

THE BOTANICAL SOCIETY
AND EXCHANGE CLUB
OF THE BRITISH ISLES.

REPORT FOR 1923

(WITH BALANCE SHEET FOR 1922)

BY THE

SECRETARY,

G. CLARIDGE DRUCE, LL.D.

VOL. VII. PART I.

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THE BOTANICAL SOCIETY
AND EXCHANGE CLUB
OF THE BRITISH ISLES.
(VOL. VII. PART I.).

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REPORT FOR 1923.

BY THE

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G. CLARIDGE DRUCE,

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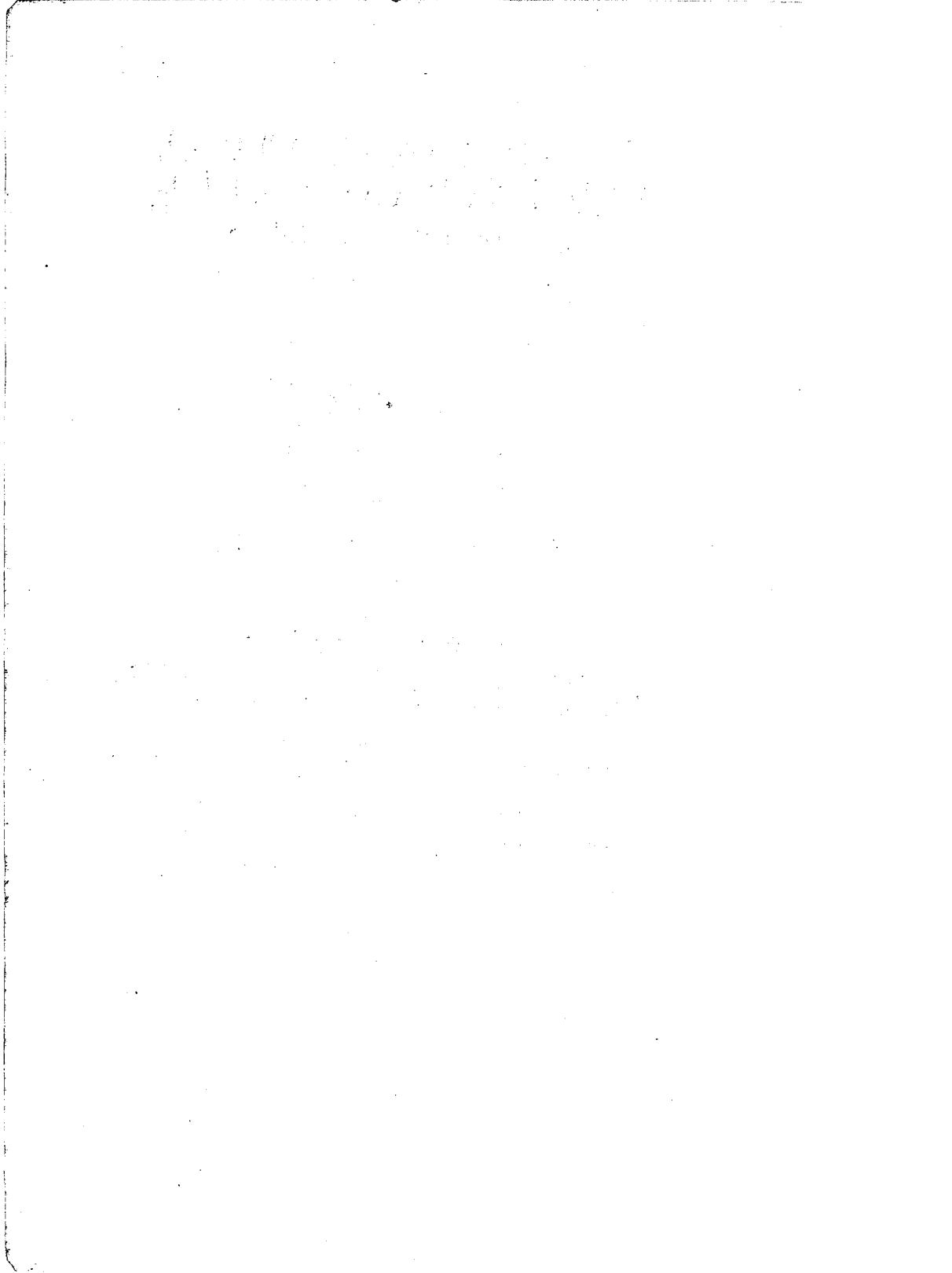
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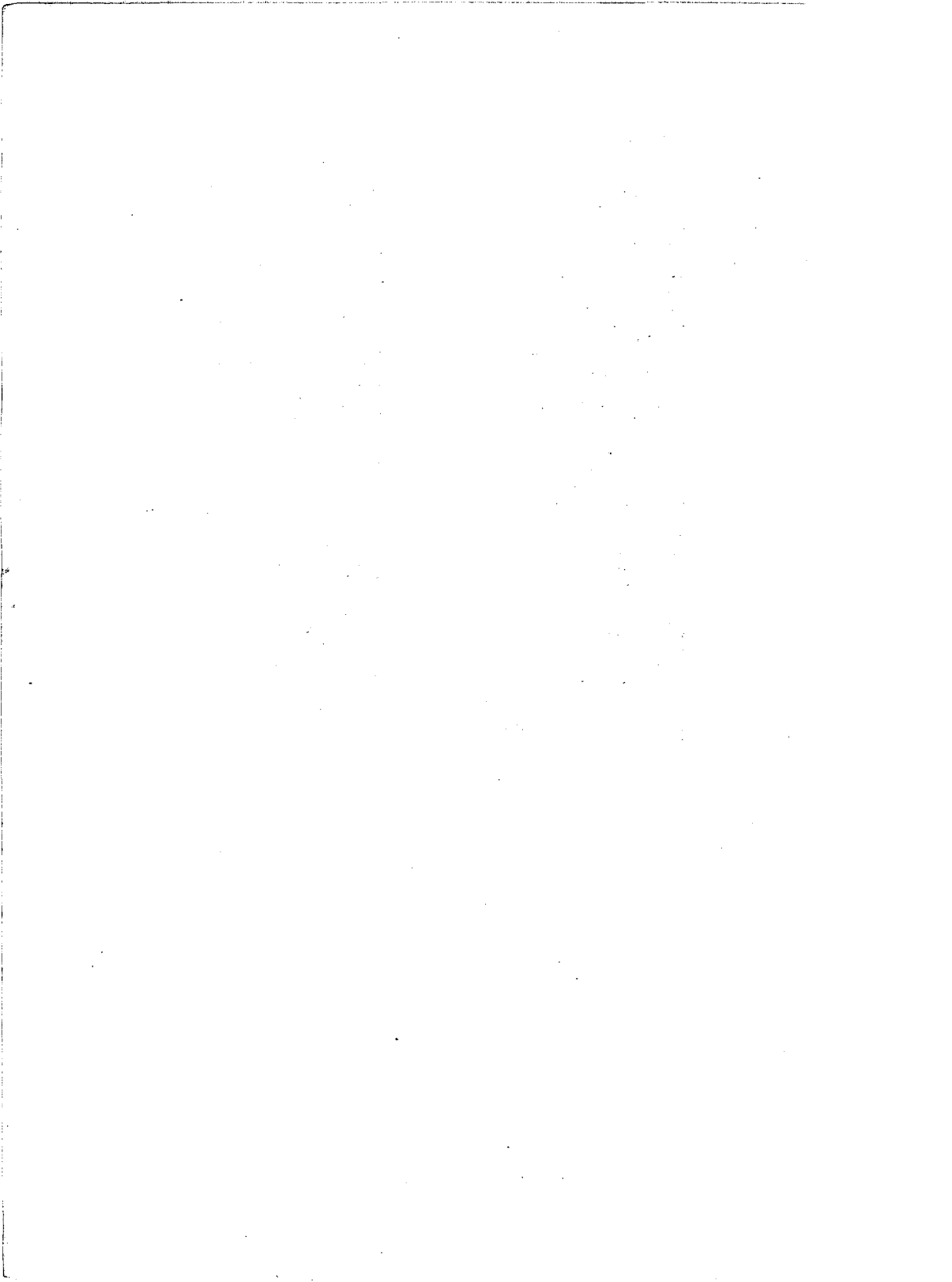
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THE
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THE REPORT OF THE SECRETARY & TREASURER,
 G. CLARIDGE DRUCE, YARDLEY LODGE, OXFORD,
 FOR 1923.

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 New Members, 5/-.

The Exchange Members are very grateful to L. V. Lester-Garland, Esq., for so ably editing the *Report* for 1922, and distributing the 4903 specimens so expeditiously.

