author says that Mr. F. Smith, of the British Museum, has related to him the following anecdote, which *confirms* the opinion that *Fulgora* is certainly luminous: "Whilst shewing these insects to two young middys, one of them exclaimed, 'Why, look here! these are the *Candle-flies* that we used to knock down with our caps in China.'" If our friend, Mr. F. Smith, were to tell us that he had seen a *Fulgora* emitting light, we would at once believe him; but we do not think the reader will believe in the fact on such evidence as appears decisive to Dr. Phipson. In addition, he urges that the fact must be so, as Dr. Donovan has carefully figured these insects, and his figures show them in the act of emitting light from the points of their peculiar proboscis. If he had only known it, he might have also referred to the title pages of the "Entomological Magazine" for *Fulgora* showing a wondrous luminosity, 'sine me dare lumina terris.' But we doubt if, in the discussion above referred to, Mr. Newman brought this fact forward as conclusive.

Into the historical, theoretical, and practical considerations which form the fourth and concluding portion of this volume, we do not propose to enter. We cannot recommend this volume as a complete, or even a tolerably complete, treatise on Phosphorescence. But it nevertheless contains a compendium of facts of great interest, many of which may be new to some of our readers.

VIII.—New Colonial Floras.

Flora of the British West Indian Islands. By A. H. R. Grisebach, M.D., F.L.S., Professor of Botany in the University of Göttingen. London: Reeve and Co. 1864. 8vo. pp. 789.

Enumeratio Plantarum Zeylaniæ; an Enumeration of Ceylon Plants, with Descriptions of the new and little known Genera and Species, Observations on their Habits, Uses, Native Names, etc. By G. H. K. Thwaites, F.L.S., Director of the Royal Botanic Gardens, Peradenia, Ceylon; assisted in the identification of the species and synonymy, by J. D. Hooker, M.D., F.R.S., &c. London: Dulau and Co., Soho Square. 1864. 8vo. pp. 483.

Dr. Grisebach's "Flora of the British West Indian Islands," is the only work containing a complete account of the plants of any con-

siderable tropical area that has ever been brought to a termination, and as such it marks an epoch in the history of descriptive Botany. It is the first of the Colonial Floras, published by Government, the origin and progress of which are detailed in the vols. for 1861 and 1863 of the present work. It includes all that is known of the Floras of Jamaica, the Bahama and Turk Islands, Virgin Isles, St. Kitts, Nevis, Montserrat, Dominica, St. Vincent, Grenada, Antigua, Barbadoes, Tobago, Trinidad, and other smaller islands. Of these by far the largest and best explored is Jamaica, containing 5470 square miles,* and mountains of 8000 feet elevation. The Bahamas rank next, with 5400 miles in all. They lie chiefly beyond the Tropic (between 27° and 21° N. Lat.), present no elevation of any importance, and their Flora, which has not been well explored, is probably neither rich nor varied. Trinidad has been pretty well botanized, it presents an area of nearly 2000 square miles, and points of elevation of 3000 feet. In its climate, geographical features, and Flora, it partakes of the characters of the neighbouring coast of Cumana, and should perhaps rank botanically rather with Venezuela, than with the West India Islands proper. Of the other Islands, Dominica has been the best explored, but all want a careful botanical investigation. It may not be the case that they will add many species to the Flora, but they will certainly extend the known range of the species very materially.

The main botanical features of the West Indies are of course tropical American, and with the exception of the slight approximation of the Flora of the most northern islands to that of the South-Eastern American States, and the more evident affinity of that of the southern islands with the Venezuelan, there seems to be no very marked or contrasting subdivisions of the Flora. Still peculiarities occur, which lead Dr. Grisebach to recognise five botanical divisions in the Archipelago. He says in his preface:—

"Though reaching beyond the Tropics (N. Lat. 10° to 27°), the West Indian Islands present an entirely tropical character in their vegetable productions, and the Northern Bahamas in this respect are quite distinct from the opposite continental shore of Florida, from which they are separated by the Gulf stream, while Trinidad, lying almost contiguous to the delta of the Orinoco, partakes of the

* According to the American authority which Dr. Grisebach has followed; but 4256 square miles, according to British maps.

Flora of Venezuela and Guiana. Jamaica again, from its mountainous character, and more distant position,—most of the Leeward Islands, from being wooded volcanos,—and the majority of the Windward ones, with a dry climate and a low calcareous soil, form three divisions of this tropical archipelago, which show as many peculiarities. Thus the whole of the British West Indies, as comprised in this Flora, may be divided into five natural sections, each with a distinct botanical character, and including the following islands, the geographical area of which is added according to the American almanac for 1858, and other sources.

