, f. 7), established by that author from the fruit of my *Cargillia australis* (*Prodr. Flor. Nov. Holl.* 1, p. 527) which belongs to the very different family of *Ebenacæ*.

Long, in his *History of Jamaica* (vol. 3, p. 735.) has given the earliest account of *Monodora Myristica*, under the name of the *American Nutmeg*, and considers it to have been probably introduced from South America: according to other accounts, it comes from the Mosquito shore; but there is more reason to suppose that it has been brought by the Negroes from some part of the west coast of Africa.

includes several species which also belong to Egypt, as *Nymphaea Lotus*, *Cyperus Papyrus* and *articulatus*, *Sphenoclea zeylanica*, *Glinus lotoides*, *Ethulia conyzoides*, and *Grangea maderaspatana*.

Of the many remarkable genera and orders characterising the vegetation of *South Africa*, no traces are to be found in the herbarium from Congo. This fact is the more worthy of notice, because even in *Abyssinia* a few remains, if I may so speak, of these characteristic tribes, have been met with; as the *Protea abyssinica*,* observed by Bruce, and *Pelargonium abyssinicum* and *Geisorrhiza abyssinica*† found by Mr. Salt.

Between the plants collected by Professor Smith in the island of *St. Jago* and those of the Congo herbarium, there is very little affinity; great part of the orders and genera being different, and not more than three species, of which *Cassia occidentalis* is one, being common to both. To judge from this collection of *St. Jago*, it would seem that the vegetation of the Cape Verd Islands is of a character intermediate between that of the adjoining continent and of the Canary Islands, of which the Flora has, of course, still less connection with that of Congo.

It might perhaps have been expected that the examination of the vicinity of the Congo would have thrown some light on the origin, if I may so express myself, of the Flora of *St. Helena*. This, however, has not proved to be the case; for neither has a single indigenous species, nor have any of the principal genera, characterising the vegetation of that Island, been found either on the banks of the Congo, or on any other part of this coast of Africa.

There appears to be some affinity between the vegetation of the banks of the Congo and that of *Madagascar* and the *Isles of France* and *Bourbon*. This affinity, however, consists more in a certain degree of resemblance in several natural families and extensive or remarkable genera, than in identity of species, of which there seems to be very few in common.

The Flora of Congo may be compared with those of equinoctial countries still more remote.

With that of *India*, it agrees not only in the proportions of many of its principal families, or in what may be termed the equinoctial relation, but also, to a certain degree, in the more extensive genera of which several of these

* Gagnedi Bruce's Travels 5, p. 52.

† Salt's Travels in Abyssinia, append. p. Lxiii. and lxxv.

families consist: and there are even about forty species common to these distant regions.

To the vegetation of *Equinoctial America* it has certainly much less affinity. Several genera, however, which have not yet been observed in India or New Holland, are common to this part of Africa and America:* and there are upwards of thirty species in the Congo herbarium, which are also natives of the opposite coasts of Brazil and Guiana.

As the identity of species, especially of the Dicotyledonous division, common to equinoctial America and other intratropical countries, has often been questioned, I have subjoined two lists of plants included in the Congo herbarium, of which the first consists of such species as are common to America and India: and the second, of such as are found in America only.

I have given also a third list, of species common to Congo and India, or its Islands, but which have not been observed in America:

And a fourth is added, consisting of doubtful plants, to which I have, in the mean time, applied the names of those species they most nearly resemble, and to which they may really belong, without, however, considering their identity as determined.

I. *List of Plants common to Equinoctial Africa, America, and Asia.*

Gleichenia Hermanni Prodr. Flor.	}	Boerhaavia mutabilis Prodr. Flor. Nov.
Nov. Holl.		Holl.
Mertensia dichotoma Willd.	}	Ipomoea pes capræ Nob.
Agrostis Virginica L.		Convolvulus pes capræ L.
Cyperus articulatus L.	} ead. sp.	———— brasiliensis L.
———— niloticus Vahl.		Ipomoea pentaphylla Jacq.
Lipocarpus argentea Nob.	}	Scoparia dulcis L.
Hypelytrum argenteum Vahl.		Heliotropium indicum L.
Eleocharis capitata Prodr. Fl. Nov. Holl.		Sphenoclea zeylanica Gært.
Fuirena umbellata L. fil.		Ageratum conyzoides L.
Pistia Stratiotes L.		

* Namely, *Eleis* Jacq. *Rivina* L. *Telanthera* Nob. (*Alternanthera pentandra*.) *Alchornea* Sw. *Blechnum* Prodr. Flor. Nov. Holl. (*Blechi* sp. Juss.) *Schwenckia* L. *Hyptis* Jacq. *Vandellia* L. *Annona* L. *Banisteria* Nob. (*Banisteria* sp. L.) *Paullinia* Juss. (*Paullinia* sp. L.) *Vismia* Ruiz. et Pav. *Conocarpus* L. *Legnotis* Sw. (*Cassipourea Aubl.*) *Chailletia Decand.*

Waltheria indica L.	} ead. sp.	Guilandina Bonduc L.	} ead. sp.
— americana L.		— Bonducella L.	
Hibiscus tiliaceus L.		Abrus precatorius L.	
Sida periplocifolia L.		Hedysarum triflorum L.	
Cassia occidentalis L.			

II. *Plants common to Equinoctial Africa and America: but not found in India.*

Octoblepharum albidum Hedw.		Sida juncea Banks. et Soland. Mss.	
Acrostichum aureum L.		Brasil.	
Eragrostis ciliaris.	}	Urena americana L.	} ead. sp.
Poa ciliaris L.		— reticulata Cavan.	
Cyperus ligularis L.		Malachra radiata L.	
Schwenckia americana L.		Jussiaea erecta L.	
Hyptis obtusifolia Nob.		Crotalaria axillaris Hort. Kew. & Willd.	
Struchium (americanum) Br. jam. 312.		Pterocarpus lunatus L.	

III. *Plants common to Equinoctial Africa and India: but not found in America.*

Roccella fuciformis Achar. Lichenog.		Grangea (maderaspata) Adans.	
440.		Lavenia erecta Sw.	
Perotis latifolia Soland. in Hort. Kew.		Oxystelma esculentum Nob.	}
Centotheca lappacea Beauv.		Periploca esculenta Roxb.	
Eleusine indica Gaert.		Nymphæa Lotus L.	} ead. sp.
Flagellaria indica L.		— pubescens Willd.	
Gloriosa superba L.		Hibiscus surattensis L.	
Celosia argentea L.	} ead. sp.	Leea sambucina L.	
— margaritacea L.		Hedysarum pictum L.	
— albida? Willd.		Indigofera lateritia Willd.	
Desmochæta lappacea Decand.		Glinus lotoides L.	

