REPORT

ON THE CONTRIBUTIONS TO

BOTANICAL GEOGRAPHY,

DURING THE YEAR 1843,

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BOTANICAL GEOGRAPHY.

THE most important work of the past year, in the department of general climatology, is Humboldt's 'Central Asia,' (Asie centrale. Recherches sur les chaines de montagnes et la climatologie comparée. Paris, 1843, 3 vols. 8vo.) In the first two volumes the relations of that part of Asia lying between the Altai and Himalayas, as to position and elevation, are deduced from a renewed analysis of all known sources. Particularly is it proved that the hitherto received notions with regard to the elevation and extent of the high lands of central Asia have been very much exaggerated. It had been already shown that the Chinese province of Thian-schan-pelu, or the land between the Altai and Thian-schan, belongs to the depression of the Caspio-Siberian steppes. But in the same way, also, the province of Thian-schan-nanlu, between Thian-schan and Kuenlün, has been excluded from the high land, because here, under the latitude of Italy, the cotton-tree flourishes, whilst in Jarkand the grape-vine thrives, and in Khotan the breeding of the silkworm is carried on successfully. (iii, p. 20.) The desert of Gobi, according to the measurements of Fuss and Bunge, in their journey to Pekin, has a mean elevation of 4000′ and is therefore on a level with the plateau of Persia. (i, p. 9.) The celebrated table land of Lesser Thibet alone, attains the level of the lake of Titicaca (12,000′), and its mean

elevation is probably lower. (Vid. last Report, p. 403.) In the third volume, some of Humboldt's most important treatises on general climatology, have been again discussed, and enriched by new measurements, partly there published for the first time. Among these are included the researches on the causes of isothermal curves, and on the snow-line.

Extract from a table of all the measurements of the snow-limit in *toises*:

I. NORTHERN HEMISPHERE.

Mageröe		$71\frac{1}{4}°$	=	370 T.	
Norway	70°	$70\frac{1}{4}°$	=	550	(v. Buch)
	67°	$67\frac{1}{3}°$	=	650	(Wahlenb.)
	60°	62°	=	800	
Iceland		65°	=	480	(Morcks and Olafsen)
The Aldan Chain in Siberia	60° 55′		=	700	
Ural	59° 40′		=	750 ?	
Kamschatka	56° 40′		=	820	(A. Erman.)
Unalaschka	53° 44′		=	550	(Lütke)
Altai	$49\frac{1}{4}°$	51°	=	1100	(Ledeb. and Bunge)
Alps	$45\frac{2}{3}°$	46°	=	1390	
Caucasus	43° 21′		=	1730	(Kupfer)
	42° 42′		=	1660	(Dubois)
Ararat	39° 42′		=	2216 ?	(Parrot)
Argaeus	38° 33′		=	1674	(Hamilton)
Bolor		$37\frac{1}{3}°$	=	2660	(Wood)
Hindu-Kho		$34\frac{1}{2}°$	=	2030	(Burnes)
Himalayas					
Northern decliv.	$30\frac{3}{4}°$	31°	=	2600	
Southern decliv.			=	2030	
Pyrenees	$42\frac{1}{2}°$	43°	=	1400	
Sierra Nevada	37° 10′		=	1750 ?	
Etna	$37\frac{1}{2}°$		=	1490	
Abyssinia	13° 10′		=	2200	(Rüppel)
Mexico	19°	$19\frac{1}{4}°$	=	2310	(Humboldt)
South America	8° 5′		=	2335	(Codazzi)
	4° 46′		=	2397	(Humboldt)
	2° 18′		=	2405	(Boussingault)

II. EQUATOR.

Quito = 2475 T. (Humboldt)

III. SOUTHERN HEMISPHERE.

Quito	0° —	$1\frac{1}{2}°$	= 2470 T.	(Humboldt)
Chili				
Eastern Cord.	$14\frac{1}{2}°$		= 2490 T.	(Pentland)

Western Cord. .	18°		=	2897	(Pentland)
Chili . .	33°		=	2300	(Gillies)
	41°	44°	=	940	(Darwin)
Straits of Magellan	53°	54°	=	580	(King)

The tables which accompanied Humboldt's celebrated 'Treatise on the Isothermal Lines,' have also been filled up with all the more recent measurements, and have been arranged by Mahlmann for Humboldt's work. They embrace 315 places, the mean temperature of which, the temperature of the four seasons, and of the warmest and coldest months, is given. In the latter particulars therefore, these tables are more copious than the immediately preceding work of Mahlmann, (Dove's Repertorium, Bd. iv, 1841,) in which of 700 to 800 places the mean temperature only is given and, where it is possible, the summer and winter temperature. Humboldt, resting upon data which, in comparison with his Treatise of 1817, are now increased fivefold, divides the surface of the earth into eight zones of temperature, the extent of each of which is determined by the following limits of mean temperature:

I.—18° to 0° C.	e. g. Melville Island,—18° 7 (74° 8′ N. L.), Nain in Labrador,—3° 6 (57° 2 N. L.)
II.+0° 1 to 5° C.	Uleaborg, + 0° 7′ (65° N. L.), Quebec, 3° 1 (46° 8′ N. L., and 300′ alt.)
III.—5° 1 to 7° 5 C.	Upsala, 5° 3 (59° 9 N. L.), Utica 7° 4 (43° 1 N. L., and 450′ alt.)
IV.—7° 6 to 10° C.	Orkney Isles 8° (58° 9′ N. L.), Berlin 8° 6 (52° 5′ N. L. and 108′ alt.), Fort Providence 8° 5 (41° 8′ N. L.)
V.—10° 1 to 15° C.	Metz 10° 3 (49° N. L.), St. Louis 12° 9 (38° 6 N. L.)
VI.—15° 1 to 20° C.	Florence 15° 2 (43° 8′ N. L. and 200′ alt.), New Orleans 19° 4 (30° N. L.)
VII.—20° 1 to 25° C.	Cairo 22° 3 (30° N. L.), Macao 22° 5 (22° 2′ N. L.)
VIII.—25° 1 to 31° C.	Calcutta 25° 7 (22° 6′ (N. L.), Guayaquil 26° (2° 2′ N. L.), Pondicherry 29° 6 (11° 9′ N. L.), Massahua 31° 5 (15° 6′ N. L.)

Observations on the periodical phenomena of vegetation are now arranged under the direction of Quetelet, according to a connected plan in England, France, Ger-

many, Italy, Switzerland, Belgium, and Holland, and published since 1843 in the 'Mémoires de l'Acad. de Bruxelles.'

E. Meyer has proposed a simple method of signs, in order to distinguish, in a list of the plants of any floral district, those which reach their areal limits somewhere in it. (Bot. Zeit. 1843, p. 209.)

The signs selected are the following :—

$|\overline{*}|$ The endemic plants of the Flora; $\overline{*}$ Plants which reach their northern limit therein; $|_*$, $_*|$, $\underline{*}$, in the same way stand for the western, eastern, and southern limits respectively.

With respect to the numerical proportion of Monocotyledons to Dicotyledons, E. Meyer asserts (Drege's Dokumente, s. u. s. 28), that the law developed by Schouw of the decrease of Monocotyledons towards mean latitudes (35°-45° N. L.) does not hold good as regards mountains, where the Dicotyledons increase in the neighbourhood of the snow-limit. The hygrometrical conditions of the atmosphere may perhaps explain these phenomena, and the alpine region which lies above the clouds, in the heat of the summer corresponds with the Mediterranean basin, where the Monocotyledons decrease in the most marked degree.

The geographical relations of several families of plants have been monographically treated in the past year, by Watson as respects the Ranunculaceæ, Nymphæaceæ, and Papaveraceæ (the Geographical Distribution of British Plants); the Malpighiaceæ, by A. Jussieu (Monographie des Malpighiacées, Paris, 1843); the Rosaceæ, by Frankenheim; the Piperaceæ, by Miguel (Systema Piperacearum, Roterod. 1843, 8vo.) As the numerical relations obtained by such researches are extremely variable, I quote only some general results.

Ranunculaceæ. In Steudel's 'Nomenclator' 830 species are enumerated. Met with in all the polar expeditions, the number of species diminishes in the temperate zone towards the tropic, or they retreat into the

higher regions of the mountains. Compared with the sum of the phanerogamia, they are most numerous in the polar circle, but the absolute number of species is greatest in the north temperate zone; 22 species are found in arctic America; Hooker enumerates 74 in British North America; Pursch 73 in the United States; Wahlenberg 44 in Sweden; Koch 109 in Germany; Sibthorp 60 in Greece; Desfontaines 30 in North Africa; and Humboldt 20 species on the Andes.

Nymphæaceæ. By Steudel 57 species, of which Asia possesses 20, North America 14, South America 9, Europe 8, Africa 7, the West Indies 2, Madagascar and Java 1 or 2. But to this distribution Watson opposes, that Torrey and Gray are only acquainted with 5 species in the United States, and Hooker with only as many in British America.

Papaveraceæ. There are distinguished of this family, including the Fumariaceæ, about 170 species. They are distributed in the arctic zone, and are found also within the tropics, though rare. They are most numerous in the warmer parts of the north temperate zone.

Malpighiaceæ. Of this family America possesses 528 species, viz., Brazil 290, Mexico 61, the West Indies 56, Columbia 45, Guiana 42, Peru 31; the Old World, on the contrary, presents only 55 species, of which 14 occur in India, 11 Madagascar, 9 West Africa, 9 in the Island of Sunda, 5 East Africa, 3 Australia, 2 Arabia, 2 China. There are but few instances of the Malpighiaceæ passing beyond the tropics; in North America *Hiræa septentrionalis* does not occur beyond 26° N. L.; in Nepal, *Hiptage* not beyond 28°, but in the southern hemisphere one *Acridocarpus* is found near Port Natal (30°), and *Higmaphyllon litorale* extends to Buenos Ayres. In the Mexican Andes the family does not ascend above 6000′, or scarcely passes beyond the limit of tropical vegetation. It is also met with at an equal elevation near the equator. In New Holland it is at present entirely unknown.

Rosaceæ. The author enumerates about 1100 species.

Of these 175 occur in central Europe, and about an equal number in North America, 92 in southern Europe, 74 in the Himalayas, 61 in the Alps, 85 in the tropical Andes; including, however, the Chrysobalaneæ.

Piperaceæ. This family is richest in species in tropical America; about a fourth part of that number are found in Asia, and isolated species in the South Sea Islands, and only a few in Africa. In the northern hemisphere, with few exceptions, scarcely any species pass beyond the tropic. In Africa only to 14° N. L. on the Senegal; from Arabia one species only, *Peperomia arabica* (22°) is known; on the Himalayas there are some at 30·5°; in China at 22·5°; in America, the only one, *Enckea Californica*, grows at Monterey up to 38°.

In Quito, *Piper peploides* extends to the altitude of 1590 *toises*. In the southern hemisphere, the Piperaceæ pass beyond the tropic to the greatest distance; they flourish at the Cape at 35° S. L., and one *Macropiper* as far as 45° S. L. in New Zealand.

I.—EUROPE.

THE new data concerning the climate of European Russia contained in Humboldt's work on Central Asia, differ materially from the earlier less accurate accounts. A comprehensive idea of the climatic relations of eastern Europe is given, founded on observations of temperature at Petersburg, Moscow, and Casan.

Petersburg. (As. Centr. 3, p. 56). The measurements are by Wisniewsky, and were already known, though not accurately computed.

	MEAN TEMP.		MEAN TEMP.
December	= — 5·2° C.	June	= + 15° C.
January	= — 9·5	July	= + 17·3
February	= — 7·5	August	= + 15·8
Winter	= — 7·4° C.	Summer	= 16° C.
March	= — 3·7°	September	= + 10·5°
April	+ + 2·6	October	= + 5·1
May	= + 15·4	November	= — 0·8
Spring	= + 2·5° C.	Autumn	= + 4·8° C.
	An. Temp. = 3·9° C.		

Moscow. (Ib. iii, p. 554.) The observations are by Spaski, and contained in the Bullet. Mosc. 1842.

Sea level	= 400′		
Winter	= — 9·5° C.	Summer	= + 17·4° C.
Spring	= + 4·5	Autumn	= + 4·1
	An. Temp. = 1·9° C.		

Casan. (Ib. iii, p. 555.) The observations are by Knorre, and published in the same place.

Height above the Black Sea	= 240′		
Winter	= — 14·3° C.	Summer	= + 16·2° C.
Spring	= + 3·2	Autumn	= + 2·7
An. Temp.	= 1·9° C.		

Blasius has given an excellent exposition of the distribution of organic nature in European Russia, which, with regard to botany, contains a general determination and characterization of the provinces proposed by Ledebour, and mentioned in the Report for 1841. (Reise im Europ. Russland in den Jahren 1840 und 1841; 2 vols. 8vo; Brunswick.) In Northern Russia the author has especially investigated the districts on Lake Onega, and the southern part of the government of Wologda. In the Central province he has explored an extensive region from Jareslaw on the Volga, across the districts on the Oka as far as the Dwina and the Dnieper; and in the south he travelled across the Ukraine as far as the Steppes.

Northern Russia is chiefly distinguished from the Central province by its dense forests, in which *Pinus sylvestris*, L., and *P. Abies*, L., are the predominant species, and whose vast extent is only broken by swamps, or where, in the neighbourhood of the fluvial valleys, the trees have been thinned and destroyed by man. Amongst the pines and firs are intermingled here and there, *Alnus incana*, L., and *Betula pubescens*, Ehrb., which in some parts constitute by themselves large forests. The limits between cultivation and the wilderness are everywhere indicated, especially by alder bushes. Besides which, the only forms of leaf-trees are *Populus tremula*, L., *Sorbus Aucuparia*, L., and *Prunus Padus*, L. The pines and firs form two distinct forest formations, differing in the proportion of the argillaceous constituent of the soil. The clayey, often marshy low lands of the old red sand-stone are covered by thick fir woods, among which occur the *aspen* and *alder*; the sandy diluvial hillocks bear *Pinus sylvestris*, L., and *Betula pubescens*,

Ehrb., and represent the forest character of the North German plain, the soil of which has been formed at the same time. On this diluvium, where the soil is deficient in clay, are met with also heaths of *Calluna* (Bd. 1, p. 102), which do not occur in the Silurian plains and trap formations. However, the diluvium is not altogether free from bogs, where *Ledum* and *Andromeda calyculata*, L., flourish, but even here also, the fir (*Tanne*) does not grow, but only the pine (*Kiefer*), which does not shun the water, and requires only a light sandy soil. (p. 161.)

The characteristic plants of the coniferous woods of North Russia, are *Rubus arcticus*, L., *saxatilis*, L., *Chamæmorus*, L., *Vaccinium Myrtillus* L., *uliginosum*, L., *Oxycoccus*, L., *Rubus idæus*, L., *Rosa canina*, L., *cinnamomea*, L., *Linnaea borealis*, L.

In the pine and birch forests, principally *Cetrariæ* or *Antennaria dioica*, Br. The forest meadows are filled with *Ranunculus reptans*, L. On the mountain limestone grow *Peristylus albidus*, Bl. and *viridis*, Bl., and on the Lake Onega, *Aconitum septentrionale*, Mart. (*A. Napellus*, Blas.), most luxuriantly.

In the North Russian bogs of the argillaceous lowlands, Blasius distinguishes two plant formations.

1. "The dwarf-birch formation." The uncertain depth is covered by a dense shaking turf of *Sphagnum* with *Vaccinium Oxycoccus*, L., from which bushes of *Betula nana*, L., and *fruticosa*, Pall., from three to five feet high, spring up everywhere. In common with these grow several Ericeæ, northern *Rubi* and *Salices: Ledum palustre*, L., *Andromeda polifolia*, L., and *calyculata*, L., *Arctostaphylos Uva ursi*, Spr., *Vaccinium Vitis Idæa*, L., and *uliginosum*, L., *Rubus arcticus*, L., *Chamæmorus*, L., and *saxatilis*, L., *Salix bicolor*, Ehrb., *limosa*, Wahl., *glauca*, L., *myrtilloides*, L., and *rosmarinifolia*, L.

2. "Formation of the reed grasses and Carices." The soil is covered with water, but the bottom is firmer and more clayey than it is under the birch bushes, and without any covering of *Sphagnum*. Tufts of reed grasses are placed

on the surface close together. About twenty species of *Carex* are enumerated, and above these project the crowded white heads of *Eriophorum*. (Bd. 1, p, 43.) Ligneous plants are wanting, but *Calla* and *Pedicularis* partly supply their place. The open pools and lakes which occur in these swamps, present almost the same forms as in Germany: *Nymphaea alba*, L., *Nuphar luteum*, Sm., and *pumilum*, Sm., *Stratiotes aloides*, L., *Hydrocharis*, white flowered *Ranunculi* and *Caltha*. (p. 252.)

The cultivated spaces form only oases in these boundless plains, which, from the White Sea, as far as the watershed towards the district of the Volga, are everywhere covered with these four formations. The country is intersected only by the river valleys, in a peculiar way. These, with their broad irregular water-courses, form deep ravines in the great plain, which is elsewhere only slightly undulating. Thus, Ustjug-weliki on the Dwina, is 330′ above the sea, and the highest plateau of the forest plain, in its neighbourhood, in general, 600′. It is on the broad ridges of land forming the declivities especially, that the swamps extend for many miles. Towards the rivers the plain is suddenly depressed, and below the forest forms two terraces, which constitute the spacious valley. The inferior terrace is quite horizontal, and is reached by the overflowing of the stream. It is uninhabited, and contains fertile meadows or wastes, banks bare of vegetation, and islands. The water-course lies throughout, on the right hand, close at the base of the steep upper terrace. (Bd. 1, p. 238.) On the desolate sandy banks throughout all Russia, even to the southern Steppes, *Salix acutifolia*, W., grows, whose roots, from 40′-60′ long, are closely interlaced in the loose soil. The meadows are formed in the first instance from clay and marl deposited from the river, and being annually irrigated and supplied with fresh marl from it, possess the most luxuriant turf. The dunes on Lake Onega bear, on the contrary, *Calluna* with *Empetrum*. The upper terrace lies about 40′-60′ above the bottom of the valley. It is undulating, and extends as

far as the base of the wooded diluvium. It is inhabited, and the greater part of it cultivated, and contains dry sloping meadows, blooming with Orchideæ, Labiatæ, and Synantheræ, which give place lower down to bogs; all the hollows also of the ground, especially along the margin of the forest, are occupied by marshy meadows.

As far as the condition of the soil is concerned, the land is everywhere adapted to the cultivation of all the central European Cerealia, but the climate is opposed to agriculture. The destruction of the forests, which has been so ruinous in Central Russia, has, in these regions, effected but little alteration in the character of the country, and that only in the neighbourhood of the river valleys; nevertheless, since the memory of man, two of the noblest and most useful trees have almost entirely disappeared from these districts. In regions where Pallas still saw large forest ranges of *Pinus Larix*, L., Blasius counted scarcely half-a-dozen trees in a distance of 60-80 miles. In the same way *P. Cembra*, L., the Russian cedar, which, at a former period extended further to the west, at present is first met with in central Witschegda, east of the Dwina. Blasius met with the finest forests along the course of the Suchona, in the government of Wologda. Here the stems of the fir and aspen rise to a height of 100′ to 150′; and the birch not unfrequently attains more than 100 feet. (Bd. 1, p. 164.)

Blasius has indicated more accurately the natural boundaries of North and Central Russia. They are accurately defined by the ridge of the Waldai, that is, the line of the watershed between the northern and southern streams. Its level lies only 200′ above the highest elevations of the north; it may be assumed to have an average elevation of 800′ (for example, near Grjansowez, between Wologda and Jareslaw, the mean altitude above the sea is 760′); and yet this low range everywhere distinctly divides two extensive botanical districts. It is the southern limit of *Alnus incana*, D.C., and the northern limit of orchards and of many leaf-trees,

for instance, of *Betula corticifraga*, which, however, at first occurs mixed with *B. pubescens*, Ehrb., but further south it composes the birch woods exclusively. The Coniferæ decrease, *Populus tremula*, L., becomes more abundant, and forms dense forests. The birch and aspen contend for the mastery with the pine until the oak appears, and from this point the forests of leaf-trees predominate. *Fraxinus excelsior*, L., *Tilia*, and *Quercus pedunculata*, Ehrb., first make their appearance near Jareslaw. *Q. Robur*, L., on the contrary, is exotic to Central Russia, and eastward does not appear to reach even the Dnieper. The underwood consists of *Corylus Avellana*, L., mixed occasionally with *Evonymus europæus*, L., and *verrucosus*, Scop., *Rhamnus frangula*, L., and *cathartica*, L. Jareslaw is, besides these, the northern boundary for the following plants: *Berteroa incana*, D. C., *Lunaria rediviva*, L., *Lavatera thuringiaca*, L., *Chærophyllum aromaticum*, L., *Eryngium planum*, L., *Scrophularia vernalis*, L., &c.

The northern marsh willows are replaced by *Salix fusca*, L., *cinerea*, L., *Caprea*, L., and *Alnus incana*, D. C., is represented by *Alnus glutinosa*, G. Thus almost all the plant formations assume another character, but the physiognomy of the whole country is much more strikingly altered by the increased extent of cultivation. The cultivated land and forest in Central Russia are in equal proportions; in this district, or that constituting Great Russia, the forests have been cleared. On the Oka, where the woods are formed of oaks mixed with the aspen and birch, they are for the most part limited to the neighbourhood of the rivers, and the adjacent valleys and ravines, indicating the gradual commencement of the treeless steppes. Here is already seen on dry elevations a thick vegetation of Artemisiæ (*A. scoparia*, Kit., *vulgaris*, L., *campestris*, L., and *Absinthium*, L.), which extends to the willows on the bank of the river, where now *Salix acutifolia* grows mixed with other species, such as *S. alba*, L., *fragilis*, L., *viminalis*, L., &c.

