

tops of the hills above; the last I have not yet visited. On a former occasion I saw *Sedum anglicum* growing plentifully on the other side of the valley, but on this, the breadth and force of the stream totally prevented any attempt to cross. This day's journey forcibly recalled to my memory the words of Curtis, when he visited the neighbourhood of Settle nearly a century ago (in July and August 1782). In one of his excursions thence he exclaimed, "What a treat for a botanist! What a recompense for one of the roughest journeys over Cam perhaps ever experienced!"

Returning to Kendal in the afternoon, we proceeded in the evening to the welcome abode of a near relative, within sight of Humphrey Head; but I have more than once before related in the 'Phytologist' the results of my botanical rambling over this interesting locality. On this occasion, June 12th, I found nothing additional of importance, except what I take to be *Galium montanum*, described by my intelligent friend Mr. J. G. Baker, as found near Settle. (See 'Phytologist,' New Series, vol. i. p. 182.) It occurred in one place, on rocky ground, as I approached the promontory. Near it, above in the wood, *Taxus baccata* and *Pyrus Aria* presented abundantly their strongly contrasted foliage. *Cochlearia danica* and *Armeria maritima* almost covered the adjoining beach, with other plants formerly enumerated. *Hypericum Androsæum* was met with in the wood more copiously than before, but not in flower; whilst *Helianthemum canum*, on the cliffs above, was in perfection. In the wood, on the opposite (Lancaster) side of the mount, I collected what appears to be *Melampyrum sylvaticum*, and a few other sylvestral plants.

AZOREAN FLORA.

Our obliging friend Mr. Kennedy has put into our publisher's hands a letter from one of his correspondents, who is now in St. Michael's (San Miguel), acting as the superintendent at a botanical establishment in one of these islands. This gentleman writes to his friend Kennedy as follows. After a remark about the high price of necessaries in Ponta Delgada, the chief town, which has no trade except in oranges,* he proceeds thus:

* "Oranges are imported in boxes containing from 250 and more, and in chests holding 500 to 1000. The quantity of fruit imported has been steadily increasing

a very fine garden here and a first-rate collection of plants of all kinds except Heaths, which are impatient of the great heat of the summer months, which here is almost tropical. New Holland species thrive well in the open air. We have *Araucarias* from forty to fifty feet high; and *Banksias* and *Dryandras* grow too fast to live long.

The great enemy to vegetation is the wind, which here is so violent that no tree can resist its force. All arboreal vegetation, unless protected, is torn up by the roots or broken by the severity of the winds. All plants suffer from these visitations.*

Another enemy against which we have to contend is the salt spray, which these awful tempests drive inland for miles and wet the plants, several of which will not endure this salt-water drenching. These storms are all from the south.

Ferns are neither plentiful nor of the most prized kinds; one of the commonest is *Balantium culcita*, Kaulf. (*Dicksonia culcita*, L'Hérit.) This grows on open parts, at about 2000 feet above the level of the sea. It does not thrive in our garden.

The whole of these islands are volcanic, and the mountains which cover the whole surface are lofty and precipitous, and their

for some years past. In the three years ending with 1842, the average imports were 334,070 boxes; in the five years ending with 1850, they had increased to 380,000 boxes. Since then the quantity has been computed in bushels. The average annual imports in the five years ending with 1860 were 977,440 bushels. The quantity taken for consumption has now reached upwards of 1,000,000 bushels; and, assuming each bushel to contain 650, this would give 650 millions of oranges, or about 22 for each soul of the population in the kingdom. The Azores, or Western Islands, from whence the finest St. Michael oranges come, furnish us with the largest supply. The imports from thence have doubled in the last five years. The expense of walling and planting an acre of orange garden is stated to be £15 for the wall, £8 for 65 trees, and £2 for labour. It yields half a crop of beans or Indian corn during seven years, but no oranges; from eight to eleven years half a crop of oranges is obtained; then a full crop, which is sold for £10 to £15. Each tree on arriving at maturity will produce annually, on an average, 12,000 to 16,000 oranges; one grower is said to have picked 26,000 from a single tree. The tree blooms in March and April, and oranges are gathered for the London market as early as November. The Portuguese never eat them before the end of January, at which time they possess their full flavour."—*Gardeners' Chronicle*.

