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CONTAINING

FIGURES AND DESCRIPTIONS

OF

SUCH PLANTS AS RECOMMEND THEMSELVES BY THEIR NOVELTY, RARITY, HISTORY, OR USES;

TOGETHER WITH

BOTANICAL NOTICES AND INFORMATION,

AND

OCCASIONAL MEMOIRS OF EMINENT BOTANISTS;

BY

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Notes of a BOTANICAL TOUR *in the* WESTERN AZORES.

(*In a Letter from* HEWETT C. WATSON, Esq., *to the Editor, dated, November,* 1842.)

IT was my wish to write to you from the Azores, by way of reporting the progress I was likely to make in investigating the botanical productions of those islands, during the surveying operations of Her Majesty's War Steamer, Styx, commanded by Captain Vidal; to whom I had been introduced, through the instrumentality of yourself and Captain Beaufort, as a person, willing to go out at my own cost, for that object, provided an order from the Admiralty was obtained for a passage in the Styx. I postponed writing, until I should reach the island of Flores, often stated to have originally derived its name from the beauty or variety of its flowers; and, by this postponement the intention was ultimately defeated. The West India mail-packets touch at Fayal on their homeward passage; but the island of Flores is upwards of a hundred miles from Fayal, with irregular and uncertain opportunities of communication, and before our return to Fayal, I had resolved to take a passage myself in the first mail-steamer to England that should touch there after we returned to that island. This resolution I was unfortunate enough to carry into effect, and by so doing, was subjected to the tediousness of a rough passage, protracted to twice its usual length, through sheer mismanagement in taking on board the mail-packet barely

sufficient coals to carry us to Falmouth with a fair wind. The wind proved adverse the whole way, and for a few days blew a hard gale, so that our stock of coal was exhausted before we could make the English Channel; and there was no resource left but that of turning back and running before the wind, under such small sails as could be raised in the steamer, across the Bay of Biscay to Corunna, for a fresh supply of coal. In this dilemma, it was some consolation to anticipate a botanical day or two on Spanish ground; but scarcely was our anchor down before we had notice from the Spanish authorities that none of us could leave the ship, which must be put under quarantine, in consequence of having come from the West Indies. Could this have been foreseen, I should have spent a fortnight on shore in Fayal, and taken my passage in the succeeding mail-steamer; the Styx being about to proceed to the more eastern islands of Terceira and Santo Miguel, to which I would not go, as it appeared very uncertain whether I should be able to land on them for botanizing. By coming home in the mail-packet Dee, I thus lost the opportunity of autumnal botanizing in Fayal, and merely wasted the time in playing at "pitch and toss" in the Bay of Biscay.

My collections were left on board the Styx, to be brought to England in December; and in their absence, at present, I cannot speak with certainty about the specific names of several species that were novelties to me, and therefore not to be determined in the absence of botanical works, which are articles unknown in the Azores. With a few exceptions, all my specimens belong to European genera. Several of the species are identical with those of the South of Europe; others being plants of Madeira or the Canaries; and a few possibly undescribed kinds. Some of these latter species have been distributed in Guthrie's collections under the specific names of "*Azorica*" and "*Calderensis*;" others were probably not gathered by that botanist.

We were rather late in reaching the Azores; that is, late for a botanist to commence collecting in islands whose win-

ter temperature is equal to that of May in England. I had expected to sail in April, but a succession of trifling circumstances (not all of them accidental or unavoidable, I suspect) concurred to detain the Styx a month longer in England, and it was not until the 18th of May that we at length steamed out of Plymouth Harbour. The War Steamers are built with a much sharper run from the deck to the keel, than is seen in the ordinary trade and passenger steamers; their form being something like the rapidly sloping roofs of old-fashioned houses turned upside down. In consequence of this build, they roll about most tumultuously on the ocean, and are by far the most uncomfortable ships in regard to their motion, that my slender experience has hitherto made me acquainted with. However, if the Styx rolled much from side to side, she rolled onwards also at a brisk rate; and by eight o'clock in the morning of the 25th, I was gratified, on going on deck, by seeing that we were already among the Central Azores, having passed Terceira, and being then on the north side of Santo Jorge; beyond which, in the distance, appeared the lofty Peak of Pico, rising high and sharp into the deep blue sky, with a wreath of white clouds floating like a loose drapery around its dark sides, much below the summit. Before one o'clock of the same day, we dropped our anchor in the Bay of Horta, the principal town of the island of Fayal, right opposite to which, at a distance of five miles, is the northern extremity of Pico island, whose towering Peak thus forms a noble background to the sea-view from the town of Horta. Looking at this great volcanic cone from the deck of the ship, I felt extremely anxious to be upon it, anticipating a rich harvest of Alpine plants, on a mountain whose altitude had been variously estimated from 6700 to 9000 feet. This anticipation was not afterwards realised; the other islands visited yielding me a larger supply of such plants, although their mountains have only half the elevation of the Peak of Pico.

To a lover of plants, who had before never been farther south than Cornwall, the island of Fayal afforded much of interest and attraction. It is of small size, about ten and

twelve miles in cross diameters. Everywhere the coast is formed of precipitous cliffs, with the exception of Praya, the Bay of Horta, and its suburb Port Pym. The Bay is formed by a crescent line of hills varying from three hundred to something near a thousand feet of elevation, by guess. Beyond the middle and highest part of this line of hills, and near to the centre of the island, is an elevated valley, several hundred feet above the sea-level, which is said to have derived its name of *Flamingos*, from having been the spot selected for their home by a body of Flemish settlers. Beyond this valley, again, the ground rises rapidly till we have passed the centre of the island, and approached within three or four miles of the coast, on the contrary side to that on which the Bay of Horta is situated. Here we suddenly come to the edge of the "Caldeira," a deep and nearly circular basin, once no doubt a boiling crater, now, as peaceful and lovely a scene as I ever beheld. It is scooped out, as it were, in the highest part of the island, near the north-west coast, is entirely surrounded by the mountain which constitutes its walls, and is consequently quite without any visible outlet for the streams which pour into it. From the edges of this basin, which I suppose to be between three and four thousand feet above the sea, the land falls in every direction towards the shore, terminating there abruptly in precipitous cliffs, against which the waves are constantly beating. In the Bay of Horta, and in a smaller bay at Port Pym, there are narrow belts of grey sand on the shore; and the same sort of shore is seen at Praya, a couple of miles from Horta, on the other side. My botanizing lay in the neighbourhood of these sandy bays, and in walks from them to the mountains about the Caldeira. Twice I descended into the Caldeira; and once I landed from a boat on the cliffs, several miles north-east of the sands, and strolled about the neighbouring country for a few hours. My rambles thus covered about one third of the island, and were made chiefly in the month of June and beginning of July, with a few short walks about the town of Horta, in the end of May and middle of September.