Central Russia is geognostically defined, on the north, by the predominance of dolomite on the old red sandstone; further on its natural character is marked by the marly soil of the new red sandstone and mountain limestone, or by the chalk marl, which present themselves tolerably free on the surface in long tracts. Northern Russia, on the contrary, presents the sandy and argillaceous strata of the old red sandstone, and thicker diluvial formations. On the Osero, the central region of vegetation encroaches to some extent upon the northern, owing to the chalky soil; on the other hand, between the Dwina and the Dnieper the northern botanical region extends further to the south, in consequence of the opposite geological conditions which there obtain.

South Russia commences where extensive diluvial deposits cover the chalk, and tertiary formations, and are again themselves covered by the humose soil termed *black earth*, or "Tschernon Sem." On the Dnieper, its northern limit lies near Tschernigoff, whence it passes through the southern part of the government of Kursk, and reaches the Volga in the neighbourhood of Simbirsk; at which point the arenaceous covering of the chalk is immediately contiguous to the new red sandstone of the north. From these geognostic relations, it is evident that the vegetation of the steppes is as distinctly defined from the district of the leaf-trees, as those are from the northern Coniferæ. On the Desna, which falls into the Dnieper near Kiew, first appear the wild fruit trees, *Pyrus communis*, L., and *Malus*, L., together with *Prunus Cerasus*, L., and with these commences the Southern region of vegetation. These trees are distinguished, even at a distance, from the other leaf-trees, by their crooked, crowded branches, and dark-coloured bark; the apple trees have a stem about the height of a man, above which they spread out into equal-sized branches. (Bd. 2, p. 221.) But the whole surface of the country is entirely treeless. It is only in the swampy hollows, and in the depths of the river valleys, the only places which in the north have been cleared, that

an arboreal vegetation flourishes; but even here there are nowhere continuous woods as far as the diluvial deposit on the surface extends. The Coniferæ have long altogether disappeared, and of the leaf-trees, the birch soon retires. The oak is the most abundant tree, and is always associated with the fruit trees; in this way narrow strips of wood are formed which, in proportion to the size of the steppe, are very inconsiderable. Cultivation is confined to the "black earth," on the border of the steppe. This narrow strip of land scarcely reaches to Krementschug, on the Dnieper, where Blasius found the northern limit of the culture of the vine. Close to this point the steppe commences with lofty shrubs, species of *Artemisia*, *Verbascum*, *Achillea*, *Euphorbia*, and *Cynara*, which are mixed with the tall dry grass, and as they are used for firing, have received the name of "Burian," fuel. In the spring these plains are covered with a flowery carpet, but which, after a few months, is again scorched up and withered by the burning sun. In the short autumn the atmosphere is again foggy, causing a renewed verdure, but snow-storms soon succeed, and the waste surface remains covered with deep snow through the long winter.

Ukraine Proper, or the government of Charkow, forms a peculiar transition between the Steppes and Central Russia. It is a hilly country, in consequence of the chalk projecting from the diluvial sand. Hence forests are produced, which cover a considerable part of this fertile country. On passing from the plain of Poltawa towards Charkow, the "black earth" is observed to diminish in thickness on the watershed of the district of the Dnieper and the Don near Walki, and here the forests first appear. They consist of oak, lime, aspen, poplar, ash, and *Acer Tataricum*, L., but always mixed with the wild pear. The underwood consists principally of *Corylus*. The unwooded surface is here thickly covered with steppe-shrubs, two to three feet high, viz. *Cytisus supinus*, *Caragana*, and the dwarf cherry (*Prunus Chamæcerasus*,

Jacq.) The Flora of this province is distinctly that of South Russia, and this renders it probable that the climate exercises a more general influence than the soil, which in the Ukraine is calcareous, like that of Central Russia.

On the southern declivity of the Taurian mountain ridge, M. Wagner found the forests from Alupka as far as Ajuga-Dagh composed of *P. Laricio*, M.B., the region occupied by which extends from 600′ to 3000′. On the northern side, where the winter cold is much greater, they are replaced by the beech. *Arbutus Andrachne*, L., occurs only on the south side from the coast, as high as 1200′, though usually solitary, and its seeds appear to have been carried thither by birds of passage from Anatolia. (Augsburg Zeitung, 1843, Nos. 47-8.)

Of Ledebour's 'Flora Rossica' (vide Report for 1841, p. 416), the third and fourth parts appeared in 1843, and the fifth in 1844. (Vol. i, fasc. iii, vol. ii, fasc. iv, v.) The statistical relations of those families which have been treated of since the former Report are Balsamineæ 3; Oxalideæ 2; Zygophylleæ 10—in the European steppes, however, only *Zyg. Tabago*, L., and at the mouth of the Ural, *Zyg. Eichwaldii*, C. A. M.; Biebersteineæ 2; Rutaccæ 14—under which are included two species of *Tetradictis*, a genus probably belonging to the Crassulaceæ; Diosmeæ 1; Celastrineæ 6, and 1 Staphylea; 10 Rhamneæ, and 1 *Nitraria;* 2 Juglandeæ, both indigenous to the Caucasus; Anacardiaceæ 3; Papilionaceæ 568, among which is *Astragalus* with 168, *Oxytropis* with 61 species—genera confined to Asia are only *Thermopsis*, *Leobordea*, *Güldenstadtia*, *Halimodendron*, *Sphærophysa*, *Eremosparton*, *Lespedeza*, *Ammodendron*, *Gleditschia*, all with a single or few species; Mimoseæ 2, viz. *Lagonychium stephanianum*, M.B., and *Acacia fulibrissia*, W.—both only in the Caucasian provinces; Amygdaleæ 18; Rosaceæ 155—among which are *Spiræa* with 18 species, *Potentilla* with 60 species, 16 distinct species of *Rubus*, and 17 of *Rosa*—the Asiatic forms are *Coluria*, *Drya-*

danthe, Chamærhodos, Hulthemia; Pomaceæ 42, chiefly 19 species of *Pyrus* and *Sorbus, Punica* 1; Onagrariæ 23; Halorageæ 2; Hippurideæ 3; Callitrichineæ 5; Cratophylleæ 3: Lythrareæ 15, viz. two species of *Peplis* and *Middendorfia*, e. g. on the Dnieper, 2 *Ammanniæ* and *Ameletia* in Caucasia—the rest are *Lythra;* Tamariscineæ 15, for the most part Asiatic, although there are five species in the steppes of South Russia; Reaumuriaceæ 3, viz. *Reaumuria*, from the Caucasus to the Sea of Azof, *Eichwaldia* on the east side of the Caspian, and *Hololachna* in Zungaria; Philadelpheæ 1; Cucurbitaceæ 9, viz. on the Caucasus single representatives of *Lagenaria, Cucumis, Cucurbita*, and *Sicyas angulatus*, L., from thence westward as far as Podolia; Portulaceæ 16, of which 11 species of *Claytonia* occur in Eastern Siberia; Scleranthеæ 2; Paronychieæ 17; Crassulaceæ 59, e. g. 12 species *Umbilicus*, for the most part from the Caucasus and Ural; Grossulariæ 13, mostly Siberian; Saxifrageæ 70, besides 57 *Saxifragæ*, and 6 *Chrysosplenia*—in East Asia there are single species of *Leptarhena, Mitella, Tellina, Tiarella*, and *Heuchera;* Umbelliferæ 331, most numerous in Caucasia, almost disappearing in Eastern Siberia, yet there are 92 species in the Altai. The genera with most numerous species in Russia are *Heracleum* 23, *Peucedanum* 21, *Seseli* 18, *Bupleurum* 18, and *Ferula* 15; Araliaceæ 2, viz. *Hedera* and *Panax horridus* in the Kodjak Islands; Hamamelideæ 1—*Parrotia* in Talüsch; Corneæ 5; Loranthaceæ 3; Caprifoliaceæ 23; Rubiaceæ 77—among which, in the Caucasus, is the Hedyotideous, *Karamyschewia*, and the Spermacoceous *Gaillonia*, both with a single species; Valerianeæ 41—among which in Siberia were 4 *Patrineæ*, in Armenia 1 *Dufresnea;* Dipsaceæ 36, with *Morina parviflora*, Kar., in the Alatau.

Works on the Flora of Finland have been commenced by Nylander (Spicilegium plantarum Fennicarum; Helsingf. 1843. Centur. I. 31 pp. 8vo, 1844. Cent. II. 38 pp. 8vo.) Further (Stirpes cotyledoneæ paroeciæ Pojo—ib. 1844, 22 pp. 8vo,) and Wirzén (Prodromus Floræ Fennicæ—ib. 1843,

32 pp. 8vo.) The 'Spicilegium' contains critical remarks upon doubtful species, particularly on the *Carices*. Wirzén's work follows the sexual system, and extends at present only to the grasses.

Nylander, in 1842, travelled over Russian Lapland, from Uleaborg to Kola, on the Arctic Sea, and in 1843, East Finland and the governments between the Ladoga and the White Sea. Catalogues of the curiosities collected on the first journey are given in Lindblom's Zeitschrift. (Botaniske Notiser, 1842, 1844.)

Lund has described his botanical travels in Nordland and Finmark. (Reise ig jennem Nordlandene og Vestfinmarken i Sommaren, 1841 ; Christiania, 1842, 8vo.) He visited Tromsöe, where the birch was in flower at the end of August, and also Alten, Hammerfest, Mageröe, as far as the North Cape, and some other points. His review of the Finmark Flora contains 402 phanerogamia, in 50 families, whilst, in the whole of Norway, following Blytt's statement, he enumerates 84 families, with about 1100 phanerogamia. The families most rich in species in Finmark, are the following : Cyperaceæ 51; Gramineæ 42; Synantheræ 33 ; Caryophylleæ 27; Cruciferæ 29; Rosaceæ 18; Junceæ 17; Ranunculaceæ 16; Ericeæ 15; Scrophularineæ 15; Saliceæ 15. Then follow 12 Leguminosæ, and 12 Orchideæ. The more interesting plants are: *Viola epipsila*, Led., nearly to the North Cape, *Lychnis affinis*, Vahl., *Potentilla nivea*, L., near Tromsöe, *Conioselinum tataricum*, Blytt., (Fisch?) near Alta, *Galium triflorum*, Mich.

The observed polar limits of the ligneous plants are, (1) near Alta, *Rubus idæus*, L., *Ribes rubrum*, L., *Myricaria germanica*, Desv., *Menziesia cærulea*, Sm., *Andromeda tetragona*, L., *Arctostaphylos Uva ursi*, Spr., *Rhododendron lapponicum*, Wahl., *Ledum palustre*, L., *Salix pentandra*, L., *arbuscula*, L., *hastato-herbacea*, Laestad., *Populus tremula*, L., *Alnus incana*, D. C. (2) Near Hammerfest, *Prunus Padus*, L. (3) *Pinus sylvestris*, L., as far north as 70°, that is, within one mile and a half

south-east of Kistrand, on the Persanger Fjord. (4.) At Mageröe itself are still found *Sorbus Aucuparia*, L., *Calluna*, *Andromeda hypnoides*, L., *A. polifolia*, L., *Arctostaphylos alpina*, Spr., *Azalea procumbens*, L., *Vaccinium Myrtillus*, L., *V. uliginosum*, L., *Vitis idæa*, L., *Empetrum nigrum*, L., *Diapensia lapponica*, L., *Salix glauca*, L., *S. lapponum*, Wahl., *S. Myrsinites*, L., *S. reticulata*, L., *S. herbacea*, L., *Betula pubescens*, Ehrb., (*glutinosa*, Ld.,) *B. nana*, L., *Juniperus communis*, L.

Beurling, who, at the meeting of Scandinavian naturalists, in the year 1842, described the physiognomy of the neighbourhood of Stockholm, has travelled through Sweden in 1843, and the botanical results of his journey have been given in the 'Memoirs of the Stockholm Academy.' (Verhandelungen der Stockholmer Akademie.)

Zetterstedt's botanical tour through Jemtland, in the year 1840, has been translated in the 'Botan. Zeitung for 1844.' This Report contains lists of the localities, although without a more general characterizing of the vegetation of this province of Sweden. V. Düben has described an excursion in Bohuslan, made in 1841. (Lindblom's Botaniske Aviser, 1843. s. 75.) The first livraisons of Gaymard's 'Voyages en Scandinavie' have appeared. The plates give a graphic representation of the natural character of the north, but the explanatory text connected with them has not yet been published.

The fourth edition of Hartmann's Scandinavian Flora had been already published. (Handbok i Skandinavien's Flora, innefattende Sveriges och Norrige's Vexter, till och med Messorna; Stock. 1843.) Högberg's 'Svensk Flora, (Oerebro, 1843) is an inconsiderable compilation. Anderson's 'Observationes stirpium circa Christinehamn provenientium' (Upsala, 1842, 4to) contains some new localities for plants. Kröningsvärd has written a 'Flora dalekarlica.' (Fahlun, 1843, 8vo, 66 pp.) Torssel has published a catalogue of the Scandinavian Lichenes (343), and Byssaceæ (43). (Enumeratio Lichenum et Byssacearum Scandinaviæ hucusque cognito-

rum; Upsal. 1843, 12mo.) The eighth Century of Fries' 'Normalherbarium (vide Report for 1841) has appeared, and the fortieth part of the 'Flora Danica.'

The statistical relations of the British Flora have afforded a subject for new labours to Watson. The first part of a great work on this subject (The Geographical Distribution of British Plants, London, 1843, 8vo), though extending only to the Ranunculaceæ, Nympheaceæ, and Papaveraceæ, contains not fewer than 259 pages. This is the most copious collection of localities which has perhaps ever been made.

The horizontal and vertical distribution of each individual species is displayed in a table, which is even repeated forty times in this volume. Bielschmied has given a summary view of these special results in the Regensburg Flora. (1843, s. 641.) The only observations of more general interest are those illustrating the distribution of the three above-named families over the whole earth, of which we have spoken before.

The vegetation of the rocky island of St. Kilda, lying westward of the Hebrides in the Atlantic (58° N.L.), has been described by M'Gillivray. (Edinb. N. Philos. Journ. 1842, pp. 47-70, and 178-80. Also extracted by Bielschmied in Regensb. Flora, 1843, s. 455.) This island, about half a German mile in length, and scarcely half as wide, constitutes a rock 1380 feet high, consisting of trap and syenite, and presents in parts pasture land with Scottish vegetation; there are, however, only fifty indigenous phanerogamia. The characteristic species are *Cochlearia danica*, L., *Silene maritima*, Wilh., *Sedum anglicum*, Huds., *Rhodiola rosea*, L., *Ligusticum scoticum*, L., *Anagallis tenella*, L., *Salix herbacea*, L., *Carex rigida*, Good.; *Salix herbacea*, L., occurs here at a lower level than in Scotland, where Watson has not met with it below 1850 feet. The winter is very mild. Barley and oats are cultivated.

Dickie has investigated the geographical relations of the vegetation in Aberdeenshire. (Notes on the distribution

of the plants of Aberdeenshire, in Hooker's London Journal of Botany, ii, pp. 131-35, and 355-58.) This is a supplement to Watson's work on the Grampians, mentioned in the last year's Report, and from it are derived the following corrections and additions to the altitudinal limits of the ligneous plants:

Quercus Robur, L.	0′ — 1500′
Lonicera Periclymenum, L.	0 — 1500
Rosa canina, L.	0 — 1860
spinosissima, L.	0 — 2000

Besides these, the extreme limit in altitude of a considerable number of plants belonging to a lower region is determined.

The author makes the following corrections in the list of alpine plants:

Arabis petræa, Hook.	1740′ (also washed down to 800′.)
Cerastium latifolium, L.	1740
Rubus Chamæmorus, L.	1000
Saxifraga oppositifolia, L.	On the shore near Aberdour.
Cornus suecica, L.	1200
Veronica alpina, L.	2300
Salix reticulata, L.	2000
Juncus castaneus, Sm.	2300
triglumis, L.	1200
Carex rupestris, All.	2000— ?
lagopina, Wahl. (*leporina*, Ant.)	3560

Babington has published a British Flora on the plan of Koch's Synopsis. (Manual of British Botany, containing the flowering plants and ferns, arranged according to the natural orders; London, 1843, 8vo.) Of Withering's British Plants (corrected and condensed by M'Gillivray. Aberdeen, 1843), the fifth edition has appeared. Of dried collections of British plants, we have 'Salicetum Britannicum exsiccatum,' containing dried specimens of the British willows, edited by Leefe (Fasc. i, 1842, fol. with thirty-two forms), and Berkeley's 'British Fungi' (four fasc. of dried specimens; London, 1843).

The 'Flora Batava' (vide Report for 1841) has advanced in 1843 to the 130th part (aflevering). Dozy has given a supplement to his Catalogue (mentioned ib.) of the Jungermanniæ and Marchantiæ, found near Ley-

den. (In v. d. Hoeven's Tijdschrift, 1843, s. 108-14.) Kickx has given the first Century of the Flemish Cryptogamic Flora, in the 13th vol. of the 'Mémoires de l'Acad. de Bruxelles,' the greatest part of which consists of the Fungi. (Recherches pour servir à la Flore cryptogamique des Flandres; Bruxelles, 1840, p. 46, 4to.)

De la Fons has published some remarks upon the plants of the upper valley of the Maas, which possess only a local interest. (Ann. d. Sc. Nat. 19, pp. 317-19.)

The six last decades of the sixth Century of Reichenbach's 'Icones Floræ Germanicæ,' have appeared, which conclude the Caryophylleæ, and contain the Celastrineæ Liliaceæ, and part of the Lineæ. The 'Flora Germaniæ exsiccata' contains at present twenty-five Centuries. Of Sturm's 'Flora Deutschlands' the 21st and 22d parts of the third division have appeared, containing the Fungi by Rostkovius. The work of Schlechtendal and Schenk with figures, mentioned in the last year's Report, has advanced in 1843 to the tenth part of the fourth volume; and that upon Thuringia to the forty-seventh part; and a new edition of the former has also been commenced. The publications by Lincke, mentioned (ib.) have both advanced to the thirty-third part. D. Dietrich has begun a work with plates on the German Cryptogamia, of which the first part includes twenty-six illuminated plates of Ferns. (Deutschland's Kryptogamische Gewächse; Jena, 1843, 8vo.)

Koch has published a second edition of his celebrated Synopsis Floræ Germanicæ, (Frankfort, 1843,) which has been augmented with numerous special researches and additions. An abridged edition of this work appeared in 1844. (Taschenbuch der Deutschen und Schweizerischen Flora von Koch; Leipsig, 12mo.) A second edition also of Kittel's 'German Flora' has been prepared. Scheele has made critical remarks upon certain German plants, but without sufficient literary aid. (In Regensb. Flora, 1843, pp. 296, 421, 557.) Of Rabenhoorst's collection of dried Fungi of the German Flora, the fifth and sixth Centuries have appeared.

German provincial Floras and similar works:—Langethal, on the north of Germany (die Gewächse des. n. D. für Landwirthe, &c., Jena, 1843, 8vo.) Schmidt on the Prussian province (Preussens Pflanzen; Danzig, 1843, 8vo. Roeper on Mecklenburg (Zur Flora M.'s Th. 1, Rostock, 1843, 8vo), containing the vascular Cryptogamia, and valuable with respect to Morphology. Scholtz, Flora of the environs of Breslau; (Breslau, 1843, 8vo.) Döll, Rhenish Flora; (Frank. 1843, 8vo), including the vegetation of the Rhine district, from the lake of Boden as far as the Moselle and Lahn, and important as regards systematic Botany. Hackl, List of Plants in the southern division of the Leitmeritzer circle in Bohemia (in the Medic. Jahrb. des österr. Staats, 1843, p. 105, &c.) More special treatises: by John, on some Plants of the neighbourhood of Berlin—in the (Bot. Zeitung, 1843, pp. 689-92); by Preuss, upon some localities for Plants in the Oberlausitz,—in the (Regensb. Flora, 1843, pp. 671-72); by Wimmer, on the Silesian Hieracia in the (Uebersicht der Arbeit. der schles. Gesellsch. für 1843); by Hampe, the latest supplement to the Harz Flora—in (Linnæa, 1843, pp. 671-74); by Traunsteiner, on the *Salices* of the Tyrol—in the (Zeitschr. des Ferdinandeums, 1842.)

Among these works the Flora of Upper Silesia, by Grabowski, is distinguished by its giving the altitudinal limits .In the Gesenke (compare Report for 1840), according to Grabowski's measurements, the extreme limits in altitude of the ligneous plants are as follows:

1. In the Fir (*Tannen*) region (1500′-3600′, according to Wimmer), *Pinus Abies*, L., and *Picea*, L. reach 4000′; *Juniperus nana*, W. 4500′; *Betula pubescens*, Ehrb. and *Sorbus Aucuparia*, L. 3900′; *Populus tremula*, L. 3800′; *Pinus Larix*, L. 3000′; *Juniperus communis*, L., 2600′; *Betula alba*, L., 2500′; *Acer Pseudoplatanus*, L., 2400′; *Prunus Padus*, L., 2300′; *Pyrus communis*, L., 2200′; *Fagus sylvatica*, L., 2000′; *Alnus glutinosa*, G., 1800′; *Prunus avium*, L., 1700.′

2. In the Oak and Pine (*Kiefer*) region, *Quercus robur*,

G., 1500′; *Fraxinus excelsior*, L., 1480′; *Ulmus campestris*, L., and *Pinus sylvestris*, L., 1300′; *Taxus baccata*, L., 1200′; *Populus alba*, L., 1000′. Wheat and barley are grown up to 1000′; rye to 1800′; and oats on the average up to 2000′.