IV. *List of Species which have not been satisfactorily ascertained.*

Acrostichum alciorne Sw.	}	Panicum crus-galli L.	
— stemaria Beauv.		Typha angustifolia L.	
Imperata cylindrica Prodr. Flor. Nov. Holl.		Giseckia pharnaceoides L.	

<i>Cassytha pubescens</i> Prodr. Flor. Nov.	<i>Hydrocotyle asiatica</i> L.
<i>Holl.</i>	<i>Hedysarum adscendens</i>
<i>Celtis orientalis</i> L.	<i>Hedysarum vaginale</i> L.
<i>Cardiospermum grandiflorum</i> Sw.	<i>Pterocarpus Ecastophyllum</i> L.
<i>Paullinia pinnata</i> L.	

On these lists it is necessary to make some observations.

1st. The number of species in the three first lists taken together is equal to at least one-twelfth of the whole collection. The proportion, indeed, which these species bear to the entire mass of vegetation on the banks of the Congo is probably considerably smaller, for there is no reason to believe that any of them are very abundant except *Cyperus Papyrus* and *Bombax pentandrum*, and most of them appear to have been seen only on the lower part of the river.

2nd. The relative numbers of the species belonging to the primary divisions in the lists, is analogous to, and not very materially different from, those of the whole herbarium; *Dicotyledones* being to *Monocotyledones* nearly as 3 to 1; and *Acotyledones* being to both these divisions united as hardly 1 to 16: hence the *Phænogamous* plants of the lists alone form about one-thirteenth of the entire collection.

The proportions now stated are very different from those existing in the catalogue I have given of plants common to New Holland and Europe;* in which the *Acotyledones* form one-twentieth, and the *Phænogamous* plants only one-sixtieth part of the extra-tropical portion of the Flora; while the *Monocotyledones* are to the *Dicotyledones* as 2 to 1.

The great proportion of *Dicotyledonous* plants in the lists now given, and especially in the two first, which are altogether composed of American species, is singularly at variance with an opinion very generally received, that no well established instance can be produced of a *Dicotyledonous* plant, common to the equinoctial regions of the old and new continent.

3d. The far greater part of the species in the lists are strictly equinoctial; a few, however, have also been observed in the temperate zones, namely *Agrostis virginica*, belonging, as its name implies, to Virginia, and found also on the shores of Van Diemen's Island, in a still higher latitude; *Cyperus Papyrus*, and *articulatus*, *Nymphaea Lotus*, and *Pistia Stratiotes*, which are.

natives of Egypt; *Glinus lotoides* of Egypt and Barbary; and *Flagellaria indica*, existing on the east coast of New Holland, in as high a latitude as 32° S.

4th. It may perhaps be suggested with respect to these lists, that they contain or even chiefly consist of plants that during the constant intercourse which has now subsisted for upwards of three centuries between Africa, America, and India, may have, either from design or accidentally, been carried from one of these regions to another, and therefore are to be regarded as truly natives of that continent only from which they originally proceeded.

It appears to me, however, that there is no plant included in any of the lists which can well be supposed to have been *purposely* carried from one continent to another, unless perhaps *Chrysobalanus Icaco*, and *Cassia occidentalis*; both of which may possibly have been introduced into America by the Negroes, from the west coast of Africa; the former as an eatable fruit, the latter as an article of medicine. It seems at least more likely that they should have travelled in this than in the opposite direction. But I confess the mode of introduction now stated, does not appear to me very probable, even with respect to these two plants; both of them being very general in Africa, as well as in America; though *Chrysobalanus Icaco* is considered of but little value as a fruit in either continent; and for *Cassia occidentalis*, which exists also in India, another mode of conveyance must likewise be sought.

Several species in the lists, however, may be supposed to have been *accidentally* carried, from adhering to, or being mixed with, articles of food or commerce; either from the nature of the surface of their pericarpial covering, as *Desmochæta lappacea*, *Lavenia erecta*, *Ageratum conyzoides*, *Grangea maderaspatana*, *Boerhaavia mutabilis*, and *Hyptis obtusifolia*; or from the minuteness of their seeds, as *Schwenckia americana*, *Scoparia dulcis*, *Jussiaea erecta*, and *Sphenoclea zeylanica*. That the plants here enumerated have actually been carried in the manner now stated is, however, entirely conjectural, and the supposition is by no means necessary: several of them, as *Lavenia erecta*, *Scoparia dulcis*, and *Boerhaavia mutabilis*, being also natives of the intratropical part of New Holland; their transportation to or from which cannot be supposed to have been effected in any of the ways suggested.

The probability, however, of these modes of transportation, with respect to the plants referred to, and others of similar structure, being even admitted, the greater part of the lists would still remain; and to account for the disper-

tion of these, recourse must be had to natural causes, or such as are unconnected with human agency. But the necessity of calling in the operation of these causes implies the adoption of that theory according to which each species of plants is originally produced in one spot only, from which it is gradually propagated. Whether this be the only, or the most probable opinion that can be held, it is not my intention to enquire: it may however be stated as not unfavourable to it, that, of the Dicotyledonous plants of the lists, a considerable number have the embryo of the seed highly developed, and at the same time well protected by the texture of its integuments.

This is the case in Malvaceæ, Convolvulaceæ, and particularly in Leguminosæ, which is also the most numerous family in the lists, and in several of whose species, as *Guilandina Bonduc*, and *Abrus precatorius*, the two conditions of developement and protection of the embryo coexist in so remarkable a degree, that I have no doubt the seeds of these plants would retain their vitality for a great length of time, either in the currents of the ocean,* or in the digestive organs of birds and other animals; the only means apparently by which their transportation from one continent to another can be effected: and it is deserving of notice that these seem to be the two most general plants on the shores of all equinoctial countries.

The Dicotyledonous plants in the lists which belong to other families have the embryo of the seed apparently less advanced, but yet in a state of considerable developement, indicated either by the entire want or scanty remains of albumen: the only exception to this being *Leas*, in which the embryo is many times exceeded in size by the albumen.