The year 1923 was, with the exception of a short spell of abnormally hot weather in July, damp, dreary and dull, and did not encourage outdoor investigation. Flowers were in poor show, with the exception of white-flowered species such as *Galium palustre*, *Radicula Nasturtium*, *Cerastium pumilum*, *Sambucus nigra*, and *Meum Athamanticum*. These blossomed profusely. The hawthorn, which had over-flowered itself in 1922, was conspicuously deficient in blossom, and necessarily in fruit, so that the hedgerows in autumn were singularly lacking in colour. In the Midlands the Marsh Orchids were scarce, but the Fragrant Orchid on the Ivinghoe chalk downs was in unusually magnificent growth. So, too, was the spring-flowered *Gentiana Amarella*. In Scotland, especially in the mountains of Aberdeen, Forfar, and Perth, the heavy snowfall in May led to a great retardation of the flowering season, indeed of the growth of vegetation in general. Never have I seen so little grass on the higher hills in July. In Caenlochan, for instance, in a place where I have seen thousands of *Phleum alpinum*, not a single spike this year showed itself, and the same might be said of *Juncus castaneus* and *Carex atrata*. But the acres of the foamy white flowers of *Meum Athamanticum* and the sheets of the golden glory of *Viola lutea* in the lower straths did something to atone for the flowerless cliffs of the higher hills.

The great botanical event of the year was the discovery of a very small sedge, but a big species, *Carex microglochis*, by Lady Davy and Miss Gertrude Bacon in Glen Lyon, Perthshire—a sedge I had long expected and sought for and had fully hoped to meet with in the Shetlands. This alone would redeem the year, as it is a very distinct species, about the identity and indigenuity of which there can be no question. Mr. A. J. Wilmott records *Myosotis sicula* from Jersey, an interesting extension of the range of a critical plant. Its nearest British ally is *M. cespitosa*, from which it is unquestionably distinct. Scotland is, however, to the fore for Professor Danser has identified a *Rumex* which I gathered some years ago on Lochnagar as *R. arifolius*, a plant which occurs in Sweden and in other places in Europe. It is kept as a distinct

species by Nyman, Lindman, Koch, Reichenbach, Rouy, and other authorities. Its nearest ally is *R. Acetosa*, of which I thought it was a variety, but its entire ochrea, among other characters, differentiates it. The plant grew on a shady cliff at nearly 3000 feet altitude. I hope to visit the station this year in order to obtain a supply of specimens for the Club. Mr Lumb and myself have named two Scottish Eyebrights—one from Glen, Peebles-shire, which Mr Bucknall thought was *E. gracilis*, var. *primaria*, but other botanists have given it various names. It seems sufficiently distinct from any of the plants suggested to be worthy of specific rank. In allusion to its variously coloured flowers we are naming it *variabilis*. The other *Euphrasia* is from the Mainland of Orkney. It does not agree with any of our named plants. It was unknown to Jorgensen, who said it was a new species. We have called it *atroviolacea* in allusion to its very distinct flower colour. With Dr Thellung I have named and described a large flowered, glandular phyllaried form of *Crepis capillaris* as var. *anglica*. A very distinct glabrous variety of *Sisymbrium Thalianum*, which Mr A. Wilson detected at Cautley Crag's in 1922 I have named var. *brevicaule*. Its habit recalls *Erophila verna*. The beautiful hybrid Rose (*mollis*, var. *alba* × *pimpinellifolia*) from Bettyhill, which was discovered by the Rev. E. S. Marshall, is now named *R. Barclayana* in memory of our Rose expert who has recently passed away. It was in beautiful flower in July this year. Mr R. L. Smith, of Cardiff, has added many aliens from Radyr, mostly of the south Italian or French coasts. These grow about 12 miles inland on sand which has been brought from the sea-shore. Their occurrence suggests that the seeds had remained in the sand for some time. On its removal from the coast to fill up some low waste ground the seeds were probably exposed to the air, and have now germinated. With what produce the sand was brought from the Mediterranean coast I have not been able to ascertain. Mr Ware found *Thlaspi alliaceum* in great quantity in arable fields near Wye, Kent. *Benthamia intermedia* (*Amsinckia*), a Californian alien, has been sent from Bedfordshire. It has become a pest in arable fields. Lady Davy sends the pretty *Ornithopus roseus* from near Pyrford, Surrey, where it grew in thousands. Mr Colin Trapnell found what Dr Murr and Kew have named *Senecio erraticus* Bert.

It grew at Lyndhurst. If correct, this will be an addition to the English Flora, as it has only been reported previously by M. Gay in 1832 from Guernsey. *Pyrus communis* is also added to Guernsey by Mr Trapnell. Miss Vachell found *Orchis militaris*, an addition to the Channel Isles, in Jersey, but I want to see the plant in situ, as the leaves of my specimen are in poor condition. Mr H. K. Airy Shaw discovered *Orchis hircina* in E. Norfolk, and Miss Stewart found a colony of it in N. Somerset, both New County Records. It has also re-appeared in Cambridge. Mr D. A. Jones obtained *Salix herbacea* on Cader Idris, a new record for Merioneth. Mr Noel Sandwith discovered just within our county boundary *Carex tomentosa*, a long desired plant for Oxfordshire. *Viola calcarea* has been found by Mr W. A. Sledge in N.-W. Yorkshire. Paul Richards discovered *Cerastium vulgatum*, var. *serpentini* in Bucks. Col. H. H. Johnston has added *Potamogeton rutilus* to the Orkney flora, and I have found *Agropyron campestre* Gren. and Godr. at Chichester Harbour, a new British plant. Prof. Danser has definitely identified as \times *Rumex Weberi* our Sussex "*maximus*." Dr Almqvist has added another Shepherd's Purse to our List—*C. pinnata*.

The year 1923 has not passed without diminishing our ranks. The deaths include those of Mr William Barclay, whose knowledge of the British Roses was very thorough. He had specially studied the Scottish hybrids. His notes bore the mark of thorough work, and his criticisms were sound and well considered, and of the highest value to our Exchange Club Reports. Personally he was a genial and kindly man. It was always a delight to go for a ramble with him, to come to his home to a real Scottish welcome, and have a chat with his good wife and enjoy her genuine hospitality. She only shortly predeceased him. The sad death of the Hon. N. C. Rothschild has left a gap in our membership which it will be impossible to fill. Although his first love was in another domain of science—he was the acknowledged authority upon the Siphonoptera—yet he had a good knowledge of British plants. He had all the known Irises in cultivation, and he was specially interested in British Orchids. He was a most generous helper to our Benevolent Fund. To myself his loss is most severe, as it has robbed me of a tried and genuine friend. The death of the Earl of Plymouth robbed us of

a kindly helper. It was in his ancestor's garden that George Don was once employed. There have also died Mr H. Manfield, M.P. for Northamptonshire, a companion of my early days in that county; Mr N. Temperley, a genial nature-lover from Gateshead; Sir H. C. Hawley, Bart., of Lytchett Maltravers Manor, Herefordshire; Mrs Atherley of Croft Castle; Mr G. E. C. Macenchy, once a worker at the Botany of Buckinghamshire; and Mr R. Kennedy of Belfast, formerly of Guildford. A specially severe loss to British Systematic Botany is that of Mr F. N. Williams, whose chief work is the *Prodromus Floræ Britannicæ*, an unfinished but scholarly publication. He also monographed *Dianthus*, *Silene*, *Arenaria*, and *Sagina*, the latter for our own *Report*. The Rev. W. Wilks, the discoverer of the Shirley Poppy, and the most excellent Secretary of the Royal Horticultural Society, is another loss to the gardening world, which also has been terribly punished by the death of the Rev. H. J. Bidder, the son of the "calculating boy," and the creator of the rockery at St John's College, Oxford.

Sincere congratulations are offered to Canon Headlam on his consecration as Bishop of Gloucester; to Mr Justice J. G. Talbot on his elevation to the judicial bench, and upon his Knighthood; to Prof. A. Henry upon his receiving the Silver Medal conferred by the National Acclimitisation Society of France; to Sir J. Colman on his success at the Horticultural Exhibition at Ghent; to Prof. J. H. Maiden of Sydney on his receiving the Mueller Medal from the Australian Association on the Advancement of Science; and to Miss Watchorn on her exhibition to Cambridge. Mr W. H. Pearsall has retired from scholastic work. May his *horæ subsecivæ* be of the happiest, and enable him to reveal fresh lake-land treasures from its waters. Mr D. Lumb has been appointed to fill Mr Pearsall's place. It is pleasing to know how much Miss Roper's thirteen years' work at the Bristol Museum has been appreciated. She has especially devoted herself to supplying the wild flower section in the Museum with fresh specimens for exhibition. These have been well selected and carefully named. We are glad to see Dr Briquet, the well-known systematist of Geneva, elected one of the Honorary Fellows of the Linnean Society.

For literary help we are specially indebted to Dr S. H. Vines, F.R.S., for translating the German monograph on *Thymus* by Dr

Karl Ronniger, and for other help; to Rev. F. Bennett, M.A., to Mr T. R. Gambier-Parry, M.A., and to Mr R. H. Corstorphine for their onerous task of proof-reading.