I am not as yet acquainted with Reichenbach's Memoir on the Botanical relations of Saxony (contained in the Gäa von Sachsen.) A botanical sketch of the Kylfhäuser in Thuringia, by Ekart, is merely a collection of lists of plants in those localities, which are known from Wallroth's communications. (Regensb. Flora, 1843, pp. 169-82.) Kirschleger has compared the vegetation of the Black Forest, of the Jura and of the Vosges. (Congrés scientif, 1842, and translated in the Regensb. Flora, 1843, pp. 186-94.)

Since the more general influence of climate upon the vegetation of these three mountains is the same in each, and the more so as that portion of the Jura which lies to the south of Neufchatel is excluded, the author correctly attributes the varieties of the vegetation, described by him, to the nature of the soil. The mountain-region from 2400′ to 4800′ presents these contrasts in the most marked degree. The Jura at this elevation affords 116 Phanerogamia, which are not met with in the Black Forest, nor the Vosges, which, on the other hand, present fifty-two species wanting on the Jura. So much richer in plants is the calcareous Jura, but to this abundance the nearer proximity of the Alps also contributes. The following, together with many alpine plants, are characteristic of that region : *Erysimum ochroleucum*, D. C., *Thlaspi montanum*, L., *Saponaria acymoides*, L., *Arenaria grandiflora*, All., *Linum montanum*, Schl., *Hypericum Richeri*, Vill., *Acer opulifolium*, Vill., *Genista Halleri*, Regn., *Heracleum alpinum*, L., *Centranthus angustifolius*, D. C., *Hieracium rupestre*, All., *Prenanthes tenuifolia*, L., *Sideritis hyssopifolia*, L., *Fritillaria Meleagris*, L. The Vosges, again, present a much more peculiar vegetation than the Black Forest.

The following are characteristic forms of these two mountains, which are absent from the Jura, and are also not among plants widely distributed elsewhere; *Nasturtium pyrenaicum!* Br., *Brassica Cheiranthus*, Vill., *Hypericum elodes*, L., in Lotharingia, *Angelica pyrenæa*, Spr., *Galium tenerum*, Schl., *Carlina longifolia*, Rehb., *Hieracium longifolium*, Schl., *Sonchus Plumieri*, L., *Campanula hederacea*, L., *Pyrola media*, Scr., *Digitalis purpurea*, L., and its hybrid *Epipogium aphyllum!* Rich.; of these, however, only the two marked (!) occur in the Black Forest, the rest only on the Vosges. The vegetation of the lower region also presents a variety of contrasts, according to the geological formation. The Jura limestone, together with the basalt and trachyte of the "Kaiserstuhl" are, in this respect, exactly opposed to the sandstone and granite. The following are the plants of the Jura limestone in the valley of the Rhine and on the Vorberg, 2400′: e. g. *Thalictrum montanum*, Wallr., *Hutchinsia petræa*, Br., *Althæa hirsuta*, L., *Alsine fasciculata*, M. K., *Trinia vulgaris*, D. C., *Bunium Bulbocastanum*, L., *Artemisia camphorata*, Vill., *Crepis pulchra*, L., *Melittis melissophyllum*, L., *Euphorbia verrucosa*, Lam., *E. falcata*, L., *Gymnadenia odoratissima*, Rich., *Himantoglossum hircinum*, Spr., *Orchis simia*, Lam., *Ophrys aranifera*, Huds., *apifera*, Huds., *Aceras anthropophora*, Br., *Allium rotundum*, L. Plants of the granite and sandstone are, e. g. *Sisymbrium pannonicum*, Jaq., *Mænchia erecta*, G., *Potentilla recta*, L., *P. inclinata*, Vill., *Lactuca virosa*, L.

Heufler has endeavoured to characterize the plant regions of the Tyrol. (Tiroler Bote, 1842, Nos. 19-27.) The botanical part of the subject, however, has been treated too generally, and the altitudinal limits can only be considered as approximate estimates. An evergreen vegetation of *Quercus Ilex* and *Phillyrea media* occurs only in the Sarcathal. The vegetation of the Reichenauer and Flatnitzer Alps, on the borders of Styria and Carinthia, has been described by Pacher. (Regensburg Flora, 1843, s. 803-11); this paper is only of local interest.

In the geological work on the Venetian Alps, by Fuchs, (Solothurn, 1843, fol.) of which I have no further knowledge, a section treats of the limits of vegetation in the southern Alps. Mohl has communicated observations on the arboreal vegetation in the Swiss Alps. (Bot. Zeit. 1843, p. 409 et seq.) They form a sequel to the observations of Martius, mentioned in the last year's Report. The author corrects some statements of Wahlenberg, which apply indeed to northern Switzerland, though not to the central chain, which was imperfectly examined by him. In this country *P. Abies* decreases in the higher forest region, and is replaced by an abundance of *P. Larix* and *P. Cembra*.

Near Zermatten, where the red pine does not attain the altitude of 5000′, the arboreal limit, formed by the two last-named Coniferæ, is placed as high as 7000′. The Beech and Oak also disappear on the central chain at a lower level than in northern Switzerland; the former in Oberhaslithal at 3000′, the latter at 2460′. Allowing that these and similar differences in the arboreal vegetation of the calcareous and slaty Alps, are to be referred to the geological substratum, the same explanation does not apply to the cultivated plants, in which similar relations are pointed out by V. Martius.

NORTH SWITZ.—ACCORDING TO WAHL:		CENTRAL CHAIN:
Cherry tree up to	2900′	4480′ in the Matterthal.
Apple	3000	3400
Walnut	2000	3600 in the Lauterbrunnenthal (Kastof)
Vine	1700	2500 near Stalden.
Cerealia	2700	Wheat 5400′, Barley 6100 } near Zermatten { (Gaudin) (Martius)

Mohl is inclined to refer these differences to climatic causes. He believes, that although the mean temperature of the seasons might be expected to produce a diametrically opposite effect, yet that, on the other hand, with reference to the amount of atmospheric deposit, at least to its increased quantity in the summer? as well as with regard to the hygrometrical condition of the air?

the greater elevation of the country in southern Switzerland possesses a more continental climate than the regions explored by Wahlenberg. It is certainly true that the central chain of the Alps, in its climatic relations, more nearly approaches the character of a *plateau* than do the steep, lesser, calcareous Alps; but it appears to me that the greater number of the phenomena adduced so prominently by V. Martius are explicable by the different conformation of the valleys in the slaty mountains, whilst the cultivation of the soil is limited by the form of the surface in the calcareous Alps and conglomerates.

The remarkable local differences in the altitudinal limits of the trees are also indicated in a paper by Heer, 'On the Forest Cultivation in the Swiss Alps.' (Schweiz. Zeitsch. für Land und Gartenbau, 1843.) The extremes are collected in the following table:

NORTH SWITZ:			SOUTH SWITZ:
Fagus sylvatica . .		4250′	4660′ in Tessin.
On the North declivity	to	3900	
South		4550	
Acer Pseudoplatanus . .		4800	
On the North declivity	to	4700	
South		5000	
Pinus Picea, L. . .		5000	
Abies, L. . .		5500	5100 near Airolo.
In the Ober Engadin it ascends, on the other hand, as high as 6100′, in the Unter Engadin to 6600′.			
Pinus Larix, L. . .	to	6000′	6500′ in Graubundten.
In the Engadin it also attains a greater elevation, and the greatest on the south side of the pass between Scarl and Münster; that near the Wormser Jochs as high as 7150′.			
Pinus Cembra, L.		6500′	
In the Engadin higher, and highest near Stelvio, where it attains 7280′			
Pinus sylvestris, L. .	to	5500′	6000′
Pumilio, H. K.		6200	6750 in Graubundten.
Betula			5000 in the Engadin. 6000 in the Albignathal.

These facts afford a scale of the influence of locality on the distribution of plants in Switzerland, an influence which causes the close approximation of so many various climates, determined by the position, inclination, and sur-

face-formation of the valleys and heights. It is only through the complete analysis of all these relations that an isolated abnormal phenomenon can be here explained. But on the whole, these local conditions equalize each other, and the peculiarities of the Oberland and Valaise, described by Mohl, lose in general importance, when they are compared with the Engadin, a valley also appertaining to the system of the central chain, and running north-east.

Systematic works on the Flora of Switzerland, are: Hagenbach (Supplementum Floræ basileensis; Basel, 1843, 8vo.) J. B. Brown (Catalogue des Plantes qui croissent naturellement dans les environs de Thoune et dans la partie de l'Oberland Bernois qui est le plus souvent visitée par les voyageurs; Thun. 1843, 8vo: Catalogue of the Phanerogamia and Mosses, with their habitats.) Rapin (Le Guide du Botaniste dans le canton de Vaud, comprenant les descriptions de toutes les plantes vasculaires qui croissent spontanément dans ce Canton; Laus. 1843, 8vo.) Blanchet (Essai sur l'histoire naturelle des environs de Vevey, 1843, 8vo): a work with which I am unacquainted. Reuter (Supplément au Catalogue des Plantes vasculaires qui croissent naturellement aux environs de Genève; Genève, 1841, 8vo): fifty-one pages, with a figure of *Arabis hybrida*, R. The rarer plants of the neighbourhood of Pfäfers are enumerated by Kaiser. (Die Heilquelle zu. Pf. St. Gallen, 1843.) Schærer's 'Lichenes Helvetici exsiccati' have reached the 18th part, and contain 450 species. The last part is accompanied with the conclusion of the 'Lichenum helveticorum Spicilegium.'

Kirschlager gives a review of the botanical relations of the environs of Strasburg. (Congres scientif. l. c.) He enumerates on this, for the most part cultivated alluvium, 960 sp., which he divides into the following formations:— "in arvis" 290 sp.; "in pratis" 300 sp.; "in campis" (incultis, &c.) 120 sp.; "in sylvis" 280 sp.; "in paludibus" 80 sp.; "in aquis" 110 sp.; "in ripâ Rheni" 20 sp.

The meadow vegetation on the Orne, from the village of Louvigny (south of Caen) to the sea, has been described by several botanists in Normandy—Hardouin, Leclerc, Fourneaux, and Eudes-Deslongchamps. (Mém. de la Soc. Linnécne de Normandie, vol. 7.) This paper shows the influence of the soil upon the distribution of meadow plants. Where inundations occur regularly, *Agrostis vulgaris* replaces *Hordeum secalinum* and *Cynosurus*, which elsewhere are the chief constituents of the grass turf, or in places where the marine tides overflow twice a month, the *Agrostis* gives way to *Glyceria maritima* and *Festuca rubra*, var. *maritima*. Of Schultz's 'Flora Galliæ et Germ. exsiccata,' six Centuries have appeared up to the present time. The following works relate to the Flora of France: Cosson, Germain, and Weddel (Introduction à une Flore analytique et descriptive des environs de Paris; Paris, 1842, 12mo.) By the same authors, (Supplément au Catalogue raisonné des plantes de Paris; Paris, 1843, 12mo.) A new edition has appeared of Bautier (Tableau Analytique de la Flore Parisienne; Paris, 1843;) as also of Mérat entitled (Revue de la Flore Parisienne; Paris, 1843); the latter in opposition to the more exact work of Cosson, &c. Godron (Flore de Lorraine—includes the departments Meurthe, Moselle, Meuse, and Vosges; Nancy, 1843. 3 vols. 12mo.) By the same author (Monographie des Rubus, qui croissent naturellement aux environs de Nancy—Ibid. 1843, 8vo.) Desmaziéres (Dixieme notice sur quelques plantes cryptogames recemment découvertes en France—Ann. Sc. Nat. 19, pp. 335-73), contains new Fungi, especially *Pyrenomycetes*, and some *Peziza*.

Tulasne has described the subterranean Lycoperdaccæ of the neighbourhood of Paris, with several new species, and the new genera *Hydnobolites* and *Delastria*. (Ann. Sc. Nat. 19, pp. 373-81.)

Massot has published a table on the plant limits on the Canigou in the Pyrenees. (Comptes Rendus, v. 17; also printed in the Regensb. Flora, 1844, p. 84, and in the

Bot. Zeitung, 1844, p. 427.) These measurements are important as regards the alpine plants.

Descending from the summit, which rises to a height of 2785 met., the ligneous plants appear in the following order:

Rhododendron ferrugineum, L. (1322 m.)	2540 m.
Genista purgans, L.	—
Pinus Abies, L. (1500 m.)	2415
Sambucus racemosa, L.	2063
Betula alba	1987
Pinus Picea, L.	1950
Sorbus Aucuparia, L.	1838
Populus tremula, L.	1640
Amelanchier vulgaris, Mch.	—
Limits of cultivation of Potato and Rye, harvest in beginning of September	—
Fagus sylvatica, L.	1623 m.
Corylus Avellana, L.	—
Lonicera Xylosteum	—
Sorbus Aria, Cr.	1566
Rubus fruticosus, L.	1322
Cratægus Oxyacantha. L.	1250
Prunus spinosa, L.	1050
Ilex Aquifolium, L.	987
Cornus sanguinea, L.	—
Rye harvest middle of July	—
Castanea vesca, G.	800
Alnus glutinosa, G.	800
Sarothamnus scoparius, W. G.	—
Attempted cultivation of the vine	750
Acer monspessulanum	700
Euonymus Europæus, L.	—
Abundant cultivation of vine	550
Cultivation of olive	420

According to Bory, the indigenous oak of the mountains of Andalusia is the *Quercus bætica*, Webb., identical with *Q. Robur*, Desf., and widely distributed in Algeria. The former has named it *Q. Mirbeckii*. (Comptes Rendus, v. 17.)

Systematic remarks upon some South European Gramineæ have been communicated by Link. (Linnæa, 1843, pp. 385-407).

An interesting memoir on the character of the vegetation of New Castille has been read by Reuter before the Geneva Natural History Society (Essai sur la végé-

tation de la Nouvelle Castille; Geneva, 1843, iv, 34 pp.) The plateau of Madrid, which is elevated more than 2000′, is bounded on the north by the Sierra of Guadarrama, (the mountains Carpétano-Vétoniques of Boissier), which are covered with snow for eight months in the year. The mean temperature of Madrid (2050′) amounts to 15° C. according to Humboldt, that of the summer to 24°·8, and of the winter to 6°·1 (Schouw); but the thermometer always falls in the winter below the freezing point, so that there is almost every year skating on the pond of the Retiro; it seldom sinks below 6°, although in 1830 it fell to 10°, and in 1802 to 11°·25 C. In summer, the thermometer occasionally rises in still air in the shade to from 37° to 41°. Rain falls only in winter and spring, with the prevailing north winds, which are cooled by passing over the mountains. In the spring these winds alternate with westerly and southerly breezes, which characterize the summer, and are accompanied with greater heat and drought. The autumn also is throughout warmer, till December. The epochs of vegetation appear to occur a month earlier than in Geneva. At the end of March, the trees were already in leaf, and the Cherry and Syringa in blossom. The vegetation of the herbaceous plants commences in the beginning of March, and is quite over by the end of June, excepting some shrubs which withstand the drought. (p. 12.)

The plateau, which presents undulating ridges of low hills, is, in the neighbourhood of the metropolis, covered for the most part with wheat and barley fields, and being destitute of wood or even of shrubs, presents the most uniform aspect, and is everywhere bounded by the same confined horizon. The plant formations are throughout dependent on the nature of the soil, and consequently fall under four classes: that of the clay, of the gypsum, of the sand, and of the granite. The argillaceous substratum stretches southwards from Madrid over the greater part of La Mancha. The hills, for example, from Aranjuez to Alcala, consist of saliferous gypsum, in the springs from

which common salt effloresces and *Halophyta* flourish. To the northward and westward of Madrid as far as the mountains, the surface is composed of close-grained sand without stones, which, in consequence of the drought, acquires almost the same degree of cohesion as the clay. Lastly, the granite soil constitutes the Sierra of Guadarrama itself, and blocks of it are also scattered over the sandy surface. These mountains attain an altitude of 7-8000′, and the passes into Old Castille are about 4500′ to 5500′. Limestone is not found in the neighbourhood of Madrid; it first appears on the east towards Cuença, and together with it the extensive shrub formations of Catalonia commence, which are not found in the plateau of New Castille.

The corn on the sandy soil is but poor, on the clay it is perhaps 4′ high; "Garbanzos" (*Cicer arietinum* and "Algarrobas" (*Ervum monanthos*) are especially cultivated for food. The vine and olive occur only in sheltered places, but the latter is always small and poor. Meadows are altogether wanting; even the pastures (Kräuterwiesen) at Manzanares consist only of annual grasses and Leguminosæ, which at the approach of summer are soon choked by thorny plants; e. g. *Centaurea calcitrapa, Eryngium campestre, Ononis spinosa, Xanthium spinosum,* or where the ground is more marshy are replaced by large tufts of *Juncus acutus* and *Scirpus holoschœnus.* According to ancient chronicles, it would appear the elevated plain of Madrid was formerly wooded (p. 13), and remains of these woods, in the form of stunted, widely scattered *oaks,* especially *Q. Ilex,* are still visible on the sandy hills of the Casa de Campo, and of the Prado, mixed with leafless Genisteæ (*Retama sphærocarpa, Sarothamnus scoparius*), but these, together with the trees growing on the banks of the river (*Salix, Populus, Ulmus, Fraxinus angustifolia,* Vahl.), and some shrubs (*Tamarix gallica, Cratægus, Rosa, Rubus, Rhamnus, Osiris*), are the only ligneous plants of the plateau. It is evident that the want of wood is only the consequence of the aridity;

this is proved by the lofty growth of the plantations in the valley of the Tagus near Aranjuez, as well as of the more recently planted avenues in Madrid, which are maintained by irrigation.

Summary of the Plant formations:—(1) Argillaceous soil. In the fields the first plants which appear are *Brassica orientalis, Lathyrus erectus,* Læg., *Turgenia, Glaucium corniculatum, Polygonum Bellardi;* these soon become choked by thorny Synantheræ; *Picnemon, Scolymus, Xanthium, Onopordon nervosum,* Boiss.; at the end of summer the only surviving plant is *Ecballion,* which at last develops its fruit, *Crozophora* also is abundant. The uncultivated plains and hills (campi) are covered with aromatic plants, a class which in Spanish is termed "Tomillares" from *tomillo* (Thymus). Here the vegetation consists of *Thymus tenuifolius, Teucrium capitatum,* and *Sideritis hirsuta,* with which various plants, characteristic of the country, are mixed, e. g. *Queria, Minuartia, Astragalus macrorhizus,* and *narbonensis, Echinops strigosus, Cynosurus Lima, Stipa barbata.*—Riparial plants are: *Althæa officinalis, Lavatera triloba, Cochlearia glastifolia, Gypsophila perfoliata, Sonchus crassifolius.*—Halophyta flourish most luxuriantly in the pool of Ontigola, near Aranjuez: *Spergularia marina, Frankenia pulverulenta, Erythræa spicata, Atriplex, Suæda setigera, fruticosa,* and *maritima, Salicornia, Hordeum maritimum,* and (cultivated) *Salsola Soda.*

(2) Gypsum. The vegetation peculiar to this substratum is, together with the soil, extended through the whole of Arragon. The steep declivities are covered with plots of *Frankenia thymifolia,* associated with *Peganum, Lepidium subulatum,* and *Cardamine, Helianthemum squamatum, Gypsophila struthium, Zollikoferia, Salsola vermiculata.*—Other characteristic plants are, *Vella Pseudocytisus, Iberis subvelutina,* Gass., *Herniaria fruticosa, Centaurea hyssopifolia, Statice dichotoma,* Cav. Extending from the south of Spain to Aranjuez, and clothing

the ridges of the downs, grows the social *Stipa tenacissima*, which is used for a variety of purposes; with this are associated several Cisteæ, *Pimpinella dichotoma*, *Rosmarinus*, *Fritillaria*. Many isolated thickets are formed of *Quercus coccifera*, with *Rhamnus lycioides*, *Retama sphærocarpa*, and *Bupleurum frutescens*.

(3) The sandy soil is characterized by numerous Cruciferæ, which perhaps nowhere present such a variety of species, nor grow individually so much associated together as here; and in spring they give a yellow colour to the cultivated plains. With this prevailing colour are also mingled blue Boragineæ and white Anthemideæ; *Diplotaxis catholica* and *virgata*, *Sisymbrium contortum* and *hirsutum*, Lag.; *Brassica lævigata* and *valentina*, *Sinapis heterophylla*, Lag.; *Anchusa undulata* and *italica*, *Echium violaceum*; *Anthemis mixta*, *pubescens*, and *arvensis*; and also *Malcolmia patula*, *Hypecoum grandiflorum* and *pendulum*, *Rœmeria hybrida*, *Cerastium dichotomum*, *Veronica digitata*, *Aphanes cornucopioides*, and several species of *Linaria*, particularly the extremely social *L. ramosissima*, Boiss., and *L. hirta* and *spartea*. When this rich vegetation has disappeared, the fields are overgrown with *Tanacetum microphyllum*, D.C. The "tomillares" occupy extensive tracts, and here consist of *Thymus tenuifolius* and *Mastichina*, *Santolina rosmarinifolia*, and *Lavandula pedunculata*. Among these, in the spring, is seen a multifarious vegetation of annual herbs and grasses; several Cisteæ, particularly *Helianth. sanguineum*, Lag., and *Ægyptiacum*, *Astrolobium durum*, *Campanula Loeflingii*, *Myosotis lutea*, *Pyrethrum pulverulentum*, *Prolongoa pectinata*, *Aira involucrata*, *minuta*, *lendigera*, and *articulata*, *Holcus setiglumis*, *Bromus ovatus*, *Psilurus anistatus*, *Hordeum crinitum*. After the disappearance of these, larger herbaceous plants spring up, especially Umbelliferæ: *Thapsia villosa*, *Margotia laserpitioides*, *Daucus crinitus*, *Magydaris panacina*, *Pimpinella villosa*, *Verbascum sinuatum* and *pulverulentum*, *Ruta montana*, *Onopordon illyricum*, *Centaurea ornata*.