In the Monocotyledonous plants, on the other hand, consisting of Gramineæ, Cyperaceæ, Gloriosa, Flagellaria and Pistia, the embryo bears a very small proportion to the mass of the seed, which is formed of albumen, generally farinaceous. But it may here be observed that the existence of a copious albumen in Monocotyledones does not equally imply an inferior degree of

* Sir Joseph Banks informs me, that he received some years ago the drawing of a plant, which his correspondent assured him was raised from a seed found on the west coast of Ireland, and that the plant was indisputably *Guilandina Bonduc*. Linnæus also seems to have been acquainted with other instances of germination having taken place in seeds thrown on shore on the coast of Norway. *Vide Coloniarum Plantarum*, p. 3, in *Amen. Acad.* vol. 8.

vitality in the embryo, but may be considered as the natural structure of that primary division; seeds without albumen occurring only in certain genera of the paradoxical Aroideæ, and in some other Monocotyledonous orders which are chiefly aquatic.

5. Doubts may be entertained of the identity of particular species. On this subject I may observe, that for whatever errors may be detected in these lists, I must be considered as solely responsible; the insertion of every plant contained in them being founded on a comparison of specimens from the various regions of which their existence in the particular lists implies them to be natives. The only exception to this being *Lipocarpa argentea*, of which I have not seen American specimens; as a native of that continent therefore it rests on the very sufficient authority of Baron Humboldt and M. Kunth.

In my remarks on the natural orders, I have already suggested doubts with respect to certain species included in the lists, and shall here add a few observations on such of the others as seem to require it.

Acrostichum Aureum L. was compared, and judged to agree, with American specimens; and I have therefore placed it in the 2d list, without, however, meaning to decide whether those plants originally combined with *A. aureum*, and now separated from it, should be regarded as species or varieties.

Fuirena umbellata L. *fil.* from Congo has its umbels somewhat less divided than either the American plant or that from the continent of India; but from specimens collected in the Nicobar Islands, this would appear to be a variable circumstance.

Gloriosa superba L. which seems to be very general along the whole of the west coast of Africa, is considered as a variety of the Indian plant by M. Lamarek. This African variety has no doubt given rise to the establishment of the second species of the genus, namely *G. simplex*, which Linæus adopted from Miller;* and which Miller founded on the account sent to him by M. Richard, of the Trianon Garden, along with the seeds of what he called a new *Gloriosa*, brought from Senegal by Adanson, and having blue flowers. Miller had no opportunity of determining the correctness of this account; for though the seeds vegetated, the plant died without flowering; but he added a character not unlikely to belong to the seedling plants of *G. superba*, namely

* *Gloriosa* 2, *Mill. Dict. ed. 1.*

the want of tendrils. Adanson himself, indeed, notices what he considers a new species of *Gloriosa* in Senegal,* but he says nothing of the colour of its flowers, which he would hardly have omitted, had they been blue: that his plant, however, was not without tendrils, may be inferred from their entering into the character he afterwards gave of the genus,† as well as from M. Lamarck's account of his variety β of *G. superba*,‡ which he seems to have described from Adanson's specimens. And as no one has since pretended to have seen a species of this genus, either with blue flowers, or leaves without tendrils, *G. simplex*, which has long been considered as doubtful, may be safely left out of all future editions of the *Species Plantarum*. As the supposed *G. superba* of this coast, however, seems to differ from the Indian plant in the greater length and more equal diameter of its capsule, it may possibly be a distinct species, though at present I am inclined to consider it as only a variety.

Sphenoclea zeylanica Gært. I have compared this plant from Congo with specimens from India, Java, China, Cochinchina,§ Gambia, Demerary, and the island of Trinidad.

I was at one time inclined to believe, that *Sphenoclea* might be considered as an attendant on Rice, which it very generally accompanies, and with which I supposed it to have been originally imported from India into the various countries where it is found. This hypothesis may still account for its existence in the rice fields of Egypt;|| but as it now appears have to been observed in countries where there is no reason to believe that rice has ever been cultivated, the conjecture must be abandoned.

Hibiscus tiliaceus L. agrees with the plant of India, except in a very slight difference in the acumen of the leaf; but the specimens from America have their outer calyx proportionally longer.

Sida periplocifolia L. corresponds with American specimens; those in Hermann's herbarium, from which the species was established, have a longer acumen to the leaf: in other respects I perceive no difference.

* Nouvelle espèce de *Methonica*, *Hist. Nat. du Senegal*, p. 137.

† Mondoni, *Fam. des Plant.* 2. p. 48.

‡ *Encyc. Method. Bot.* 4. p. 134.

§ *Rapinia herbacea* of the *Flora Cochinchinensis* (p. 127) is certainly *Sphenoclea zeylanica*, as appears by a specimen sent to Sir Joseph Banks by Loureiro himself.

|| *Delile Flor. Egypt. illust. in op. cit.*

Waltheria indica L. I consider *W. americana* to be a variety of this sportive species, which seems to be common to all equinoctial countries.

Urena americana L. and *U. reticulata* Cavan. appear to me not to differ specifically; and the plant from Congo agrees with West India specimens.

Jussiaea erecta L. from Congo, agrees with West India specimens in having linear leaves; a specimen, however, from Miller's herbarium, which has been compared, and is said to correspond, with that in the Linnean collection, has elliptical leaves.

Chrysobalanus Icaco L. has its leaves more deeply retuse than any American specimens I have seen, but in this respect it agrees with Catesby's figure.

Guilandina Bonduc L. from which *G. Bonducella* does not appear to differ in any respect, is one of the most general plants on the shores of equinoctial countries.

Pterocarpus lunatus L. I have compared the plant from Congo with an authentic specimen from the Linnean herbarium, the examination of which proves that the appearance of ferruginous pubescence in the panicle, noticed in Linne's description, is the consequence of his specimen having been immersed in spirits.

Several of the plants included in the fourth list, I am inclined to consider varieties only of the species to which they are referred; but I have placed them among the more doubtful plants of this list, as their differences seem to be permanent, and are such as admit of being expressed. One of these is

Cardiospermum grandiflorum Sw. of which the specimens from Congo differ somewhat in inflorescence from the West India plant.

Paullinia pinnata L. is distinguished rather remarkably from the American plant by the figure of the leaflets, which approach to cuneiform, or widen upwards, but I can perceive no other difference.