* The history of our insular colonies supports this; see 'Phytologist,' vol. vi. p. 32. There is the following quotation from a New Zealand paper:—"Canterbury (in New Zealand) certainly gives promise of being a first-rate fruit-growing country, wherever due precaution is taken to provide the first requisite of successful gardening, viz. good shelter."

tops are generally hidden by misty clouds. Smoking craters and hot springs abound; and sometimes so close to a cold one, that you may put your thumb into a spring which will boil an egg in three minutes and your little finger in another which is chilling cold.

The usual arboreous plant is *Erica mediterranea*, which grows everywhere from chinks in the rocks. The country is all rock, and all the rocks are honeycombed, as lava usually is.

The orange groves are fine when well sheltered by high stone walls, and where the soil is good. St. Michael oranges have a high reputation in Europe.

Pittosporum undulatum, a New Holland plant, is quite naturalized in our groves and gardens, many of which, ours among the rest, are like an Indian jungle, the plants are so crowded and drawn up. I am well pleased with the productions of these islands, but the places themselves are like penal settlements, and the natives are poor and also excessively conceited: though few of them have so much as a shoe to their foot, they despise people of other nations, and especially look upon Englishmen as a very inferior race, much lower in the scale of humanity than they themselves. Their ignorance is not over-matched by their conceit and their poverty, prominent though these qualities be.

Our friend's correspondent, Mr. Rieth, concludes with the expression of his longings for English newspapers and for letters from his friends. No marvel that he is heartily sick of a place like a convict establishment, and feels the want of something to relieve him from the tedium of so wretched an abode.

The Azores, like other volcanic islands, are probably still on the increase; for as late as since 1811 new islands have been emerging from the deep, and it is possible that some of those formed at an earlier period may have increased in their dimensions.

It would be worth the labour to write a brief history of the vegetation of some of the recently formed islands, said to be already 3000 feet high. As the plants of the entire group are probably not much above 400, those of a small, newly-born island would not probably be more than thirty or forty. But this would be a very interesting bit of the history of botany. Would it throw any light on the origin of species?

The *endemic* plants of the Azores (this formidable term means *peculiar*—found there and nowhere else) are fifty, or, in other terms, they constitute one-eighth of the entire vegetation of these islands; or in every eight Azorean plants one is found *only* here. Of these only five are cryptogamous species. The vascular plants of the British isles are probably about four times as many as the plants of the Azorean group. We know that an eighth part of these is not endemic to the British Isles. Is there one in a hundred peculiar to our native land? Is there one in a thousand which is only produced here and nowhere else? Is there as many as one?

Some will say, Yes, *Primula scotica*! Others will say, Nay, this is only a variety of *P. farinosa*, as it was long called. But an eighth part is a large proportion of endemic species! How came they there? Did the seeds or the roots of these fifty peculiar plants retain their vitality under water during thousands of years? Few would assert this. It may amuse the believers in Mr. Darwin's theory of the origin of species to hear that there are some people who want to know where the forty-three single plants and the four doubles (for there are two Spurges and two Nettles among these strict Azoreans) existed without increasing their progeny till the islands were in a condition to receive them and to afford them a habitation and a home where they could increase and multiply as they now do. Were they created when the land was drained?

Those who can crack this nut have better teeth than we,—but ours are aged,—and especially if they believe what we do not, that only a single hermaphrodite plant and a pair of monœcious species were originally created. It is not easy to account for their long lives, nor to imagine where they lived, nor to conceive why they were formed at all, when there was no place for them to occupy. These are questions to be solved only by those who can see further into nature's secrets than the mason can see into the millstone.

The climate of this insular group is about the same as that of the south of Portugal and Sicily, only rather moister. The lowest temperature is in January, 8° R., or about 50° Fahr., and the highest in August, 20° R., or 90° Fahr.

Heavy rains fall between the months of December and March inclusive, and these, by washing the rocky ground, diminish the

natural fertility of the soil. Hence the vegetation is both scanty in number of kinds and generally stunted.

This is the case especially with trees; and the devastation caused by the violence of the terrific storms with which these islands are visited is irreparable. Natural shelter is scarcely procurable, and artificial protection or high stone walls are erected, which are of course too expensive to be adopted except for the preservation of orange-trees—objects of commercial importance.