		English Square miles.
I. 27°—21° N.L.	Bahamas	5420
21°	Turk Islands	400
II. 19°—18°	Jamaica	5470
III. Western Caribbean Islands (most Leeward, and including some of the Windward Islands).		
18°	Virgin Islands	140
17°	St. Kitts	70
,,	Nevis	30
16°	Montserrat	50
15°	Dominica	290
14°—13°	St. Lucia	225
13°	St. Vincent	130
12°	Grenada and Grenadillos	155
IV. Eastern Caribbean Islands (most Windward, and some Leeward Islands).		
18°	Anguilla	30
17°	Barbuda	90
,,	Antigua	100
13°	Barbadoes	170
11°	Tobago	190
V. 10°	Trinidad	2000

"Thus the territory comprised may be estimated as amounting to about 15,000 English square miles, or nearly twice as much as the area of Wales. Haiti alone is nearly twice as large as the whole of the British West Indies; Cuba surpasses them almost three times, and this will account for the fact, that, considerable as were the materials at my disposition, and great the exertions of so many excellent collectors, the number of novelties in my Flora is, compa-

ratively speaking, small, while Cuba affords a daily increasing number of unpublished species. Considering, at the same time, how neglected by botanists Cuba has been, if we compare it with the standard works of men like Jacquin and Swartz, the publications of whom, with regard to the West Indies, were almost confined to the British possessions, it will appear probable, that by far the greatest part of the plants of our territory consists of old species; these indeed being the foundation of our scientific knowledge of the Flora of tropical America.

"To study these primary species and their varieties (which have so often been misunderstood that their synonyms are far more numerous than their numbers) to show that many of them range through the whole of tropical America, and some even beyond its limits, and that a considerable number of so-called geographical species must be reduced, is an object of great systematic importance, and this has been the aim which, during my labour, I have constantly had in view."

The first remark we must make on the West Indian Flora is the apparent absence of temperate American species or types on the loftier mountains. These, as stated above, rise in Jamaica to 8000 feet, and yet, with the exception of a few naturalized plants, as *Fragaria vesca*, *Ranunculus repens*, &c., we find scarcely any European or North American temperate genera or species, and very few Andean either. Indeed, of nearly 1100 West Indian genera, less than 100 (exclusive of aquatic genera) are decidedly northern, and of this number the majority are tropical genera represented in Europe. The more decidedly temperate genera represented in the West Indies amount to only thirty. Of these, the most remarkable are *Cakile* (*C. æqualis*, a species closely allied to our *C. maritima*, and which has indeed been reduced to it by A. Richard and others); *Drosera* (*D. longifolia* β., an American form of the European plant which ranges from Canada to South Brazil, but which, in the West Indies, has hitherto been found only in Trinidad); various American species belonging to *Salix*, *Vaccinium*, *Prunus*, *Rubus*, *Galium*, *Lactuca*, *Sonchus*, *Pinguicula*, *Plantago*, and other genera which are found in the Cordilleras; and lastly, a species of *Allium*, which ranges from the United States to Chili. The actually European and North American species, exclusive of water plants and sub-tropical grasses, believed to be indigenous in the Islands, are.

Cardamine hirsuta,
Nasturtium officinale,
Sonchus asper,
——— oleraceus,
Plantago major, β.,
Leonurus Sibiricus,
Drosera intermedia, β.,
Juncus tenuis,
Oxalis corniculata,

of which several are possibly introduced, and most of the rest are weeds of wide dispersion.

Whether the lofty mountains of Cuba and Haiti present a larger assemblage of Northern forms, we do not know; the Mexican Alps certainly do, and as there is a marked affinity between the more peculiar vegetation of the Blue Mountains of Jamaica and the Mexican Alps, on the one hand, and the New Grenada ranges on the other, it may prove that there has been an ancient geological connection between these regions, previous to that cold epoch which favoured the migration of Northern forms across the Tropics which Mr. Darwin so plausibly advocates. Be this as it may, the almost total absence of typical North American plants in the West Indies, is perhaps the most singular feature in the whole Flora, one that is incompatible with their having shared in the effects of a glacial migration.

On the other hand, it may be argued that the difference between the temperature of the islands, and of even the warmest of the North American States, is so great, that this alone may have expelled what Northern plants once inhabited the islands. In favour of this view, it must be stated, that it is difficult to conceive greater contrasts of climate within equally small distances than obtain between the Bahamas and Florida. This, as is well known, is due to the influence of the Gulf stream, which, where it impinges on the American Coast, does not raise its winter temperature much, but which, bathing even the northernmost Bahama Islands off the Floridan coast, raises their winter temperature to that of the tropics.