Pterocarpus Ecastophyllum L. differs merely in the want of the very short acumen or narrow apex of the leaf, which I have constantly found in all the West India specimens I have examined.

Giseckia pharnaceoides L. from Congo, has nearly linear leaves; but I have seen specimens from Koenig with leaves of an intermediate form.

I shall conclude this essay, already extended considerably beyond my original plan, with a general statement of the proportion of new genera and species contained in Professor's Smith's herbarium.

The whole number of species in the collection is about 620; but as specimens of about thirty of these are so imperfect as not to be referable to their proper genera, and some of them not even to natural orders, its amount may be stated at 590 species.

Of these about 250 are absolutely new: nearly an equal number exist also in different parts of the west coast of equinoctial Africa, and not in other countries; of which, however, the greater part are yet unpublished: and about 70 are common to other intratropical regions.

Of unpublished genera there are 32 in the collection; twelve of which are absolutely new, and three, though observed in other parts of this coast of equinoctial Africa, had not been found before in a state sufficiently perfect, to ascertain their structure; ten belong to different parts of the same line of coast; and seven are common to other countries.

No natural order, absolutely new, exists in the herbarium; nor has any family been found peculiar to equinoctial Africa.

The extent of Professor Smith's herbarium proves not only the zeal and activity of my lamented friend, but also his great acquirements in that branch of science, which was his more particular province, and to his excessive exertions in the investigation of which he fell a victim, in the ill-fated expedition to Congo.

Had he returned to Europe, he would assuredly have given a far more complete and generally interesting account of his discoveries than what is here attempted: and the numerous facts which he could no doubt have communicated respecting the habit, the structure, and the uses of the more important and remarkable plants, would probably have determined him to have followed a very different plan from that adopted in the present essay.

It remains only that I should notice the exemplary diligence of the Botanic Gardener, Mr. David Lockhart, the only survivor, I believe, of the party by whom the river above the falls was examined, in that disastrous journey which proved fatal to the expedition.

From Mr. Lockhart I have received valuable information concerning many of the specimens contained in the herbarium, and also respecting the esculent plants observed on the banks of the Congo.

APPENDIX. N^o. VI.

MY DEAR SIR,

British Museum, Nov. 5th, 1817.

In compliance with your desire, I have examined the specimens of rocks that were collected in the late expedition to Congo, and presented by the Lords Commissioners of the Admiralty to the British Museum. These specimens are all from the banks of the narrows of the Zaire, and are few in number; but they suffice to prove that the rock formation which prevails on the banks and islands of the lower parts of the river is primitive, and greatly resembles that beyond the ocean to the west: a circumstance which adds to the probability that the mountains of Pernambuco, Rio, and other adjacent parts of South America, were primevally connected with the opposite chains that traverse the plains of Congo and Loango. As you have already given, in your "General Observations," a satisfactory view of the broad geological features of the country along those banks, as far as they could be collected from the narratives of Captain Tuckey, and Dr. Smith, I shall confine myself to a few desultory remarks which offer themselves upon comparing the observations of these gentlemen with such of the specimens as have their respective localities affixed to them.

The specimens from the Fetish rocks exhibit a series of granitic compounds, in which the feldspar predominates: and most of them, especially the fine-grained varieties, contain disseminated a great quantity of minute noble garnets, some of them pellucid, others opaque, and of a reddish brown colour; and all belonging to the trapezoidal or leucite modification. Similar garnets also abound in the mica slate of Gombae. A few specimens of a siliceous rock, nearly compact, being composed of confluent particles of quartz, intermixed with minute scales of mica, are likewise ticketed as obtained from the Fetishes. This insulated group of rocks seems to represent a miniature of the stupendous granitic bulwark, which arises from the plain on the north side of the river Coanzo, near Cabazzo (the capital of Matamba), and of which an account, together with a good representation, has been given by Father Cavazzo. We

are told by this author, that the name given to it by the Portuguese, is *il Presidio* (the fortress), and that the natives call it "*Maopongu*,"—a word which, making but little allowance for national difference of expressing the same sound in writing, is pretty like that of "*M'wangoo*," synonymously added to the sketch given of the Fetish rock by Captain Tuckey.

Boka M'Bomma, according to the same gentleman's account, consists entirely of schistus; but his own specimens from the S., S.E., N.E., and S. W. parts of that island, are stratified granite or gneiss, in which the felspar exists in very small proportion, and which, on the S.W. side, passes into a beautifully resplendent silvery variety, stained, towards the surface of the blocks or separated pieces, by brown iron ochre. It is in the variety of this gneiss from the last-mentioned part of the island, that laminar particles of a dark brown colour are seen, some of them exhibiting traces of the regular octohedral form, and which appear to be an iron oxydule. There is also, among the specimens from Boka Embomma, a fragment of primitive green-stone with embedded garnets.

The specimens from the creek of Banza M'bomma exhibit a mixture of fine granular hornblende and quartz; some of them are real hornblende-rock, and contain disseminated garnets. These specimens, among which there are also some varieties of reddish massive quartz, not unlike milk-quartz, were collected by Mr. Tudor.

Besides these primitive rocks, and those from Chesalla, near the Banza, which latter affords two varieties of gneiss with black and with yellow mica, we have, from the same neighbourhood, and particularly from the Chimoenga cliffs, a few specimens of sandstone: it is coarse-grained and ferruginous; its colour is grayish, and yellowish, with here and there some purplish specks; and it appears to belong to the oldest formation of this rock. The plain on which the banza is situated, is covered by a bed of clay, which, according to a label accompanying the specimens, is two feet thick. It is of an ash-gray colour, and perfectly plastic.

The quartz mentioned by Captain Tuckey and Professor Smith, as being found in large masses, on the summit of Fidler's Elbow, belongs to the variety called fat-quartz: the fragments have mica adhering to them, and are here and there stained of a blood-red colour. Some specimens of brown-ironstone, massive and friable, have likewise been found on this hill. A ticket written by

Capt. Tuckey, and affixed to one of them from the highest summit, informs us that a globule of some metal, either gold or copper, has been seen adhering to one of the cavities, by Dr. Smith; but no such observation has been communicated in this Gentleman's journal: the lump, however, bears evident marks of having been exposed to the action of fire. There is scarcely any appearance of metals in the rocks near the lower parts of the Zaire; if, therefore, the accounts which the missionaries have given of the great abundance of every description of ores in Congo, extend to the banks of that river, it must be higher up; where, according to Dr. Smith's account, the rock-formation appears to adopt a different character. The specimens from Condosono, Banza Nokki, and Benda consist of sienite, with green hornblende, and a rock composed of feldspar and quartz, with thickly-disseminated particles of magnetic iron stone, instead of mica or hornblende. It is probable that the primitive trapp occurs here in beds subordinate to the gneiss and mica-slate, of which a few specimens are sent, together with some others from the same parts, which appear to be flint-slate.