The Flora is rather meagre when compared with the extent of the islands.

The number of the Azorean plants of all kinds, as localized and described (see 'Flora Azorica,' by Hochstetter, father and son, edited by M. Seubert, Ph.D., etc.: Bonn, 1844), is 400. 50 are peculiar to the Azores; 316 are European; 23 are Madeira and Canary plants; 5 are African, and 6 American.

The botany and geology of the Azorean islands were investigated by the celebrated Chr. Fr. Hochstetter and his son, who were accompanied by Rud. Gygax, a Swiss mineralogist, in 1838; and the result of their labours was published at Bonn, as above stated.

These islands, for they constitute a numerous group, are almost equally distant from the two older continents of Europe and Africa and rather further from America; they are included between the 37th and 40th parallels of north latitude, and between 25 and 31 degrees west from Greenwich. They are 550 miles distant from the Madeiras and 740 from the Canary Islands.

Several English works on these islands had been published prior to the visit of the previously named *savants*, viz. by Fr. Masson (see Phil. Trans. vol. lxiii. 1778); by Ashe ('History of the Azores,' 1813, 4to); J. Webster, Boston, 1821; Captain Boid (Boyd), London, 1835; etc. etc.

The origin of these islands, or of some of them, is volcanic; extinct craters are still conspicuous, and on the loftiest hills (mountains), 7000 feet high, smoke and vapours are still issuing. In one island alone, St. Maria, there are calcareous strata, rich in fossils. In this island there are also beds of plastic clay, which the natives can use in their pottery works.

FLORA AZORICA.

As a sample or as samples of the Azorean flora, the following plants are entered; the first group are common in the British

Isles and widely distributed, the second group are also of home growth, but not so common as the former, and the third are all rare plants in our kingdom. The fourth group comprehends plants either peculiar to the Azores or species with which it is desirable that we should be better acquainted.

First Group :—

<i>Holcus mollis.</i>	<i>Filago germanica.</i>	<i>Sagina procumbens.</i>
<i>Anthoxanthum odoratum.</i>	<i>Galium Aparine.</i>	<i>Silene inflata.</i>
<i>Triticum repens.</i>	<i>Galium palustre.</i>	<i>Polygala vulgaris.</i>
<i>Carex flava.</i>	<i>Prunella vulgaris.</i>	<i>Geranium robertianum.</i>
<i>Carex stellulata.</i>	<i>Convolvulus arvensis.</i>	<i>Peplis Portula.</i>
<i>Eleocharis palustris.</i>	<i>Veronica arvensis.</i>	<i>Rubus fruticosus.</i>
<i>Juncus bufonius.</i>	<i>Veronica officinalis.</i>	<i>Potentilla Tormentilla.</i>
<i>Juncus uliginosus</i>	<i>Euphrasia officinalis.</i>	<i>Potentilla reptans.</i>
<i>Potamogeton natans.</i>	<i>Calluna vulgaris.</i>	<i>Sarothamnus Scoparius.</i>
<i>Lemna minor.</i>	<i>Helosciadium nodiflorum.</i>	<i>Medicago lupulina.</i>
<i>Callitriche verna.</i>	<i>Ranunculus repens.</i>	<i>Trifolium repens.</i>
<i>Polygonum Persicaria.</i>	<i>Fumaria officinalis.</i>	<i>Lotus corniculatus.</i>
<i>Plantago major.</i>	<i>Nasturtium officinale.</i>	
<i>Plantago lanceolata.</i>	<i>Sisymbrium officinale.</i>	