As to the extent to which this induced climate may have affected the Northern plants, we can only judge by observing its effects upon such as have been introduced by the agency of man. Of these, a small proportion have run wild, or become naturalized; and it may be worth while to devote a short space to the consideration of them. Fortunately Dr. Grisebach has most carefully discriminated between the truly naturalized species and occasional escapes, and thus enables us to extract the following information from the body of his work:—

In the British West Indies the naturalised species amount to less

than 150 out of the 3055 flowering plants; a very small proportion considering how long the Islands have been not only colonised, but under cultivation, and how extensive and of how long duration the intercourse between these Islands and both Europe and Africa has been. If we arrange these under the Continents to which they are severally indigenous, another remarkable fact appears, viz., that the numbers contributed by each Continent are almost exactly in an inverse ratio to what would *a priori* have been assumed. They are as follows:—

African	13 species.
American	17 „
European	31 „
Asiatic	85 „

Over and above these, there are some 250 species which are common to the three tropical Continents of America, Africa, and Asia, and some of which may have been introduced, but being chiefly littoral plants, or annual weeds, that have with equal probability been diffused by natural agencies over them all, they have been regarded as indigenous in all. With these we have here nothing to do at present.

To begin with the African species, the most important are those which have been introduced for food or commercial purposes. They are

Coffee . . .	Coffea Arabica.
Oil-Palm . . .	Elaeis Guineensis.
Tamarind . . .	Tamarindus Indica.*
Akee	Blighia sapida.
Ground nuts . . .	Arachis hypogæa.
Calabash, or American nutmeg	Monodora Myristica.
Henna . . .	Lawsonia inermis.

The others are an *Aloe*, *Capparis*, *Cassia*, *Tephrosia*, and two species of *Acacia*.

The American naturalised plants of Economic value are

Cherimolia . . .	Anona Cherimolia.
Tobacco . . .	Nicotiana Tabacum.
Sweet potato . . .	Ipomea Batatas.
Coco-nut . . .	Cocos nucifera.
Maize	Zea Mays.
Pine Apple . . .	Ananassa sativa.

* Which is indigenous nowhere in Asia.

The others are, almost without exception, garden plants that have been introduced for ornament.

Asia supplies	
Nutmeg	Myristica moschata.
Ben-oil	Moringa pterygosperma.
Castor-oil	Ricinus Palma-Christi.
Jews' Mallow	Corchorus olitorius.
Orange	Citrus Aurantium.
Lemon	Citrus Medica var.
Citron	Citrus Medica var.
Shaddock	Citrus decumana.
Lime	Citrus Aurantium var.
Bread fruit	Artocarpus incisa.
Club Wood	Casuarina equisetifolia.
Mango	Mangifera Indica.
Cassia pod	Cassia Fistula.
Senna	Cassia obovata.
Native Almond	Terminalia Catappa.
Indigo	Indigofera tinctoria.
Dhal or Pigeon Pea	Cajanus Indicus.
Jute	Crotalaria juncea.
Clove	Caryophyllus aromaticus.
Otaheite Apple	Jambosa Malaccensis.
Malay or Rose Apple	Jambosa vulgaris.
Jambolana	Sizygium jambolanum.
Cinnamon	Cinnamomum zeylanicum.
Mankuda	Morinda citrifolia.
Kauki	Mimusops Kauki.
Sesamum	Sesamum orientale.
Cocoe, or Eddoes, or Bleeding Heart	Colocasia esculenta.
Bamboo	Bambusa vulgaris.
Chinese corn	Setaria italica.
Sugar cane	Saccharum officinarum.
Job's Tears	Coix Lachryma.
Balsam Apple	Momordica charantia.*
Cerasee	Momordica Balsamina.
Bottle Gourd	Lagenaria vulgaris.*
Towel Gourd	Luffa acutangula.*
Yams	Dioscorea alata and triphylla.
Plantains and Bananas	Musa Sapientum and Paradisiaca.
Ginger	Zingiber officinarum.

* Those marked with an asterisk are undoubtedly of Asiatic origin, though not so stated in the Flora.

The remaining Asiatic naturalized plants are chiefly garden shrubs, as Jasmines and Ixoras, together with a very few weeds.