A rolled piece of sienite from the falls of Yellala, covered by a thin, shining, black crust, proves, that the action of the water of the Zaire is similar in its effects to that of the Oronoko. There are boulders of sienite in our collection, found by Baron Humboldt, at the cataracts of Ahures, which are covered with exactly the same crust, and bear, externally, the most striking resemblance to meteoric stones. This black crust, both in the stones from the Zaire, and from the Oronoko, Mr. Children, to whom I communicated some particles, found to be a mixture of oxides of iron and manganese.

There are no specimens sent from above the Falls, except two varieties of compact limestone, one of them magnesian; but the places from which they came are not distinctly marked.

This is all I have to say on the scanty materials before me; and I leave it to you to make any use of it you please. Believe me, my dear Sir,

Your most obedient humble Servant,

CHARLES KONIG.

To John Barrow, Esq. Sec. to
the Admiralty, &c. &c. &c.

APPENDIX. No. VII.

Hydrographical Remarks from the Island of St. Thomas, to the Mouth of the Zaire.

1816. 16th May. At noon the land was reported to be seen from the mast-head, and immediately after from the deck: it was Prince's Island; and bore S E b. S, 12 or 14 leagues distant. By our observations the centre of it lies in lat. $1^{\circ} 35' N$, long. $7^{\circ} 17' 45'' E$; variation about $21^{\circ} W$. We continued endeavouring to get to the southward, with light airs from S to S W, and a strong current setting to the northward; and on the 19th, at daylight, saw the Island of St. Thomas, bearing S b. W 12 or 14 leagues. We remained two days in sight of it, making scarcely any way to the southward, which induced us to stand to the westward, hoping to get the wind more westerly, and less current; in both of which expectations we were disappointed: nor did we succeed in getting to the southward of this island until the 27th, having been obliged to stand so far to the westward as $4^{\circ} E$, and then passed only about 4 leagues to the southward of it. The little island of Rolle, at the south end of St. Thomas, lies on the equinoctial line, and in long. about $6^{\circ} 44' 37'' E$. We continued working to the southward, taking every advantage of the wind, and frequently trying for soundings without obtaining them, until the 3d of June, when, at noon, we had $17\frac{1}{2}$ fathoms greenish ouse, and immediately saw the coast of Africa. Lat. observed $2^{\circ} 10' S$, long. $9^{\circ} 29' E$. The land was about 4 leagues to the eastward, which would make the longitude of the coast in the above latitude in $9^{\circ} 41' E$. The land appeared low, but owing to the weather being hazy, and our standing off from it, we were not able to make any remarks. The bank of soundings here does not probably run farther off shore than ten leagues, deepening as follows: at 10 or 12 miles off shore 18 fathoms, greenish ouse. We then ran S W $\frac{1}{4}$ W 5 miles, and had 30 fathoms, coarse sand; then S W 3 miles further, 47 fathoms, sand and broken shells: then S W b. W 4 miles, 67 fathoms, same bottom, and S W b. W $\frac{1}{4}$ W 4 miles, no bottom with 130 fathoms, (these courses are from the true meridian). From this day (the 5th), we conti-

nued working out of soundings, making very little way to the southward, until the 17th, when we were by observation, $3^{\circ} 12' S$, long. $9^{\circ} 59' 30'' E$, from which time to 3 P. M. we ran $E\frac{1}{2} S$ (true) 12 miles, and sounded in 66 fathoms, coarse brown sand with red specks. On the same course to 6 P. M. ran 10 miles, and had 56 fathoms, fine oazy gray sand. By a lunar observation taken this day, the longitude reduced to noon was 8 miles to the eastward of that given by the chronometer from the midnight above, to 2 A. M. on the 18th. We now ran $S E b. E$. 8 miles, and had 37 fathoms, fine gray sand. From 2 to 4 on the same course, 8 miles; had 33 fathoms, fine white sand. From 4 to 7 the same course, 12 miles; had 25 fathoms, same bottom as last. We then observed in lat $3^{\circ} 24' S$. long. $10^{\circ} 44' 30'' E$. about 5 leagues off shore; found by the chronometer we had experienced since the preceding noon a current running $N. 56 W.$ 34 miles. From noon to 4 P. M. we ran $E S E\frac{1}{2} S$. 13 miles, and sounded in 17 fathoms; from 4 to 6, $E S E\frac{1}{2} E$, 6 miles, 16 fathoms; then 3 miles farther on the same course, and tacked at 7: from which time to 10, we ran $W b. S\frac{1}{2} S$ 9 miles, and had 25 fathoms; then tacked again, and stood in east about 2 miles, when it falling nearly calm, came to with the stream anchor in 25 fathoms, red clay. Found a current running due north by compass $1\frac{1}{4}$ mile an hour.

May 19. At 4 A. M., a light breeze came off the land with drizzling rain, when we weighed, standing to the southward till 11, when it fell calm, and we came to with the kedge in 38 fathoms, slate-coloured sandy clay. Found a current running $N W b. N.$ (compass) $\frac{1}{2}$ mile an hour: weighed again and made sail on the western tack with the wind at south. We were this day disappointed in our hopes of the sea breeze; and about 10.30 P. M. it fell calm, when we came to with the stream in 37 fathoms, current setting $N W b. N$ (compass) $1\frac{1}{4}$ knot an hour.

May 21st. During this forenoon it was either calm or the wind so very light from the southward that had we weighed we should have lost ground considerably; but at 3.30 it became pretty brisk from south, which we immediately took advantage of, standing to the eastward; just before weighing, we saw the land plainly, from $N E\frac{1}{2} E$ to $E b. N$; at 5.30 the wind came round to the SSW , and at 6 sounded in 25 fathoms, oazy ground; we had run since weighing $S E b. E$ (compass) 8 miles; at 7 had 28 fathoms, having run $S E$ 2 miles, again at 8 had 23 fathoms, all the same bottom; having run 2 miles $S E b. E$;

at 9.30 it fell calm. We came to with the stream in 22 fathoms, ouse; very little current to the N W; we were now about 8 or 9 miles off shore.