Second Group. The following British species are not so common as the above:—

<i>Trifolium procumbens.</i>	<i>Anagallis arvensis.</i>	<i>Daphne laureola.</i>
<i>Trifolium scabrum.</i>	<i>Veronica Anagallis.</i>	<i>Chenopodium rubrum.</i>
<i>Agrimonia Eupatoria.</i>	<i>Solanum nigrum.</i>	<i>Chenopodium murale.</i>
<i>Poterium Sanguisorba.</i>	<i>Echium vulgare.</i>	<i>Potamogeton pectinatus.</i>
<i>Hypericum perforatum.</i>	<i>Myosotis versicolor.</i>	<i>Isolepis fluitans.</i>
<i>Hypericum humifusum.</i>	<i>Verbena officinalis.</i>	<i>Carex divulsa.</i>
<i>Malva rotundifolia.</i>	<i>Sherardia arvensis.</i>	<i>Hordeum murinum.</i>
<i>Chelidonium majus.</i>	<i>Carduus tenuiflorus.</i>	<i>Festuca bromoides.</i>
<i>Sinapis nigra.</i>	<i>Chrysanthemum segetum.</i>	<i>Poa loliacea (Triticum loliaceum).</i>
<i>Lysimachia nemorum.</i>	<i>Plantago media.</i>	

Third Group. Rare plants common to the Azorean and British isles :—

<i>Cynodon Dactylon.</i>	<i>Mentha viridis.</i>	<i>Oxalis corniculata.</i>
<i>Polypogon monspeliensis.</i>	<i>Mentha rotundifolia.</i>	<i>Lythrum hyssopifolium.</i>
<i>Bromus madritensis.</i>	<i>Echium violaceum.</i>	<i>Erodium malachoides.</i>
<i>Lagurus ovatus.</i>	<i>Antirrhinum Orontium.</i>	<i>Melilotus parviflora.</i>
<i>Cyperus longus.</i>	<i>Sibthorpia europæa.</i>	<i>Trifolium glomeratum.</i>
<i>Euphorbia Peplis.</i>	<i>Fœniculum vulgare.</i>	<i>Lotus angustissimus.</i>
<i>Euphorbia Lathyris.</i>	<i>Tillæa muscosa.</i>	<i>Lathyrus Aphaca.</i>
<i>Plantago Lagopus.</i>	<i>Delphinium Consolida.</i>	
<i>Filago gallica.</i>	<i>Senebiera pinnatifida.</i>	

The most valuable productions of these islands are the introduced and cultivated species, viz. sugar and dyeing plants (*Saccharum* and *Isatis*), now discontinued, cereals, Potatoes, Yams, Lupines, Vetches, Flax, etc. Among trees, the vine, the date, the dragon-tree (*Dracena Draco*), and above all the orange-tree, of which two species are cultivated, viz. *Citrus Aurantium*, Orange, and *C. medica*, Citron.

This is the most important growth of these islands, and the staple of their commercial intercourse with Europe. The plantations of these trees, or orange-groves, are protected by lofty stone walls, and further sheltered by the Azorean Myrtle (*Myrica Faya*) and by *Picconia excelsa*, Dec., *Olea excelsa*, Aiton, which are extensively planted about orchards, and reach to upwards of twenty feet in height.

The produce of orange-trees in St. Michael's appears fabulous, amounting in numbers from 8000 to 20,000 per tree, and in bulk sufficient to load a ship.

The Azorean flora has a far closer relationship with that of the south-west of Europe than it has with that of Africa. All the Orders represented in the Azores are common to the British Isles except *Asclepiadeæ*, *Oleaceæ*, and *Laurineæ*. Most of the genera are common to both these distant insular groups, and about 130 species are found both in the Azorean and in the British Isles.

Of the 400 Azoric plants 50 are peculiar (endemic); 23 are common to the three insular groups, Azores, Madeira, and Cape de Verd; 316 are European, 5 are African, and 6 American.

SPECIES AZORICÆ.

Some of the commonest and most widely distributed of our Ferns are Azorean, viz. *Polypodium vulgare* (var. *serratum*), *Pteris aquilina*, *Aspidium angulare*, *Cystopteris fragilis*, *Osmunda regalis*.

Among the Grasses the following are very common :—

<i>Holcus mollis</i> .	<i>Briza</i> .	<i>Bromus madritensis</i> .
<i>Anthoxanthum odoratum</i> .	<i>Triticum repens</i> .	<i>Cynosurus echinatus</i> .
<i>Aira caryophyllæa</i> .	<i>Hordeum murinum</i> .	<i>Lagurus ovatus</i> .

Among the *Carices*, *C. flava*, *C. stellulata*, and *C. divulsa* are common.