Of the European naturalized plants, the great majority are escapes from gardens, that have established themselves here and there, very few being generally diffused. As, however, they are almost without exception British species, it may be interesting to enumerate them, which we shall do under two heads.

1. Plants introduced for food or pasture, or other economic purposes.

Cress	Lepidium sativum.
Furze	Ulex Europæus.
White Clover	Trifolium repens.
Creeping do.	T. filiforme.
Vetches	Vicia sativa.
Lentils	Ervum hirsutum.
Strawberry	Fragaria vesca
Parsley	Petroselinum sativum.
Parsnip	Pastinaca sativa.
Carrot	Daucus Carota.
Pomegranate	Punica Granatum.

2. Introduced accidentally, or for ornament.

Creeping Crowfoot	Ranunculus repens.
Small flowered ditto	——— parviflorus.
Hedge Mustard	Sisymbrium officinale.
Shepherd's Purse	Capsella Bursa.
Hearts' Ease	Viola tricolor.
Purple Spurge	Euphorbia Peplus.
French Catch-fly	Silene gallica.
Mouse-ear Chickweed	Cerastium viscosum.
Nettle-leaved Goosefoot	Chenopodium murale.
White ditto	——— album.
Mountain Crane's bill	Geranium Pyrenaicum.
Nipple-wort	Lapsana communis.
Dandelion	Taraxacum dens-leonis.
Centaury	Erythræa ramosissima.
Thyme-leaved Speedwell	Veronica serpyllifolia.
Yellow Toad-flax	Linaria vulgaris.
Corn Wound-wort	Stachys arvensis.
Prunella	Prunella vulgaris.
Donax Cane	Arundo Donax.
Brome Grass	Bromus sterilis.

The European list is certainly a remarkable one for a thoroughly

tropical climate, showing as it does that many of the common weeds of our own country have the power of establishing themselves under climatic conditions so very different from our own. Some of the species are, it is true, confined to the upland districts of Jamaica; but even here the mean annual temperature is high compared with any part of Northern Europe, and the extreme temperatures very feebly contrasted.

Turning to the elements of the indigenous British West Indian Flora (exclusive of Cryptogams), these may be roughly classed into the Endemic and non-Endemic, the former being quite one-third of the whole; about 1030 out of 3050 being hitherto found only in the West Indian Islands (British and others). No doubt a certain number of them will yet be discovered on the main land of America; but, on the other hand, probably a more than counterbalancing number of Endemic species remain to be discovered in the Islands. Whether this proportion represents the Endemic character of the whole West Indian Flora or no, it is impossible to say. Cuba and Haiti will no doubt add enormously to the number of peculiar plants; but on the other hand, such islands as Curacoa and Tobago must contain a large proportion of continental species not found in any of the other Islands. Meanwhile, we are glad to learn, that Dr. Grisebach promises us a work on the distribution of the whole Flora of the West Indies, as far as is known, which will, no doubt, throw great light on the precise relation between the Floras of the several Islands and between these and the neighbouring parts of the Continent.

Let us now briefly consider this Flora, and compare it with that of other tropical countries. Of the above 2000 indigenous species (or thereabouts), which are common to the West Indies and other countries, 1750 are American exclusively, and about 250 are also natives of the Old World. The latter is a surprisingly small number, considering the great similarity that pervades the vegetation of most tropical littoral climates, and observing how readily so many Asiatic and African trees and shrubs have become naturalized in the islands after being introduced by man.

When again these 250 extra-American plants are divided into African and Asiatic, another curious fact appears, viz., that notwithstanding the proximity of the West Indies to Africa, and the constant traffic between these countries for upwards of three centuries, there are actually fewer plants common to the West Indies and Africa

than there are to the West Indies and Asia; the approximate numbers being, of the former 210, and of the latter 220. Of the aggregate number, upwards of 200 are common to Africa and Asia, leaving a very few common to Africa and the West Indies, and not hitherto found in Asia. Of these the following are, as being large trees, the plants of most interest in this inquiry:—

American trees that have migrated to Africa; or vice versa.

Carapa Guianensis.
Paullinia pinnata.
Lonchocarpus sericeus.
Drepanocarpus lunatus.
Hecastophyllum Brownii.
Andina inermis.
Chrysobalanus Icaco.

Of these seven, four belong to one Natural Order, *Leguminosæ*, and most of these, together with probably all the rest, are more or less littoral plants.