May 22d. At daylight calm and hazy; at 7 saw the land from N E $\frac{1}{2}$ N to E b. N. might have seen much farther to the southward but for the haze; a very light drain of current to the N W. At 8 weighed with a light breeze from the southward, hauled on the western tack. At noon still very hazy; had 25 fathoms, ouse, land about Cape Mayumba N E to E N E $\frac{1}{2}$ N. At 4 we were about the same place as at noon, with same soundings; at 6 had 23 fathoms, fine gray sand with red and black specks. Cape Mayumba N. 50 E. (compass) about 7 or 8 miles: at 8 we heard the roaring of the surf on the beach very loud; at 9 it fell calm, when we came to with the stream in 22 fathoms, greenish sand and shells.

May 23d. At daylight calm and hazy. This morning while at anchor caught several fish of the bream species of a reddish colour. At 9 a light breeze springing up from the S E, weighed and hauled on the western tack, and soon after saw Cape Mayumba, and the land on each side of it to some extent; at noon observed in lat. $3^{\circ} 42'$ S. Cape Mayumba N E $\frac{1}{2}$ E. 8 or 9 miles had 25 fathoms fine white sand with red and black specks, this day and yesterday had no sights for chronometers, at 4 got a fresh breeze at S S W, which lasted about half an hour, and then became very light; about 9 it fell calm; came to with the stream in 18 fathoms, greenish sand; a very light drain of current to the N W.

Remark. During the nights we find a most perfect calm prevail throughout, and a very light drain of current going to the N W-ward, both by night and day; from sun set to its falling calm a moderate dew falls, which ceases directly the clouds collect over the land, which take place immediately the wind dies away.

May 24th. At 2 A. M. a light breeze sprung up at E S E. We weighed and made sail to the southward; at about 4 it fell calm, and we anchored again in 20 fathoms. At daylight, very hazy; saw the land from N N E to E b. S. This day many of the fish spoken of yesterday were caught on board both vessels. During the whole of the night we heard the surf roaring extremely loud on the beach, and we were at least 6 or 7 miles off shore. At 8 got a light breeze from the S E, weighed, and stood to the S W. At noon lat. observed $3^{\circ} 43'$ S, long. $11^{\circ} 13'$ E, Cape Mayumba N. 29 E, (compass) 8 or 9 miles; had 21

fathoms coarse brown sand; we now stood in-shore, the wind having drawn round to the S S W. a pretty brisk sea breeze; at 4 we had 17 fathoms, fine gray sand. Cape Mayumba N b. E 9 or ten miles. At 6, having run S E b. S (compass) 5 miles since 4 o'clock, we had 13 fathoms, small gravel and shells; the land from N N E to S S E; at 8 calm, came to in 10 fathoms, dark soft sandy ouse, and no current.

Remark. We have hitherto remarked that as soon as it becomes calm in the evening, a very thick haze arises, and the dew falls much less than between this and sun set; the surf, though not heard by day, then becomes very noisy. The calm generally takes place between 8 and 10 P. M.

The latitude and longitude of Cape Mayumba from this day's observation is $3^{\circ} 34' S$, $11^{\circ} 13' 36'' E$, by chronometer. With respect to the longitude, there appears so great a difference between that given by our chronometers and those assigned in the following charts, that it must remain for future navigators to decide. Laurie and Whittle's chart places it in $10^{\circ} 16' E$, and Arrowsmith in $10^{\circ} 23' E$.

May 25th. At daylight calm and hazy, a heavy surf rolling on the shore, from which we were about 3 miles distant. At 9 a light air from the southward; weighed and made sail on the western tack: at noon observed in lat. $3^{\circ} 49' S$, long. $11^{\circ} 5' E$. had 16 fathoms, fine brown sand with black specks, extremes of the land from $S 34^{\circ} E$ to $N 8 W$; at 2 P. M. had 17 fathoms; at 4 the same depth about 7 or 8 miles off shore; at 6 had 11 fathoms, then tacked, standing off W b. N 4 miles till half past 7, when we had 13 fathoms, stiff black mud, and anchored. Variation (azimuth) $25^{\circ} 30' W$.

May 26th. At 2 a light breeze sprung up at E N E: weighed and made sail to the southward; soon after the wind chopped round N W, and continued gradually drawing round to S W, where it continued till 9, when some small rain fell; it was very cloudy, and the wind suddenly veered round to S E. After weighing we ran on a S W b. S course 4 miles, and had 20 fathoms; 8 miles further 29 fathoms; then $S \frac{1}{2} E$. 4 miles, 35 fathoms; all black mud and broken shells. At noon observed in lat. $4^{\circ} 8' S$, long. $11^{\circ} 15' 22'' E$, and had 48 fathoms, same bottom; we also found that a current had set us since weighing 10 miles north. About 2 the wind drew round to S S W, wore to the S E, at 4 running on a S E course 3 knots an hour, we had 49 fathoms, at 5, 46., at 6, 47 fathoms, all muddy bottom, at 8, 40 fathoms, coarse sand, at 9, 35, and

at 10, 33 fathoms, same bottom; at 10.30 it fell calm. Came to in 32 fathoms, black mud. Found per log a current running N N W, $\frac{1}{2}$ knot an hour. Variation of the compass by amp. $25^{\circ} 33' W$, by azimuth $25^{\circ} 30'$.

May 27th. At 9, a light breeze sprung up at S S W; weighed, and stood S E 3 miles, and had 23 fathoms, S E b. E, 2 miles 24 fathoms, and S E 1 mile 21 fathoms, all black mud and shells; here we observed in lat. $4^{\circ} 9' S$. lon. $11^{\circ} 38' 37'' E$. Banda point E b. N 8 or 9 miles, extremes of the land from E b. S $\frac{1}{2}$ S. to N b. W. About 6 P. M. the wind drew round to W b. S, a fresh breeze; from noon we ran on a S E b. S course, shoaling gradually, with scarcely any variation in the bottom (chiefly ouse.) In running along shore the land is beautiful, appearing as if laid out in parks and pleasure grounds; it is noted in the charts as being high; which is certainly an error, as there has not been any part of it yet seen by us higher than the Lizard on our own coast. The latitude of Banda point by this day's observation is about $4^{\circ} 4' S$, lon. $11^{\circ} 46' 2'' E$. Arrowsmith in his chart of this part of the coast, places it in lat. $4.3 S$. lon. $10.52.0$, and Laurie and Whittle in $3^{\circ} 53' S$. and $10^{\circ} 30' E$.