Of maritime plants, I found only a scanty supply, chiefly on the sands about Port Pym. Here I gathered *Juncus acutus*, *Polygonum maritimum*, *Salsola Kali*, a species of *Cakile*, and a *Convolvulus*, much resembling *C. Soldanella*, but with white and larger flowers. On the other side of Horta, I saw *Euphorbia Peplis*. The rocks of the coast produced another species of *Euphorbia*, an *Arenaria*, and a profusion of *Asplenium marinum*, which indeed grew all over the islands.

In the vicinity of Horta, the land is almost all under cultivation, having been converted into gardens, orange orchards, and cultivated fields, which are fenced by stone walls, with very narrow and rugged roads winding between them, also flanked by the monotonous stone walls. Living reeds are almost the only other material used for fences; and planted in rows, they answer this purpose very well, growing ten feet high and upwards, so as to constitute an excellent protection against the violence of the Atlantic gales, before which their elastic stems bend without breaking. Against the trespasses of man they can be no defence; but by cutting down some of them to be tied as rails across those which are left growing, a sufficient fence against cattle may readily be made. There is a constant renovation of these reed hedges from the succession of suckers thrown out by their roots.

The field crops consist of *maize*, *wheat*, *beans*, *lupines*, *flax*, *potatoes*, and various *gourds*. The gardens produce *lemons*, *oranges*, *grapes*, *figs*, *apricots*, *peaches*, and *bananas*. *Strawberries* do not succeed well, and the fruit which they do bear is with difficulty preserved from the innumerable blackbirds. *Apples* I observed in Pico and Flores, but none in Fayal. *Cherries*, *raspberries*, *gooseberries*, or *currants*, I saw neither in Fayal nor in any of the other islands. As to ornamental shrubs and flowers, anything that grows in our green-houses might or does grow in the open ground in Fayal; but the violent sea-breezes would break and destroy most kinds of trees, as they rose above the shelter of the walls, or of those robust evergreens, which are constantly planted in the gardens and orange orchards to protect the less hardy kinds. The *Pas-*

siflora cærulea has become wild, and thrives prodigiously. *Canna Indica* is occasionally found wild, with flower-stalks five or six feet high. The *Amaryllis Belladonna* is abundant in various places about Horta. Yet these three should probably be regarded as introduced plants, which have passed from the gardens to the wilds.

The use of stone walls and reeds for fences is prejudicial to the pursuits of the botanist, who may look in vain for hedges or hedge-banks, meadows or pastures, about the town of Horta or elsewhere in the cultivated regions of Fayal. The pedestrian walks along very narrow paved or rocky roads, hemmed in between two stone walls from six to ten feet high, or along narrow footpaths which cross only cultivated fields. These peculiarities, of course, greatly affect the spontaneous vegetation. What may be considered the characteristic Flora of the Azores, is very sparingly scattered about the town in a few spots, whose steepness or exposure has interfered to discourage the efforts of the cultivator. The wild plants which are met with, are chiefly annual weeds of cultivated grounds, plants which thrive about inhabited places, and such as are adapted to exist on rocks, or in the crevices of stone walls. Some of these are among the commonest weeds of England, as *Sisymbrium officinale* and *Sherardia arvensis*. Others are still English, but among our most local kinds, as *Cynodon Dactylon* and *Polycarpon tetraphyllum*. Others, again, though quite unknown in the English Flora, are still plants of south Europe; as *Phytolacca decandra* and *Portulaca oleracea*. But *Sida Canariensis* (of Guthrie's collection) and *Vicia albicans* are extra-European species, derived from other islands of the Atlantic.

Passing inland from Horta towards Flamingos, we gradually lose many of these ordinary species of cultivated countries, and find the proper vegetation of the Azores, where left more in a state of nature. *Myrica Faya* and *Myrsine retusa* grow on the low hills which encircle the bay, immediately behind the town. *Erica Azorica* (of Guthrie's collection, but in reality *E. scoparia*) and *Thymus cæspitosus* are plentiful on these hills, though still more abundant on the wilder moun-

tains above Flamingos. *Spartium junceum* and *Asclepias fruticosa* (growing on the banks of a ravine, where a river crosses the line of hills and forms a waterfall in its approach to the town) may be indigenous, though very local. About Flamingos, the banks of the river are covered with many species of *Ferns*, and a few of the mountain shrubs are seen, the seeds of which probably come down with the streams, as *Menziesia polifolia* and *Calluna vulgaris*; the former of which is extremely abundant on the hill-sides between Flamingos and the Caldeira, and is doubtless the *crimson-flowered heath* mentioned by Messrs. Bullar in their account of the Azores.

Though the orange and lemon ripen their fruit at Flamingos, cultivation ceases altogether within a thousand feet above the village; the highest crops being the *potato* and "yam," as it is called, but it is apparently the *Caladium esculentum*. The proximity of the clouds probably arrests cultivation at this moderate altitude; the "yam" being better adapted to withstand moisture than the other cultivated food-crops of the Azores; indeed, it thrives best in wet or marshy places.

About the upper limits of cultivated ground, where patches of *Myrica Faya* and other indigenous shrubs intermingle with the spaces cleared for the crops, I saw *Rosmarinus officinalis* and *Lavandula Stœchas*, now quite wild, yet possibly originating from the cottage-gardens of Flamingos, in which they are planted; as I did not meet with them in other parts of Fayal, or in other islands. Above the region of cultivation, there is a broad belt of natural wood, which grows up again as it is cut down for fuel. It consists chiefly of *Erica scoparia*, *Myrica Faya*, *Myrsine retusa*, and a species of *Juniperus*, which the natives call "Cedros;" the latter, being very abundant in the Azores, causes several places to be called by its name of *Cedros*. Intermixed with these, but chiefly in the ravines down which the mountain streams rush rapidly, the *Vaccinium Maderense* displays its fine clusters of long drooping blossoms. A large-flowered *Rubus* sends long rambling shoots among the other shrubs, to the great inconvenience of a botanical pedestrian and the barefooted peasants. *Ilex*

Perado, *Viburnum Tinus*, *Laurus Canariensis* (*?*), and a handsome shrubby *Euphorbia* also occur in the ravines. *Pteris aquilina* and *Blechnum boreale* are very abundant among the shrubs; and many other *ferns* may be seen growing luxuriantly in the ravines.

As we keep ascending towards the Caldeira, these shrubs become less plentiful. The large mass breaks into clumps, between which various grasses and other herbaceous plants form a pasturage for cattle, and the more humble *Menziesia polifolia* bespangles the ground. Higher still, the shrubs are reduced to single and stunted bushes; and, at last, at the rim of the Caldeira, they cease altogether; the ground being there covered with a thick elastic mass of grass and moss. *Serapias cordigera* occurs rather frequently above Flamingos, and *Erythræa diffusa* much more so. Between Flamingos and the Caldeira, chiefly in the ravines or on banks facing from the sun, I observed species of *Bellis*, *Luzula*, *Lysimachia*, *Carex* and *Cardamine*, which were unknown to me, but to which Mr. Guthrie has attached names on the labels distributed with his specimens. *Tormentilla officinalis* and *Fragaria vesca* were among the commonest plants on the declivities of the mountains.