Under whatever light we regard this fact, it appears a very strong argument against their being much oceanic and aereal transport of seeds between the tropics of the Eastern and Western worlds; and, coupled with the no less remarkable counter-fact, that there are many more marked points of affinity between the Floras of the extra-tropical regions of America and Africa (though these are so very much more distant geographically), than between the tropical Floras of these countries, it would at first-sight appear to throw us back upon ancient continental extension, to account for much of the community of vegetation, which we do find to exist between the tropics of the Old and New Worlds. But sufficient ancient continental extension demands incalculable time to account for; and one effect of this, if granted, must be great specific and even generic change on the descendants of the species that lived on the common continent. The question, therefore, next to be asked is, whether there is greater generic affinity between the West Indies and Africa, than between the West Indies and Asia? Here again we are baffled, there being only 50 genera common to the former case, but 53 in the latter!; besides which, there are a considerable number of large and important Natural Orders common to the West Indies and Asia, that are almost wanting, or comparatively very rare, in tropical Africa; such are *Laurineæ*, *Magnoliaceæ*, *Myristiceæ*, *Ilicineæ*, *Guttiferæ*, *Rutaceæ*, *Gesneriaceæ*, *Vaccinieæ*, *Coniferæ*, *Orchideæ*, *Palmeæ*, *Piperaceæ*.

It is evident from these considerations, that tropical Africa and America have borrowed little of one another within the period of the creation of the forms of plants now inhabiting each,—that the differences between these Floras are so great, that it is doubtful whether at any time there has been much community of vegetation,—and that the hypothetical modern Atlantic continent, which Heer assumes to have existed in the North Atlantic, and to have connected Europe and North America, cannot have extended to the south of the Tropic of Cancer.

If, on the other hand, we compare tropical Africa with tropical Asia, we find, 1, a vast amount of specific and generic identity; 2, an absence in Africa of any great or peculiar group, that is not also Asiatic; and 3, an absence in Africa of many of the great groups that are characteristic of Asia. The sum of these facts amounts to fair evidence, that tropical Africa was peopled by plants from tropical Asia, and that within a comparatively modern epoch. Up to the present time we have no sufficient data for comparing tropical Africa, generically even, with America beyond the West Indies, and until this is done, it would be rash to speculate upon the means whereby the few plants common to tropical Africa and the West Indies have been transported from the one to the other; or why it is that there should be so many Orders common to America and Asia, that are scantily represented, or totally absent in tropical Africa.

Turning now from these points of difference between the Floras of the Old and New Worlds to those of similarity, a comparison of the contents of Dr. Grisebach's Flora with those of Mr. Thwaites' enumeration, gives some curious results.

In the first place, the number of Natural Orders is almost precisely the same in both areas, viz., 156 in Ceylon, and 152 in the West Indies; and the Orders† themselves are to a great extent the same; the Orders not represented in both being, with the exception of six, either small or feebly represented. These are the following:—

Present in the West Indies, but absent in Ceylon.			*Present in Ceylon, but absent in the West Indies.*		
ORDERS.	GEN.	SPEC.	ORDERS.	GEN.	SPEC.
Papaveraceæ .	2	2	Berberideæ .	1	1
Sauvagesiaceæ	1	1	*Tamariscineæ	1	1

† The respective authors have slightly different opinions as to the limits of some of the Orders, but these are here reduced to the same standard.

*Canellaceæ	2	2
*Marcgraviaceæ	3	4
Chrysobalaneæ	4	10
*Papayaceæ	1	3
*Turneraceæ	1	6
Loaseæ	1	1
*Cyrilleæ	1	1
Myoporineæ	1	1
Juglandeæ	1	1
Myriceæ	1	1
*Garryaceæ	1	1
Lacistemeæ	1	1
Saliceæ	1	1
Coniferæ	3	5
Irideæ	1	3
Hæmodoraceæ	1	1
*Bromeliaceæ	13	37
Elatineæ	1	2
Lineæ	2	3
*Dipterocarpeæ	8	10
*Aurantiaceæ	12	19
Geraniaceæ	1	1
*Balsamineæ	2	22
*Pittosporeæ	1	2
Corneæ	1	2
Valerianeæ	1	1
Dipsaceæ	1	1
*Stylidieæ	1	1
*Salvadoreæ	1	1
*Jasmineæ	1	7
Orobancheæ	2	6
Santalaceæ	3	2
Elæagneæ	1	1
*Nepenthaceæ	1	1
Triurideæ	1	1
*Apostasiaceæ	1	1

Therefore the sum of the *Ordinal* differences between two spots in the tropics of the Old and New World respectively, and containing together upwards of 2000 genera and 5000 species is represented by only about 82 genera and 200 species.