(4) On the granite of the Sierra of Guadarrama, these "tomillares" extend up to about 4000′, becoming gradually mixed with other plants. The greater moisture of the soil produces here several central European plants. Extensive pasture grounds for horned cattle, which are protected by fences from the flocks of sheep (and termed "Dahesa"), are covered with bushes of *Quercus Toza* and *faginea;* on the rocks grow *Jasminum fruticans, Lonicera etrusca, Daphne Gnidium, Juniperus Oxycedrus.* Here also Rose-Cistuses first appear; *C. ladaniferus* and *laurifolius.* Several new species of plants were found by Reuter in this region, which for the rest differs but little from the plateau, e. g. *Ranunculus carpetanus, Pœonia Broteri, Silene Agrostemma, Hispidella;* and also are here found, *Caucalis hispanica,* Lam., *Digitalis thapsi, Dianthus lusitanicus, Antirrhinum hispanicum,* Chav., *Macrochloa arenaria;* several Orchideæ, Irideæ; under the shade of the oak bushes, *Arenaria montana, Bunium denudatum, Valeriana tuberosa, Scilla nutans.* The higher mountain region, above 4000′, is that of the Genistæ, since it is almost entirely covered with *Genista purgans.* Solitary shrubs of *Juniperus* and *Adenocarpus hispanicus* occur; upon the latter of which lives the true "Cantharis." In this shrub region are found *Arabis Boryi,* Bois., *Linaria delphinoides,* Lag., *saxatilis,* Chav., and *nivea,* Boiss., *Senecio Tournefortii* and *Duriæi,* Gay, *Narcissus apodanthos.* Some higher points rise above this Genista region, and bear a thick firm turf of *Festuca curvifolia,* Lag., mixed with *Armeria juniperifolia,* W. Of alpine plants there are only a few traces, such as *Saxifraga nervosa* and *hypnoides, Ledum hirsutum* and *brevifolium,* the annuals of the sandy plain of Madrid, however, flourish even here. In the neighbourhood of the mountain-rivulets the turf is composed of *Nardus stricta* with *Pedicularis sylvatica, Jasione carpetana* and *Veronica serpyllifolia.*

It is only on the northern declivity of the Sierra that forests of a bifoliate fir (*P. sylvestris*) occur, and here large tracts are covered with *Pteris.* The Sierra de

Gredos, the most westerly and highest elevation of this ridge, differs but little in its vegetation, and is in a still higher degree poor in plants, and of a uniform aspect.

Much more interesting appear to be the mountains south of Toledo, which were explored by Reuter at too late a season of the year. These extensive rounded hills belong to the vegetation form of the Monte Baxo, under which the Spaniard understands the oak bushes which grow in clumps. But the contrast presented by the Sierra Nevada is much greater, since all the plants which are common to this and that of Guadarrama, grow, without exception, also in Asturia and on the Pyrenees.

Reuter collected above 1250 species of plants in New Castille. The new species (about 50) are published by him, in concert with Boissier, in the 'Bibliothèque Universelle de Genève' (1840). The families most rich in species of this collection are the following: 143 Synantheræ, 123 Gramineæ, 110 Leguminosæ, 76 Cruciferæ, 61 Caryophylleæ, 54 Labiatæ, 52 Scrophularineæ, 38 Rosaceæ, 33 Ranunculaceæ, 38 Boragineæ. The recurrence of a series of Castilian plants in the Crimea, without their being found in any of the intermediate countries is remarkable. Reuter explains this extraordinary fact by the analogy of the extreme climates, and of the geological substratum, which is especially evident in the heavy clayey soil and saliferous gypsum. The plants to which this explanation applies, are: *Lepidium perfoliatum, Meniocus linifolius, Mollugo cerviana, Minuartia dichotoma, Queria hispanica, Callipeltis, Campanula fastigiata, Veronica digitata, Acinos graveolens, Rochelia stellulata, Plantago Loefflingii.*

Contributions to the Flora of Italy. Of Bertoloni's 'Flora Italica' the fifth volume has appeared, containing the 11, 12, and 13 classes (Bologna, 8vo); and also the second volume of Moxis' 'Flora Lardoa,' an original work, indispensable in the systematic study of the plants of South Europe; this volume, in which De Candolle's

arrangement of the families is followed, includes the Rosaceæ and the whole of the Ericeæ, from No. 411-779, together with Pl. 73 to 93—(Turin, 1840-43, 4to.) Puccinelli (Synopsis plantarum in agro Luccensi sponte nascentium Lucca, 1842.) Id. (Additamentum ad Synops. Lucc.—Giornale Bot. Ital. fasc. 1.) Gussone (Synopsis Floræ Siculæ, 1842:—a new working out of his Prodromus) Todaro (Orchideæ Siculæ, 1842.) Gasparrini (Nonnullarum plantarum descriptiones—Rendiconto, accad. Nap. 1842, extracted in the Botan. Zeitung, 1843, s. 643); 1 *Geranium*, and 1 *Fumaria* from Calabria, 1 *Cerinthe* from Naples, 1 *Sedum* from the Nebrodes.

Ball has published some remarks on his botanical tour in Sicily, and has taken occasion to give a very complete list of the Sicilian Gramineæ (240 sp.). (Ann. Nat. Hist. 11, pp. 338-51.)

The statement in the last year's Report, that Schouw had indicated *Opuntia* and *Agave* as occurring in Pompeii, appears, according to the Bot. Zeit. (1844, s. 581), to have originated only in an erroneous translation of his account.

On the vegetation around Pola, in Istria, are some remarks containing only what is known, by Von Heufler, (in the Regensb. Flora, 1843, s. 767.)

Zanardini, in a new systematic memoir, has completed his catalogue of the Dalmatian Algæ up to 272 species (Saggio di classificazione della Ficee; Venezia, 1843, 64 pp. 4.)

In Davy's work on the Ionian Islands (Notes on the Ionian Islands and Malta. London, 1842, 2 vols. 8vo,) are contained two years' observations on the climate of Constantinople, from which I extract what is most important as regards vegetation. (ii, p. 400.)

MEAN TEMPERATURE.

	1839.	1840.
January	= + 2·2°	= + 4·8° C.
February	= + 5·6	= + 4·1
March	= + 4·4	= + 4·6
April	= + 6·1	= + 7·7
May	= + 11·1	= + 15·5
June	= + 21·1	= + 20·6
Max. of temp.	+ 31·7°	= + 32·7° C.
Min.	— 1·7	= — 4·4

	1839.	1840.
July	= + 22·2°	= + 24·5° C.
August	= + 26·7	= + 22·9
September	= + 20·	= + 20·6
October	= + 17·2	= + 15·6
November	= + 13·9	= + 12·7
December	= + 7·8	= + 3·2
Mean temp.	= + 13·3	= + 14·7 C.

Prevailing winds, N.E. (215 and 199 days), S.W. (99 and 113 days). Rain fell (102 and 122 days). Amount of rain, 1840=31·65″; May, June, July, and August, almost without rain; between 1″ and 2″ in November; between 2″ and 3″ in February and April; between 3″ and 5″ in May, September, October, December; above 6″ in January.

According to Davy's observations, the temperature of the springs in the Ionian Islands, at the level of the sea, fluctuates between 16° and 18° C.

The mean temperature of Malta (i, p. 261), equals 17·8° C.; the max. temp.=31·1°, and the min. temp.=+5° C.

The same work contains an important series of observations on the saline contents and temperature of the Mediterranean Sea. The common opinion that it is specifically lighter and warmer than the Atlantic, is in no way supported by these observations.

In Forbes's researches on the distribution of the lower animals in the Ægean Sea, the Algæ are also considered, though only in a general way. (Report on the Mollusca and Radiata of the Ægean Sea; from the Report of the

British Association, &c. for 1843.) In the eight regions admitted by Forbes, from 0° to 1380′ deep, the prevailing Algæ are distributed in the following relations:

(1) 0—12′.

a. Above low-water mark, *Dictyota dichotoma* and *Corallina officinalis.*

b. Below low-water mark. The characteristic Fucoid is *Padina pavonia.*

(2) 12′—60′. The mud is usually green from the presence of *Caulerpa prolifera.* The sandy bottom is rich in *Zostera oceanica.*

(3) 60′—120′. *Caulerpa* and *Zostera* gradually diminish in quantity.

(4) 120′—210′. Fucoids are abundant, especially *Dictyomenia volubilis, Sargassum satirifolium, Codium Bursa* and *flabelliforme, Cystosira.* Corallines increase. Nulliporæ and Spongiæ frequent.

(5) 210′—330′. Fucoids diminish in number; *Dictyomenia volubilis* is rare, *Rytiphlæa tinctoria* and *Chrysimenia uvaria,* more abundant. The bottom is constituted for the most part of Nulliporæ and shells.

(6) 330′—474′. Fucoids are extremely rare. The sea bottom consists of Nulliporæ. Although at this depth, the higher Algæ scarcely any longer exist, yet many phytophagous Testacea are met with, from which circumstance the opinion that the Nulliporæ are plants receives new and very important support.

(7) 474′—630′. The Algæ, except the Nulliporæ, which still usually constitute the sea bottom, entirely disappear.

(8) 630′—1380′. Here the Nulliporæ also appear to be wanting; as the sea bottom from this point onwards consists of yellow mud, with remains of Foraminifera.

Of my 'Spicilegium Floræ rumelicæ et bithynicæ,' in which about 2000 plants have been systematically studied, the first volume containing the Polypetala (almost the half of the whole), has appeared. (Brunswick, 8vo.) On the conclusion of this work I shall recur to it.

The Report on Koch's journey by the Danube to Constantinople, seems to have appeared without the knowledge of the author (Bot. Zeitung, 1843, s. 605), and must be passed over on account of the uncertainty of the names of plants (e. g. *Pinus Cembra* and *Ammodendron* on the Bosphorus).

Tenore has published remarks upon Sibthorp's 'Flora Græca,' which should not be overlooked in the comparison of the Italian and Greek Flora. (Rendiconto accad. Nap. 1842, extracted in Bot. Zeitung, 1843, s. 877.)

Schultz has proposed a considerable number of new Greek *Orobanchæ* (Reg. Flora, 1843, s. 125); but the descriptions are defective, and the species, without doubt, for the greater part untenable.

II.—ASIA.

Aucher-Eloy's oriental journals have been edited by Count Jaubert. (Relations de Voyages en Orient de 1830-38, par Aucher-Eloy, revues par le Cte. Jaubert; Paris, 1843, 2 vols. 8vo.) The scientific contents of this work are not considerable, but the importance of the author's collections, which have already for the most part been arranged, invests even a simple Itinerary, from which the locality and time of flowering of most of the plants can be determined, with a great degree of interest. Before entering upon the review of these travels, and as Aucher-Eloy has made no estimates of altitude, I will premise an observation of Ainsworth, which occurs in his last book of travels (Travels and Researches in Asia Minor, Mesopotamia, Chaldea, and Armenia. London, 1842, 2 vols. 8vo., ib. ii, p. 374), and in which the altitudinal relations of a part of the regions explored by Aucher-Eloy have been strikingly characterized from his own measurements. Asia Minor is a highland, encircled by a level or hilly littoral tract, to which on the north side, a second terrace of less elevated plains succeeds, e. g. that of Duzcha, E. of Nicomedia, 250′; of Boli, 570; of Vezir Köpri, above the mouth of the Kizil-Irmak, 800′, &c. Thence commences on the south, the elevated plateau, which, descending gradually from Persia towards the Ægean Sea, is near Angora, 2700′, and even near Kastamuni, close to the Black Sea, S.W. of Sinope, still 2400′ high, but rising near Erzerum to a height of 6000′. This plateau, with its scattered conical hills, the highest

of which, that of Argäus, near Cæsarea, according to Hamilton, rises to 12809′, contains numerous basins, having no exit for the water; viz., Ak-Scher, 2300′; Konia, 2200′; the great salt lake, Koch-Hissar, south of Angora, 2800′; Erekli, on the northern base of the Taurus, 2600′; Kara-Hissar, near Cæsarea, 3420′; the lake Van, 5460′; and Urmia, 4300′. The Taurus, or southern border chain of this great highland, descends on the south abruptly, partly to the littoral tract and partly to the plains of Assyria and Mesopotamia, the latter of which are nowhere more than 700′ above the sea.

The first journey of Aucher-Eloy occupied from November 1830 to October 1831. It included Egypt, where he remained from December to March, and Syria, where he passed the months from April to July; August he devoted to a visit to Cyprus.

The imperfect journal of 1832 shows that Aucher-Eloy in this year explored Smyrna and Rhodes, whence he returned by way of Moylah and Guzel-Hissar. The third journey is comprehended in the year 1834. In May he arrived at Cæsarea from Constantinople, by way of Nicomedia and Angora; in April, at Scanderoon and Antioch, by way of Tarsus; in May he explored the country about Aleppo and Aintab: between Antioch and Aleppo he remarked the sudden transition from the Mediterranean to the Syrian vegetation (vol. i, p. 84); in June he crossed the passes of the Taurus to Malatia, on the Euphrates, and followed that stream downwards to the vicinity of Arabkir, and proceeded, in July, by Erzingan to Erzerum. Fourth journey in 1835. February, Constantinople, Brussa, Kutaja, Ophium, Kara-Hissar, Ak-Scher; March, Konia, Adana: *Crocus*, *Hyacinthus*, *Anemone coronaria*, and others, in flower on the 9th March on the southern declivity of the Taurus. Skanderoon: *Phœnix* abundant on the coast; groves of *Myrtus*, *Laurus*, *Styrax*, and *Arbutus Andrachne* towards Antioch. Aleppo: the period of vegetation of the steppe lasts from the end of February to June. (Ib. p. 177.) April: Bir, Mardin, Mossul: as prevailing steppe-plants between the two latter

towns, are mentioned *Serratula cerinthefolia*, D. C., *Sinapis oliveriana*, *Avenæ* sp. (Ib. p. 191.) May: along the Tigris to Bagdad; banks of the river covered with *Tamarix gallica*, *Populus euphratica*, Oliv., *Capparis leucophylla*, *Sinapis lævigata*; below Dor (34° N.L.) the Date-palm becomes abundant; considerable palm groves near Hilla and Kerbela; prevailing plants of the saline steppes: *Tamarix pycnocarpa*, Decaisn., *gallica*, *Chenopodium fruticosum*, *Zygophyllum simplex*, *Peganum*, *Fagonia Bruguieri*, *Cucumis* sp., *Ajuga elongata*, M. B., *Savignya ægyptiaca*. (ib. p. 227). June: Kermanschah; limits of *Phœnix* towards Persia, near Hadschi-Kara-Khani, S.W. of Elluan (ib. p. 231), Hamadan, ascent of the Elvend. July: Scheschnau, Ispahan. August: excursion to Zerdaka, a mountain lying to the S.W. (32° N.L.), the height of which Aucher Eloy estimates at more than 10,000′; journey continued by Cashan to Teheran. September: excursion to Demavend, Kasbin, Tauris. The chain of the Elbruz presents no Coniferous region. The forests consist of *Quercus*, *Fagus*, *Ulmus*, *Celtis*, *Diospyros*, *Gleditschia caspica*, *Acacia Julibrissin*, *Platanus*, succeeded by bushes of *Paliurus* and *Juniperus hispanica*, A. E, in the alpine region, another *Juniperus*, *Rosa*, and *Berberis*. (Ib. p. 335.)

Fifth journey in 1836.—Smyrna, Chios, Syra, Athens, Parnassus, Eubœa, Thessaly, Olympus, Hajion-Oros, Skyros, Lemnos, Imbros, Hellespont, Brussa.

Sixth and last journey, 1837 and 1838.—March: Nicomedia, Angora. April: Tokat, Baibut. May: Erzerum, Koi, Lake Urmia. June: Tauris, Ardebil, coast of Ghilan, Rescht. July: Erzevil on the southern declivity of the Elbruz. August, September: exploration of that mountain, second ascent of the Demavend. September to December: remains in Teheran. January: Ispahan, Schiraz; spring vegetation commences in the middle of January with a *Bulbocodium* (*Colchicum crocifolium*, Boiss.), and in February the country is covered with flowers; the only rainy season is from the 15th January, to the 15th March Bushire on the Persian Gulf. February: Dscha-

run, Lar., *Mimosæ* become frequent; Bender-Abassi. March: passage to Muscat, the coast near Sohar is covered with palm groves (vol. ii, p. 545), excursion inland as far as the mountain Akadar (about 5000′ high). April: passage to Bender-Said, and back to Bender-Abassi. May: Forg, Darap, limits of palm vegetation between Darap and Fasa (ib. p. 600), Shiraz. June: returns to Ispahan, where he dies in October.

Ainsworth (l. c. et sup. vol. ii, p. 131) describes the annual course of vegetation in the environs of Mossul. During the moist February, the mean temperature of which = 10° C., the vernal plants, which constitute the only adornment of the steppe, bud forth. In the beginning of March, *Anemone* and *Narcissus* flower; in the second week of the same month, species of *Ranunculus*, the Fig, and Apricot shoot; in the third week, flowering Cruciferæ and Orchideæ, *Ranunculus Asiaticus* and *Traganth-Astragalus*. Towards April, about twenty Phanerogamia were in flower, viz., *Gladiolus*, *Sternbergia*, *Trollius asiaticus*, and a small Anthemideous plant; the almond trees blossomed, and the water-melon put forth buds. In the latter half of this month, the temperature = 15° C. With May commenced the dry season; to the spring grasses now succeeded other species of *Chrysurus*, *Dactylactenium*, &c.; the prevailing Phanerogamia were Euphorbiæ and Synantheræ; the corn-harvest lasted from the middle to the end of the month, at which time the mean temperature = 30° C., now all the Phanerogamia began to wither, and only a white *Trifolium* and *Nigella damascena* continued in flower. Finally, no plant remained except the prevailing steppe-plants, species of *Artemisia* and *Mimosa*. In July the heat reaches 40° C., and from this time the hibernation of the vegetation continues till the following year.

As the most abundant plants of the Mesopotamian steppes, the light red soil of which, according to Aucher Eloy, rests upon a calcareous formation, with the rolled fragments of which it is mixed, Ainsworth enumerates (ib. p. 177) *Artemisia fragrans* and *Absinthium*; here and

there are found other social plants, e. g. *Allium*, *Rœmeria*, *Silene*, *Erigeron*, (*Aster pulchellus*, Ains.), Anthemideæ, &c. Where the ground is less arid, an *Avena* prevails for miles together, together with some other Gramineæ and Synantheræ, *Chrysanthemum*, *Gnaphalium*, *Crepis*, *Centaurea*. The steppe is nowhere altogether barren, but bare tracts are often only covered with lichens, especially with a gray *Lecidea* with black apothecia, a *Cetraria*, and some *Verrucariæ*.

The region of oak forests in the high mountains of Kurdistan, near Amadia, extends from 1500′-2500′, according to Ainsworth's measurements. (Ib. p. 194.)

On the Lake Urmia, the steppe-vegetation consists of almost the same plants as in the low-lying country of Mesopotamia and Babylon, although its level is almost 4000′ higher. (Ib. p. 301.) But the Artemiseæ are for the most part represented by species of *Traganth-Astragalus*, *A. verus*, and *tragacanthoides*. Where the steppe is free from salt, *Nigella damascena* grows, together with *Capparis spinosa* and *ovata*, as near Mossul, or the surface is covered with *Ononis* and a *Mesembryanthemum*, which flourishes as near Hilla. The vegetation of the saline steppe on the Lake Urmia consists of Chenopodeæ: *Salsola*, *Salicornia*.

M. Wagner ascended the Great Ararat, and found the arboreal limits to be constituted by some tufts of birch, at an elevation, estimated by Parrot, to be 7800′. The mountain declivities of Armenia, however, are almost as bare of trees as the elevated plains. The traveller was assured by the natives, that forests formerly existed in districts at present entirely bare. (Augsb. Zeit., 1843, No. 214.)