We are under a great debt of gratitude to Mr F. Bellamy, Hon. M.A., F.R.A.S., for the immense labour he has spent in indexing the Reports from 1878 to 1923—an enormous task. When will some Maecenas arise who will pay for its publication? I have also made an index for my own use, one, alas, which it is difficult for me, and impossible for anyone else, to decipher.

Our sincerest condolence is offered to the University of Tokyo on the loss of its Library in the earthquake of 1923. Over 200,000 English books were destroyed. Donations to the purchase of works or volumes for presentation will be gladly received. They can be sent, so far as monetary offerings go, to the Tokyo University Library Committee Fund, Westminster Bank, Law Courts Branch, Strand, London, or through the Secretary. Lord Balfour is Chairman of the Committee. Cheques may be ear-marked for certain purchases.

Our foreign experts have been most helpful. We specially thank Dr Albert Thellung of Zurich for his kindly assistance. We greatly regret to hear that he has had a nervous breakdown, but we hope for his speedy restoration to health. We are very grateful to Dr J. Murr, who has again kindly examined our *Chenopods*; to Dr E. Almquist, who has examined the *Shepherd's Purses*; and sent other contributions; to Mr H. Dahlstedt, for diagnosing and describing the *Dandelions*, and to Professor Danser, who has kindly examined the *Docks and Polygonums*. Dr Karl Ronniger has placed us under special obligation by naming the *Thymes*, and writing such an excellent monograph of the British plants of the genus. Professor C. H. Ostenfeld, who has our hearty good wishes on his appointment, has kindly supplied various notes.

Our new members include Mr Baird, Mr C. J. Bond, C.M.G., F.R.C.S.; Prof. G. A. Boulenger, LL.D., D.Sc., F.R.S.; Mrs Brown (1924); Mrs John Buchan (1924); Mrs J. Bulteel, Capt. A. D. Chase, M.C., M.A.; Mrs G. Clutterbuck, Mr C. J. Cooke, Mr R. J. Dix, F.R.C.S.; Darlington & Teesdale Nat. Hist. Society; J. H. Dixon, Mrs Douie Urquhart, H. H. Prince F. Duleep Singh, Prof. R. Ruggles Gates, Mrs Gibbings, H. B. Guppy, F.R.S. (1924); Mrs

Fleming, Prof. F. D. Griffith, Mrs E. M. Macalister Hall, Viscountess Harcourt, Col. H. N. Head, Mrs Hichens, Mr F. E. Howard, Mr R. R. Hutchinson (1924); Rev. J. M. Hugh, Rev. S. Laing, M.A.; Lord Lambourne, Mr J. R. Lee, Rev. Canon Little, Prof. Dr Lotsy (1924); Mrs F. MacKinnon, Manchester University Bot. Department, Mrs Henry Manfield, Mr H. J. Massingham, Mr J. Matthews, Mr R. Melville (1924); Rt. Hon. Sir Alfred Mond, Lady Dorothy Meynell (1924); Lord Moreton, Rev. D. P. Murray (1924); Mrs Newman, Mr Miller Christy, Major R. Orme, Mr J. A. Rose, M.A.; Baron Lionel de Rothschild, Mrs C. N. Rothschild (1924); Mr Norman Ritchie (1924); Miss Ryle, Viscountess St Cyres, Mr H. S. Salt, Mrs Sanderson-Furness, Mrs Scholberg, Mr W. A. Sledge (1924); Mr Colin Trapnell, Miss Trower, Lady Margaret Watney (1924); Mrs Hugh Willan (1924); Mr E. B. Wilkinson, and Dr J. Stirling Young.

My own field work of 1923 in Britain, though it covered all the British counties save Rutland, Lincoln and Hereford, was not very successful. In March I went to Penzance in order to see *Hermodyctylus* in flower. This, under the guidance of Mr Thurston, was duly accomplished in superb weather on one of the fine days of the year. The plant was growing freely with *Narcissus major* and *Galanthus*, and doubtless, although now quite naturalised, owes its origin to an old garden probably over a century ago. We visited the beautiful garden of the Rev. Boscawen, where a scarlet passion flower in blossom was climbing up the house, and where the pride of New South Wales, the Waratah, was in fine bloom. The garden was a mass of colour, and feared no rival even in Cannes or Mentone. It was difficult to believe we were in England. On the Tuesday I saw the *Romulea* in blossom at Dawlish. In early April I went to Gower in order to search for it where Mr Cookson gathered it last year, but was unsuccessful. *Potentilla verna*, *Lithospermum purpureo-caeruleum*, *Helleborus foetidus*, *Scilla verna* and *Viola rupestris* gladdened the eye. Two days we occupied in this vain search. Then we went on to Fishguard where we saw an alien Composite quite naturalised on the Fish rocks near the station. From that very comfortable hotel St David's was visited and then Haverford West and Tenby. Near the latter place we gathered *Carex riparia*, *Hyacinthus hispanicus* (alien), *Allium triquetrum* (naturalised) and

Brassica oleracea in profusion. We then went to Cardiff where Miss Vachell kindly took us to Llandaff and Radyr, where Mr R. L. Smith has found so many southern aliens. At Bristol, despite the road-alterations at St. Vincent's Rocks, *Arabis scabra* still remains. In May some of the members of our Society, including the Hon. Mrs Adeane, the Hon. Mrs Guy Baring, Sir Roger Curtis, the Secretary, Miss Floyd, Mr Foggitt, the Hon. Mrs Leith, Mrs and Miss Newman, Mrs O'Callaghan, Lady Victoria and Miss Russell, Mr N. O. Simpson, Miss Trower, Miss Vachell, and Mr and Mrs Williamson, made an expedition to Jersey, of which Miss Vachell has contributed an account. Mr T. Attenborough joined us on our arrival. The visit gave unqualified pleasure to those who attended. Most of the rare plants of the Island were seen, and one feels certain without damage being done to any of the rarities, as most of the members were contented with painting them. Miss Vachell, who stayed one day later than the rest of the party, added *Orchis militaris* to the Island flora, and the Secretary found *Sonchus oleraceus* crossed with *asper*, a rare British hybrid. The splendour of the Thrift and *Silene maritima* at Plemont was remarkable, and the delicate colouring of *Matthiola sinuata* was greatly admired. *Poa bulbosa* was over, but specimens were seen in Lady Davy's locality.

In early June the Dunstable downs were again visited. They afforded a great show of *Gentiana praecox* in such quantity as to give a colouring to a dry grass hollow. Here, too, occurred *Orchis O'Kellyi* and the large flowered *Cerastium vulgatum* which was discovered by Paul Richards. Later on, with Mrs Wedgwood, the wonderful expanse of colour given by *Anthemis tinctoria* on the railway bank near Hanslope in Bucks was observed. Here it is associated with two central European Hawkweeds, *Hieracium praecaltum* and *H. stoloniflorum*. Then with Misses Trower the Chippenham Fen was visited. There was no *Liparis* but plenty of typical *Orchis praetermissa* and *O. incarnata*, var. *ochroleuca* Boll. Near Six Mile Bottom *Euphorbia virgata* was seen. Wilbarrow Hill, which is in both Herts and Beds, was visited to see *Carum Bulbocastanum* in fine flower. *Phleum Phleoides* was in great quantity.

In July Scotland was visited, where I enjoyed the hospitality of the Earl and Countess of Airlie at Cortachy Castle. Through

their kindness I was able to visit the glens of Caenlochen and Clova in company with Mr and Mrs Williamson and Mr C. W. James, but, as I have elsewhere said, the season was too backward, scarcely a single Hieracium showing itself. *Woodsia alpina* was, however, noticed. Near the Castle *Peucedanum Ostruthium* and *Taraxacum naevosum* were added to the Forfar flora. In Glen Dole and Glen Fee the vegetation was equally retarded, but *Oxytropis* was in fine flower.