But I must now rest my pen here, without taking you and it into that lovely valley of the Caldeira, so interesting to the botanist, so delightful to the lover of scenery. The Caldeira of Fayal, the Peak of Pico, the waterfalls of Flores, and the precipice of Corvo, are the four most inviting localities for the botanist who visits these more westerly of the Azorean islands. Another day I shall be happy to send you some account of them, as well as a full list of the plants collected; to which, the geographical position of the islands, so far in the Atlantic, must give some interest with the readers of the *Journal of Botany*. I may here just remark that there are no indigenous trees in the islands which I visited. The characteristic features of the vegetation consist in the abundance of evergreen shrubs and ferns, with a few peculiar alpine plants. Some of the shrubs are almost arborescent; the stems of the

heath attaining a circumference of two or three feet, and those of the *Juniper* occasionally three to four feet. *Ferns* constitute about a twelfth part of the whole flora, excluding the other cryptogamic plants. Of the genera *Salix, Rosa, Sedum, Sempervivum, Saxifraga, Statice, Linum,* or *Gentiana,* I did not observe a single indigenous species.

(*To be continued.*)

Descriptions of four NEW GENERA OF PLANTS *from the* ORGAN MOUNTAINS, *by* GEORGE GARDNER, F.L.S., *Professor of Botany and Natural History, in the Andersonian University, Glasgow.*

BOWMANIA.

(COMPOSITÆ-NASSAUVIACEÆ.)

CHAR. GEN. *Capitulum* multi-60-70-florum. *Involucrum* pluriseriale, squamis laxis foliaceis oblongo-lanceolatis ciliatis apice subdentatis æqualibus. *Receptaculum* alveolatum piloso-fibrilliferum. *Flores* omnes hermaphroditi. *Corollæ* bilabiatæ, labio exteriore 3-dentato ligulæformi, in floribus exterioribus longiore, interiore bipartito lobis revolutis. *Filamenta* glabra. *Antheræ* basi bisetosæ. *Styli* rami lineares compressi divergentes apice truncati hispiduli. *Achænia* subteretia ovato-oblonga glanduloso-pilosa disco epigyno dilatato coronata. *Pappus* pluriserialis rufus, setis deciduis filiformibus scaber.—Herba *Brasiliana, elata, tomentosa, simplex*; foliis *alternis, denticulatis*; capitulis *magnis, laxe paniculatis, aurantiacis.*

I. Bowmania *verbascifolia, Gard. Herb. Bras. n.* 5797.

HAB. In dumetis, in summitatem montis, *Serra dos Orgãos,* Prov. Rio de Janeiro, Brasiliæ. Aprili florebat.

Herba 4-6 pedalis. *Caulis* simplex, erectus, angulato-striatus, dense lanuginoso-tomentosus, usque ad apicem distanter foliosus. *Folia* alterna penninervia, subamplexicaulia, lanceolata, subacuminata, basi in petiolo dilatato attenuata,

one in Japan, &c, as *Decumaria* by *Schizophragma*, *Schizandra* by *Sphærostemma*, *Hamamelis* by *Corylopsis*, &c. I have elsewhere alluded to this subject, and shall probably consider it more particularly on some future occasion.

(*To be continued*).

Notes of a BOTANICAL TOUR *in the* WESTERN AZORES. *By* HEWETT C. WATSON, ESQ. (*Continued from page 9 of the present volume.*)

IN a former communication, I gave a hasty sketch of my passages to and from the Azores, and first impressions of Azorean botany. Since that letter was written, my collection of specimens has reached England. The species of *Flowering Plants* and *Ferns* amount to three hundred and fifty; and notwithstanding this limited number of species, for Islands in the latitude of Portugal and Greece, I am disposed to believe that the collection will afford a fair approximation towards a Flora, not only of the more westerly isles on which the plants were gathered, but even of the entire group. This opinion is founded in part on the similarity of species seen in the different islands visited by myself; in part, also, on the resemblance between the species gathered by myself and a set of Azorean plants in the possession of Sir W. J. Hooker, who received them from Mr. Guthnic.* The latter collection was formed in the islands of St. Michael, Terceira, Fayal and Pico; mine, in the islands of Flores, Corvo, Fayal and Pico: the two, united, represent the botany of six islands, out of a group of nine islands in the whole; and the number of distinct species in both collections together amounts to about three hundred and seventy. It is highly probable, however, that Sir W. J. Hooker's set of specimens does not include all the species collected by Guthnic and his companion Hochstetter. Terceira, apparently, has supplied most of the twenty kinds of plants in

* This name was erroneously printed Guthrie in the early portion of this article.

their collection which are not included in mine; while Flores afforded a large proportion of my species which are absent from their parcel sent to Sir W. J. Hooker.

It might be expected by a home botanist, or one who lived on shore while herborizing, that with only three hundred and fifty species, I ought to have brought away a very large supply of duplicates. Yet this is not the case; for I do not estimate my specimens altogether at more than four thousand, including the smaller Cryptogamous plants, of which, indeed, I possess very few species. On making this estimate of the specimens, when they arrived in England, I was certainly much disappointed at their paucity. I had collected, from the last week in May up to the first week in September; and had I been living on shore, instead of being on board a ship, it is probable that the specimens dried would have been six times as many. But, as hints for the benefit of other botanists likely to be so impeded, I may here mention the three circumstances which materially lessened the expected results of my exertions. In the first place, the plants dried very slowly, and when their paper was changed there was great difficulty in getting the damp paper made fit for use again. To have scattered the sheets loose about the deck, would have been a great breach of the neatness and etiquette of a man-of-war; and though I did frequently bring them on deck tied in bundles, the process of desiccation was extremely slow in this condition. The only place in which I could keep loose papers was my sleeping cabin; and it will easily be conceived that a space of six feet square, which was occupied already by a bed, chest of drawers, wash-stand, table, chair, and botanical presses, could afford no "drying ground" for loose papers. Secondly, my opportunities for collecting were very uncertain. Sometimes, when all my paper was already damp, I could have got an ample supply of specimens; and at other times, when I had paper dry and ready, a week might elapse without having the opportunity of setting foot on shore. This I had hoped would not have been the case; but it was so; and the circumstance was even more provoking, because, in every other

respect, except not finding the expected facilities for botanizing, I had the fullest reason to be satisfied and pleased with the conduct of Captain Vidal and the officers generally. Thirdly, I fell into the error of drawing the straps of my presses too tight, which no doubt rendered the process of desiccation much slower, and considerably injured some of the more succulent specimens. Accustomed to dry plants at home, in an airy room, with usually many quires of paper between each layer of specimens, I had found a heavy pressure advantageous. In a damp climate and ship, where space compelled me to keep a limited supply of paper in use, a heavy pressure was certainly detrimental; though "in the darkness visible" of a sleeping cabin, it was long before I observed the injuries arising from this practice. I can now better understand why specimens come so imperfectly pressed from warm and damp climates, where tight pressure would induce an incipient putrefaction and destroy the distinctness of parts in the succulent individuals. I have, unfortunately, experienced this effect in my semi-succulent species of *Euphorbia*, *Campanula*, and *Convolvulus*, which appear to be undescribed.