If again we seek to ascertain the extent to which the dominant Orders are represented in each, we find a further great and remarkable uniformity. More than half the Flowering plants belong to eleven Orders in the case of the West Indies, and to ten in that of Ceylon, whilst with but one exception the Ceylon Orders are the same as the West Indian, and they follow in nearly the same sequence in each country.

West Indies. (Of total 3500 species.)	
1. Leguminosæ	262
2. Orchideæ	226
3. Rubiaceæ	173
4. Gramineæ	160
5. Compositæ	160
6. Euphorbiaceæ	118
7. Cyperaceæ	107
8. Melastomaceæ	103
9. Urticeæ	69
10. Solaneæ	67
11. Convolvulaceæ	64

Ceylon. (Of total 2400 species.)	
1. Leguminosæ	196
2. Gramineæ	168
3. Orchideæ	146
4. Rubiaceæ	168
5. Cyperaceæ	133
6. Euphorbiaceæ	121
7. Acanthaceæ	82
8. Compositæ	70
9. Urticeæ	59
10. Melastomaceæ	52

* The species in each column marked with an asterisk, are confined (in the tropics) to the Old and New Worlds respectively.

Tropical Africa, according to the data published twenty years ago, in the Niger Flora, differs little in its ten dominant Orders, and their sequence from Ceylon; and lastly, to show that this uniformity is not accidental, we have taken the figures from Miquel's Flora of the Dutch East Indian Islands, which also includes a good many Continental Asiatic plants.

TROPICAL AFRICA.		MIQUEL'S FLORA.	
1. Leguminosæ	264	1. Leguminosæ.	632
2. Rubiaceæ	159	2. Orchideæ	616
3. Gramineæ	152	3. Rubiaceæ	594
4. Compositæ	82	4. Gramineæ	430
5. Cyperaceæ	74	5. Urticeæ	412
6. Acanthaceæ	61	6. Euphorbiaceæ	268
7. Euphorbiaceæ	55	7. Cyperaceæ	262
8. Convolvulaceæ	45	8. Acanthaceæ.	257
9. Malvaceæ	55	9. Compositæ	250
10. Urticeæ	35	10. Melastomacæ	224

Again, of the 110 Orders, common to Ceylon and the British West Indies, only 37 are so unequally represented as to contain in one country double the number of species which the other contains. They are the following:—

Majority in West Indies.		*Majority in Ceylon.*
Samydeæ.	Borragineæ.	Dilleniaceæ.
Malvaceæ.	Solaneæ.	Anonaceæ.
Buttneriaceæ.	Begoniaceæ.	Menispermeæ.
Malpighiaceæ.	Gesneriaceæ.	Bixineæ.
Rutaceæ.	Verbenaceæ.	Olacineæ.
Melastomaceæ.	Nyctagineæ.	Ampelideæ.
Onagrarieæ.	Begoniaceæ.	Rosaceæ.
Passifloreæ.	Piperaceæ.	Rhizophoreæ.
Cacteæ.	Palmeæ.	Styraceæ.
Compositæ.	Amaryllideæ.	Ebenaceæ.
Lobeliaceæ.	Musaceæ.	Acanthaceæ.
Ericeæ.		Restiaceæ.
Myrsineæ.		Liliaceæ.

The following Orders are singularly equally represented in each:—

	West Indies.	Ceylon.
Magnoliaceæ	1	1
Nymphæaceæ.	3	3
Cruciferæ	5	4
Tiliaceæ	19	21
Ternstrœmiaceæ	7	6
Guttiferæ	14	18

Erythroxyleæ	6	4
Sapindaceæ	31	25
Meliaceæ	13	14
Oxalideæ	5	5
Ochnaceæ	5	5
Hippocrateaceæ	6	7
Chailletiaceæ	1	1
Rhamneæ	9	12
Terebinthaceæ	17	22
Connaraceæ	4	4
Lythrarieæ	9	12
Homalinieæ	1	1
Araliaceæ	7	5
Umbelliferæ	6	9
Loranthaceæ	22	19
Caprifoliaceæ	2	3
Lentibularineæ	10	8
Sapotaceæ	23	17
Oleineæ	6	7
Asclepiadeæ	28	33
Gentianeæ	20	19
Labiatæ	33	39
Amarantaceæ	25	26
Laurineæ	28	30
Thymeleæ	5	5
Euphorbiaceæ	118	121
Cycadeæ	2	2
Aroideæ	29	25
Xyrideæ	4	4
Scitamineæ	26	32
	550	569