The Artillery was in possession of the Sands of Barry so we were disappointed at missing *Corallorrhiza*, but we visited Rescobie and Restennet and saw the curious narrow-leaved form of *Cerastium arvense*, *Salix pentandra*, *Lysimachia thrysiiflora*, *Cicuta* and other rare plants. From Forfar Mr Williamson took me in his motor by Dunkeld, where there were sheets of *Melampyrum pratense*, var. *hians*, Killiecrankie, Blair Athol, Kingussie and Boat of Garten, where *Equisetum hyemale* and *Drosera obovata* still grow, Carr Bridge (next week visited by that cloud burst which did so much destruction) and Inverness to Dingwall—not a bad day's work. Then on to Bonarbridge and Golspie. Between these places we found a new locality for *Moneses uniflora*. It grew in thousands and was known to the village lads as Cowslips. From Golspie we went to Berriedale, Latheron and Thurso—another good day. From Thurso we explored Scrabster and Holburn Head gathering *Hieracium orarium*, var. *fulvum*, *H. iricum*, *Primula scotica*, *Ligusticum scoticum*, *Euphrasia foulaensis*, *E. latifolia*, &c. Then we went north-eastwards to see *Saussurea* growing within a few feet of the sea level. Then the banks of the Thurso river were searched and *Carex aquatilis* in various forms was seen, while the stream here and there showed *Potamogeton nitens* in variety. The rosettes of *Ajuga pyramidalis* were observed and there was plenty of *Ribes alpinum* in the hedgerows. Another day was spent in visiting Dunnet links where *Juncus balticus* abounds. *Primula scotica* and *Viola Pesneavi* also occur. Then to John O' Groats where *Carum Carvi* is plentiful, also *Pneumaria maritima*, but the trippers have taken too heavy a toll of the latter. In a ditch by the roadside grew the Magellan *Senecio Smithii* which I saw there five years ago, and on the way to Wick *Heracleum villosum* is naturalised. By the Wick river we gathered, in heavy rain, *Carex salina* and *C.*

aquatilis, and in the Wick meadows in the grass I got fine specimens of *Viola lepidota*. Then we explored Scarmolett where we gathered *Deyeuzia stricta* and *Orchis praetermissa*, var. *pulchella* in splendid show and also some hybrids.

The following day we went on by Reay, Melvich and Bettyhill. This is surely one of the most flowery places in the British Isles. On July 11th *Oxytropis sericea* was in full blossom and its tufts of rosy-purple flowers were a great attraction. Then there were sheets of large-flowered *Euphrasia brevipila*, bushes of *Rosa villosa* and *tomentosa* in great variety, large-flowered, but small plants of *Vicia sepium*, *Hieracium caledonicum*, *H. protractum*, &c., and across the river Naver a hillside, covered with blown sand up to 300 feet, was occupied by masses of *Dryas octopetala*. Here I once found the hybrid *Ajuga pyramidalis* × *reptans*. In cultivated ground grew splendid *Rhinanthus major* with *Lamium mollucellifolium*. *Draba incana* was on the walls of the village and *Saxifraga oppositifolia* on rocks only a little above sea-level. In the damp sands of the Naver grew *Carex incurva*.

The next day we motored from Bettyhill by Loch Naver to Altnaharra when a long search afforded *Carex chordorrhiza*, this year in very small quantity, *Castalia alba*, var. *occidentalis*, *Carex limosa*, *Drosera obovata* and *Melampyrum pratense*, var. *alpestre*. Then we motored through grand scenery and through a country the botany of which still remains for a great part unknown, to Erriboll and round the shores of that wonderful loch to Durness where the limestone comes to the surface and *Dryas* is the common plant. We explored the Cave of Smoo and found several Hawkweeds there, including *H. rubicundum*, var. *Boswellii* and *H. britannicum*. We reached Rhiconich rather late and found the Hotel filled with fishers who are almost as dull and self-centred as golfers. The next day we had to go from the west to the east coast and back, since the Scourie Ferry was not working. Our road, therefore, took us by Loch More and Loch Shin to Lairg and Invershin and then back by Oykeil Bridge where *Hieracium stictophyllum* was plentiful to Inchnadamph. Here the pasture by the stream was literally full of *Habenaria bifolia*, plenty of *H. albida* and *Orchis praetermissa*. *Dryas* was on the rocks with *Carex rupestris*. From here we climbed Ben Garve where there was plenty of *Arctostaphylos alpina*,

and a few specimens of *Hieracium alpinum* and other alpinæ. *Utricularia ochroleuca* was near the stream. Only a very few plants of *Arenaria norvegica* showed themselves. It is to be hoped that botanists will not eradicate this little gem. On the 16th we motored from Inchnadamph to Ledbeg and Cnochan. There we saw a small pasture one mass of *Trollius*. *Orchis incarnata*, *O. praetermissa* and its var. *pulchella* and their hybrids were in great show. On the rocks, indeed on a wall by the road, lurked *Carex rupestris*. Quantities of the Holly fern grew among the stones. *Thalictrum alpinum* and fine *Hieracium anglicum*, var. *longibracteatum* were on the cliffs. Thence through magnificent scenery we journeyed to Ullapool. What a series of mountains between Inchnadamph and the latter place—Quinag, Canisp, Suilven, An Stack, Stack Polly, Coulmore, Coulbeg and Ben More of Coigach, most of which I have climbed but the flora of which is relatively unknown. Surely on the last will be found *Arabis alpina*. Then from Ullapool we went by Braemore, now dismantled of its fine trees, but where *Polygonum sachalinense* and *cuspidatum* have gone wild, over the dreary Diriemore to Garve, Dingwall, Beauly, Inverness, Nairn to Grantown, a big day, but we were not too tired for an after-dinner stroll through the pine woods where *Melampyrum pratense*, var. *hians* makes a bright show, as in the pastures do *Orchis praetermissa* and var. *pulchella*. On the 17th we motored from Grantown to Kirkmichael, then to Tomintoul by the Conglas Water, over the pass above 2000 feet altitude, descending to the valley of the Don at Cargill near which place *Senecio Smithii* is established, then by a picturesque route to Aboyne. In a small loch we saw some immense tussocks standing well above the water of a sedge which could be only *cespitosa*, *elata* or a form of *Goodenowii*. It was too far in to reach or even identify but eventually our resourceful chauffeur, Watson, put on his indiarubbers and waded in and obtained specimens. It proved to be *C. Goodenowii*, var. *strictiformis*. Several trees of *Populus laurifolius* were noticed on the way, and *Erica cinerea* was in brave show. We stayed at Ballater to lunch and saw *Lupinus* in great beauty on the shingle of the Dee. Then on to Braemar where we saw *Galeopsis speciosa* in plenty, and a plant or two of its hybrid with *Tetrahit*. The next day we motored from Braemar to Aberdeen, thence by Stonehaven, St Cyrus and

Montrose to Arbroath when I had to return to England for some meetings and thus missed being with Mr Williamson and the other botanists when Glen Lyon yielded *Carex microglochis*. Of this expedition Mr W. D. Miller gives an account.

At the end of July Swanage was visited. We got *Calamagrostis canescens* near the *Erica ciliaris* station, and obtained good plants of the hybrid *ciliaris* × *Tetralix* in flower. On Corfe Castle, or rather on the roadside near, we found the *Satureia* which I had noticed there many years ago. It is distributed through the Club this year. Mr Van de Weyer kindly motored us to the Chesil Beach where we found a fine fig tree. Some years ago he had also found one there but it was not the ordinary form. Studland was visited, and so was Ridge, but there was no *Scorzonera* visible. *Cotoneaster Simonsii* grew in a hedge far away from houses. In early August I paid a visit to Sir Roger Curtis at Lichfield and we visited Chartley Castle, Hoar Cross, where there was beautiful *Ranunculus Lingua*, and Wigginton, where the true *Populus nigra* grows and *Acer platanoides* is planted. Gailey Reservoir was explored. This too, had *R. Lingua*, and *Salix daphnoides*. Aquilate, Copnor and Eccleshall were visited, also Dudley Castle on the very top of which grew *Senecio squalidus*. On Wren's Nest, where there is an outcrop of limestone, we added *Bromus erectus* to the Stafford flora and there was fine *Hieracium sciaphilum*. On the tips at Tipton, Wallsall, etc., *Senecio squalidus* has become thoroughly established and brightens that dismal district.

Next I determined to gather *Carex microglochis* so went up to Perth where Mr Corstorphine kindly met me and we motored to Kenmore. There was a little misunderstanding about the actual locality where the sedge was found. We knew it grew near *Carex atrofusca*, so our first visit was to the remotely situated Ben Heasgarnich at the head of Glen Lyon but we spent the day in vain. Then another corrie was explored which seemed to answer the description but this also proved a failure. Meanwhile I had made further enquiries and on Saturday my friend, Mr D. Haggart, came up and a large party of us, including Mrs Douie Urquhart, Dr and Mrs Fleming, and Mr L. Fleming, the Rev. W. M. Gillies, Mr Corstorphine, Mr T. Churchill and myself started for the Yellow

Corrie where at 2500 feet we found this newly discovered Sedge but a little over-ripe. It was tracked up the sides of the corrie to about 3000 feet. For an account of its plant associates see note under *C. microglochin*. Near Garve Castle *Avena strigosa*, sub-sp. *glabrescens* was plentiful and we saw *Polygonatum verticillatum* in fruit and the rose-flowered form of *Silene Cucubalus* by Loch Tay. *Hieracium pulmonarioides* Vill. was in flower at Kenmore as a garden escape. *Ribes alpinum* is common there. My next visit was to Naworth Castle, the romantic home of the Earl and Countess of Carlisle, where the Rt. Hon. H. F. Baker joined us. In the picturesque dell beneath the Castle grew *Petasites nivea*, and *Lonicera Xylosteum* was naturalised on the slopes. We also went to Askerton Castle, the residence of the Hon. F. R. Henley, but the season was too late for flowers. Mr Williamson then motored me to Silloth where we saw *Potentilla intermedia*, *Melilotus arvensis*, *Salvia nemorosa* and other aliens. Then we went to Seascale when Dr Hellon pointed out *Gentiana baltica*, and where we saw *Geranium lancastriense*. Dr Hellon also showed me a curious form of *Plantago* which awaits further study. We motored by the Vale of Lorton, where *Rosa hibernica* was plentiful but barren and where *R. mollis*, var. *Grenieri* occurred, to Keswick, on the way seeing the home of *Lychnis alpina* and gathering *Asplenium septentrionale*. At Seascale *Fumaria Bastardi* was found.