To return from a digression which may probably give useful hints to some other collector. My former communication had carried me to the edge of the Caldeira, in Fayal. This was described as a circular hollow in the highest part of the island, and has doubtless been a volcanic crater in long bygone ages: now it is a natural botanic garden, where the true Flora of the Azores, above the cultivated region, reigns undisturbed by plough or spade. The diameter of the basin appears to be about one mile, and its perpendicular depth is more than a quarter of a mile, with very steep sides or walls, down which several small streams rush rapidly, forming beautiful cascades in places where they fall over precipitous ledges of rock. Ultimately, these streams are absorbed in a lake, which occupies about a third of the base of the valley; and from which, as before stated, there is no visible outlet for the waters which are constantly pouring into it.

The summit, or rim, of the Caldeira varies from 1,200 to 1,500 feet above its base; the height of the most elevated point of the rim (which is also the loftiest part of the whole island of Fayal) being 3,170 feet above the sea, and the base of the Caldeira, consequently, about 1,670 feet above the sea. During our stay near Fayal, this Caldeira was scarcely ever clear from clouds or mist for an entire day; and, mostly, it was completely enshrouded during the day, though, not uncommonly, clear for some hours at night, or very early in the morning. Rain falls here frequently, while the lower parts of the island are perfectly dry and sunny; and when no rain is actually descending, the vegetation is often bedewed with moisture from the heavy mists.

The depth of this small valley, and the prevalence of mists over it, must necessarily reduce its share of sunshine to a very slender allowance; while its high and steep walls probably cause an almost constant calm at the base, though the winds of the Atlantic may be sweeping vehemently over their summit. Add to these peculiarities, a plentiful supply of humidity from the streams and spray of waterfalls, coursing down the deep gulleys that are formed in the walls, and it will readily be conceived that the Caldeira is exactly the spot for a natural *Fernetum*. Indeed, so numerous are the *Filices* here, that they give quite a character to the landscape, hanging in profusion about the rocks and waterfalls, and covering the more gradual declivities, among the various *evergreen shrubs* which clothe great part of the sides of the Caldeira, at least in the lower portion of it, for the shrubs gradually become scattered and stunted in the higher parts of the walls, and finally cease near their summit; as was remarked to be the case on the much more gradual ascent from Flamingos to the rim of the crater outside. I made no separate list of the plants seen in the Caldeira, which are almost all of them found also in the various ravines of the mountains around it outside; but the great advantage to a botanist is, that they are here collected into a small space, so that he can, in one day, within the Caldeira, find the species which would occupy his

time during research for several days, if looked for outside the basin. I lost much time by not being sooner aware of this circumstance.

The shrubs which are most abundant in the Caldeira are *Erica scoparia*, *Juniperus* (species unascertained), *Myrsine retusa*, *Laurus Canariensis*, and *Vaccinium Maderense* (or *padifolium*). Though the flowers of this *Vaccinium* are much longer than those of the Madeira specimens, I am disposed to regard the Azorean plant as the same species; not detecting any other well marked difference. *Viburnum Tinus*, *Hedera* (*Helix ?*), *Ilex Perado*, and a handsome shrubby *Euphorbia*, also occur among the more abundant species first named. This *Euphorbia* is nearly allied to *E. mellifera*, but is much larger in all its parts, and more especially in its leaves. It grows like a great forked candelabrum, with long and stiff branches, which terminate in tufts of darkly glaucous leaves and umbels of yellow flowers.

Among the *Ferns*, as far as my recollection serves, the most conspicuous for their size or frequency were *Woodwardia radicans*, *Pteris arguta*, and *aquilina*, *Aspidium fœniseciiland angulare*:—*Trichomanes speciosum*, *Hymenophyllum Tunbridgense*, *Cystea fragilis*, *Acrostichum squamosum*, and *Asplenium monanthemum*, though less conspicuous, were plentiful enough in many places, on wet and shady rocks. *Lycopodium suberectum* may also be gathered in the Caldeira; and here only did I see any species of *Equisetum*, the few barren fronds found apparently belonging to *E. fluviatile*.

Ranunculus cortusæfolius, *Cardamine Caldeiraria*, *Sanicula ciliaris*, *Senecio malvæfolius*, *Bellis Azorica*, *Erythræa diffusa*, *Veronica* (No. 158 of my specimens), *Rumex* (No. 216), *Luzula* (No. 254), *Carex sagittifera*, and other species of the same genus, were also observed in this Caldeira, and may be regarded as the Alpine plants of Fayal.

At the base of the Caldeira, about the lake, were several British species which are commonly found in wet or damp places in this kingdom, namely, *Mentha rotundifolia*, *Cerastium viscosum*, *Callitriche verna*, *Peplis Portula*, *Veronica*

Anagallis, *Potamogeton natans*, *Juncus effusus* and *Scirpus Savii*. In Fayal, where the low grounds consist of porous rocks, which allow very little water to remain on the surface, the marsh productions thus associate with the alpines; and these alpines are several of them large plants, unlike the diminutive growth of the Scottish Highlands. To these species we may add *Sibthorpia Europæa*, *Tormentilla officinalis*, *Fragaria Vesca*, *Lysimachia nemorum*, (or *L. Azorica*), *Cotyledon Umbilicus*, and *Thymus cæspititius*, as farther souvenirs of the Flora of the Caldeira; and generally that of the hilly parts of the island.

Some other plants also occur on the hills between Flamingos and the Caldeira, which I do not recollect to have seen within it, though it is likely enough that they may be most of them found there, if sought for; namely, *Dicksonia Culcita*, *Asplenium anceps*, *Juncus ericetorum*, *Serapias cordigera*, *Festuca jubata*, *Tolpis macrorhiza*, *Nephrodium molle*, *Holcus mollis*, *Rubia splendens*, *Hypericum grandifolium*, *Aira caryophyllea*, a handsome (but yet unascertained) species of *Solidago*, a *Habenaria* allied to *H. viridis*, a new *Carex*, to which Dr. Boott has attached the specific name of *Watsoni*, and some few more plants. *Menziesia polifolia* is extremely abundant on the hills, and was also, I think, seen in the Caldeira. *Calluna vulgaris* and *Myrica Faya* are plentiful in places above Flamingos. A *Rubus*, with larger flowers than our native species, also occurs locally.

Among the more interesting productions of the lower parts of the island, and not mentioned in my former letter, may be enumerated the following; namely, *Solanum pseudo-capsicum*, *Physalis pubescens*, *Frankenia pulverulenta*, *Arenaria macrorhiza*, *Lathyrus Tingitanus*, *Trifolinm Ligusticum*, *Dorychnium parviflorum*, *Asplenium palmatum*, *Gymnogramma leptophylla*, *Lythrum Græfferi*, *Chrysanthemum Myconis*, *Microderis rigens*, *Bidens leucantha*, *Cyperus badius* and *C. esculentus*, *Gaudinia fragilis*, *Festuca petræa*, *Juncus tenuis*, and *Urospermum picroides*. *Laurus Indica* and an *Olea*, allied to *excelsa*, are doubtful natives.