It would be worth inquiring to what longitudes this similarity of vegetation is confined within the tropics. We know that no such Ordinal uniformity exists between the vegetation of extratropical Africa and South America, nor between that of either of these countries and extratropical Australia ; and we also know that the Floras of the Mediterranean Region and the Southern American States, and those of middle Europe and the Northern American States, differ more than those of Ceylon and the West Indies in their Ordinal relations. This is a most interesting subject in relation to the hypothesis of an intertropical cold epoch, such as Mr. Darwin demands for the migration of the Northern Flora to the Southern hemisphere, and which epoch, occurring (as it must have occurred) since the creation of most of the existing temperate species, must have destroyed a great part of the pre-ex-

istent vegetation of the Tropics, obliging us to regard the majority of existing tropical plants as modern creations compared with the temperate. With ourselves it is a matter of doubt whether the vegetation of the Tropics (exclusive of the temperate regions of its mountains) is richer generically and specifically than that of the Temperate zones. If it should prove to be richer, it presents a grave difficulty in the way of Mr. Darwin's hypothesis, and one which he may perhaps best obviate by showing that, owing to the struggle of life being greater in intertropical regions, and the greater activity of the subsidiary agencies (such as rapid development of vegetable life, insects and the elements that tend to hasten change), there has been a more rapid process of differentiation and selection. There will still, however, be the difficulty of accounting for the uniform distribution of Genera and Orders over the Tropics of the Old and New World, without any obvious means of transoceanic migration between them.

The last point to which we shall allude in the West Indian Flora is the astonishing number of Ferns it contains. Dr. Grisebach adopts Sir W. Hooker's moderate estimate of the value of specific characters, and according to it enumerates no less than 340 species (exclusive of 23 *Lycopodiaceæ*). Considering the area of the two islands which contain almost the whole of them, viz. Jamaica and Trinidad, this number is enormous. Ceylon, a very rich country, contains 205 species and 14 *Lycopodiaceæ*. Jamaica alone contains 290 Ferns and 17 *Lycopodiaceæ*.

In Mr. Thwaites' Enumeratio Plantarum Zeylaniæ, we have a work whose modest title covers a great amount of most accurate botanical matter, which will prove of the greatest use to the Indian as well as to the Cingalese Botanist. It comprises the Flowering plants and Ferns of one of the richest tropical islands in the world, perhaps the very richest, considering its area and elevation; and one which derives an additional interest from being the first the Flora of which was published in a systematic form, and this too by the great Linnæus.

The number of species described by Linnæus in 1757 as indigenous to Ceylon was 657. Mr. Thwaites enumerates no less than 2832, which might be considerably enlarged by those who take a narrower view of specific limits than he does. On this subject the author says in his preface, "Care has been taken not to multiply species unnecessarily, for observation has shown that the amount of variation is often considerable in plants, affecting a large range of station, and

consequently of climate. Instances occur, as in the genera *Hortonia*, *Mappia*, *Turpinia*, *Euonymus*, *Elæodendron*, in which a more elevated locality produces a form or variety possessing a stouter habit and larger flower than are observed in the same species when growing only a little above the level of the sea. These forms or varieties would probably be viewed by some botanists in the light of distinct though closely allied species, and they occupy, in fact, that debatable ground the difficulties and perplexities of which the practical naturalist alone knows, and which, in the opinion of many (and I may include myself among the number), are only to be got rid of by the adoption of the views enunciated by Mr. Darwin as regards the relationship of allied forms or species by descent from a common ancestor."

Owing partly to our ignorance of the extent of the Floras of other tropical islands, and partly to the different estimates of specific limits entertained by different authors, it is not possible to compare the Ceylon Flora accurately with that of any other tropical island, except that of Jamaica, which, as we gather from Grisebach's Flora of the British West Indies, contains about 1092 species of flowering plants. The latitudes, areas, and elevations of these islands respectively are—

	Latitude.	Area.	Elevation.	Gen.	Sp.
Jamaica	18° N.	4256 miles	8000 ft.	735	1840
Ceylon	6—10° N.	24,600 „	8300 „	933	2832

This comparison would not be, however, a good one, for Jamaica presents little variation of climate beyond what the elevation of the Blue Mountains afford. In Ceylon, on the other hand, Mr. Thwaites tells us that much of the variety of its vegetation is due to the great difference of climate which the island presents. The southern part possesses a humid very hot climate, equable temperature, and considerable rainfall. The northern portion is hot and dry, being screened by the hilly interior from the rainy south-west monsoon, and enjoys but a short rainy season. The mountainous interior again presents a considerable tract of cool very rainy districts. Hence, as Mr. Thwaites remarks, the vegetation of the humid south is akin to that of Sumatra and the Malay Archipelago. That of the dry northern districts is identical with that of the Coromandel Coasts, and of the hilly interior with the Neilgherrie Mountains.