In October a short visit to the Rev. J. Freshfield enabled me to see *Taraxacum naevosum* at Hursley, in Hampshire, and to hear of *Draba muralis* as a garden weed in the Nursery at Winchester. My last visit was to Westonbirt for the glories of the autumn colouring.

PLANT NOTES, ETC., FOR 1923.

(*Mostly New Plants to the British Isles or Notes on British Species
inserted here for Convenience of Reference.*)

ABBREVIATIONS.—† before a name signifies the plant is not native;
× = a hybrid; ± more or less; † after a locality, that the
Secretary has seen the plant there; [] that the plant is not British
or the record is doubtful; *Ann. Bot.* = *Annals of Botany*; *Bot.*
Abstr. = *Botanical Abstracts*; *Gard. Chron.* = *Gardeners' Chronicle*;
Ir. Nat. = *Irish Naturalist*; *Journ. Bot.* = *Journal of Botany*; *Nat.*
= *The Naturalist*.

22. RANUNCULUS ACRIS L., var., sub-var. or forma MINUTIFLORUS Druce. (*Rep. B.E.C.* 469, 1916). A plant coming under the name is sent by Mr J. Parkin from Brayton, Cumberland. He says "It is fairly common this year, the flowers are undersized, and the stamens have been arrested in their development. The plant is functionally female only. As a rule all the flowers on a single plant are affected the same way. Here and there I have noticed plants with flowers somewhat intermediate. *i.e.* stamens only partly arrested, but generally the difference between the ordinary form and this depauperate one is very marked. The plants of the latter can be quite tall and robust looking and there does not seem any difference in the vegetative features. They look like setting seed." JOHN PARKIN, *in litt.*

47. R. FICARIA L. L'Etude Expérimentale sur la Tubérisation et la Stérilité de la Ficaire, R. DOSTAL in *Preslia* 32, 1923. He finds that the fertile flowers have larger corollas (36 mm.) than the sterile (24 mm. only) and that the sterile are darker in tint. En résumé—la stérilité de la Ficaire est un phénomène corrélatif, mais d'une tout autre nature que l'on suppose d'ordinaire.

Var. FLORE PLENO. Near Welbeck, Notts, R.W. GOULDING. A pretty form which is of rare occurrence in Britain. I saw it as a pot plant on the table of a relative of the Mikado at Tokyo.

48. *CALTHA PALUSTRIS* L. A form with more rounded sepals is sent from Aldbourne, Wilts, by Miss TODD.

72. *BERBERIS VULGARIS* L. Much has been written about the danger there is of allowing this plant to grow in agricultural areas. The U.S. Dept. of Agriculture has issued Circ. n. 269 showing how its eradication prevented Black Rust in Western Europe. It is suggested that the best method of eradication is by means of common salt. Ten pounds placed on the crown will kill an ordinary bush. Weed-killer, consisting of arsenite of soda, is also effectual. It is said that English farmers practically eradicated it from the Midland counties 200 years ago. It is now certainly very local there. Every English plant pathologist believes that the destruction of the Barberry has solved the black-stem rust problem whereas in Wales, especially Pembroke, Cardigan and Carmarthen, where there is still much Barberry, there is a greater number of outbreaks of rust, as is given in detail from W. H. Broadbent's valuable researches. Denmark, Sweden and Norway have prevented rust by destroying Barberry. But in Southern Italy and especially in Greece where *Berberis cretica*, even at 3000 feet elevation, grows plentifully there is much disease in the corn from this cause, even wild grasses being rotten from it. An instance is cited which shows that a great outbreak of rust started from one Barberry bush. The spores travelled in one direction for five miles. The total wheat area infected was 963 acres and the amount of wheat sank from 21 bushels to 8 bushels. The combined money loss was over 1200 dollars. In Minnesota the spores were carried over ten miles. In the Farmers' Bulletin, n. 1058, 1923, the Department have issued directions for destroying this pretty but dangerous shrub. The loss from the Rust in 1916 in the States is estimated at 200,000,000 dollars, almost as much as that country receives from Britain for her war debt. The Japanese *B. Thunbergii* is harmless, not so the American *B. Aquifolium*. A list of other rust-carriers is appended.

80. *PAPAVER RHOEAS* L. Mr WILKS gives this account of his production of the Shirley Poppy. "In 1860 I noticed in a waste

corner of my garden, abutting on the fields, a patch of the common wild Poppy, one solitary flower of which had a very narrow white edging to the petals. This one flower I marked and saved the seed of it alone. Next year, out of perhaps 200 plants, I had four or five of which all the flowers were white-edged. The best of these were marked and the seed saved, and so on for several years, the flowers all the while getting a larger infusion of white to tone down the red until they arrived at quite a pale pink, and I obtained one plant that was absolutely pure white in the petals. I then set myself the task to change the black central portion of the flowers, the anthers, stigmatic surface and pollen from black to yellow or white and succeeded at last in obtaining a strain with petals varying from the brightest scarlet to pure white, with all shades of pink between, and all possible varieties of flakes and edged flowers, and having golden or white stamens, anthers, stigmatic surface, and pollen, and a white base to each petal." *Gard. Chron.* 149, 1-23.

80. P. RHOEAS L., var. HOFFMANNIANUM. Under the name *Papaver sylvestris*, in *Gard. Chron.* 148, 1923, there is an excellent figure which Mr Savage has reproduced from one of the beautiful paintings made by Jacques Le Moyne de Morgues about the year 1576. This shows the scarlet petal having a black blotch at the base, the upper margin of the blotch having a fimbriate edge of pure white. The size of the painting is $10\frac{3}{4}$ in. by $7\frac{1}{2}$ in. The beautiful set of water-colour paintings is in the Victoria and Albert Museum. This var. was common at Frilford, Berks; near Blisworth, Northants, and Stone, Bucks, this year, G. C. DRUCE.

Var. AEGADICUM (Fedde). Witney, Oxon, G. C. DRUCE.

Var. OMPHALOPHORUM (Fedde). Headington, Oxon, G. C. DRUCE.

Var. SUBCAUDATIFOLIUM (Fedde), forma RUFO-NIGRESCENTE. This has the long, nearly simple, terminal leaf-lobe of the type var., but is clothed with reddish-black hairs. Frilford, Berks, G. C. DRUCE.

Var. IMMACULATUM Kuntze. A common form at Princes Risborough, Bucks, G. C. DRUCE.

120 (2). MATTHIOLA OXYCERAS DC. Syst. ii., 173. Alien, Damascus, Syria; between Aleppo and Mosul; Persia. Hayle,

Cornwall, 1922, Miss TODD; Sleaford, Lincoln, 1922, Miss LANDON. Characterised by caule erecto ramoso glanduloso, foliis velutinis sinuato-repandis superioribus integris siliquis teretibus subvelutinis glandulosisque tricuspидatis, cuspidibus lateralibus subreflexis. Near to *M. lividus* and recalls *M. tristis* in its flowers.

167. COCHLEARIA. Miss M. B. CRANE and Miss A. E. GAIRDNER in *Journ. Genetics* xiii., n. 2. These workers find that *C. officinalis* and *C. alpina* have 28 chromosomes, *C. danica* 42, and *C. anglica* 49-50, all the numbers thus being multiples of 7. They have also made crosses between the various species. The range of variation in the F₂ offspring is in some cases greater than the combined ranges of the parents. The specimens of *anglica* were obtained from Hayling Island, and the offspring proved fairly constant. The Blakeney *anglica*, where *officinalis* also occurred, is very variable, due, as the authors suggest, to crossing with *officinalis*. This natural hybrid was recorded in *Rep. B.E.C.* 186, 1915 (published in April 1916), having been found by Mr T. A. Briggs (see *Rep. B.E.C.* 9, 1872-4), and named by me $\times C. Briggsii$. Subsequently I found that this hybrid had been named *C. hollandica* in December 1915 by Th. Henrard, and this is the name it should bear. Miss Crane and Miss Gairdner could not succeed in crossing *C. danica* with *anglica*, but the hybrid *officinalis* and *danica* has been freely obtained. Professor Udney Yule sent plants from Cornwall of *danica* which showed some interesting modifications—(1) similar to the Hayling plant; (2) with the upper surface of the leaves concave; (3) a form with smaller leaves and more prostrate growth. Natural seeds taken from these three forms gave very uniform offspring. It may be remembered that Mr Beeby had a natural cross in his garden of *officinalis* and *micacea* (see *Rep. B.E.C.* 510, 1896). He there suggested that *C. alpina* might be found to cross with *C. officinalis*. The authors of this important paper give descriptions of the three species, and the results of their experimental crossings. It is to be hoped that further researches will be made with *C. alpina*, *C. groenlandica*, and especially *C. micacea*, in order to discover if the last be a true species and not a form educed by its habitat, and to see if *alpina* \times will account for the variability of the mountain forms.