Several of the names thus mentioned will be unknown to most botanists. They have been obtained from the labels of Guthnic's collection, or are the appellations conferred on the same species in Madeira, by the Rev. Mr. Lowe, and kindly communicated to me, with numerous specimens from Madeira, by Dr. Lemann, from whose extensive knowledge of plants, and more particularly of the productions of the Atlantic islands and the Mediterranean coasts, I have derived great assistance in determining many of those collected in the Azores. While alluding to Mr. Guthnic's collection, I may correct a misprint of his name, which runs through the whole of my former communication; the name having been printed Guthrie, probably in consequence of my spelling it Guthnic, though Guthnick may be the proper orthography.

The genera of Fayal plants, which yield species that I have not yet been able to refer to described species, are *Convolvulus*, *Carex*, *Euphorbia*, *Luzula*, *Veronica*, and *Rubus*. There are also species of *Carex*, *Cardamine*, *Bellis*, *Festuca*, *Sanicula* and *Lysimachia*, which have been named, if not described, by Lowe, Guthnic, or other botanists.

Notes on the Distribution of the PLANTS OF ABERDEENSHIRE *in relation to altitude, by* G. DICKIE, M.D., *Lecturer on Botany in the University and King's College of Aberdeen.*

IN studying the Distribution of Plants, in relation to Altitude, it is important to bear in mind the different agencies by which they may be removed, even to a considerable distance, from their natural places of growth; in short, it is necessary to distinguish between what may be called *natural* and *accidental* stations.

When one meets with patches of *Urtica dioica*, *Cerastium viscosum*, &c. in the Highlands, at a distance from any habitation, it will generally be found that the ruins of some former smuggling hut are not far off. For the most part, however, plants of the low country are not so liable to make

sometimes bipartite, under-side pale-coloured, full of concave dots (stomata.)

Species. 1. K. æsculifolia, *Blume.* 2. K. Assamica, *Griff.*

Illust. Hook. gen. fil. t. 59. A. *Hook. et Grev. ic. fil. t.* 229. *Hook. Journ. of Bot.* 2, *t.* 11, 12.

Obs. Few instances have been detected of this remarkable genus. The original species was found by Blume in Java, and recently by Cuming in the Island of Leyte, where only one plant was noticed; a second species has lately been discovered in Assam by Mr. Griffith.

Kaulfussia, in habit, venation and the position of its sporangia, presents much similarity to *Drynaria plantaginea, Aspidium trifoliatum and Hypoderris Brownii;* while the structure of its sporangia denotes its place to be in this division, and like *Marattia* and *Danæa,* the multilocular or compound sporangium may be viewed as formed by the union of from ten to twelve oblong sporangia, sessile round a punctiform receptacle, which being concrete, forms one mass, constituting a multilocular or compound, rotate sporangium, each cell opening interiorly as in *Angiopteris.*

Notes of a Botanical Tour *in the* Western Azores.

By Hewett C. Watson, Esq. (*Continued from page* 125 *of the present volume.*)

AN ASCENT OF THE PEAK OF PICO.

The island of Pico was not surveyed during the summer of 1842; but while the Styx lay at anchor in the Bay of Horta, in the neighbouring island of Fayal, I had two opportunities of joining parties made from that vessel for the ascent of the Peak; which is by much the loftiest of the hills in the Azores, and consequently affords good illustrations of the influence of elevation in modifying their vegetation.

On the first occasion, which was on the 30th of May, two of the Lieutenants, the Assistant Surgeon, and myself, formed the party; but having started from the vessel on a dull and unfavourable morning, we had scarce accomplished one-third of the ascent, before the increasing violence of the wind, the driving rain, and the dense mists in which we were enveloped, became obstacles sufficient to baffle our efforts. We persevered so long as to spend a highly uncomfortable afternoon and night in a low cave which afforded some partial shelter from the rain and wind; but were compelled the next morning to give up our struggle against the continued bad weather, and to return to the ship.

A second and successful attempt was made on the 1st of July. The party from the Styx consisted of Captain Vidal, with Lieutenant Cleaveland and myself, who intended to ascend the mountain, and Assistant Surgeon Speer, who remained on the shore to register the barometer for comparison with a second instrument which was to be carried to the summit.

The Peak being perfectly clear from clouds on the 30th of June, we crossed to the island of Pico in the afternoon of that day, with the design of commencing our ascent early the following morning. We borrowed for the night a handsome house built on the shore of Pico, by Mr. Dabney, of Fayal, Consul for the United States, in which he and his family are accustomed to spend a part of each summer. At this time, however, the house was unfurnished; and not having brought any beds with us, we found the experiment of trying to sleep on the floor, or on the wooden frames of sofas destitute of their cushions, to be a very bad overnight preparation for the laborious march of the following day.

As daylight spread over the shores of Pico, on the morning of the 1st of July, we had the uncheering prospect of a dense canopy of clouds extending across the island and completely shrouding the Peak from our view. Apprehensive that he could obtain no good observations with the theodolite, Captain Vidal appeared greatly disposed to return to the ship,

without attempting an ascent; and if any other voice in the party had expressed a similar inclination, this other attempt would probably have been abandoned. But our half dozen natives who had been engaged as guides and porters, were all in favour of making a trial, in expectation of the day clearing up shortly; especially since it signified little to them whether we reached the summit of the mountain or not, so that their time and services were paid for. Some feeling that a partial ascent only would still be productive of botanical interest and acquisitions, probably influenced my own opinion and wishes to chime in harmony with those of the guides; but I also entertained tolerably firm conviction that the upper part of the Peak would be found clear, having frequently observed, during the preceding month, that the stratum of clouds seldom covered more than a third of the mountain in its perpendicular height, and that the summit was left bright while the clouds hovered low down on the flanks. After some time spent in hesitation we at length started, about five o'clock, taking with us the various necessary instruments, a store of provisions, thick coats to wear in the night, and also two beasts of great rarity in Pico, namely, a pony and an ass, which had been considerately procured for us by Mr. Dabney, and which we bestrode in turn while ascending the lower part of the hill. The extreme trepidation exhibited by the women and children, whom we met in the road, while mounted on these animals, showed unequivocally how little they were familiar with the appearance of such creatures.

The first part of our route carried us for a short distance along a bare and rocky shore. In the vicinity of Mr. Dabney's house I observed a few plants of *Hyoscyamus Canariensis*, being the only spot in which it was found during my walks about the islands. Shortly bending our course inland and upwards, we travelled for some miles along a rough road, partly paved, but mostly floored by the natural and very uneven surface of the rock, ground into deep ruts by the wheels of the small bullock waggons which are the only conveyances

in the island, and whose wheels of solid wood, studded with bosses of iron round the rim, grind channels in the lava not unlike the deep ruts seen in clayey lanes in England.