May 28th. The breeze of last night continued at W S W till about 6 this morning, when it fell calm, and we came to in 15 fathoms, ouse; found the current per log N b. W $1\frac{1}{2}$ mile an hour. At 8 a light breeze from the S E, with which we weighed, but falling calm almost immediately, came to again in 14 fathoms, ouse; just before noon weighed again with a light breeze, but finding we lost ground came to directly in 12 fathoms, ouse, where we observed, in lat. $4^{\circ} 24' S$, lon. $12^{\circ} 11' E$, extremes of the land from S S E to N b. E current N b. W $1\frac{1}{2}$ mile an hour. About 2 P. M. the sea breeze came in moderate at W S W; weighed and made sail, but the ship in a most unaccountable manner, with all sail set and a good breeze on the quarter, refused to come higher than E S E, and lay like a log on the water, while the Congo, whose tow-rope we had cast off, was lying up south about 3 knots; at 2.30 finding we were drifting bodily in shore with the current, and had decreased our depth of water from 12 fathoms ouse, to $9\frac{1}{2}$ rocky bottom, let go the stream anchor; and before we could bring up got into $7\frac{1}{2}$ rocky bottom. We were about 6 miles from the nearest shore, no point or known headland to set, but right abreast of us were some reddish cliffs; and a little to the southward of them two holes in the land, apparently of the same quality as the cliffs; these holes both in size and shape, are much like the large chalk pit on Portsdown hill.

To the southward of these pits, there is a deep bay, the southern point of which is low at the extremity but rises gradually to moderately high land.

The above reef is certainly very alarming, the water shoaling very rapidly and the current setting right over it due north $2\frac{1}{2}$ miles an hour; the rocks of which it is composed are soft, the lead always bringing up pieces sticking to it: it is probable this may be what is called in the charts Kilongo reef; if so, it is laid down much to the northward of its real situation.

At about half past 3 the breeze freshening we made all sail, hove in as much of the slack cable as we could, but having run over the anchor, and the cable becoming taught, cut it, leaving the anchor and about $\frac{1}{2}$ of the stream cable behind.

The bay before mentioned agrees precisely with the description of Loango Bay, as given by Grandpré, a French navigator; and also in one of Laurie and Whittle's charts; but the latitude differs so widely, as to make us doubt the reality of its being that bay. At 6 P. M. we had the point bearing E S E, consequently nearly on its parallel, at which time our latitude could not be more than $4^{\circ} 33'$ S, and Indian point, the south point of Loango Bay in Arrow-smith's chart, lies in latitude $4^{\circ} 53'$ and in Laurie and Whittle's $4^{\circ} 45'$ S, so that the latitudes assigned to it in the above charts must be extremely erroneous. At about 8 P. M. the sea breeze backed round to west, and at half past 11 it fell calm, when we came to with the kedge anchor in 22 fathoms, soft muddy bottom. Found the current per log. to run N N W $1\frac{1}{2}$ knot an hour.

May 29th. At daylight saw the land to a great extent. Observed the point spoken of yesterday to bear a great resemblance to the Bill of Portland lengthened, which by Laurie and Whittle's chart appears to be the case with the south point of Loango Bay, or Indian Point. At 10 a light breeze sprang up at S E, which, on our weighing died away, we therefore anchored again, and at noon observed in lat. $4^{\circ} 44'$ S. lon. $12^{\circ} 14'$ E, Indian point N 68 E, 10 miles, which would make its lat. $4^{\circ} 37'$ S, extremes of the land from N b E. to S E $\frac{1}{2}$ E, current running N b. W $1\frac{1}{2}$ mile an hour.

By the mean of yesterday and this day's observation Indian point lies in 4.35 S.

At half past one P. M. the sea breeze set in at W b. S. Made all sail; found the ship slackened the cable. Up anchor, and steering a south course $4\frac{1}{2}$ knots, we gradually deepened our water to 28 fathoms, and then shoaled again to 23 fathoms, when we anchored at half past 9, being quite calm. During these last 24 hours the water has had a deep tinge, like blood and water mixed.

Remark. For some days past we have invariably had a light breeze from S S W to S S E, which springs up about 5 o'clock in the morning, and generally lasts about 10, though sometimes so late as 11; it is then calm till one or two in the afternoon, when the sea breeze sets in at S W, or S W b. W, light, and about an hour after it has commenced it generally carries us 3 or $3\frac{1}{2}$ knots, gradually gathering strength and drawing round to W, and sometimes to W N W; again hauling round to W S W an hour or more before it falls calm. The time of its falling calm appears to depend on the time of the sea breeze setting in; this breeze generally lasts about 9 or 10 hours, but in one or two instances we had it 12 or 14.

May 30th. At daylight calm, dark, and cloudy; saw the land, but could not distinguish any particular or known point: current running N N E $1\frac{1}{2}$ knot an hour. At noon still calm; observed in lat. $5^{\circ} 2' S$. lon. $12^{\circ} 15' E$ extremes of the land from S E $\frac{1}{2}$ E to N E $\frac{1}{2}$ N, about 11 or 12 miles, current the same as at daylight.

There can be no doubt of the point before described being Indian point, as we are this day to the southward of its situation in every chart; and have not seen the least appearance of such a bay as that of Loango, between the land we are now abreast of and the above point. Horsburgh, in his chart, places Indian point in lat. $5^{\circ} 0' S$, which makes it 25 miles, Arrowsmith 18, and Laurie and Whittle 10 miles all too far to the southward, supposing $4^{\circ} 35'$ to be the latitude, which I am certain is very near the truth.

At 3 P. M. the sea breeze came in at W b. S, with which we weighed and made sail, at half past 10 falling little wind, came to in 11 fathoms, muddy bottom, scarcely any current.