192. SISYMBRIUM THALIANUM Gay, var. BREVICAULE mihi.

Stenophragma Thalianum Celak., var. *brevicaule* mihi. Native. Found by our valued member, Mr A. WILSON, on Cautley Crag, Sedbergh, Yorkshire, at an elevation of about 2000 feet, growing in a rocky ravine of Upper Silurian rocks (Coniston Grit) in July 1922 (see *Rep. B.E.C.* 826, 1922). Mr Wilson kindly sent me specimens which led me to think it a distinct variety. He obtained seeds which he grew in his garden at Sedbergh, and sent me fresh flowering and fruiting specimens in July 1923. They had remained practically unchanged in cultivation. The elevation at which it grew was above any previous English record, but it has been found at 2500 feet in Perthshire, and 8000 feet on the Sierra Nevada. Description: Plant short, with the habit of *Erophila verna*, glabrescent; stems very short ($\frac{1}{2}$ inch), wiry, flexuous, bearing about 10 flowers; leaves in a dense rosette, sharply but remotely denticulate, glabrous; pods slender, nearly terete, glabrous, on short ($\frac{1}{4}$ inch) pedicels, the lower ones much overtopping the upper.

193 (2). *S. MULTIFIDUM* (Pursh) Macmillan. Alien, N. America. Bristol, W. Gloster, 1922, GAMBIE-PARRY.

226 (2). *DIPLOTAXIS CATHOLICA* DC. Syst. ii., 632, 1821. Alien, Spain and Portugal. Bristol, W. Gloster, 1922, NOEL SANDWICH. Det. Dr THELLUNG. Characterised by "siliquis sessilibus erectiusculis; stylo subtereti, 1-2 spermo; foliis pinnatipartitis, lobis dissectis laciniis linearibus sinuato-dentatis. = *Sisymbrium catholicum* L. Mant. 93. It differs from *tenuifolia* in the compressed beak containing one or two seeds, whereas *tenuifolia* is seedless. In Spain it occurs in dry sandy places, by waysides, on walls, and in cultivated ground.

232. *BURSA PASTORIS* Weber. *B. PINNATA* (At.). Ballater, S. Aberdeen, 1923, G. C. DRUCE; near Christchurch, S. Hants, J. RAYNER. Det. Dr ALMQUIST.

250 (2). *THLASPI ALLIACEUM* L. Alien, Spain, France, Italy, Istria, Illyria, Croatia, Serbia, &c. A clear green, biennial plant from 1-2 feet high, differing from *arvense* in its elliptic, convex fruits, and in the stem being hairy at the base. The plant has a strong oniony odour, which it communicates to the milk of cattle

feeding on it. See paper in *Journ. Min. Agric.* xxx., Sept. 1923, with figure of the plant and seeds, by W. M. WARE, B.Sc., and J. E. CHAMBERS. Hothfield and Ashford, Kent, in great abundance. It is a vigorous seeder, averaging 8 seeds to a fruit, and an average number of 767 fruits to the plant. Vide fruiting specimens kindly given by W. M. WARE and a younger one sent by Miss COBBE.

253. *IBERIS ODORATA* L. Alien, Greece. Bristol, W. Gloster, 1922, Mrs SANDWITH. Det. Dr THELLUNG, who says it occurs at Eleusis in Greece. Near to *I. pinnata*, but characterised—"Herbacea glabra, foliis linearibus, dentatis basi ciliatis apice dilatatis, siliculis subrotundis, emarginature lobis acutis patulis stylo brevioribus," DC. Syst. Veg. ii., 400, 1821. De Candolle cites it from Creta, and Nyman from Eleusis, Attica, ex Heldr. *Herb. Norm.* 774. The number 774 in Heldr. *Herb. Norm.* is cited, however, by Halacsy (*Consp. Fl. Gr.* i., 106) for *I. acutiloba* Bert. Misc. 227, t. 9, f. 1 = *I. odorata* Boiss. Diagn. i., 75, scarcely of L., "cujus species in alpebus Allobrogicis, id est in Delphinatu et Sabaudia crescit." Bauhin, on whom De Candolle relied, cited it from Crete whence it has not been collected recently. Rouy & Foucaud and Archangeli (*Flora Italiana*) give no reference to either plant. Perhaps it will be safer to name it *Iberis acutiloba* Bert. until its identity with the Linnean species is clearly proved.

298. *VIOLA ODORATA* L., var. *IMMACULATA* E. S. Greg. in *Journ. Bot.* 82, 1923. Maidencombe, S. Devon, Miss C. L. PECK. It differs from *V. dumetorum* Jord. in its early and prolonged flowering, in its tall, erect growth, in its long vigorous stolons, and in the pure whiteness of the flower. The stipules are more distinctly herbaceous than in *dumetorum*.

302 (2). *V. EPIPSILA* Greg., and ? Ledeb. Under *V. palustris* L. Mrs Gregory (*Brit. Violets* 29) says it is scentless. Major Bates van de Weyer tells me that the Burghfield *epipsila* has a strong pansy fragrance, and that, too, is the case with Portuguese plants. Perhaps the latter may be the *V. Juressi* K. Wein, with which Mr A. J. Wilmott identifies our British *epipsila*. The Wigton *V. palustris* was without odour, and its veins were less branched than in the Berks *epipsila*.

303. *V. TRICOLOR* L. Studies on the Collective Species. Dansk. Bot. Tidskr. 363-416, J. CLAUSEN.

305. *V. NANA* Lam., Précisions sur la. E. L. GERBAULT in *Bull. Bot. de Fr.* 455, 1923.

305. *V. KITAIBELIANA* Roem. & Schultes *Veg. Syst.* v., 383. W. C. BARTON affirms that the type as well as the var. *nana* DC. occur in Jersey. These larger specimens are what *nana* grew to in my garden. Probably *nana* is only a dunal form. *Kitaibeliana* must be very close to *V. Olonensis* Genev. Mem. Soc. Acad. Angers v., 8, which Rouy & Foucaud (*Fl. Fr.* iii., 49) say differs from *nana* —“ Plante plus robuste, à tiges plus élevées et à pédoncules moins divariqués.” Rouy & Foucaud describe this as a sub-var. *major*. They also place *derelecta* Jord. under *Kitaibeliana*.

360. *LYCHNIS DIOICA* L. Miss K. B. Blackburn of the Botanical Department, Armstrong College, says (*Nature* 688, 1923) that Strasburger found that both sexes possessed twelve pairs of chromosomes in the somatic cells. In the heterotype division he found one pair of bivalents much larger than the others, but the individual members of this pair were of equal size. Miss Blackburn finds that in *L. alba* there are also 24 somatic chromosomes, of which two are larger than the rest. In the female plant, at the reduction division, these two appear similar; thus the daughter nuclei are alike. In the male, however, the two larger chromosomes differ from one another in size and shape. “ Since *L. alba* is so closely related to *L. dioica*, in which Shull has demonstrated sex-linked characters with the male heterozygous for sex, it seems more than probable that we have here a definite case of an XY pair of chromosomes in the male with a corresponding XX in the female. This is the first definite record of sex chromosomes in a Dicotyledon.” Miss Blackburn promises a full account of this and other species of *Lychnis* and their hybrids at an early date, and her results cannot fail to be of value.

360. *L. DIOICA* L., An Apocarpic Plant of. R. SNOW in *New Phyt.* 156, 1923.

371. *CERASTIUM VISCOSUM* L., forma nova MACROPETALUM.

Petals exceeding the sepals by 2 mm. or more. Abbots Leigh, Somerset, 1923, Mrs WEDGWOOD; Swanbourne, Bucks, 1899; Fins-town, Orkney, 1920, G. C. DRUCE.

Forma ROTUNDATA mihi. Leaves very blunt, 10 mm. x 6.50 mm.; 15 mm. x 10 mm.; 20 mm. x 14 mm. Bembridge, Isle of Wight; Burnham Beeches, Bucks, 1898; Oxford, G. C. DRUCE.