The road was flanked on both sides, by an interminable net-work of *vineyards*; almost the whole surface of the country being here divided by low stone walls into small compartments, varying considerably in size, but often about three yards wide by ten or fifteen yards in length. Within these compartments the vines are planted in crevices of the rock or between loose blocks, which are scantily clothed with weedy herbage. Among the weeds, *Briza maxima*, *Polycarpon tetraphyllum*, *Galactites tomentosa*, *Gnaphalium luteo-album*, *Gastridium lendigerum* and *Bromus Madritensis* were frequent species. The monotonous continuity of the vineyards was partly broken and relieved, immediately adjacent to the road, by the small gardens attached to many of the cottages.

Besides the *vines* there were some *apricot* trees, with fruit nearly ripe and very small, also numerous *fig* trees and *peach* trees, thickly covered with young fruit, but very few *oranges* or *lemons*. On the opposite coast of Fayal, which faces south-east, and has a good depth of mould produced by the decomposed lava-rocks and cinders, the *orange* and *lemon* trees are numerous, while comparatively few *vines* are cultivated, except to form shady walks in the gardens, when trained over trellis work. It is worthy of note, however, that the fruits of this part of Pico (although it is that declivity of the lofty peak, which faces nearly north,) are ripe earlier than those of Horta, which is built, as before stated, on the south east base of a range of fertile hills, and not ten miles distant. Probably the dark lava-rocks and walls of Pico, sparingly covered with vegetation, and thus often heated strongly by the rays of the sun, may be the chief cause of this peculiar result. *Erodium malachoides* and *Heliotropium Europæum* were gathered in small quantity by the road side, in the lower part of the region of vines; and this was the only spot in the Azores where I found these plants.

On attaining some elevation, that is, about a thousand feet above the sea by rude estimate, the *orange* had disappeared; *fig* trees had become more numerous than below; and the *vines* were giving place to *apple* trees, of stunted size, and producing small fruit of little flavour, as I afterwards ascertained, for at this time the fruit was not full grown. *Vineyards* were thus changing into *orchards*, not by any abrupt transition from one to the other, but by the substitution of the *apple*, for the *orange*, *vine*, *fig* and *peach* in succession; while the appearance also of patches of *cocos* or "*yams*" (*Caladium*) and *potatoes*, which were scarcely seen lower down, indicated a transition from orchards to field crops. At first we saw occasional patches of these vegetables, interspersed with the fruit trees. Higher up, indigenous shrubs took the place of planted fruit trees; single bushes or clumps of *Laurus* (*Canariensis* or *Barbasana ?*) *Myrica Faya*, *Myrsine retusa*, *Erica scoparia* and *Juniperus (communis ?)* being left to grow on stony or rocky spots that were unsuitable for the cultivation of the tuber-bearing vegetables just named.

As we passed across the orchard and potato grounds, *Solanum Pseudo-capsicum* was observed rather frequently by the road side, and *Smilax divaricata* (Solander MSS. in Herb. Banks.) was gathered in one locality among the apple trees, but no doubt quite wild there. *Tillæa muscosa* and *Trifolium suffocatum* were collected in the road, and *Asplenium palmatum* very sparingly on the walls by which it was enclosed. A few tufts of *Calluna vulgaris* were seen about the altitude at which *Solanum Pseudo-capsicum* ceased, and a single plant of *Aquilegia vulgaris*, with a white flower, being the only specimen which I found in the islands.

Somewhat higher, the patches of cultivated ground visibly decreased, and the clumps of native shrubs became larger and closer, finally coalescing into a belt of natural wood, consisting of the *Laurus*, *Myrica*, *Myrsine*, *Erica* and *Juniperus* above mentioned. The road now was becoming more damp and less stony or rocky, and narrowed in places to a mere cattle track between rising banks, which were thickly car-

petted with *Tormentilla officinalis*, *Fragaria vesca*, *Prunella vulgaris*, and other small plants of northern Europe. Ferns became plentiful here, including *Pteris arguta*, *Allantodea umbrosa*, *Balantium Culcita*, *Aspidium fœnesecii* and some others. *Luzula elegans* (of Guthnick, not of Lowe) was frequent; and the pink or pale purple colour of its flowers rendered it much more ornamental, than any of our own native species. On shaded banks, where the road became a sort of gulley, I gathered *Bellis Azorica* (Guthnick's collection), *Lysimachia Azorica* (Hornemann), *Erythræa diffusa* (Woods), and *Lycopodium suberectum* (Lowe). The long flowered form of *Vaccinium Maderense* (which is *V. cylindraceum* of Smith) was pretty frequent on the banks by the road side, and highly ornamental. A few plants of *Daphne Laureola* were also observed, and *Hypericum foliosum* (Aiton, which is *H. grandifolium*, Chois.) was rather plentiful, though not yet in flower.

As we continued to ascend, the narrow belt of natural wood, which was formed by the evergreen shrubs interspersed with ferns again became broken into clumps; the intermediate spaces being now covered by a grassy sward, with many small pools of stagnant water, which gave an abode to *Scirpus fluitans*, *Scirpus Savii*, *Carex stellulata*, *Callitriche verna*, *Peplis Portula* and *Potamogeton natans*. Though very small and shallow, these pools are kept supplied with water by the mists and clouds from which this part of the mountain is seldom quite clear. Among the short grass here, I noticed *Bellis Azorica*, *Erythræa diffusa*, *Carex Azorica*, and *Carex sagittifera*, all plentiful. *Fragaria vesca* and *Tormentilla officinalis* (passing into *T. reptans*) were extremely abundant, as, indeed, they are almost every where in the islands above the height of a thousand feet, though scarcely seen in the low grounds near the coasts, except under the shade of rocks.

On getting more completely within the region of clouds and moisture, all the shrubs ceased except *Erica scoparia*, which still grew in scattered patches, and attained a height

of six or eight feet, giving shelter to *Hymenophyllum Tunbrigense* and *Acrostichum squamosum*. *Aspidium fœnesecii* was still plentiful, but most of the other ferns seen lower down were now lost. This clouded region corresponds with the higher part of the hills and Caldeira in Fayal, being at once the region of alpine and of marsh plants; and the lower zone of it being also the most productive of *Ferns*. But the better and more comprehensive designation is that of the *Region of Clouds*; since the absence of cultivation, the green pasturage, and the prevalence of small marsh and boreal plants, interspersed with some of the peculiar alpine productions of the Azores, are all apparently attributable to the clouded condition of the atmosphere.

At length the *Erica scoparia*, that most frequent shrub of the Azores, itself yielded before the cloudy atmosphere, and we crossed a space of the hill quite destitute of shrubs, but covered with a close short herbage, consisting chiefly of *grasses*, *Carices* and *Tormentilla reptans*. Here Captain Vidal remarked that we had already ascended above the limit of the heath. Though I could not dispute the apparent fact, yet I felt convinced we were not truly above the natural limit of heaths, since the fronds of *Pteris aquilina* were conspicuous around us, rising above the very short pasturage. *Calluna vulgaris* had been observed lower down the Peak; and as that heath ascends in Scotland far above the *Pteris aquilina*, I read the appearance of the latter as a fair indication that we were still within the natural limit of heaths, so far as determined by absolute elevation; but the mist was here too dense to allow the sight of any thing beyond a distance of fifty yards. Accordingly in no long time, as we gained increased elevation, and a less clouded atmosphere, (probably between four and five thousand feet of altitude), scattered and very dwarf bushes of *Erica scoparia* again greeted our eyes, interspersed with a few examples of *Daphne Laureola* and tufts of *Aspidium fœnesecii*, together with occasional specimens of *Lycopodium Selago*, whose close and upright branches give it a totally different appearance from

the curved and straggling habit of *L. suberectum* seen lower down the hill.