The systematic works connected with the Flora of Hither Asia, have made considerable progress. Of Boissier's 'Diagnoses Plantarum orientalium' (vid. last Report), the second and third parts have appeared, and this important work will be concluded in 1844 with the fourth and fifth parts. The new species described in it

belong to the following families.—5 Rhamneæ from Persia, Kurdistan, and Cilicia; 1 *Rhus* from Muscat; about 180 Leguminosæ, of which 54 are Persian, for the most part *Astragali* (39), two species of *Taverniera*, 1 *Crotolaria* from Bender-Abassi, and 1 *Tephrosia*, the rest for the greater part from Asiatic Turkey; also about 10 *Astragali*, then follow *Trifolium* (11), *Trigonella* (10), *Onobrychis* (9); but many species are not as yet sufficiently determined, for comparison with those of Sibthorp and Willdenow; 10 Rosaceæ, mostly *Potentillæ* from Anatolia, 1 *Cotoneaster* from the Bithynian Olympus, found by Boissier, 2 *Amelanchier* species; 5 Paronychieæ with a new genus *Sclerocephalus* (*Paron. sclerocarpa*, Decaisn.), indigenous on Sinai and near Muscat (Mascate); 1 Reaumuriaceous plant; *Eichwaldia Persica* from the plateau of the Persian steppes. 6 Crassulaceæ, among which 3 *Umbilici* from Persia and Babylon; 6 *Saxifragæ* from Cadmus, Bithynian Olympus, Taygetus and Parnassus; the numerous Umbelliferæ have been published in the 'Ann. d. Sci. Nat.' for 1844; about 45 Rubiaceæ, many of which, however, must be reduced, the most remarkable are the *Wendlandia*, found by Kotschy in Kurdistan, and the new genus *Mericarpæa* from Mesopotamia; 8 Valerianeæ; 13 Dipsaceæ. Above 40 Synantherеæ, of which the most numerous are *Anthemis* (9) and *Centaurea* (8), though with several of the species untenable; a newly instituted genus *Cephalorrhynchus* with the habit of *Crepis pulchra*, found by Boissier in Lydia; 6 Campanulaceæ from Anatolia; 1 Primulaceæ; 2 Asclepiadeæ; 1 Convolvulaceæ; 17 Borragineæ; 47 Scrophularineæ, amongst the most numerous of which is *Verbascum* (18) mostly from Anatolia, *Scrophularia* (9), *Veronica* (9); what is remarkable, 1 *Gymnandra* near Erzerum, 1 *Wulfenia* near Seleucis; 1 Acanthaceæ from Caria; 65 Labiatæ, among which are *Salvia* (7), characteristic of Persia, *Nepeta* (5), *Phlomis*, 2 *Otostegiæ*, 1 *Lagochilus*, and the two new genera *Zataria* and *Sestinia*; 3 Polygoneæ; 3 Santaleæ. 3 Aristolochiæ. 7 Euphorbiaceæ; 1 *Orchis*. 15

Liliaceæ, with the new genus *Chionodona* found by Boissier in the alpine region of the Tmolus, near Sardis; 4 Colchicaceæ: 13 Gramineæ, with the new genera *Rhizocephalus* from Mesopotamia, and *Nephelochloa* from Caria. In the appendix are contained: 1 Fumariaceæ from Spain (*Aplectrocapnos*), 5 Cruciferæ, 4 Caryophylleæ, 1 Lineæ, 2 Rutaceæ, 1 Leguminosæ, 1 Dipsaceæ, 3 Gentianeæ, among which is a *Swertia* from Persia, also published by me in De Candolle's 'Prodromus.'

Henzel's illustrated work, mentioned in the former annual Report, is entitled 'Illustrationes et descriptiones plantarum novarum Syriæ et Tauri occidentalis' (Stuttgard, 1843, fasc. i, with 14 lithographic plates, 4to.) This livraison contains, besides complete descriptions of the species published in the 'pugillus:' 12 Leguminosæ, with the new genus *Hammatolobium* from the Taurus; 2 Rosaceæ (*Potentilla*); 1 Geraniaceæ; 1 *Euphorbia*; 4 Hypericineæ; 18 Caryophylleæ, chiefly species of *Silene* and *Dianthus*; 4 Violarieæ; 7 Cruciferæ; 1 Ranunculaceæ; 3 Crassulaceæ; 10 Umbelliferæ.

The 'Illustrationes plantarum orientalium' of Comte Jaubert and Spach (vide last Report) make rapid progress. The first volume of 100 plates was completed in 1843, and the second is already commenced with the 12th livraison. The following genera have been completed: *Argyrolobium, Cicer, Hypericum, Gaillonia, Statice, Quercus.* I shall afterwards refer to this work more in detail. In the 'Ann. d. Sc. Nat.' Spach has at the same time discussed several oriental genera, particularly *Spartium, Leobordea, Argyrolobium, Ebenus, Amygdalus, Gaillonia,* and the section Armeriastrum of *Statice.*

Schlechtendal has described some plants collected by Kotschy in Kurdistan (Linnæa, 1843, pp. 124-28): 3 Umbelliferæ, with the new genus *Polycyrtus*, 1 *Fedia*, 1 *Althæa*, 1 *Hyosciamus*. 7 new Umbelliferæ from the same source have been described by Fenzel (Regensb. Flora, 1843, s. 457-63); among which are the new genera *Callistroma, Elæosticta, Anisopleura, Uloptera.*

The Flora of Cyprus has been composed by Pöch, and the work has been founded principally on an herbarium collected in that island by Kotschy in 1840. (Enumeratio plantarum, hucusque cognitarum ins. Cypri; Vindob. 1842, 8vo, pp. 42.)

In the whole 310 species are enumerated, of which four are given as new: *Pterocephalus multiflorus*, *Teucrium Kotschyanum*, *Quercus alnifolia*, *Crocus veneris*. The diagnoses of these have been given in the 'Regensb. Flora,' 1844, s. 454. Flotow has determined some lichens collected in Cyprus. (Linnæa, 1843, s. 18-20.)

I have, unfortunately, not yet obtained C. Koch's 'Travels in the Caucasus.' His list of Caucasian and Armenian plants, however, has been previously published. (Linnæa, 1843, s. 31-50, and s. 273-314.) The following families were treated of in the past year:— 5 Caprifoliaceæ, 21 Rubiaceæ (new, 1 *Galium*); 7 Valerianeæ (new, 1 *Dufresnea*, 1 *Valerianella*); 16 Dipsaceæ (new, 2 *Scabiosæ*); 178 Synantherеæ (new, 1 *Centaurea*, 3 *Cirsia*, 1 *Carduus*, 1 *Anthemis*, 1 *Pyrethrum*, 2 *Senecio*, 1 *Antennaria*, 2 *Podosperma*, 1 *Scorzonera*, 1 *Lactuca*, 2 *Crepis* species, 2 *Mulgedia*); 16 Campanulaceæ, 2 Cucurbitaceæ, 7 Ericeæ, 1 *Diospyros*, 1 *Ilex*, 2 Oleineæ, 2 Asclepiadeæ, 2 Apocyneæ, 10 Gentianeæ, 3 Convolvulaceæ, 10 Solaneæ, 67 Scrophularineæ (new, 2 *Verbascum*, 1 *Celsia*, 2 *Scrophularia*, 1 *Linaria*, 3 *Veronica*, 1 *Gymnandra*, 1 *Odontites*, 1 *Pedicularis*); 10 Orobancheæ (new, 1 *Phelipæa*, 2 *Orobanche*-species); 1 *Sesamum*, 1 *Globularia*, 1 *Verbena*, 81 Labiatæ (new, 2 *Ziziphora*, 1 *Satureja*, 1 *Micromeria*, 1 *Lamium*); 43 Borragineæ (new, 1 *Omphalodes*, 1 *Caccinia*, 1 *Onosma*); 16 Primulaceæ, 5 Plantagineæ, 1 Laurineæ, 2 Thymeleæ, 3 Eleagneæ, 2 Santaleæ, 24 Chenopodeæ (new, 1 *Spinacia*, 1 *Halimocnemis*), and the new genus *Halanthium* from the Araxes.

Trigonometrical measurements of the altitude of the Caucasus above the level of the Black Sea, by Fuss, Sabler, and Sawitsch differ materially from the previous

statements. For three of the most known mountains they have been communicated by Humboldt. (Asie Centr. ii, p. 57.) The western peak of the Elbruz measures 2882 toises (18493 English feet); the eastern 2880 toises; the Kasbeck 2585 toises; the Beschtau 710 toises.

Basiner gives a concise description of the autumnal vegetation on the sea of Aral, in his 'Journey from Orenburg to Khiva.' (Bull. Petersb. ii, pp. 199-204.) The steppe between the Caspian Sea and that of Aral is called "Ust-Jurt;" it was traversed by Basiner, and, according to the report of Tschihatscheff, forms a plateau lying 500′ above the plain of Orenburg. (Humb. Asie Cent. iii, p. 558.) The last-named officer, who accompanied the unfortunate expedition of the Russians against Khiva, has given an account of the extreme climate of this region, where the cold in winter descends to — 43·7° C., whilst in summer it may be observed to reach + 42·2° C. When Basiner travelled with an embassy from Orenburg to Khiva, by the same route, the steppes were already burnt up by the summer heats.

Between Orenburg and the Aral he observed in many places the plain covered for miles together with *Salsola arbuscula*, and *Atraphaxis spinosa*. On the rocky declivities of the "Ust Jurt," above the Aral, these were mixed with other Chenopodeæ. On the sand hills *Pterococcus aphyllus* was particularly abundant, easily distinguished by the slender leafless branches, and the fruit dependent on filiform peduncles.

Two shrubs vegetated among the testaceous tertiary rocks on the Aral, *Tamarix ramosissima*, Led., and the frequently mentioned "Saxaul" (*Anabasis Ammodendron*, C.A.M.), which resembles a bundle of green painted twigs. Further to the south near Aiburgir, N.W. of Kunä-Urgendsch, Basiner met with a large and moderately thick grove of "Saxaul," in which stems 15′ high occurred. This was the first wood after passing the Ileck, but a wood without leaves of any kind, although verdant and blooming.

The other characteristic plants of the "Ust-Jurt" coincide with the usual forms of the steppes of South Russia, and they extend also as far as Khiva. In Khiva *Karelinia caspia*, Led., and *Alhagi camelorum*, Fisch., are generally distributed, and *Salsola subaphylla*, C.A.M., and *Halimocnemis sclerosperma*, C.A.M., are not unfrequent. The saliferous loamy soil, however, of Khiva was in many places completely bare of plants. The meadows of the Kanat, so celebrated in the East, are indebted for their existence only to artificial irrigation, and in them *Poa pilosa*, *Setaria glauca*, *Melilotus*, and *Plantago*, contend with the Chenopodeæ, *Kochia hyssopifolia*, and *Atriplex Hermanni*. The embassy returned, in the middle of winter, to the western bank of the Amu-Deria, which presents a shrub formation of *Elæagnus angustifolia*, L., *Halimodendron argenteum*, D.C., *Tamarix ramosissima*, Led., and *Populus diversifolia*, Schrk. At the end 3 new species are described: 1 *Asperula*, 1 *Lepidium*, and the fruit of *Sium cyminosma*, which is cultivated in Khiva, supplies the place of *S. Sisarum*.

The remarkable journey of Middendorf in northernmost Siberia, almost to the promontory of Taimoor, may be said to have approached the limits of the next world. (Erman's Archiv für Russland, 1843. H. 3.) Descending the river of that name, the traveller did not turn back until he had attained the 76° N.L., when he had nearly reached the open Arctic Sea, under unspeakable difficulties. He then lay sick eighteen days, and forsaken by his companions during the month of September, buried in the snow on the Lake Taimoor, and was with difficulty saved. The last traveller in this region had been Laptiew (1739-1743), who advanced to 77° 29′, and traces of whose expedition were discovered by Middendorf. The whole peninsula on the Lake Taimoor is inhabited by only two Samoiede families, who pasture their herds of reindeer there in the summer, and drive them southwards in the winter. The collection of objects of natural history made under 74° N.L. is not yet arranged. Middendorf found arboreal vegetation even beyond 70° N.

At the meeting of Scandinavian naturalists at Stockholm (1842), Eichwald gave an account of an Alga of the Aleutian Isles, which is used for food, *Bromicolla aleutica*. At Unimah it forms a layer two feet thick, of a nostoc-like substance, which is covered with a gramineous vegetation. Whenever the provision of fish of the natives fails, these Algæ are collected and eaten.

Systematic works on the Flora of Northern Asia.

Schrenk has explored the regions on the Tschu, a river of the Zungarian steppes. The new species which he found have been already published. (Bullet. Petersb. 2. Nos. 32, 37.) They belong to the following genera: *Lepidium*, *Diplotaxis*, 3 species, *Silene*, *Zygophyllum*, *Euphorbia*, 5 species, *Astragalus*, *Oxytropis*, *Rosa*, 2 species, *Lythrum*, *Rubia*, *Microphysa* (nov. gen. Stellat.) *Cousinia*, *Apocynum*, *Pedicularis*, *Diploloma*, (nov. gen. Boragin.), *Solenanthus*, *Echinospermum*, *Plantago*, *Brachylepis*, *Rheum*, *Allium*, *Juncus*.

To these, besides, are added 9 Chenopodeæ (with both the new genera *Pterocalyx*, Schr., and *Halostachys*, C.A.M.), and 2 Staticeæ, which have been described in the Bull. de l'Acad. de Mosc. (Mars, 1843.) A monograph on the Siberian Rosacean genus *Chamærrhodos*, by Bunge, is given in the Ann. Sc. Nat. (Vol. xix. p. 176-178). A monograph by Besser on the *Artemisiæ*, which is only just printed, (Mém. Péters. Divers savans, v. 4, 1843), is highly important towards a knowledge of the steppe vegetation.

Kützing has given the characters of the Fucoideæ collected by Tilesius on the coast of Japan, which had been already admitted in his Phycologia generalis. (Bot. Zeit. 1843. s. 53-57.)

In the 'Souvenirs d'un Voyage dans l'Inde par Delessert' (Paris, 1843-4), are reports upon the climate of the Neilgherries, derived partly from his own, and partly from Baikie's measurements. The two English stations are named Kotagherry and Ootacamund, the former is situated 1983·5m. above the sea, the latter 2255m., both in. 11°-12° N.L.

	Mean Temperature.	Difference between Max. and Min.
Kotagherry	= 16·1	8°
Ootacamund	= 14·4	

An important systematic work has been commenced by Bentham, which is intended to embrace all the East Indian Leguminosæ, as well as those of tropical and Southern Africa. (Hook. Lond. Journ. of Bot. 1843. pp. 423-81, and 559-613.) This monograph relates principally to the collections of Wallich, Royle, Wight, Jaquemont, Griffith, Helfer, &c., from India; of Kotschy, Heudelot, and Vogel, from tropical Africa; of Burchell and other travellers at the Cape. Up to the present time, the Podalirieæ, the Liparieæ, and part of the Genisteæ, particularly the Crotalariæ, have been published, already about 300 species. Among these there are about 100 Genisteæ, 37 diadelphian Genisteæ (Liparieæ), and 27 Podalirieæ; about 80 Genisteæ, and 3 Podalirieæ, Indian, from the Himalayah; about 40 Genisteæ belong to tropical Africa.

Griffith has described the following new genera: *Jenkinsia* (Thymeleæ) from Assam, *Enkleia* (Thymeleæ) from Malacca, *Leptonium* from Assam, and *Champereia* from Malacca (both transition forms from the Santaleæ to the Olacineæ), *Plagiopteron* from Silhet (Euphorbiaceæ?), *Siphonodon* (Ilicineæ) from Malacca. (Calcutta, Journ. of Nat. Hist. vol. iv, 1843; also in the Regensb. Flora 1844, p. 432.) In the same Journal, which has not yet come to hand, Jack's botanical labours on Sumatra, &c., are also said to be collected.

The great illustrated work on the Flora of Java, which has been edited by Blume under the title of 'Rumphia' (Lugd. Batav. fol.), has advanced in 1843 to the end of the second volume, which relates principally to the Palms. A second work by Hasskarl, which has very little connexion with that mentioned in the last annual Report, is published in v. d. Hoeven's Tijdschrift (1843, pp. 115-50). It contains systematic observations upon Javanese plants, and descriptions of new species from the following fami-

lies: 1 *Fern*, 2 Cyperaceæ of the new genus *Pandanophyllum* (near *Chrysitrix*), 1 Xyrideæ, 1 Commelineæ, 1 Melanthaceæ, 1 Amaryllideæ, 1 *Canna*, 1 *Artocarpus*, 4 Labiatæ, 1 *Begonia*, 1 Malvaceæ, 1 Meliaceæ, 4 Euphorbiaceæ, 1 *Connarus*, 1 *Rubus*, 2 Leguminosæ.

Junghuhn's 'Travels in Java' (vide Report for 1841), have been edited in more detail with the assistance of Nees v. Esenbeck. (Lüdde's Zeitschr. für vergleich. Erdkunde, Bd. 2, 3.) In the investigation of the mountain vegetation of Java, the traveller enjoyed great advantages from his residence at Djocjokarta, at the southern base of the volcano of Merapi, which is more than 8000′ high. He ascended this mountain repeatedly, and has described its vegetation. The forests of the lower region (vol. ii, p. 457), consist of hundreds of species of trees, but species of *Ficus* and other Urticeæ prevail, and after them Magnoliaccæ, with an undergrowth of Melastomaceæ and Scitamineæ.

To these succeed the oaks, especially *Quercus pruinosa*, Bl., with stems 100′ high, covered to the summit with Orchideæ and other parasites, and with *Usneæ* a foot long, and mosses. In these woods the Palmaceous forms are represented by *Areca humilis*, W., and the tree-ferns by *Chnoophora glauca*, Bl. A coniferous belt is wanting on the Merapi. Above the oak-region the forest consists of *Celtis*, which is called "Angring," and this affords shade to species of *Rubus* which, as in other mountains, are joined with *Podocarpus* (*Rub. javanicus*, Bl., *moluccanus* L., *lineatus*, Reinw.) In this region even, volcanic blocks occur, which throughout Java, above the altitude of 5000′, are clothed with *Polypodium vulcanicum*. On other declivities of the Merapi the *Celtis* is replaced by *Acacia montana* (vol. iii, p. 68), or the *Rubus* by *Gaultheria* and *Thibaudia*. These Ericeæ, together with other shrubs, here constitute an alpine region above the arboreal limits, a formation which reaches to the upper trachyte declivities.

The most abundant species is *Gaultheria punctata*, Bl.,

and a ligneous *Gnaphalium* (*G. javanicum*, Bl.) Mixed with these, grow *Thibaudia varingifolia*, Bl., *Rhododendron tubiflorum*, Bl., and other Ericeæ, besides *Hypericum javanicum*, *Polygonum paniculatum*. Junghuhn found: *Gualtheria repens*, with *Lycopodia*, some mosses, and *Polypodium vulcanicum*, up to the margin of the crater.

The views of the south coast of Java are not sufficiently definite to convey any precise ideas; but few travellers have as yet displayed the talent of being able to exhibit a luxuriant tropical vegetation. Junghuhn is especially acquainted with the *fungi*, of which family he has been the first to describe many Javanese forms. He treats of them in the description of the Znider Hills, a wooded range which runs along the Bay of Pashitan, on the south coast. At this part, thin groves of *Tectonia grandis; Emblica officinalis*, and low leguminose trees, alternate with the moist primitive forests; the open spaces in these groves are occupied by a dense growth of high grass, the "Allang-Allang" of the Javanese. It is, however, in the shades of the lofty primitive forests that the fungi are to be met with (ii, p. 358). In this equatorial Flora their appearance is not limited to any particular season of the year. The rains continue, at least in the mountains, all the year round, and the rich "humus" soil is constantly moist and spongy. Each particular species even is not limited to any special season, and the same species is continually making its reappearance. On the other hand, the larger *fungi* are not here so much associated together as in the temperate zone. They everywhere occur only solitary, a condition consequent upon their habitat on decaying trees; for in these forests the *Agarici* of the North are replaced by parasitic *Polypori*.

In the forestlike plantations of Batavia and Weltevreden the most abundant trees are the following (ii, p. 89): *Garcinia Mangostana, Mangifera indica, Artocarpus, Nephelium lappaceum, Citrus, Averrhoa, Morinda, Eugenia, Anona, Persea, Durio zibethinus, Carica, Cocos, Areca, Tamarindus, Canarium, Morus, Hibiscus tiliaceus,*

Musa paradisaica, Bambusa arundinacea, Bixa. On the plain of Batavia there are no longer any primitive forests, and only thickets of *Psidium, Mussænda glabra,* and *Melastoma malabaricum.* The soil here consists of a reddish brown, rich clay, which, towards the sea-shore, acquires an admixture of "humus," until it finally passes into the pure "humus," or swamp of the Rhizophorous region. In these morasses the river water is mingled with that of the sea. True Rhizophori do not occur here, but *Bruguiera caryophylloides,* Bl., *B. Rhedii,* Bl., and species of *Ægiceras* with climbers of *Ipomœa maritima,* Br., *Verbesina,* and *Borassus,* with Loranthaceæ, or a jungle composed of *Nipa fruticosa* and *Acanthus ilicifolius.* (Ib. ii, p. 141.)

Botta (vide last Report) has given an account of his Travels in Arabia Felix, chiefly as an introduction to the description of the plants collected by him. (Archives du Muséum d'histoire nat. v. ii, pp. 63-88.)