<i>Isolepis fluitans.</i>	<i>Callitriche verna.</i>	<i>Polygonum Persicaria.</i>
<i>Scirpus maritimus.</i>	<i>Euphorbia Peplis.</i>	<i>Plantago Coronopus.</i>
<i>Eleocharis palustris.</i>	<i>Euphorbia Lathyrus.</i>	<i>Plantago major.</i>
<i>Cyperus longus.</i>	<i>Parietaria officinalis.</i>	<i>Plantago media.</i>
<i>Potamogeton natans.</i>	<i>Chenopodium urbicum.</i>	<i>Plantago lanceolata.</i>
<i>Potamogeton pectinatus.</i>	<i>Chenopodium murale.</i>	<i>Plantago Lagopus.</i>

127 vascular plants are common to the Azorean and British Isles. Some of them are among the most common, some the scarcest.

The following Azorean plants are peculiarly interesting, either being peculiar species or else belonging to well-known genera:—

Of the order ULVACEÆ there is in this Flora (Hochstetter's) a figure of *Bryopsis penicillata* with a description, p. 9.

In HEPATICÆ, *Rhacotheca azorica*, with figures and an ample description.

In JUNGERMANNIACEÆ, *Gymnomitrion erythrorhizum*.

In MUSCI, *Hypnum Hochstetteri*.

In FILICES, *Alantodia*, var. *azorica*.

In LYCOPODIACEÆ, *Lycopodium cernuum*.

We omit the *Gramineæ* and *Cyperaceæ*, etc., for want of room.

Among the Orchids there are two *Habenarias* peculiar to the Azores, *H. micrantha* and *H. longibracteata*.

The following are probably desirable species, viz. *Euphorbia azorica*, *Urtica azorica*, *Plantago azorica*, *Scabiosa nitens*, *S. neglecta*. *Bellis azorica* and *Solidago azorica* are both interesting species, especially the latter, which might be an ornament to the shrubbery. *Tolpis nobilis* is truly a noble plant, and as it grows at a great altitude, upwards of 3000 feet, is probably hardy enough to resist our winter's cold.

We should like to see specimens of *Erythræa latifolia*, from St. Michael's and Terceira.

E. diffusa is a species peculiar to these islands. *Myosotis murina* is another desirable plant. *Euphrasia grandiflora* is an elegant species, with rounded, singularly curled, rigid leaves. It grows between 3000 and 4000 feet altitude, and has large, handsome flowers; a fine plant for artificial rocks.

There is a new *Rubus*, *R. Hochstetterorum*, and a new *Rhamnus*, viz. *R. latifolius*, which has leaves five inches long and two and a half broad. *Hypericum foliosum*, Ait., is another desirable species. *Cerastium azoricum*, of which there are several varieties, might be a useful plant.

Sanicula azorica is, judging from its figure in 'Flora Azorica,' a lovely plant; the foliage is exquisite, and as it grows between the altitudes of 2000 and 4000 feet would probably succeed in our variable though not severe climate.

It is probable that the *Erica mediterranea* of our correspondents should be *E. azorica*. This and *E. scoparia* are the only Heaths observed by the Hochstetters in these islands. This shrub, which reaches a height of fifteen feet, grows as high up the sides of the rocky mountains as 6000 feet. It might be worth trying as an inmate of our more sheltered shrubberies.

There are also two *Vaccinia* which might become denizens of our gardens, viz. *V. longiflorum* and *V. cylindraceum*; the latter is almost a tree, and grows at as lofty an altitude as 5000 feet.

In concluding this rather long article, we beg leave to give our readers a hint or two about the introduction into their collections of some of the plants recently published in our columns as natives of the Pyrenees.

Among these, *Ramonda pyrenaica* is specially desirable; it is a very rare plant, and seldom to be seen in collections.

Several of the Editor's correspondents have seen samples of this rare species, for many have been distributed. To amateur cultivators and to nurserymen these alpine plants are especially recommended; indeed they commend themselves by their beauty, neat growth, and suitability to our somewhat cold and moist climate.

Nothing can exceed the brilliancy and intensity of the colours of the alpine Gentians, and their habit is unexceptionable. The same may be said of many Primulas, Pediculars, and even of the alpine Buttercups.

We have the addresses of botanists, resident in the Hautes and Central Pyrenees, who will, as matters of business and on moderate terms, supply applicants with both seeds and roots of these interesting species.