Var. ELONGATUM Druce in Camb. Brit. Fl. 51. Differs from the type not only in its laxer but in its elongated inflorescence and longer pedicels. Lerwick, Shetland, G. C. DRUCE.

Forma INTERRUPTUM. Inflorescence elongated, sublateral, with flower clusters interruptedly arranged along the stem. Vale, Guernsey, 1923, TRAFFORD.

374. *C. TETRANDRUM* Curt., var. *EGLANDULOSUM* Salmon in *Journ. Bot.* 90, 1923. Mr Salmon describes this variety, which he has seen from Cornwall, S. Devon, Isle of Wight, Caithness, Shetland, Orkney, and Cork, for plants which have non-glandular hairs. Rouy and Foucaud (*Fl. Fr.* iii., 215) wrongly, I think, make *C. tetrandrum* subordinate to *C. pumilum*, the super-species being described as "velue-glutineuse." The subordinate *tetrandrum* is laconically diagnosed "plante irrégulièrement dichotome; bractées toutes herbacées, poilues même au sommet," and under this a var. *glabrum* R. & F., which is glabrous and has shorter petals and pedicels. One wonders whether this or *eglandulosum* would bear the test of culture. The locality given as Point of Sataford in Shetland is perhaps meant for Saxaford.

396. *ARENARIA VERNA* L. Mr CLARENCE ELLIOT (*Gard. Chron.* 183, 1923) recommends this lead-loving species for the rock garden where it does quite well in the absence of lead, with which it is so often associated in its native habitats in Britain.

419. *CLAYTONIA PERFOLIATA* L. Much correspondence has gone on in the *Gard. Chron.* in 1923 as to the use of this North American species as a winter salad. Mr J. S. Gamble (*l.c.* 212) cordially recommends it, and he also uses Lamb's Lettuce, Endive and *Camparula Rapunculus*. The last mentioned has a double advantage since the young shoots are a good salad and the mature

inflorescence is a pretty table decoration. The fleshy root is also edible.

474. GERANIUM SANGUINEUM L., var. or forma DECUMBENS mihi. *G. sanguineum* L., var. *prostratum* Syme in part, non *G. prostratum* Cav. which is *lancastricense*. *G. sanguineum*, var. *prostratum* (Cav.) Br. Pl. List. Not uncommon on the British coasts from Carnarvon northwards. It is not a windswept form for it keeps its decumbent growth if removed from its native home. Cultural tests are, however, necessary to see if it comes true from seed. It is different from the dwarf form of *sanguineum* which occurs in stony places. It grew with *lancastricense* at Seascale, Cumberland, and it occurs between Llandudno and Deganwy, etc. Here the branches lie flat on the sand but they do not root at the nodes.

526. ACER CAMPESTRE L. Schneider (Laubholzkunde ii., 230, 1907) describes var. *trilobum*, leaves three lobed, fruits pubescent; var. *lobatum*, leaves with 5 obtuse, toothed lobes, fruits pubescent; var. *acutilobum*, leaves with five acute, nearly entire, lobes, fruit pubescent; var. *pseudomarsicum*, leaves with three lobes, fruits glabrous and var. *austrica*, leaves with acute, nearly entire, lobes, fruit glabrous. See Elwes & Henry *Trees* iii., 652.

532 (2). GENISTA HISPANICA L. Alien, South Europe. Hortal. Found as a solitary plant about six inches high, apparently self-sown, on Eartham Down, W. Sussex, about five miles from Chichester, May 1923, Miss BEATRICE FARLEY. A native of Portugal, Spain, Southern France and Liguria, it was introduced into Britain in 1759. It is remarkable on account of its heterophyllous foliage, the lower leaves being narrow and spinous, the upper lanceolate, villous and unarmed.

564. MEDICAGO SATIVA L. How to grow Alfalfa. U.S. Dept. of Agriculture, Farmers' Bulletin, n. 1283, 1923. It states that alfalfa probably originated in south-western Asia although wild forms, from which it might have sprung, are found in China and Siberia. The name is of Arabic origin and is translated to mean the best fodder. In America the name is replacing 'lucerne,' the

origin of which is not clear. It is supposed to be a corruption of the old Catalan name 'lusedras' whence comes the common name 'laouzerdo' used in the south of France. From this 'lucerne' has been derived. The name of the Swiss Canton has nothing to do with the plant. Alfalfa was supposed to have been first cultivated in Persia and brought by the Persians when they invaded Greece in B.C. 490 to provide forage for the horses and cattle. It was apparently introduced into Italy in the first century and into Spain by the Moors in the eighth century. The Spaniards took it in with them to South America and Mexico in the sixteenth century and doubtless to California and the south-west during their first expeditions. It was not until 1850, when Alfalfa was taken from Chile to San Francisco, that its rapid extension under irrigation commenced in the West. Now it is one of the most important forage-crops in the United States exceeding any other perennial crop except timothy alone or timothy mixed with red clover. The acreage devoted to it has practically doubled every ten years since 1899. In 1919 eighteen and three-quarter million tons of hay were produced. The varieties cultivated are regional strains of Common Grimm, Turkestan and Peruvian. Grimm Alfalfa was brought from Germany in 1857 by Wendelin Grimm. It is a hybrid of *M. sativa* with the yellow flowered *M. Falcata*. It has a valuable hardiness, in part derived from *Falcata* and in part to the natural selection that has taken place under the severe climatic conditions to which it has been subjected since its introduction into the States. Another hybrid, the Cossack Alfalfa, with variegated flowers, is also grown. Most valuable and detailed advice as to its cultivation is given in this practical Bulletin.

573. *M. LITORALIS* Rohde, var. *INERMIS* Moris. Det. A. THELLUNG. Alien, Western France, S. Europe. Barry, Glamorgan [n. 68], 1922, R. L. SMITH. Differs from the type "Légumes inermes ou légèrement tuberculeux aux bords."

643 (6). *DORYONIUM RECTUM* (L.) Ser. *Bonjeana recta* Reichb. Alien, Portugal, Spain, South Europe. A pretty plant, sometimes a yard high, with the small flowers aggregated into a compact head, the wings and standard pale rose and the keel blackish-purple.

The smaller leaves and longer, narrower pods, distinguish it from *D. hirsutum*. Barry, Glamorgan [114], R. L. SMITH.

643 (7). *D. HERBACEUM* Vill. Alien, Central Europe, Turkey and Asia Minor. The flowers-heads consist of about 15-20 flowers which are pale blue, not touched with black at the tip, as in its ally, *D. suffruticosum*. Barry, Glamorgan, [103], R. L. SMITH.

645 (2). *LOTUS CRETICUS* L. Alien, S. Europe, Spain, Portugal, Malta, Syria and North Africa. Near to *L. edulis* but perennial and with a longer, cylindric, narrower pod and unequal calyx-teeth. Barry, Glamorgan [105], R. L. SMITH.

681 (2). *VICIA BENGHALENSIS* L. History and Seed Production of Purple Vetch. U.S. Dept. of Agriculture, Circular 256. 1923. The first Purple Vetch seed was received by the Bureau of Plant Industry, U.S. Dept. of Agriculture, from Naples, Italy in 1899, numbered 4244, and in December of that year seeds of *V. benghalensis* n. 3954 and in November of the next n. 5576 were received. Seeds of the last were used in Berkeley, California and Tucson, Arizona. The yield was found to be good and the demand for seed became very great. To show how wonderful has been the result of this experiment it may be said that in 1921 about 1,000,000 pounds were produced in north-western California alone, 125,000 pounds being also grown in Western Oregon. A figure of the plant with seed-pods is given.

725. *LATHYRUS NISSOLIA* L., var. *GRAMINEUS* Beck. Fl. Nied.-Oesterr. ii., 1, 882 with pods glabrous or somewhat rough. Walton-on-Thames, Lower Morden, Surrey. Is not this the usual form of the British plant? No examples of var. *pubescens* Beck. with pubescent pods have come under observation. C. E. BRITTON.

950. *ROSA SPINOSISSIMA* L. × *MOLLIS*, var. *ALBA* = × *R. BARCLAYANA* mihi. This beautiful hybrid was found at Bettyhill, W. Sutherland, some years ago by the Rev. E. S. Marshall (*Journ. Bot.* 167, 1887) and placed by him under *Rosa Sabini*. I am glad to say that it is still abundant and occurs in an isolated mass near the River Naver on sandy soil. The stems are strongly aciculate, the

fruits are those of *mollis*, the flowers are pure white, and the leaves are hairy and very beautifully biserrate. *R. mollis*, var. *alba* occurs in the neighbourhood. I have connected the name with that of our lamented member and Rose specialist who did so much to unravel the difficulties connected with these hybrids of *mollis* and *tomentosa*. G. C. DRUCE.

953. PYRUS MALUS L., var. *vel lusus abortiva* mihi. Sent by Mr J. H. STEPHEN from Horsham. The inflorescence shows a very hairy calyx tube, but the petals are absent, and some of the filaments are anther-less yet, Mr Stephen says, the tree usually produces a fair crop of apples.