June 1st. At daylight observed we were abreast of a river with a very fine entrance; a light breeze springing up, we shifted a little off shore, but falling calm, anchored again at 9; about 10, two canoes came along side with 8 natives in them, one of whom spoke tolerably good English, and said he came to inform us the Mafouk or governor of Malemba was coming on board; from the information of these people it appears this river is called Louango Louiza, and not Louiza Louango as in the charts; and on enquiring after the river Kacongo, they knew nothing of it, declaring there is no other river between Loango Bay and Malemba, than Louango Louiza: when we enquired what river the town of Kinghele was situated on, they called it Chimbélé, and said it stood

on the bank of a little river called Bele, which is situated to the southward of Cabenda. If their account is correct, which there is no reason to doubt, a river is laid down in the charts that does not exist, a corroborative proof of which is, that in our run between Loango bay and where we now are, not the least appearance of one was seen: and the natives assure us there is not another till you come to the southward of Cabenda.

At noon observed in $5^{\circ} 17' S.$ lon. $12^{\circ} 10' 15'' E.$ south point of the river Louango Louiza E b. N $\frac{1}{2}$ N, 7 or 8 miles, which makes this point in $5^{\circ} 12' S.$ $12^{\circ} 15' 33'' E.$ current running N b. W $\frac{1}{4}$ mile an hour. About 2 the sea breeze set in at W b. S, with which we weighed, and at 10. 30 falling little wind, came to in 11 fathoms, current running N N W $\frac{1}{4}$ mile an hour: in running along shore the natives pointed out to us the point of Malemba; it is a bluff cliff not easily distinguished, being considerably lower than the land at the back of it, which is but moderately high, and may be easily known, by its being full of red cliffs, like chalk pits.

June 2nd. At daylight, light airs from the southward with light rain and haze; at 8, went in-shore with two boats to find out a bank, which Grandpré states to lie between Malemba and Cabenda, close on the north side of Cabenda bay; two of the natives, who said they knew the bank, went with me; one of whom said he was on board Maxwell's ship when she grounded on it; I went into $5\frac{1}{2}$ fathoms, which was about $2\frac{1}{2}$ or 3 miles from Cabenda point, which depth was sufficient to disprove Grandpré's assertion that "After you have 7 fathoms, you will be on shore before you get another cast." I found the water to shoal gradually, and 7 fathoms was at least one mile outside of me. After weighing we stood W b. N 2 miles, then S b. E 3 miles, when we had 14 fathoms, from this we ran S b. W 3 miles, and had 13 fathoms, 3 miles further on the same course 12 fathoms, $2\frac{1}{2}$ miles further 10 fathoms, and 2 miles farther 7 fathoms, where, at 5.40, we anchored, with Red point south 9 or 10 miles, Cabenda hook N E b. E $\frac{1}{4}$ E, about 3 miles off shore: current running N b. W $1\frac{1}{4}$ mile an hour. I now went in the gig to sound, and found the water to shoal gradually all the way to the shore, at about $\frac{1}{2}$ mile distant from which had 3 fathoms: by the time I got in shore, had no other light than that afforded by the moon (which had just completed the first quarter), which enabled me to see some heavy breakers to the southward, I accordingly rowed towards them, and found a dangerous reef running off shore to the westward, about $\frac{1}{2}$ of a mile

with 5 fathoms, close to the western edge ; it lies about half way between Cabenda hook and Red point ; about 8, I returned to the ship : the soundings regular as before.

June 3d. At noon observed in lat. $5^{\circ} 37' S$, the high land of Cabenda, E b. N, and Red point S S E $\frac{1}{2}$ E. For the last two days we have not been able to get sights for longitude. At 2 wore ship, and stood to the southward with a moderate sea breeze at W b. S ; we continued sounding every hour, and had constantly 23 fathoms, until 11 o'clock, when it fell little wind, which obliged us to anchor in the above depth, sandy clay of a greenish hue.

June 4th. At daylight saw the land about Cabenda 5 or 6 leagues distant : during the whole of this day, the breezes were extremely light, and the weather dark and hazy, had no observation, current running N b. W, $1\frac{1}{2}$ mile an hour.

June 5th. The whole of this day was calm, dark, and cloudy ; and we remained at anchor, current N N W, $1\frac{1}{2}$ mile an hour.

June 6th. The whole of this forenoon was calm, dark, and cloudy ; at noon observed in $5^{\circ} 40' S$, at 2.30, the sea breeze came in at W b. S, when we weighed and made all possible sail to the southward : at 4 the haze cleared off a little, saw the land, the southern extreme of which bore S S E, sounded in 15 fathoms ; from this time to 6 o'clock, we ran on a S b. W course, gradually shoaling to 13 fathoms ; from 6 we kept on a S and S b. W. course going $3\frac{1}{2}$ knots an hour till 9, keeping all the time the same depth of water : and then gradually deepening to 17 fathoms ; shortly after getting this latter depth, we had no bottom with 160, fathoms ; in about an hour after the wind headed us, and we observed an extremely great ripple all round the ship, making a noise like a mill sluice (apparently a very rapid current) ; we soon got out of this, and on trying for soundings without the hope of getting any, had 24 fathoms, muddy bottom ; we immediately anchored at about half an hour after midnight, and found scarcely any current, what little there was ran to the southward ; had it not been for this circumstance, should have concluded we had been drifted back again to the northward, which was Captain Tuckey's opinion ; but considering we had always found a strong northerly current, when to the northward of the deep water channel, that now we must have crossed it, on finding it run to the southward, which proved to be the case.

From the above it will appear that the deep water is much narrower than is

generally supposed, it is probably not more than 3 miles across; we sounded every hour, and at 10 we had $16\frac{1}{2}$ fathoms, at 11, no bottom, at 11.30 the wind headed, and we fell off to S E, going only 2 knots, and at half past midnight we had 24 fathoms.

June 7th. At daylight saw the land from S S E to N E, the Zaire apparently open abreast of us; I went in-shore to examine the coast and ascertain whether the opening we saw was really it; about 11 o'clock I observed the ships were under way, by which time I was sufficiently near to be satisfied of our being at the entrance of the river, and accordingly after taking a view of the coast returned on board to inform Captain Tuckey, which together with the observation they had taken on board, being $6^{\circ} 5' S$, proved it beyond a doubt, we accordingly bore up and made sail; and at half past 3, came to under Shark's point in $4\frac{1}{2}$ fathoms, the point bearing E S E about $\frac{1}{4}$ mile from the nearest shore.