Higher still, as we ascended above the clouds, and attained an elevation that gave us a full view of the upper part of the Peak, now seen rising into a clear blue sky as anticipated, several other shrubs re-appeared which had been also seen below the region of the clouds; and we soon found ourselves crossing a much drier and more stony portion of the mountain, which was thickly covered with the species of *Erica*, *Juniperus*, *Myrsine* and *Vaccinium*, before mentioned. Apparently, this upper zone of wood had been the growth of a long series of years, although the shrubs were much smaller in their dimensions than those of the same species in the lower wooded zone, just below the region of clouds. *Calluna vulgaris*, and *Menziesia polifolia* (the dwarf variety figured in Loddiges' Botanical Cabinet) were interspersed in a few places between the larger shrubs, over spaces from which the latter had probably been burnt or cut and carried away.

Here we saw a number of women and children, employed in burning this natural cover of shrubs; but I omitted to ask whether their work was done in the expectation of producing pasturage for sheep, or whether there was some other object in view. If the former, I should deem it likely to prove labour thrown away, so bare and stony was the steep acclivity here, and so nearly destitute of water at this season. Whatever might be the object, there must have been much time spent in walking to and from the scene of their labour, the uppermost houses being quite within the limit of the cultivated region, distant by a walk of two or three hours.

It was now about noon, and we halted half an hour in this upper natural zone of shrubs, for the guides to eat their dinner, and for ourselves to make a lunch before commencing our ascent of the remaining and very steep portion of the Peak. Our resting-place was fixed by a small hollow in the rock, which held a gallon or two of water, and which slowly refilled itself as we abstracted the water from it, yet never overflowing. Here we found it advisable to leave our

basket of provisions and sleeping coats, with other heavy articles, not indispensable to the objects of our ascent. Among these, I included my collecting-box, which had become rather weighty, and the contents of which were more likely to be injured by the burning rays of a cloudless sun, than to be increased from the dry and barren rocks still above us.

On again getting into motion, we slowly toiled up the shoulders of the mountain, and soon left below us all shrubs except *Calluna vulgaris*, which, with *Thymus cæspititius*, composed the principal part of the vegetation. Considerable spaces of bare rock, or of loose cinder-like stones, intervened among the portions of surface covered by the prostrate *Calluna*; and as these bare spaces gradually increased in extent and frequency, with the increasing altitude, almost the whole surface at length appeared to be destitute of vegetation. Only two species of flowering plants were observed within or below that region; the one being *Polygala vulgaris*, of which only a single root was seen on the Peak, and none elsewhere in the islands which I visited; the other was a species of *Agrostis*, possibly a form of *A. vulgaris*, afterwards picked just by the summit of the Peak, and nearly parched with drought.

The task of ascending this uppermost portion of the Peak was exceedingly toilsome. In many places the surface was covered by loose pieces of lava, which, when set in motion over each other by our feet, slipped rapidly down the steep declivity, endangering the freedom of our ancles and the integrity of our bones. The dark and bare rocks also were sensibly hot to the hands and feet, even felt through our shoes, under the influence of the mid-day sun, shining in full splendour through a dry and rarified atmosphere. Not a drop of water was found above the place at which we had rested to lunch; and all the portable stores that we had carried higher, consisted of a bottle of cyder and a very small flask of whisky, for we had expected to find water, if not snow, near the summit. We had soon cause enough

to repent this bad management; thirst becoming painfully excessive, under the united influence of heat and great muscular exertion, more especially to the three Englishmen. The natives bore this better than we did, but one of the four guides or porters, who were still ascending with us (two having been left in charge of our baggage at the resting-place), was at length fairly knocked up, and he returned without reaching the summit.

The top of the Peak is a large hollow crater, out of which arises a smaller cone, of two or three hundred feet in altitude, produced by some eruption more recent than that which formed the chief crater itself; and the upper part of this little cone constitutes the pointed summit of the Peak, as seen from the ocean. Before reaching this crater, we lost the *Calluna vulgaris* entirely, but a few tufts of *Thymus cæspititius* were still visible, and continued to be seen even to the summit of the little cone. The crater is now imperfect, the sides having fallen down; but a considerable portion of the walls, too steep for the foot of man, still surround it with black and bare precipices. We crossed the crater, from which all snow and water had vanished, and gained the base of the small cone; and up this cone, nearly as steep as a sugar-loaf, we at last scrambled. I cannot say we walked up it, for hands were almost as serviceable as feet in effecting the ascent.

The summit of the small cone, or extreme summit of the Peak, is again the edge of a crater, there being a basin-like depression within it. Inside this basin, or little crater, the ground was hot and steaming, and at the depth of a few inches below the surface of loose stones, it was too hot to allow of the hand being pressed against it. We remained on the cone two or three hours, and while exposed to the wind, by standing on the edge of the basin, we speedily became so chilled as to tremble with cold, though Fahrenheit's thermometer indicated a temperature of 53°, the only instance in which I saw the thermometer so low during my stay about the islands. On descending into the small crater

deep enough to be screened from the wind which swept over its summit edge, the climate was changed into a pleasant hothouse warmth, by the heat of the ground and the steam which rose from it. Here I felt quite comfortably warm while sitting on the rock without a coat, my own having been transferred as an outside coat to Captain Vidal, whose observations with the theodolite obliged him to stand on the exposed summit. He had made the ascent in a thin and light jacket, which had been exchanged for a coat of woollen cloth, before taking his exposed position; but after the heat and exertion of the ascent, the breeze of the summit would have made a thick cloak welcome, although the sun shone clear and the ground was warm.

On arriving at the summit, we had divided and drunk the bottle of cyder, and found it little enough for six parched tongues, and for lips painful from excessive thirst. But after remaining so long about the summit, the small flask of whisky had become at least equally valuable as another bottle of cyder might have been deemed, could it have been offered to us. The painful thirst, and intense longing for cool or bland drinks, such as cyder or milk, again returned in full intensity as we descended towards the spot at which we had rested for lunch, and near to which our sleeping ground was to be chosen for the night. The dark and steep sides of the hill, where there was so much bare rock, caught the rays of the declining sun, like a wall, as we descended the north-western declivity, and thus kept up the heat till sun-set.