The traveller started from Hodeida (15° N.L.) to Zebid, and explored the mountains in the district of Taas, particularly Mount Saber, celebrated from the time of Forskäl, on account of its botanical riches. It is a lofty precipitous mass of trachyte, at the northern base of which lies the city of Taas. The plain of Taas, which is situated at an elevation about half that of the mountain, is at present a waste, in consequence of the political disturbances of Yemen, and is covered with fleshy *Euphorbiæ.* On Mount Saber, on the other hand, which is easily defended, together with the cultivation of wheat and oats, the culture of *Celastrus edulis* (Cât.) flourishes; the buds of this plant and the unexpanded shoots are eaten without any other preparation, and produce a slight and pleasant excitement of the nerves. The trade in this production is in Yemen even more considerable than that in coffee. A single person may consume five francs' worth in the course of a day. Coffee plantations occur only on the south side of Mount Saber. In the country, the pulp only of the coffee-fruit is used; the infusion of the beans

being but little esteemed. The hill is, besides these, rich in all varieties of fruits, both of the tropical and temperate zones, which are here cultivated: Banana, Anona, Vine, Almond, Pomaceæ. On ascending the summit, Botta, lastly, observed also European plants (*Rubus*, *Geranium*) succeeding the tropical region, which he states to be characterized by thorny Solaneæ and Orchideæ. At a considerable elevation woods occur of a tree-like *Juniperus*, under the shade of which, however, tropical Aroideæ (*Arisæma*) and Labiatæ (*Coleus*) are still met with. From the summit of the Saber, which appears to rise far above the other mountains of Yemen, Botta saw both the Red Sea and the Gulf of Aden. From thence he returned to the coast, and lay sick for a long time at Mecca. The plants collected are, in great part, different from those of Forskäl. As they were collected in the same region, but at another period of the year (October and November), and in part at higher altitudes, the author conceives that they so far complete the Flora of South Arabia that little more remains to be explored in that country. (p. 81.) We only wish that the materials may be completely worked out. In the sketch of the botanical regions, which Botta has appended to his account, the absence of systematic knowledge of the forms collected is to be regretted; the description, however, of the relations of cultivation is interesting. The low strip of country along the coast of Western Arabia, called by the natives "Téhama," and which is occasionally some miles in width, and sometimes very narrow, is not everywhere capable of cultivation, being sandy and barren; but the country is capable of being rendered extremely fertile by artificial irrigation. The usual crops are Maize, Doura and Indigo. Extensive plantations of the date-palm are also here met with. The woods consist entirely of various *Acaciæ*, and present many forms of plants common also to Sennaar: *Indigofera*, *Aristolochia indica*, *Capparis*, *Amyris*, *Cissus*, *Cadaba*, Asclepiadeæ and thorny Solaneæ. The Halophyta of the coast consist of *Salsola* and *Suæda*. The

altitude of the mountains, according to Botta, is considerable, he estimates that of Saber as much above 8000′. The rainy season there occurs in the months of May, or July to October, whilst in "Téhama," where the heat is greater, the rainy season is limited to the winter months after December, and depends on the monsoon of the Gulf of Arabia.

Decaisne has begun to work upon the plants collected by Botta in Yemen, but at present only the Cryptogamia have appeared. (Loc. cit. p. 89-199, with seven plates.) The whole collection, however, according to the prefatory observations, contains only 500 sp. and more perhaps could not be obtained in two months. Whether the Algæ of the Red Sea are included in this or not, can only be learnt from the continuation of Decaisne's work, which at present is confined almost entirely to the Algæ, of which Botta has sent 53 sp., e. g. 7 sp. *Caulerpa*, 3 sp. *Dictyota*, 12 sp. *Sargassum*, &c., most perfectly figured by the author. To these succeed 13 *Ferns*, among which 5 are European and 2 new; lastly, 2 Lycopodiaceæ, edited by Spring.

III.—AFRICA.

Bory de St. Vincent has made a report to the French Academy on the Flora of Algiers, upon the return, and as an earnest of the results of the scientific expedition sent there in 1840-42. (Comptes rendus, t. 16.) The herbarium collected contained about 3000 species, of which only 60 are undescribed; for the most part they correspond with the productions of Spain and Portugal. The Cryptogamia collected amount to 400 species. The forests of the Lesser Atlas are laid waste. The chesnut, evergreen oak, and laurel, have become rare. The Syrian cedar occurs only on isolated declivities, and is said to be very abundant on the Great Atlas.

Bory distinguishes three botanical regions, the Numidian, Mauritanian, Tingitanian. The eastern, or Numidian, extends from Biserta to Collo; La Cala is situated in the centre of it; the country is well wooded, and contains many plants of central Europe. Algiers lies in the middle of the Mauritanian, or central region, and in its environs plants of the south of Europe prevail, and the Banana ripens its fruit. The Tingitanian, or western region, stretches from Cape Tanes to Morocco; it contains various African forms, among which, however, the *Stapelia* from Oran, adduced as an example, ought not to be included.

The 'Characteristik' of the Flora of Kordofan, mentioned in the last annual Report, is again enlarged and corrected by Brunner (Regensb. Flora, 1843, s. 473), and A. Braun (ib. s. 498). The former paper is unim-

portant, the latter relates only to two Alismaceæ, and contains valuable remarks upon that family.

A. Braun has also communicated a numerical review of the plants sent by Schimper from Abyssinia. (Ib. pp. 749-52.) These herbaria consist of 1250 species, two thirds of which are new. The first two parcels sent by Schimper are here included. The families are arranged in consecutive order, according to the number of species they respectively contain:—Gramineæ (141), Synantherеæ (140), Leguminosæ (116), Cyperaceæ (60), Acanthaceæ (46), Malvaceæ, including the Tiliaceæ (42), Labiatæ (40), Scrophularineæ (33), Rubiaceæ (26), Urticeæ (25), Euphorbiaceæ (24). Added to which are 18 species Cruciferæ and Borragineæ, 16 species Terebinthaceæ and Orchideæ, 15 species Amarantaceæ, 14 species Ranunculaceæ, 13 species Convolvulaceæ and Asclepiadeæ, 11 species Combretaceæ, Crassulaceæ, and Solaneæ, and 10 species Capparideæ and Verbenaceæ.

Included in the above number (1250 species) are about 100 Cryptogamia, viz. 27 Ferns, 50 Mosses, 17 Lichens, &c.

New Abyssinian plants collected by Feret and Galinier have been described by Raffeneau-Delile. (Ann. Sc. Nat. xx, pp. 88-95.) At present the number of species is only 16, but among them are several new genera: *Teclea* (Zanthoxyleæ), *Laneoma* and *Ozoroa* (Terebinthaceæ), *Feretia* and *Galiniera* (Rubiaceæ). Flotow has defined the lichens collected by Schimper (Linnæa, 1843, H. 1.); few of the species are new. Hochstetter has proposed the following new African genera (Regensb. Flora, 1843, ss. 69-83): *Xylotheca* from Port Natal (Bixineæ), *Candelabria* ib. (Samydeæ), *Diotocarpus* ib. (Rubiaceæ): *Kurria* of the former report. = *Hymenodictyon*, Wall., *Haplanthera*, *Monothecium*, and *Tyloglossa*, from Abyssinia and Nubia (Acanthaceæ), *Lachnopylis* from Abyssinia (Loganiaceæ?) *Pterygocarpus* ib. and *Apoxyanthera* from Natal (Asclepiadeæ).

E. Meyer has published a very important memoir on

the Flora of the Cape, which is based upon the complete list of localities given by Drège, and which are printed together with it. (Zwei pflanzengeographische Dokumente von Drège nebst einer Einleitung von E. Meyer: als besondere Beigabe zur Regensburg Flora, 1843.) It contains 230 species and a chart. Drège's herbarium contains about 7000 different species (6595 Phanerogamia and 497 Cryptogamia), and was collected in a district of scarcely 4000 square miles. E. Meyer estimates the number of the Phanerogamia of the Cape, hitherto known, at 9000 species, and their whole number indigenous to the colony, chiefly in the districts explored by Drège, at 11500. He considers a very limited range of distribution for each species to be a fundamental feature of the Cape Flora, the areal range of most of them being five times more contracted than is the case in the Flora of Europe, where, according to Schouw, the average area extends over from 10° to 15° of latitude. Social plants form but a very small proportion of the mass of vegetation, and even those that are met with, are for the most part, much less numerously associated than the meadow grasses or forest trees of Europe. Among the social forms, Drège enumerates some Proteaceæ, small-flowered Ericeæ, *Elytropappus rhinocerotis* (Stœbe, Th.), which covers large tracts on the 'Karroo,' *Galenia*, and in the eastern plain of the 'Karroo' is found *Mesembryanthemum spinosum*, one of the most social plants of the country. Besides these, the *Cliffortiæ*, *Prosopis elephantina*, *Acacia horrida*, are tolerably abundant on the streams of the 'Karroo,' and some Bruniaceæ, Oxalideæ, Asclepiadeæ, and Aloes species; on the "Giftberge," on the west coast, *Toxicodendron capense;* near Port Natal, the Rhizophori and *Hyphæne coriacea;* lastly, the social water plant *Prionium serratum* (*Juncus*, Th.)

The Cape genera, as at present defined, contain on the average 6 to 8 species; on which account, the unusual number of species in some of the genera, characteristic of the Flora, is the more remarkable. Thus Drège collected

151 species of *Senecio*, 148 species *Pelargonium*, of *Erica* proportionately few, only 139 species; of *Helichrysum* 108 species; of *Aspalathus*, *Hermannia*, *Oxalis*, and *Restio*, between 80 and 90; of *Mesembryanthemum*, *Crassula*, *Euphorbia*, and *Indigofera*, between 60 and 70; of *Polygala*, *Muraltia*, *Rhus*, *Cliffortia*, *Anthericum*, and *Heliophila*, between 50 and 60, &c.

The statistical relations of the families are exhibited by E. Meyer with great precision, assuming Endlicher's genera as the basis of his conclusions. The Monocotyledons constitute 21, and the Dicotyledons 125 families. Of these, 38 appear to be wanting in New Holland, whilst, on the other hand, that continent presents 18 species not met with at the Cape. The families most rich in species form in Drège's collection the following series: 1110 Synanthereæ, i. e. almost 17 per cent., 510 Leguminosæ, 312 Gramineæ, 286 Irideæ, 264 Liliaceæ, 191 Restiaceæ, 184 Cyperaceæ, 170 Scrophularineæ, 169 Geraniaceæ, 167 Ericeæ, 157 Proteaceæ, 135 Euphorbiaceæ, 122 Orchideæ, 112 Polygaleæ, 108 Crassulaceæ, 104 Asclepiadeæ, 104 Umbelliferæ, 99 Byttneriaceæ, 88 Rubiaceæ, 87 Cruciferæ, 83 Oxalideæ, 79 Labiatæ, 75 Thymeleæ, 75 Campanulaceæ, 71 Rosaceæ, 69 Mesembryanthemeæ, 69 Selagineæ, 68 Malvaceæ, 66 Acanthaceæ, 65 Anacardiaceæ. Besides these, E. Meyer regards the following less numerous families as characteristic: Lobeliaceæ (56), Rhamneæ (56), Smilaceæ (51), Zygophylleæ, (44), Celastrineæ (40), Bruniaceæ (38), Hypoxideæ, (37), Cucurbitaceæ (35), Ebenaceæ (27), Penæaceæ (11), Cycadeæ (9), Stilbeæ (4). Some families range over only a portion of the colony: the Ericeæ, of which Bentham has already described 455 species from the Cape, were collected in smaller numbers by Drège, since the majority of that family are confined to the mountains of the extreme south; no Proteaceæ are found above thirty miles from the coast, but even within those limits the family does not extend to the borders of the colony. The Crassulaceæ occur principally in the great plain of the 'Karroo;' the *Her-*

manniæ are found in the northern districts; the species of *Heliophila* on the west coast, between 30° and 34° S. L., and the *Rhus* species on the east, as also the Hypoxideæ. Four families are endemic in the Cape Flora: the Selagineæ, Bruniaceæ, Penæaceæ, and Stilbeæ.

The Cape Flora is physiognomically characterized by the abundance of large flowered Monocotyledons with coloured perigon, by the succulent plants, and Ericaforms. Of the latter, at least single genera occur in most of the great families, e. g. *Stæbe* among the Synanthereæ, *Aspalathus* among the Leguminosæ, some *Proteæ*, and among the Rhamneæ *Phytica;* and to the same class, besides the Ericeæ themselves, belong most of the Diosmeæ, Bruniaceæ, Stilbeæ, Penæaceæ, Thymeleæ. Among the succulent forms, may be instanced the Crassulaceæ, Mesembryanthemeæ, the Stapeliæ, many Euphorbiaceæ, several Portulaceæ, and Aloes.

Lofty arboreal forms are notoriously wanting, and dense forests entirely so. Drège adduces the following list of ligneous plants above twenty feet high, some of which attain a height of fifty feet: 3 Coniferæ, (3 species *Podocarpus* = Geelhout); of the Urticeæ, *Ficus Lichtensteinii;* the Laurineæ, *Ocotea bullata;* 3 species of *Olea* (Yserhout, among which *O. exasperata* is the thickest tree of the colony, but only about 30′ in height); of the Araliaceæ *Cassonia paniculata;* certain Meliaceæ (*Trichilia*); 1 Tiliacea (*Grewia*); of the Celastrineæ, *Curtisia faginea; Ilex crocea,* the Rhamneæ, *Olinia acuminata;* the Diosmeæ, *Calodendron capense;* the Myrtaceæ, *Jambosa cymifera;* and Leguminosæ, *Virgilia grandis.* Of parasitic Dicotyledons, Drège has collected 42 species, among which are 17 Lorantheæ, 5 *Cassytæ*, 1 Cactus, 12 Orobancheæ, 3 Cytineæ, 1 Balanophoreæ, 3 Cuscuteæ.

The Monocotyledons of Drège's collection, are in proportion to the Dicotyledons as 1 to 3·2, as is the case also in the same latitude in New Holland. From the coast towards the elevated plains of the interior, the Monocotyledons at first increase, then decidedly diminish, and again

increase on the most elevated terraces; but the proportionate number of these latter does not correspond with the above given statement of E. Meyer. To the lower terrace of the country he assigns a mean altitude of 500′, to the central, one of 2000′, and to the upper, one of 3500′, above which then, the mountains, where the Monocotyledons again increase in number, still rise to an altitude of more than 8000′ above the sea. Meyer endeavours to explain these differences in the distribution of the Monocotyledons, by the quantity of atmospheric deposit, an increase in which induces a corresponding increase in the Monocotyledons.

According to Drège, it nowhere rains more frequently or more copiously than on the south-west coast of the colony. From stage to stage in ascent the quantity of rain diminishes, in the same proportion that the Dicotyledons increase. Similar differences are also observable on the coast line. At the mouth of the Gariep, the winter rains of the Cape are said to be almost entirely wanting, and the summer rains seldom fall; on the east coast on the other hand the influence of the trade-wind is felt in the opposite condition of a dry winter, and a tropically moist summer, by which the peculiar vegetation of Port Natal is explained. The Verbenaceæ and Acanthaceæ begin to increase even at Algoa Bay. The following forms consequently are characteristic at Natal: tropical Leguminose genera, Myrtaceæ, Rubiaceæ, two Palmæ, and other plants of the torrid zone; although this settlement lies at 30° S. L., or more to the south than the mouth of the Gariep.

Bunbury has continued the reports of his botanical wanderings in the Cape country (vid. last Report.) (Hook. Lond. Journ. of Bot., ii, pp. 15-41.) He has described his journey from Cape Town to Graham's Town. In the coast region he found a distinct limit of vegetation at the mouth of the Gamtos river; from this point towards Algoa Bay commences a district which is characterized by fleshy *Euphorbiæ* and other succulent plants, as also by *Schotia speciosa* (Boerboontje.)

Rather further to the west as far as the River Kromme, the *Zamiæ* make their first appearance, with respect to which Meyer observes erroneously that they are first seen in Albany. For the rest, the whole journey occupied only seventeen days, and consequently little opportunity for observation was afforded, but a further supplement is to appear in 1844.

The systematic contributions to the Cape Flora, drawn principally from the herbaria of Krauss, have been continued by Meissner in the same journal (pp. 53-105 and 527-59.) This second part contains the following families: 2 Tiliaceæ, 1 *Aitonia*, 30 Oxalideæ, 7 Zygophylleæ, 1 Ochnaceæ from Natal, 1 Rhamneæ, 1 Bruniaceæ, 166 Leguminosæ, 10 Rosaceæ, 1 Portulaceæ, 1 Cunoniaceæ, 28 Umbelliferæ, 1 Hamamelideæ, 1 Corneæ, 3 Loranthaceæ, 5 Rubiaceæ, 1 Lobeliaceæ, 1 Jasmineæ, 1 Apocyneæ, 25 Asclepiadeæ, 1 Scrophularineæ, 1 Orobancheæ, 10 Amarantaceæ, 6 Chenopodeæ, 12 Polygoneæ, 28 Thymeleæ, 3 Penæaceæ, 4 Euphorbiaceæ. Bartling has given detailed descriptions of twenty-two new Diosmeæ, or which have been made known only by Ecklow; among which is the new genus *Gymnonychium*. (Linnæa., 1843, pp. 353-82.) Some new Cape plants have been published by Fenzel (ib. pp. 323-34); the new Amarantacean genus *Sericocoma* with three species; the newly proposed Asclepiadea, *Anisotoma;* and one *Veronica*, all from Drège's collection. Flotow has given definitions of fifty-five Cape Lichens, and descriptions of the new ones (ib. pp. 20-30); Berkeley has contributed thirty-one fungi from Zeyher's collections. (Journ. of Botan., pp. 507-24.)

Bojer has again, as in the last year, described new plants from the islands lying off the south-east of Africa. (Ann. d. Sc. Nat. xx, pp. 53-61, and 95-106.) Among which are 1 Anonacea, 2 Menispermeæ, 8 Capparideæ, 4 Polygaleæ, 2 Pittosporeæ, 1 Lineæ, 6 Tiliaceæ, 2 Leguminosæ, with the new Dalbergiea *Chadsia*.

IV.—ISLANDS OF THE ATLANTIC.

I HAVE here merely to refer to the interesting memoir on the botanical characteristics of the Azores, by Seubert and Hochstetter, with which the present annual volume of these Reports commenced. Watson has, at the same time, given a report upon his botanical voyage to the Azores. (Hook. Lond. Journ. of Bot. 2. pp. 1-9, 125-31, and 394-408). The endemic vegetation was observed by Watson, beyond the cultivated district of Fayal, first between Horta and Flamingos, where the low hills on the strand are covered with *Myrica Faya* and *Myrsine retusa;* together with these grows *Erica azorica,* Hochst. (*E. arborea,* S. H. p. 21), which, however, according to Watson, is probably only a variety of *E. scoparia,* L. Near Flamingos, there are added to these, two European Ericeæ: *Menziesia Dabœci,* D.C., and *Calluna.* It appears to be probable, from this description, that the region of the Laurel Woods 1500′-2500′, which consists almost entirely of the same ligneous plants as the coast formation near Flamingos, originally extended everywhere to the sea. The forest above Flamingos is composed of *Erica scoparia, Myrica Faya, Myrsine retusa,* and *Juniperus Oxycedrus,* S.H., which is regarded by Watson as distinctly an endemic species; with these are mixed *Vaccinium maderense,* L.K. (a small flowered variety of which probably is *V. cylindraceum,* Sm., *V. longiflorum,* Wickstr., and *V. padifolium,* S.H.), besides *Rubus Hochstetterorum,* S., *Ilex Perado, Viburnum Tinus, Persea azorica,* S., *Laurus canariensis,* S.H.), and *Euphorbia stygiana,* W. (*E. mellifera,* S.) The margin of the crater of Fayal is

situated 3170′ above the sea, and sinks down internally to an inclosed lake, the altitude of which is only 1670′. This moist hollow, the diameter of which is about a mile, is thickly covered with Ferns and the endemic evergreen shrubs. The Phanerogamia are for the most part the same as on the outside of the crater, but the endemic species are here much more densely crowded. The water-plants on the lake, however, are again European. The description of the Peak of Pico, agrees in all respects with that by Seubert and Hochstetter. The altitude of the peak, by barometrical measurement, amounted to 7616 feet Eng., and it would appear that the upper limits of some plants are placed higher than was supposed by Seubert and Hochstetter. At the summit the only plants are *Thymus micans*, and an undetermined species of *Agrostis*, with some mosses and lichens. Highest limit for *Calluna* 7000′, for *Erica scoparia* 6000′.

The younger Hooker, on his Antarctic voyage, explored the Cape de Verd Islands. (Journ. of Bot. p. 250.) The interior of St. Jago, of which island the coasts are completely barren, presents a luxuriant vegetation; on the mountains are forms of the Atlas and south of Europe, and in the valleys tropical genera. It is only now that a little is known of this Flora; in the opinion of the traveller, the mountains, immediately after the rainy season, would afford the richest booty. Any one who is desirous of exploring them must proceed directly from Porto Praya to St. Domingo, because, at that time, for several miles around the capital no plant is any longer visible. Foyo, the volcano of which is said to be about 7000′ feet high, might be more interesting than St. Jago. St. Antonio also is covered with wood, and Sal, a saliferous plain.

Hooker did not land on the island of St. Paul (0° 58′ N.L.), but Darwin, who explored it, remarks (Journ. of Research, p. 10), that although there are several indigenous insects and spiders, not a single plant, not even a lichen, is to be found, and only Algæ in the greatest variety.

St. Helena has already in great measure lost its endemic Flora, (ib. p. 582). The great forest of the elevated plain which existed at the commencement of the last century has been destroyed, and together with it, doubtless, many plants which, like the productions of a former world, have now disappeared from the earth. Darwin agrees with Beatson in ascribing this change to the introduction of the goat, which prevents the growth of the seedling trees. Instead of the endemic Flora, European plants have in great measure now become distributed over the soil of St. Helena. The most abundant tree at present is the Scotch Fir, but Hooker also observed (l. c. p. 252) *P. Dammara*, *Casuarina*, *Acaciæ*, and Pittosporeæ from New Zealand, *Eucalyptus* from New Holland, and Scitamineæ and Aroideæ from the East Indies.

V.—AMERICA.