It is to be hoped that on some future occasion Mr. Thwaites will enter fully into the subject of the relations of the vegetation to the climate, and tell us how far he thinks the presence in Ceylon of

the plants of the several countries he cites as having analogous climates, may be accounted for by favouring climate alone. With regard to the peopling of the northern districts by Coromandel plants, few naturalists would, in the present state of geological belief, deny that the immigration of these may have taken place before the severance of Ceylon from the great Western Peninsula of India; and as the large Indian mammals of the island could only thus have found their way across, it is reasonable to suppose that the plants did so too. To account thus, however, for the generic and almost specific identity of the mountain temperate Flora of Ceylon with that of the Neilgherries, 400 miles distant, is not so easy, and, except a great lowering of temperature be assumed, demands not only continuous land, but a continuous mountain chain. In this case the small size of many of the seeds of the plants, common to both mountain-ranges, and other circumstances connected with their facility of transport, (direct by currents, or indirect by birds, &c.) must also be taken into account.

Far more curious and suggestive, however, than the similarity of the northern and mountain Floras of Ceylon, with those of Coromandel and the Neilgherries, is the relation of the Southern Ceylon Flora with the Malayan. This which alone would furnish materials for a most interesting discussion is evidenced by the presence of gigantic trees of *Dipterocarpeæ*, of which Order Ceylon contains 8 genera and 42 species, while in continental India there are probably not one-sixth of that number; by the presence of *Cycas Rumphii*,* and by a great many representative and identical species, scattered through many Natural Orders. There is also a most curious relation established between Madagascar and tropical Africa and Ceylon by means of a species of Cacteæ, *Rhipsalis Cassytha*, the only plant of its Order found beyond the limits of America, by *Angræcum* and sundry other plants; to which must be added, by way of negative evidence the absence of Conifers and Cupuliferæ in both countries.

Our limits prevent us going further into detail as to the contents of Mr. Thwaites' volume, which we the less regret, from believing it to be only a precursor to a general Flora of the island, in which he will doubtless expatiate upon these and kindred topics.

We should like too to have carried out our comparison between Ceylon and the West Indies, and show all the points in which they

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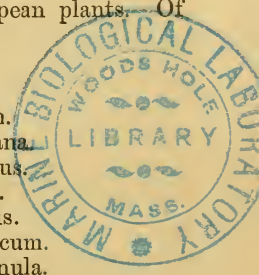
* Discovered by Mr. Thwaites whilst the last part of his work was passing through the press

contrast, but we must confine ourselves to the most prominent, and that is the very intimate relationship subsisting between the Cingalese vegetation and that of the temperate zone to the northward of it. The West Indies, as we showed, have not on their mountains any temperate North American types; Ceylon, on the other hand, though its mountains are no higher and are situated much nearer the Equator, presents many Northern and even European plants. Of these the most remarkable are



Of Genera.

Thalictrum.	Galium.
Anemone.	Valeriana.
Ranunculus.	Dipsacus.
Berberis.	Bidens.
Sinapis.	Sonchus.
Cardamine.	Doronicum.
Nasturtium.	Campanula.
Viola.	Vaccinum.
Drosera.	Gaultheria.
Stellaria.	Rhododendron.
Cerastium.	Lysimachia.
Linum.	Ligustrum.
Hypericum.	Gentiana.
Geraniaceæ.	Pedicularis.
Rubus.	Scutellaria.
Potentilla.	Teucrium.
Poterium.	Elæagnus.
Helosciadium.	Arum.
Pimpinella.	Asparagus.
Heracleum.	Allium.
Viburnum.	Avena.

Of Species.

Stellaria media.	Mentha arvensis.
Tamarix gallica.	Calamintha Clinopodium.
Oxalis corniculata.	Plantago major β.
Agrimonia Eupatoria.	Chenopodium murale.
Alchemilla vulgaris.	Juncus glaucus.
Sanicula Europæa.	Brachypodium sylvaticum.
Bupleurum falcatum.	Triticum repens.
Artemisia vulgaris.	

Here then we have in Ceylon no less than 57 genera (out of 933) which are all European, in contrast to 30 (out of 1094) in the West Indies; and 15 Northern species in Ceylon, in contrast to 9 in the West Indian highlands.