While descending from the summit I felt too much wearied and worn out for botanical observations: indeed, I had scarcely an eye for any thing except spots which appeared in the distance likely to produce water, and for which I was vainly looking around at every downward step. Small channels were occasionally crossed, through which water had been flowing earlier in the season, but now all was dry and parched. Six weeks before, M. Dabney had sent a party of men to the summit, to obtain snow for a sick friend, and they had then procured some; but all trace of snow was

now gone, and we had ample proof of the inaccuracy of those geographical works, which describe the Peak of Pico to be covered with perpetual snow. Snow lies till the month of May under some of the steep rocks that form the large crater, but on this first day of July snow and snow-water were no longer to be seen. The summit of the Peak is 7616 feet above the level of the sea, as afterwards calculated by Captain Vidal from the barometrical observations. The difference of temperature between the base and summit was about 22° of Fahrenheit.

Thymus cæspititius and the *Agrostis* before mentioned were the only phænogamous plants seen on the little cone; and a very few *mosses* and *lichens* were associated with them. I should think the highest tufts of *Calluna vulgaris* were met with at an altitude of about 7000 feet. *Erica scoparia* was the second shrub observed in the descent, and might attain a height of 6000 feet. I should guess the spot at which we halted for the night to have been about 5000 or 5,500 feet in elevation. Here we were in the upper zone of shrubs, including *Vaccinium Maderense*, *Myrsine retusa*, *Menziesia polifolia*, and (if I remember rightly) also the *Juniperus* (*communis?*) and *Daphne Laureola*, along with *Erica scoparia* and *Calluna vulgaris*. Below this place, the *Calluna* was very sparing in quantity. We formed our beds with green bundles of the *Erica*; and having made a good fire with the dead and dry branches of the shrubs, we passed the night more comfortably than the preceding night on the deal boards in Mr. Dabney's house. Pilot-coats and a good fire were by no means unnecessary while we slept under a clear sky after the day's labour. About sunrise we were scarcely two hundred feet above a dense mist, but during the whole night the heavy masses of mist or cloud, which enveloped the middle portion of the mountain, remained constantly below us. The sun rising on the contrary side of the Peak to that on which we had slept, threw the conical shadow of the hill, deep and distinct, over the volumes of white cloud beneath us, and thus told us that it had risen, long before

we could see the luminary itself. We made a rapid descent through the mist, and found the bushes and grass dripping wet until we got below it, when we came into a fair and sunny morning on the lower part of the mountain, and arrived at the house of Mr. Dabney before nine o'clock. The whole ascent and return had thus occupied us for about twenty-eight hours, or excluding the night, and the time spent in the observations with the theodolite, a space of fifteen or sixteen hours. The entire ascent and return might therefore be made in one day; indeed, it was accomplished in a day by two English gentlemen, who ascended on the last day of June.

I regret not being enabled to state the exact heights at which the various species of plants mentioned, commence and cease. I was of course much tied by accompanying a party who ascended for a different object. Captain Vidal wished only to ascertain the absolute height of the Peak, and the relative position of other islands, or other parts of the same island, as seen from the Peak. On this account, I was unable to avail myself of an opportunity, which might, under other circumstances, have been afforded, for ascertaining also the altitudes at which the shrubs and other plants grow, whether indigenous or cultivated. The highest cultivation, that of the potatoe and cocoa, probably did not exceed 2000 feet. Neither, of course, did a rapid ascent and return allow much time for looking about after plants beyond the line of march, without risk of losing the party. It is highly probable that the lower wooded zone would repay a more careful scrutiny, and prove more interesting to a botanical collector than the ascent to the actual summit of the Peak.

On one other occasion I crossed to Pico again for a few hours, and landed at a different part of the coast, to ascend one of the small hills, or volcanic cones, formed by some eruptive burst of cinders and lava near the base of the great mountain. I got thoroughly soaked from head to foot by the heavy rain, which commenced almost as soon as I landed, and almost prevented my botanizing. On this oc-

casion I collected *Corema alba* and *Bartsia Trixago*, both on the cone ascended, and neither of which did I find elsewhere in any of the islands visited; also *Triticum ciliatum* and *Myosotis maritima*, found elsewhere by Guthnick, but only on this part of the coast of Pico by myself. *Rhus Coriaria* was likewise gathered on the volcanic cone, and apparently indigenous there, though other localities in which it was observed, in the islands of Fayal and Flores, were all near houses or gardens, and to which I deemed it to have been introduced by the hand of man.

It may be here observed, that the names which are applied to some of the plants mentioned in these notes, may be disputed by other botanists. The shrub which I have called *Vaccinium Maderense*, is certainly the *V. cylindraceum* of Smith; but I cannot regard it as being specifically distinct from *V. Maderense*, of which, however, it is a very handsome variety, with flowers more numerous, and often twice the size of those in the Madeira specimens. Those botanists who delight in multiplying species on paper, by describing extreme forms, in disregard of intermediate and connecting links, will doubtless keep *V. Maderense* and *V. cylindraceum* distinct. The *Daphne Laureola* of these notes is the same as the plant marked "*Daphne, n. sp.*" on the labels of Mr. Guthnick, and I supposed it a different species when collected; the more spreading branches and shorter leaves inducing a dissimilarity of aspect from the upright shrubs of our hedgerows and coppices; but as I detect no essential distinctions in the dried specimens, the different mode of growth may perhaps be ascribed to the influence of elevation and exposure to violent winds. The *Lysimachia Azorica* (of Hornemann) is possibly a variety of *L. nemorum*, which it closely resembles. The specific character assigned to it in the Botanical Magazine was drawn from plants cultivated in a pot, and is inapplicable to the wild specimens, the stems of which are not erect, and are larger, stronger, and more branched than those of our indigenous *L. nemorum*. Perhaps the best distinction lies in the broader sepals of *L. Azorica*,

which are incorrectly figured in the Botanical Magazine. The *Juniperus* may be only one of the many varieties of *J. communis*. It differs from the form of that species which is indigenous in Britain, by having an almost arborescent growth, the stems attaining three or four feet in circumference, broader leaves not at all subulate: in the latter respect, it approximates to *J. nana* of our mountains. The name of *Bellis Azorica* is taken from Mr. Guthnick's labels; but while the plant closely resembles our *B. perennis*, in its leaves and general habit, the receptacle is almost flat, and is covered by short broad scales; so that the generic character is not that of a *Bellis*. The *Erythræa diffusa* is a proteiform species, but the specimens collected on Pico are readily distinguished from those of our native species, by their prostrate stems, elongated peduncles and perennial root. The plant is common on the hills in all the islands visited, and invariably white-flowered, though the French specimens, on which the species was founded, produce pink flowers. A tendency to the production of white-flowered species and varieties seems a characteristic of the botany of the Azores. The name of *Myosotis maritima* is also taken from the labels of Mr. Guthnick. It is an undescribed species in this country, apparently annual, and nearest our *M. arvensis*, but with much larger and paler flowers than the latter. The *Luzula* of the Azores approaches our *L. maxima* in size and habit, while that of Madeira, described by Lowe under the name of *L. elegans*, more resembles the British *L. pilosa*. Both species differ conspicuously from our indigenous species in the colour of their flowers, which are pale purple. I suppose that Lowe has the priority in the name of his Madeira species. If so, that of the Azores might be named *L. Azorica*.