Nuttall has continued the description of the plants collected on his journey through North America to the Sandwich Islands, (vid. Report for 1841, in the Transactions of the American Philosophical Society, 1843, p. 251.) This memoir contains the Campanulaceæ, Lobeliaceæ, Ericeæ, and allied families; several extensive genera have been divided by the author: e. g. *Vaccinium* and *Andromeda*. Engelman has published a distinguished monograph on the North American Cuscuteæ. (Silliman's American Journal of Science, vol. 43, pp. 333-45, 1842. Extracted in London Journ. of Bot. 1843, pp. 184-99.) In the same American Journal, has also appeared a continuation of Dewey's 'Caricographia.' (Vol. 43, pp. 90-2, with five figures.) Bruch and Schimper have examined Drummond's collection of Canadian mosses, and the results have been published by Shuttleworth. (Journal of Bot. pp. 663-70.)

An account of the botanical geography of the Mexican volcano Orizaba, was given by Liebmann at the meeting of Scandinavian Naturalists, at Stockholm, in 1840. (Also translated in the Botan. Zeitung, 1844, s. 688 et seq.)

(1) Hot Region. (0′ to 3000′.) The sloping savannahs to the west of Vera Cruz, beyond Santa Fé, and at an altitude of 200′, are interrupted by a forest, in which the characteristic trees are *Mimosa, Bombax, Citrus, Combretum*. Then follows an extremely fertile marly soil, derived from the disintegration of the porphyritic blocks of the Orizaba, the forests on which present magnificent groups

of the undescribed "*Palma real.*" Hence the sloping grass savannah again extends to an elevation of 3000′, with *Mimosa* bushes, and the Ternstræmiacea *Wittelsbachia*, a *Convolvulus* and a *Bignonia*.

(2) The Warm, Moist Region. (3000′ to 6000′.) At 3000′ commence the moist mountain forests, in which the oak makes its appearance in numerous forms, and with it grow six species of *Chamædorea*, sometimes erect, sometimes creeping palms. This is the richest botanical region of Mexico, and in which with a mean temperature of 21° C., and a rainy season of eight or nine months, about 200 Orchideæ are indigenous. Here commences a ferruginous, hard clayey soil, which overlies the volcanic rock to a height of 11000′. The oak is most luxuriant between 4000′ and 5000′; about twenty species are met with, and several are limited to those altitudes. As is the case in Java, the oaks grow in a thick tropical forest of Laurineæ, Myrtaceæ, Terebinthaceæ, Malpighiaceæ, and Anonaceæ. The underwood is formed of *Melastoma*, *Treeferns*, *Mimosa*, the Monimiea *Citrosma*, *Bambusa*, *Yucca*, *Jatropha*, and *Croton*, *Triumfetta*, *Magnolia*, arboreal Synanthereæ, *Symplocos*, *Æsculus*, Araliaceæ, &c. The climbers are Smilaceæ, Sapindaceæ, *Cissus*, Apocyneæ, Asclepiadeæ, Bignoniaceæ, Passifloræ, Leguminosæ, and Cucurbitaceæ. In these forests the upper limit of the cultivation of coffee and cotton is attained at from 4000′ to 5000′, and that of sugar and the plantain at 5500′.

(3) Region of the Oak Forests. (6000′ to 7800′.) At 6000′ the foot of the Cordilleras is reached, where another climate and other forms of plants commence. In the neighbourhood of the city of Coscomatepec, where, together with maize, the orchard trees of Europe and fruits of the south are cultivated, and where the fertile plains of the plateau begin, the most abundant trees are the following: *Yucca gloriosa*, *Cratægus pubescens*, *Sambucus bipinnata*, *Clethra tinifolia*, *Persea gratissima*, *Cornus*; the climbers are here composed of *Convolvulus*, *Vitis* and *Rubus*. The Palms have

already ceased at 5000′, but in the interior highland other species reappear up to 8000′. Tree-ferns are also wanting on the Cordillera, flourishing only between 2500′ and 5000′; and the last fruticose myrtles are seen at 4800′. The Orizaba itself is a more lofty peak, rising 1700′ above the border of the plateau. The traveller explored it in the month of September, in the middle of the rainy season. The lower forest belt (6000′ to 7800′), consists chiefly of species of *Quercus;* the other trees are *Lacepedea pinnata, Ulmus, Alnus, Clethra,* a Verbenacea, and an Araliacea; an underwood of *Cornus toluccensis, Viburnum, Triumfetta, Rubus,* with climbers of *Vitis, Ipomœa Purga,* a *Bidens,* and *Cuscuta,* Alstræmeriæ; parasitic Ferns, *Viscum,* Orchideæ, *Piper,* in three small forms, *Cereus flagelliformis.* The open spaces are covered with *Cassia* and *Mimosa* bushes, the herbaceous plants and grasses are rich in forms, and among the characteristic ones are *Ranunculus, Thalictrum, Anada, Hypericum, Drymaria, Oxalis, Geranium, Euphorbia, Desmodium, Rexia, Lopezia, Cuphea, Georgina, Lobelia, Salvia, Erythræa, Iresine, Cyperus, Panicum, Paspalus, Festuca, Vilfa, Lycopodium;* Ferns, Mosses, and Lichens are also tolerably abundant. Even at an elevation of 7000′ the vegetation is remarkably changed. *Vaccinium, Gualtheria, Andromeda,* become frequent, and particularly a new, tree-like *Arbutus, Fuchsia microphylla;* among the herbaceous plants: *Chimaphila, Dracocephalum, Tagetes, Carduus,* a Gentianea, several Orchideæ, *Ferraria,* and Commelineæ.

(4) Coniferous Region. (7800′ to 11000′.) The first Coniferæ appear at 6800′, *Pinus leiophylla,* but the oaks are not supplanted by the Coniferæ below 7800′. At this altitude vigorous trees of *Pinus Montezuma* predominate, with parasitic Tillandsiæ and Usneæ. At 9000′ commence the forests of the Oyamel pine (*Abies religiosa*), but *P. Montezuma* again constitutes the upper belt of the continuous pine forest at 11000′, solitary or situated individuals occur as high as 14,000′ on the N.W. side of

the peak. The traveller staid a fortnight in the Coniferous region, in a herdsman's hut in the 'Vaqueria del Jacal.' (10000′.) The mean temperature at that season was 11° C. At the end of autumn instead of rain, snow falls, which lies from November to March. The uniformity of the north does not prevail in these Coniferous forests. Leaf-trees are everywhere intermixed; such as the oak and alder; shade plants continue numerous; the ravines (barrancas) nourish a luxuriant vegetation; whole mountain sides are bare of trees, and covered with a high grass, together with alpine plants. The plants of the Coniferous region especially, present the greatest variety of forms, of which Liebmann furnishes a copious list. The following belong to the characteristic families: Leguminosæ (*Lupinus*), Umbelliferæ, Ericeæ (*Clethra, Vaccinium, Pyrola,* &c.), Synantheræ (*Eupatorium, Stevia, Bidens, Baccharis, Aster,* &c.), Scrophularineæ (*Chelone, Lamouzouxia, Gerardia, Castilleja*), Labiatæ (*Salvia Stachys*), *Verbena*, Orchideæ (*Spiranthes, Serapias*), *Veratrum*, Irideæ (*Sisyrinchium*). Ferns, &c. Bushes of Laurineæ, Rhamneæ, *Tilia, Viburnum, Cornus,* Synantheræ, *Salix* occur together with the Ericeæ. In one "barranca" Liebmann observed a thicket of bamboo, a form of plant that elsewhere disappeared at 3000′.

(5) Region of the Steviæ. (11000′ to 13600′.) Low Synantherean shrubs (*Stevia purpurea, arbutifolia,* &c.) represent the sub-alpine Erica-forms, as they do on the Cordilleras of South America, where instead of *Stevia*, the genus *Baccharis* makes its appearance. Still they do not, as here, extend to the uppermost limits of vegetation. A more abundant shrub in the lower part of the region is *Spiræa argentea.* Besides these, alpine genera for the most part grow upon masses of volcanic rock, which now appears instead of the clayey soil. Characteristic forms are: Cruciferæ (*Draba, Nasturtium*), Alsineæ, *Viola, Lupinus,* Rosaceæ (*Alchemilla, Potentilla*), Umbelliferæ (*Eryngium, Seseli, Œnanthe*), *Tiarella, Pedicularis, Lithospermum, Stachys,* Synanthe-

reæ (*Erigeron, Hieracium, Hypochæris*), *Veratrum, Sisyrinchium, Scrapias*, Junceæ, *Carex*.

(6) Alpine Mountain Plains. (13600′ to 14800′.) The soil of the highest parts of the surface below the crater consists of a mixture of volcanic sand with ashes; it bears a gramineous vegetation, the species of which correspond with those found by Humboldt on the Nevado of Tolucca: *Festuca toluccensis, Bromus lividus, Avena elongata, Deyeuxia recta, Crypsis stricta, Agrostis*, and other Festuca species. Instead of the *Steviæ*, are here seen thick-leaved, hoary shrubs of *Senecio*. The smaller craters are clothed with *Mahonia ilicina* and *Juniperus mexicana*. Under the Gramineæ grow several Synantheræ (*Conyza, Helichrysum, Carduus, Saussurea*), *Gaultheria ciliata*, and of the other alpine genera, *Cerastium, Viola, Draba*, extend up to this height. The thawed snow affords growth to a formation of *Ranunculus* and *Potentilla*, associated with which are some Glumaceæ and *Veronica* (*Luzula, Carex, Phleum, Agrostis*.) Mosses and Lichens abound, and among the latter also, especially the northern Umbilicariæ (*U. pustulata*, 10000 to 14000′, *U. vellea*, 13000 to 14000′, *U. cylindrica* and *proboscidea*, 14000 to 14800′). The base of the great crater, which slopes at an angle of 30°, is situated at an altitude of 14300′, and is covered with broken rocks difficult of ascent. Here grow the last phanerogamous plants, which have, for the most part, not been observed by Schiede: 1 Hydrophyllea (*Phacelia lactea*, Liebm.), 1 *Castilleja, Saussurea, Carduus nivalis, Arenaria, Cherleria, Draba vulcanica*, Liebm., one of the fruticose Senecios, and most of the above-mentioned Gramineæ. The traveller observed the last Phanerogamia at the elevation of 14600′. The large rocks continue to be covered with Cryptogamia from this point up to 14800′; these are, besides the Umbilicariæ, *Tortula ruralis, Parmelia Ehrharti, Lecidea atro-alba, citrina geographica, Cenomyce pixidata*, and, as the last of all, 50′ higher than the rest, *Parmelia elegans*, a lichen which Agassiz also

found among the highest on the Jungfrau in Switzerland. (Vide last Report, p. 389.) The snow-line on the Orizaba may probably be taken at 15000′.

Much may be anticipated for systematic botany, as relates to the Flora of Mexico, when Liebmann's collections are fully studied, and these expectations have been raised to a greater height, among other things, by the essays already read by that traveller at the meeting of Scandinavian naturalists, held at Christiania in 1843, after his prosperous return. In the meanwhile other contributions to the knowledge of the Flora of Central America have been simultaneously made public in England and Belgium. Bentham has published a second and last part of his 'Plantæ Hartwegeanæ.' (London, 1842, 8vo.) This extends from Nos. 518-631, the greater part of which have been collected not in Mexico, but in Guatemala. The new genera are: *Hemichæna* (Scrophularineæ), *Lindenia* (Rubiaceæ), *Oxylepis* (Heliantheæ), *Caloseris* (Trixideæ), *Lampra* (Commelineæ). Very copious is the 'Enumeratio synoptica plantarum a Galeotti in Mexico lectarum,' which was commenced by Martens and Galeotti, and which is already tolerably far advanced. This work is contained in the 'Bullet. de l'Acad. de Bruxelles' (1843, vol. x. P. i, pp. 110, 208, 341; P. ii, pp. 31, 178, 302. 1844, vol. xi, P. i, pp. 121, 227, 355.) The families at present discussed, with numerous new and copiously described species, are the following: 7 Irideæ, 1 Hæmodoraceæ, 2 Hypoxideæ, 14 Amaryllideæ, 10 Bromeliaceæ, 4 Scitamineæ, 1 *Najada*, 4 Aroideæ, 1 Typhacea, 3 Palmæ, 11 Coniferæ, 24 Piperaceæ, 2 Myriaceæ, 35 Cupuliferæ, 2 Betulineæ, 2 Plataneæ, 8 Saliceæ, 5 Chenopodiaceæ, 14 Amarantaceæ, 12 Polygoneæ, 10 Nyctagineæ, with the new genera *Tinantia*, 4 Laurineæ, 2 Thymeleæ, 13 Valerianeæ, 83 Rubiaceæ, 5 Caprifoliaceæ, with the new genus *Vetalea*, 15 Apocyneæ, 40 Asclepiadeæ, 17 Gentianeæ, with the genus *Arembergia*, considered new, and for the most part new species, 8 Spigeliaceæ, and 205 Leguminosæ, with the new genera

Mikelertia and *Robynsia*. Besides these, there had previously appeared the Ericeæ and Vaccineæ, under the title of 'Notice sur les plantes des familles des Vacciniées et des Ericacées, recueillies au Mexique par Galeotti, et publiées par Martens et Galeotti.' (Ib. 1842. p. 526.) Schlechtendal's recent communications on the Mexican Flora (vide Report for 1840) relate to the Burseraceæ, especially *Elaphrium* (Linnæa, 1842. H. 6, and 1843, s. 245), and also to the Dioscoreæ. (Ib. s. 602.)

E. Otto has now collected the results of his American travels (vide Report for 1840). (Reis erinnerungen an Cuba, Nord und Südamerika, 1838-41; Berlin, 1843, 8vo.) Starting from Caraccas, he explored the district of the Orinoco.

Jameson's observations on the Flora of the Ecuador (Lond. Journ. of Bot. 2, pp. 643-61) are at present too fragmentary to allow of their being more closely considered; they will not certainly, however, be unimportant when continued, as is promised by the author. Of Bentham's work on the plants collected by Schomburgh in Guiana, the following families have appeared: Euphorbiaceæ, by Klotzsch (32 species, with the new genera *Schismatopera, Dactylostemon, Traganthus, Brachystachys, Geiseleria, Discocarpus*, the two penultimate separated from *Croton*); by Bentham himself, the Dilleniaceæ (1 sp.), Nymphæaceæ (1 sp.), Cabombeæ (1 sp.), Sarraceniaceæ (1 sp.), Ternstræmiaceæ (10 sp., with the two anomalous new genera *Catostemma* and *Ochthocosmos*), Guttiferæ (8 sp.), Marcgraviaceæ (1 sp.), Hypericineæ (3 sp.), Erythroxyleæ (6 sp.), Trigoniaceæ (3 sp.), Humiriaceæ (4 sp.), Olacineæ (3 sp.), with which Bentham places the new genus *Ptychopetalum* from Cayenne, Rhizoboleæ, (1 sp.); by Lindley, the Orchideæ (66 sp.) The number of species at present published amounts to 846. (Hooker, London Journ. of Bot. 1843, pp. 42-52, 359-78, 670-74.)

Miquel has published in several journals concerning new plants from Surinam, especially from the herbarium of Focke; in the first part of the 'Annals of Nat. Hist.

for 1843,' which has accidentally not reached us from the bookseller; and further in the 'Linnæa,' and in b. d. Hoeven's 'Tijdschrift.' The continuation in the 'Linnæa' (1843, s. 58-74) contains species from various families, and little that is new; viz. 1 Cyperaceæ, 1 Xyrideæ, 2 Pontedereæ, 1 Smilaceæ, 1 Hæmodoreæ, 1 Aroideæ, 4 Synantherеæ, 4 Rubiaceæ (among which is the new genus *Bruinsmania*). The 'Animadversiones in herbarium Surinamense, quod in colonia Surin. legit H. C. Focke, auct. Miquel,' (Tijdschr. voor natuurlijke Geschiedenis, 1843, pp. 75-93,) include the following families: Cacteæ (without any new sp.), 2 Portulaceæ (1 n. sp.), 1 Phytolacceæ, 7 Malvaceæ (2 n. sp.), 1 new Byttneriaceæ, 3 Guttiferæ (1 n. sp.), 1 new Marcgraaviaceæ, 1 Hypericineæ, 6 Malpighiaceæ (1 n. sp.), 1 new Erythroxyleæ, 2 new Sapindaceæ, 1 Polygaleæ, 1 Euphorbiaceæ, 1 Anacardiaceæ, 1 Myrtaceæ, 16 Leguminosæ.

Focke, in Paramaribo, has caused to be published by Miquel, a systematic catalogue of all the plants cultivated in Surinam. (Hoeven's Tijdschrift, l. c. pp. 373-85.) The following is an abstract of the Dutch names of the most important tropical products: *Anona muricata*, L. (Zuurzak); *A. squamosa*, L. (Kaneelappel); *Terminalia latifolia* (Amandelboom, Tafelboom); *Eugenia pimenta*, D. C. (Bayberry tree); *Jambosa vulgaris*, D. C. (Pomme de Rose); *J. malaccensis*, D. C. (Schambo); *Passiflora quadrangularis*, L. (Marquisade, Grenadille); *Mammea americana*, L. (Mammi); *Caryocar tomentosum*, W. (Bokkenoot); *Hibiscus esculentus*, L. (Okro); *H. Rosa sinensis*, L. (Engelsche Roos); *H. Sabdariffa*, L. (Roode Zuring); *Spondias dulcis*, Forst. (Pomme de Cythère); *Ricinus communis*, L. (Krapatta); *Janipha Loefflingii*, Kth. (Zoete Cassave); *J. Manihot*, Kth. (Bittere Cassave); *Malpighia glabra*, L. (Sure Kers); *Averrhoa Bilimbi*, L. (Bilambi); *Abrus precatorius*, L. (Weesboontje); *Erythrina corallodendron*, L. (Koffij-mama); *Arachis hypogæa*, L. (Pienda); *Poinciana pulcherrima*, L. (Sabinabloem); *Parkinsonia aculeata*, L. (Jerusalemsdoren); *Anacardium*

occidentale, L. (Cachou); *Mangifera indica*, L. (Manja); *Artocarpus incisa*, L. (Broodboom); *Persea gratissima*, G. (Advocaat); *Coccoloba uvifera*, L. (Zeedruif); *Achras Sapota*, L. (Sapotilla); *Chrysophyllum Cainito*, L. (Star-appel); *Sesamum orientale*, L. (Abonjera); *Crescentia Cujete*, L. (Kalebasboom); *Justicia picta*, L. (Portret-boom); *Lycopersicum esculentum*, Dun. (Tomati); *Solanum ovigerum*, Dun. (Antroeri); *Plumeria rubra*, L. (Frangipane); *Cycas revoluta*, Th. (Sayo); *Amomum granum paradisi*, L. (Malaguetsche Peper); *Musa paradisiaca*, L. (Banane); *M. humilis*, L. (Dwerg-Banane); *M. sapientum*, L. (Bakove, Bakoeba); *Agave fœtida*, L. (Ingi-sopo); *Yucca stricta*, Ker. (Bajonet); *Bambusa arundinacea*, W. (Guinea-Gras).

Steudel has commenced the determination of the plants in Hoffman's herbarium from Surinam, mentioned in last year's Report. (Regensb. Flora, 1843, pp. 753-65.) The species described as new belong to the following families: Anonaceæ (3 sp.), Sterculiaceæ (2), Tiliaceæ (2), Sapindaceæ (1), Homalineæ (1), Leguminosæ (21), Rosaceæ (5), Combretaceæ (2), Myrtaceæ (3), Paronychieæ (1), Umbelliferæ (1), Rubiaceæ (2), Solaneæ (2); Verbenaceæ (1); Spigeliaceæ (2), Gentianeæ (2). The diagnoses are short, and descriptions are not added.

Of Pöppig's illustrated work upon the plants collected by him on his South American travels, (Nova genera, &c., Lips. 1843-4), the 5th and 6th Decades of the third vol. have appeared. Orbigny's 'Travels' have appeared regularly up to the 74th livraison. Casaretto has published 8 Decades of Brazilian plants, a work which has not yet come under my notice. (Novarum Stirpium Braziliensium Decades. Genuæ, 1842-44, 8vo, 72 pp.)

Meyen's collection of dried plants, made on his voyage round the world, has been subjected to the united labours of several botanists, and been published in the Transactions of the Leopoldine Academy. (Nov. Act. Nat. Curioser. vol. xvi. Supplem. secund.; Vratisl. 1843.) This collection contains about 1500 species, but the number of

new ones is proportionately not great. The Leguminosæ were submitted to the late Vogel, Nees v. Esenbeck undertook the Glumaceæ, Philydreæ, Acanthaceæ, Solaneæ, and in conjunction with Lindenberg and Gottsche, the Lycopodiaceæ; Meyen himself, with Flotow, the Lichens; Klotzsch the Euphorbiaceæ and Fungi; Schauer the Myrtaceæ, Apocyneæ, Asclepiadeæ, and the rest of the Monocotyledons; I took the Gentianeæ; Walpers the rest of the Dicotyledons, and Goldmann the Ferns.

The greater number of the plants collected are from South America, especially from Chili and Peru, but more interest attaches to the herbaria from Manilla (about 200 species) and Macao (about 220 species).

Gardner's publication on the Flora of Brazil (vid. last Report) has been continued. He has described four new genera from the Organ Mountains at Rio: *Bowmania* (Nassauviæ), *Leucopholis* (id.), *Hockinia* (Gentianeæ), *Napeanthus* (Cyrtandreæ). (Hooker, Lond. Journ. of Bot. ii, pp. 9-15.) The continuation of the list of his collection, which is arranged geographically, contains 125 species from the Organ Mountains, among which are many new species, and the new genera, *Isodesmia* (Hedysareæ). (Ib. pp. 329-55.) 39 *Fungi*, collected by Gardner, have been determined and described by Berkeley. (Ib. pp. 629-43.)

Darwin, whose spirited descriptions of the natural relations of South America and the South Sea Islands, presents such a variety of interest, has occupied himself with the problem of determining the reason of the absence of forests from Monte Video to Patagonia. (Journ. of Researches, p. 53.) On the banks of the large streams in Monte Video willows occur, and report speaks of a palm forest near Arroyo-Tapes. The traveller observed a solitary palm at 35° S.L. But these are the only exceptions to the treelessness of a country in which the orchard trees of Europe flourish extremely well. Plains, such as the Pampas of Buenos Ayres, are entirely treeless, a circumstance that appears to depend upon the prevailing winds,

and the consequent hygrometrical conditions of the air. But these conditions do not obtain in Monte Video, where the hilly rocky surface presents the utmost variety of soils, including clay, and where there is no want of water. Here there is, in winter, a regular rainy season, and even the summer is not inordinately dry. New Holland, south of the tropic, is much drier, and yet it is always well wooded on the coasts. Consequently, the author is of opinion that the absence of trees at Monte Video can only be referred to geological causes, to an original peculiarity in this centre of creation. If on that occasion the larger ligneous plants were omitted, they could not readily extend themselves to this region from other centres of creation, for the trees of Brazil require a tropical climate, and there is no other forest country adjacent to this coast. South America generally presents forests, only in much moister regions, as on the west coast, southwards from 38° S.L., where the west winds of the Pacific prevail, and in Brazil as far as the trade wind extends. Thus, the districts on either side of the Cordilleras, which interrupt the course of the winds and deprive them of moisture, as well within as without the tropical zone, are in opposite conditions. Opposite to the primitive forests of Brazil lies the west coast, which from 4° to 30° S.L. is barren and treeless, and the wooded coasts from Chiloe to Tierra del Fuego are in the same way opposed to the scanty vegetation of Patagonia. Thence it might be concluded that Monte Video, as regards the arboreal vegetation of South America, possesses a too dry climate although not so in comparison with other wooded parts of the globe. The Falkland Islands also are barren of trees, although, with respect to climatic and geognostic relations, they are placed under precisely the same conditions as the forests of Tierra del Fuego.

The Rio Colorado constitutes the southern limits of the Pampas vegetation; its mouth lies at 40° S.L. (Ib. p. 87.) Here the nature of the soil of the steppe is changed, and with it the character of the vegetation. Between the Rio Negro and the Colorado, the gravelly

surface bears a turf of grass with low thorny bushes, and this continues to be the type of the vegetation along the whole of the shores of Patagonia. The entire surface of the country, in like manner, from the Straits of Magellan to the Colorado, consists of a gravelly soil, which is for the most part composed of porphyry, derived from the Cordilleras. North of the Colorado the gravel becomes gradually smaller, till it finally passes into the calcareous argillaceous soil of the Pampas, which sort of soil, without stones, occupies a large basin, extending to the granite of Monte Video. The climate north of the Colorado continues to be no less arid and sterile, but the soil produces a variety of herbaceous plants and grasses, whilst the thorny shrubs are lost, together with the gravel. The vegetation of the Pampas of Bahia Blanca was still in its winter sleep at the beginning of September, around the White Bay (p. 115), but in the middle of this month the plains were covered with bloom; just as in all steppes, both of the Old World and New, the abundant blossoms of spring usually burst out suddenly. Previously to the bursting of the flowers the mean diurnal temperature had been 10°·6 C., but it then rose to 14°·4 C., that is to say, to a height at which the hibernation still continues at Monte Video. Hence it might be supposed that a different degree of irritability existed in the two floras separated by the Rio de la Plata; but probably in this problem the moisture of the atmosphere is concerned, which at Monte Video, longer than in the hot Pampas, prevents the evaporation of the plants, the cause of the rise of their sap in the spring. The steppe vegetation of the Pampas, from the Rio Salado to Buenos Ayres, is much more luxuriant than it is in these southern border districts, but probably only in consequence of the greater use of pasture. (p. 137.) In common with the wild horses and other domestic animals, which, since the first colonization of these countries in the year 1535, have spread themselves widely over the steppes European plants have also been introduced, and having completely supplanted the endemic

vegetation over extensive tracts, have given the country, in many districts, from the Plata to the Cordilleras, its present natural character, in the same manner as the Opuntiæ and Agave have become characteristic on the shores of the Mediterranean. In this region, where at the present time horses of European origin only exist, Darwin has discovered the remains of a fossil indigenous horse of the latest geological period, and exactly in the same way, together with an endemic thistle which covers extensive tracts on the Rio de la Plata, has the European *Cynara Cardunculus* obtained possession of the soil over much wider districts.

This lofty growth of thistles is, on account of its extreme density, quite impenetrable by man or beast. Darwin is acquainted with no instance of an introduced plant occurring in such enormous quantity, and found on prolonged land journeys the same growth frequently recurring; he even observed it beyond the Plata, and saw many square miles in Monte Video thickly covered with the same thistle.

In South Patagonia, after having already explored a series of points on the coast, Darwin ascended the St. Cruz (50° S. L.) up to the foot of the Cordillera. The whole of Patagonia consists of a tertiary plain, gradually rising in a succession of terraces up to the Andes, and precipitous towards the sea from a height of 1200 feet. The rounded gravel which covers this plain, reposes upon a whitish soil, the argillaceous porphyritic detritus, in which the plants are rooted. Amongst the few productions of this soil, *Opuntia Darwinii*, Hensl., is characteristic. The terraces are frequently cut across by level valleys, but without water, and in these, the thorny shrubs abound. The climate is so dry that one may travel many days together without meeting with a drop of water.

The most striking contrast to these steppes is afforded by the clay-slate mountains of Tierra del Fuego, which are, however, very closely contiguous to them; these mountains are everywhere, down to the sea-shore, covered

with a continuous gloomy forest. (p. 227.) The valleys of this mountainous region, like those in Norway, are lower than the sea-level, and constitute "Fjorde." The forest consists principally of *Fagus betuloides*, Mirb., (*Betula antarctica*, Forst.,) the other species of *Beech* and *Drimys* occurring only in inconsiderable numbers. The forest extends on the steep declivities, where there is scarcely anywhere a speck of earth, up to the altitude of 1000′ to 1500′, to this succeeds the region of alpine plants, which grow on a boggy soil, and reach to the line of perpetual snow (3500′.) A turf formation is also frequent in the forest region, in a wilderness of fallen and still vegetating trees. On this account, and owing to the yellowish, brown-green of the beech leaves, which do not fall in winter, the landscape acquires a gloomy character, which is also not often enlivened by sunshine. The peat formation (p. 349), which extends on the north as far as the Chonos Archipelago (45°), and is no longer met with in Chiloe, is constituted, in open situations, principally of the social *Astelia pumila*, Br., (*Anthericum trifarium*, Sol.,) a genus allied to the Junceæ, and which consequently here represents the *Narthecium* of the "Emsmoore," which is systematically placed immediately next to it. Together with the *Astelia*, grow *Myrtus nummularia*, *Empetrum rubrum*, and *Juncus grandiflorus*, which take a part in the formation of the peat. In the Falkland Islands, in a corresponding soil, all the plants are converted into peat, especially the Gramineæ. At the eastern entrance of the Straits of Magellan, the Patagonian steppes pass over into the shores of Tierra del Fuego; in the interior, the strait separates the one Flora from the other rather abruptly (p. 263), a condition with which may be compared the analogous contrast between Jutland and Norway. The cause of this remarkable contrast in the southern extremity of America, is to be sought, according to Darwin, in the amount of atmospheric deposit. At first sight such a difference in the character of the landscape, within a distance of four geographical miles, appears

almost wonderful, but the climate itself presents the same degree of contrast; on the one side are the rounded mountains of Port Famine, continually drenched with showers and mists, which are collected by the stormy movement of the atmosphere, and at a distance of twelve miles, on "Gregory Bay," are dry barren plains, under a hot and cloudless azure sky. The mean temperature of Port Famine is probably = 5°·3 C., that of summer = 10°, in winter = + 0°·6. (King and Darwin.)

Dr. Hooker has described his stay in the Falkland Islands during the winter. (Journ. of Bot. ii, pp. 280-305.)

Urville enumerates, in his 'Flora' of these islands, 217 species. Hooker has added to the list, especially in the Cryptogamia. The only shrubs are *Chiliotrichum amelloides*, *Empetrum rubrum* and *Pernettia empetrifolia*, and on the western island, *Veronica decussata*. The famous "Tussac grass" (*Dactylis cæspitosa*, Forst., = *Festuca flabellata*, Lam.,) which grows to a height of six feet, and forms extensive patches of turf upon the peaty substratum, and the naturalization of which in Ireland, on account of its great nutritious properties, has been thought of, is limited, however, only to peculiar localities, and yields in importance as a food for cattle to the much more generally distributed and also very nutritious *Festuca Alopecurus*, Urv., with which every peat bog is covered.

"Hermit Island" lying to the west of Cape Horn, is the southernmost point at which Hooker, on his antarctic voyage, observed any arboreal vegetation. (Ib. p. 365.) An herbarium of eighty-four phanerogamous plants, corresponds with the forms of Tierra del Fuego, and the Falkland Islands; the tree is Darwin's evergreen *Beech*, to which, besides the synonyms given above, Hooker has applied as probable ones, those of *Fagus Forsteri*, Hook., and *F. dubia*, Mirb.

Darwin compares the forests of Chiloe for their luxuriant vegetation with those of the tropics. Various evergreen species, particularly Laurineæ and *Drimys*, are

intermixed, and loaded with parasitic Monocotyledons, and under their shade grow various large *ferns* and tree-grasses. This vegetation, on the west coast of the continent at 45° S. L., borders on the uniform forest which extends from hence on the west side of the Andes as far as Tierra del Fuego. Its existence in such a high latitude, is owing to the extraordinary moisture of the climate. In Chiloe it rains both winter and summer, and Darwin believes that no other country in either temperate zone is subject to so much atmospheric deposit. The winds are usually violent, and the sky almost constantly covered with clouds. Even in Valdivia the forest character becomes remarkably changed (46°), the evergreen trees decrease, and at Valparaiso (33°), where, during the summer, rainless south winds prevail, and the atmospheric deposits take place almost only in the three winter months, there is scarcely a tree.

VI.—AUSTRALIA AND SOUTH SEA ISLANDS.

Darwin has given a general description of the botanical characters of the Gallapagos, the endemic Flora of which is still almost entirely unknown. (Ib. p. 453.) Covered with innumerable craters, these islands rise to the altitude of 3000′—4000′, and possess, on account of the low temperature proper to the surrounding ocean, a not very hot climate. On the coasts it seldom rains, but on the mountains the clouds hang low, and consequently at the altitude of about 1000′ a tolerably luxuriant vegetation makes its appearance, instead of the barren aspect presented by the littoral region. The modern lavas, however, spread over the declivities are entirely bare. Both animals and plants indicate for the most part an endemic creation. The plants are characterized by the sparing development of the leaves, and cannot be at all referred to the equatorial position of the islands. Ligneous plants are rare: amongst the most abundant in the lower region is a fruticose Euphorbiaceous plant, with small brownish leaves, together with an *Acacia* and the treelike *Opuntia galopagea*, with large, oval, compressed joints springing from the cylindrical stem; in the mountain region is an arboreal Synantherous plant, as well as ferns and grasses, but no tree-fern, and no palms.

Bentham has continued his investigation of the Flora of the Fidji Islands, &c. (vide last Report), from the collection of Hinds and Barclay. (Journal of Bot. pp. 211-40.) This list of not quite 200 species, appears now to be closed; it contains the new genera *Vavæa* from the Friendly Isles (allied to the doubtful Cedrelaceous plant, *Ixio-*

nanthes), *Cardiophora* from New Ireland (Terebinthiaceæ), *Lasiostoma* from New Guinea (Rubiaceæ), *Chætosus*, ib. (Apocyneæ), *Leucosmia* from the Fidji Islands (Aquilarineæ).

Lhotsky has endeavoured to characterize certain districts on the east coast of Australia by their productions. (Some data towards the Botanical Geography of New Holland, ib. pp. 135-41.) He distinguishes the following formations:

(1) "The coast vegetation" from Sydney southwards to the Illawarra. Quicksands or sandstone rocks with a scanty soil; numerous lagunes with salt or brackish water. The only tree, a *Eucalyptus;* thick bush of Epacrideæ, Proteaceæ, Podaliriæ, *Boronia* and *Comesperma*, social Xanthorrhoeæ and *Xerotes*. These shrubs constitute an almost impenetrable growth, and are of no economical use.

(2) "Watered rocky valleys along the coast." This appears to be the only locality for both the palms of New South Wales: *Corypha australis* and *Seaforthia elegans*. Here grow also the arboreal Amaryllideous plant, *Doryanthes*, a tree-fern (*Alsophila*), the Magnoliaceous *Tasmania*, besides some Malvaceæ, Rubiaceæ, and *Callicoma*.

(3) "Vegetation of the clayey soil." Extensive tracts of this formation are covered by the thin Eucalyptus forest, well known from R. Brown's celebrated sketch; it contains little underwood, but excellent pasture ground, with the greatest variety of herbaceous plants.

(4) "The vegetation of the Minero-Downs" includes the large tracts of pasture along the foot of the Blue Mountains. Excepting *Hakea* and *Brunonia*, ligneous plants are entirely wanting on this plain. In November it is clothed with a luxuriant vernal vegetation, which withers up under the heats of summer, and after April it presents only the aspect of a yellow-coloured steppe; the plants, however, consist chiefly of Gramineæ and Cyperaceæ. On these downs, between which and the argillaceous district there is no very marked line of demarcation,

the breeding of cattle is carried on, the wealth of the colony.

(5) "Vegetation of the Blue Mountains." The upper declivities of "Mount William the Fourth," which was ascended by Lhotsky, and on the summit of which the boiling point=196° F. were found by him to be covered with *Eucalyptus* trees 12′ to 20′ in height.

The Australian grasses in Lindley's collection have been determined by Nees v. Esenbeck, and besides several new species, the genera *Gamelythrum* and *Amphibromus* have on this occasion been instituted by him. (Journ. of Bot. ii, pp. 409-20.) Schauer has given a report on the Myrtaceæ collected by Preiss on the Swan River (178 species.) (Regensburg Flora, 1843, s. 405-10.) A. Braun has described 8 New Holland *Charæ*, for the most part collected by Preiss; they are all without an external cellular layer. (Linnæa, 1843, pp. 113-19.)

In Van Diemen's Land, a journal has appeared since 1842, (The Tasmanian Journal of Natural Science, Agriculture, &c.,) with botanical contributions by Gunn and Colenso. According to an extract from the first volume (Bot. Zeit. 1844, p. 140), the former has communicated remarks upon the Flora of Geelong, Port Philip; and the latter described some ferns from New Zealand.

Dieffenbach in his 'New Zealand Travels' speaks of the statistical relations of the indigenous Flora. (Travels in New Zealand, London, 1843, i, pp. 419-31.) Up to the present time, only about 630 species from New Zealand have been made known, and this paucity is to be referred, in the traveller's opinion, not to an incomplete exploration, but to the actual poverty of the Flora, the greater part of which appears to him to be already known. Principal families are: ninety-four Ferns, which constitute the distinguishing characteristic of the Flora, not simply in consequence of the variety of forms, but chiefly from the quantity of the individual plants, since enormous tracts of open country are covered with them, as representatives of the grasses in other Floras; three Tree-ferns (*Cyathea medul-*

laris and *dealbata*, *Dicsonia squarrosa*) attain a height of from 30′ to 40′, and grow in even greater numbers together, deep in the forest; 24 Gramineæ; 20 Cyperaceæ; representatives of the Junceæ, among which the European social *Juncus filiformis*, widely distributed, is said to indicate a thin layer of fertile soil, above the sterile argillaceous deposit; of Palms only *Areca sapida*, but which is seldom wanting in the denser forests; certain Liliaceous forms, characteristic of the open regions; *Phormium* almost everywhere; *Dracæna australis* forming a jungle on the river banks; of the Smilaceæ, *Ripogonum parviflorum*, Br., together with a Pandanea (*Freycinetia Banksii*), which is the most abundant climber of the forest; Orchideæ rare, however 3 Epiphyta are met with; *Typha angustifolia* usually covers the swamps, as in Europe; 2 Piperaceæ, common; 11 Coniferæ, among which the most important the Kawri Pine (*Dammara australis*) is confined to the northern extremity of the north island, and the others (*Dacrydium*, *Podocarpus*, *Phyllocladus*) do not occur associated, but dispersed about in the forests; 9 Epacrideæ; some Araliaceæ of curious forms (*Panax*, *Aralia Scheffleri*, &c.); several Cunoniaceæ, amongst which *Leiospermum racemosum* constitutes large forests in all parts of New Zealand; 20 Onagrariæ; 13 Myrtaceæ, including some widely-distributed forest trees (2 species *Leptospermum*, 9 *Metrosideros*, *Eugenia*, and *Myrtus bullata*, indigenous also in Chili); 6 Pimelea-species, but only 2 Proteaceæ (*Persoonia tora* and *Knightia excelsa*); 3 Laurineæ, 2 of which are extensively distributed, and constitute a riparial growth; *Laurus tawa* covers the upper region of the mountains on Cook's Strait; of the Atherospermeæ, *Laurelia*, a bulky tree; 12 Scrophularineæ, with 9 Veronica-species, some of which are fruticose; of the Cyrtandraceæ, only *Rhabdothamnus Solandri*; of the Myoporineæ, *Avicennia tomentosa*, which forms the mangrove woods of New Zealand; of the Verbenaceæ, the important tree *Vitex littoralis*, the "New Zealand oak" of the settlers.

"Lord Auckland's Islands," lying to the south of New Zealand (51° S. L.), were explored by Dr. Hooker, during several weeks in the most favorable season (Nov. Dec.), and afforded him, without reckoning the Algæ, an herbarium of 120 species. The Flora, as stated by Dieffenbach, is probably not endemic, but introduced from New Zealand. This opinion is supported by the circumstance, that even in this high latitude true tree-ferns are met with, though here forming only a low stem. The surface of this mountainous Archipelago, is pretty equally covered with forest—bush and open pasture ground. From the sea-shore to the forest, European genera especially are found, together with the prevailing ferns which are also very numerous in the woods. The forest trees cover a thick undergrowth; the more lofty trees consist of a *Veronica*, an Araliaceous plant, some Myrtaceæ, and Epacrideæ, and these trees are often placed so thick, that they completely shade the ground. The tree-ferns belong to *Aspidium*. To this forest succeeds a region of shrubs, in which the Veronica tree is wanting, and the constituents of the undergrowth become more and more dwarfish. Above the fruticose region is one, consisting of the Gramineæ, where the mountain-meadows consist of *Bromus*, and one *Hierochloa*, together with some herbaceous plants, e. g. two Umbelliferæ; and strongly defined by a different vegetation, an alpine region occupies the summit of the mountain, with European genera and *Acæna*. Characteristic forms: a very social *Asphodelus*, with gold yellow flowers, *Veronica*, *Gentiana*, *Coprosma*, *Dracophyllum*, *Astelia*, &c. With the Flora of the "Lord Auckland's Archipelago," that of the neighbouring Campbell Island corresponds, even in the two arboreal ferns (52½° S. L.), only the south-west or windward side of the island is wholly without ligneous plants.

On "Keelings Islands," which have become celebrated through Darwin's 'Researches on the Coral Islands' (12° S. L.), and which, from the introduced Cocoa Palms, have also received the name of Cocoa Islands, that tra-

veller collected about 20 plants, to which the indigenous Flora is confined. (Journal, p. 541.) According to Henslow's examination, 20 species belong to 19 different genera, and 16 natural families; and as these have all been washed from Java or New Holland, there is not a single endemic species produced by the coral reefs.

Kerguelen's Land (50° S. L. in the Indian Ocean) was a long winter station on Dr. Hooker's voyage. (Journ. of Bot. ii, pp. 257-63.) He there collected many Cryptogamia, and obtained an herbarium of 130 species, among which were 30 lichens, which cover the 2000′ high mountains in large quantities. The peculiar nature of the climate appears to have enabled Hooker to collect also the few Phanerogamia in a condition admitting of their determination. The following genera are met with: *Agrostis* and 4 other grasses, 1 *Juncus*, 1 *Ranunculus*, 1 *Callitriche*, 1 large cabbage-like Cruciferous plant, 1 social Umbellifer (probably *Bolax*,) 1 *Acæna*, 1 *Silene?* 1 Portulaceæ, Rubiaceæ, and Synanthereæ, and 3 Phanerogamia of uncertain relationship. Moreover of Cryptogamia, still 1 fern, 2 *Lycopodia*, 23 mosses, mostly corresponding to the Arctic forms, 10 *Jungermanniæ*, 1 *Marchantia*, 10 *Confervæ*, and 39 other Algæ, 1 Fungus. This great poverty of the Flora cannot be considered to be caused by the climate, which though indeed stormy, is otherwise not so very inclement, but is to be explained geologically.

The French works with figures which have been published, as a sequel to the Antarctic Voyage of Dumont d'Urville, as well as to the 'Expedition of the Venus,' contain botanical sections, but are as yet far from completion.