967. CRATAEGUS OXYACANTHOIDES Thuill., var. *CUNEATIFORMIS* mihi. Stokenchurch, Oxon [AA 254]. Differs from the type in its long, narrow, very cuneate leaves, which are long lobed only at or near the apex. G. C. DRUCE.

973 (2). AMELANCHIER ALNIFOLIA Nuttall in Journ. Soc. Phil. ii., 22, 1834. *A. florida* Lindm. Bot. Reg. t. 1559. *Aronia alnifolia* Nutt. Gen. i., 306, 1818. Alien, N. America. Hortal. In a wood near Midhurst, Sussex, June 21, 1923, A. WEBSTER.

973 (3). *A. LAEVIS* Wieg. Shad Bush, N. America. Alien, N. America, in cool ravines of the Northern States and Canada ascending to 5,500 feet. Hortal. A planted, ornamental tree up to 40 feet high found by Mrs THOMPSON in the middle of a very rough bit of heath between Elvetham and Minley in N. Hants, June 1923. It is the *A. canadensis* of many authors, in part, not of L. from which it differs in having, when young, less tomentose leaves, in flowering slightly later, that is when the leaves are nearly half grown, in having glabrous not tomentose racemes, in the fruit being succulent and sweet not dry and tasteless, and in the leaves being less acuminate. See Sargent's *Trees of N. America* 394. Mrs Thompson says there are two trees about the size of a large hawthorn on the heath about 40 yards apart, looking quite wild. The leaves colour very beautifully in the autumn.

1027. DROSERA LONGIFOLIA (as INTERMEDIA) and D. ANGLICA, forma PUMILA Kihlm. CARL G. AHN in *Bot. Not.* 99.

1073 (2). *CIRCAEA INTERMEDIA* Ehrh. If this be kept as a distinct species, its earlier name, according to Fernald in *Rhodora* xix., 85-8, 1917, and Schinz & Thellung in *Viert. Gesell. Nat. Zurich* 297, 1921, is *Circaea canadensis* Hill Veg. Syst. x., 21, 1765 with which they say it is identical. By many botanists *intermedia* is considered to be a hybrid, but *canadensis* occurs in the absence of one of the alleged parents.

1080 (2). *ERYNGIUM PLANUM* L. Alien, Eastern Europe. Hortal. Det., with some doubt owing to the specimen lacking the lower leaves, by Dr THELLUNG. Known in cultivation since the time of Gerard. The flower is figured in Nicholson's *Dict.* iii., 530.

1099 (2). *APIUM LEPTOPHYLLUM* (Pers.) F. v. Muell. T. A. SPRAGUE in *Journ. Bot.* 129, 1923 gives a good history of the species, showing that it is of American origin as given in the *Adventive Flora of Tweedside*. It was first recorded as occurring in Britain at Galashiels in *Rep. B.E.C.* 324, 1913. This is not cited by Mr Sprague. It was determined by Dr Thellung and exhibited by Miss Hayward, its discoverer, at the Linnean Society in 1914, as *Apium Ammi*, a name used by Urban. It is very remarkable that an American species should so early reach Italy since there is a specimen, Penzig says, in Cibo's Herbarium, which was probably collected before 1540. This Herbarium also has the Maize and Prickly Pear. A lengthy and interesting enumeration of its distribution is given, but England may be added since Miss Cobbe found it at Bedminster and Hull, and Mr Robinson at Watton, Norfolk (*Rep. B.E.C.* 381, 1918; 125, 1920 and 728, 1922). Its source of origin at Galashiels was doubtless Argentine or Bolivian wool, at Bristol it may have come from the West Indies with fruit, but Mr Sprague says that it may come with ship's ballast or guano. We hope this will not be the last of such useful notes even on "rubbish-heap" plants.

1119. *CHAEROPHYLLUM TEMULUM* L., nov. var. or sub-var. *CHRYSEUM*. Differs from the type, which is described in all floras as white flowered, in having the flowers of a *Pastinaca* colour. It does not appear to differ in leaf, stem or hairs, which are as in the normal plant. *Chryseum* must be of very rare occurrence. I found

it first near Northcourt, Abingdon, Berks in 1898 as a solitary plant, but the ditch in which it grew was cleared out and subsequent visits failed to reveal it for a second time. It is so distinct in appearance as to suggest a different species. This year Dr PEGLER has kindly given me a specimen of the same variety which he found on June 7, 1923, at Drewsteighton, Dartmoor, Devon, to which I give the name *chryseum*. G. C. DRUCE.

1153. *HERACLEUM VILLOSUM* Fisch. is excellently illustrated in the *Gardeners' Chronicle* 52, 1923 under the name *H. giganteum*.

1229. *DIPSACUS SYLVESTRIS* L. The Common Teasel as a Carnivorous Plant. MILLER CHRISTY in *Journ. Bot.* 33, 1923. A very readable paper in which the writer states his belief that the liquor in the teasel cups definitely attracts and stupifies insects and other visitors, and that the plant derives actual benefit from the absorption of the resulting highly nitrogenous liquor which the cups contain.

1248. *BELLIS PERENNIS* L., The Caulescence of. C.C. LACAITA in *Journ. Bot.* 99, 1923 shows, inter alia, that the variety or species *hybrida* is not of hybrid origin but is a caulescent state depending upon external conditions. The name may therefore disappear from our *List*.

1258. *ASTER TRIPOLIUM* L. An interesting observation is given by Prof. J. Massart in his recent work on the Botany of Belgium, namely, that in the flooded area *Aster Tripolium*, var. *discoidea* is the prevailing form, but as the marsh dries a fringe of the typical blue-flowered form appears on the more fertile less saline soil.

1286. *PULICARIA ULIGINOSA* Hoffmg. & Link = *P. ARABICA* (L.) Cass., var. *HISPANICA* Boiss. Alien, Lusitania, Greece, Egypt, Crete, Arabia. Cardiff Docks, Glamorgan, G. C. DRUCE. Det. Dr THELLUNG. Allied to *P. prostrata* but much more divaricately branched, often prostrate; leaves cordate, amplexicaul, smaller and narrower; peduncles longer and more thickened; bracts small; ligules broader and more spreading.

1286 (20). BUPHTHALMUM SPECIOSUM (Schreber Dec. 11, t. 6, 1766) ?nov. comb. *B. cordifolium* W. & K. Pl. Rar. Hung. ii., 117, 1805. *Telekia speciosa* Baumg. Enum. Pl. Trans. iii., 149, 1816. Alien, Europe. Hort. Glasgow, 1922, R. GRIERSON. This was previously found near Beaulieu, at Lovat Bridge, Easternness, by the Rev. J. ROFFEY. See *Rep. B.E.C.* 15, 1914.

1295. XANTHIUM SPINOSUM L. Mr W. B. TURRILL tells us that fruits of this species have been discovered in prehistoric deposits near the village of Bogorow, 15 km. east of Sofia. The fruits had been collected in considerable quantity and stored as if for use as food or fodder. The deposits are of neolithic age. This discovery proves that *Xanthium* is of European and not of American origin. Following Thellung (*Fl. Adv. Montpel.*) I said in *Adv. Fl. Tweedside* it was "probably of American origin" but intimated that Godron thought it was originally from Northern Africa.

1295 (3). X. ECHINATUM Murr in Comm. Hort. Gott. vi., 32, 1783-4. Det. Dr THELLUNG. Alien, N. America. Cardiff Docks, Glamorgan, G. C. DRUCE. In the *Index Kewensis* it is put under *X. canadense*.

1325 (2). ANACYCLUS PROSTRATUS Pomel Nouv. Mat. Fl. Alg. 53. *Anacyclus valentinus* L., var. *prostratus* (Pomel). Det. as sub-species *A. prostratus* (Pomel) in Vierteljahrsschrift Naturl. Ges. Zurich, lxiv., 806, 1919 by Dr THELLUNG. Alien, Algeria. Bristol, Gloster, N. SANDWITH.

1325 (3). A. DISSIMILIS Pomel, l.c. *A. valentinus*, sub-sp. *dissimilis* (Pomel) Thell., l.c. 805. Det. Dr THELLUNG. Alien, Algeria. Bristol, Gloster, N. SANDWITH.

1344 (2). ANTHEMIS PEREGRINA L. Alien, Italy, Greece, Asia Minor. Cardiff, Glamorgan, G. C. DRUCE.

1353. CHRYSANTHEMUM LEUCANTHEMUM L., var. LACINIATUM Vis. = var. PINNATIFIDUM Lec. et Lam. Cat. 227, 1847. *C. incisum* Bertol. Native. Dry stony field, Charlbury, Oxon, July 1923 [AA. 252]. This, under Rouy's key, is described as *Leucanthemum*

vulgare, var. *lacinosum* (Arv.-Touv. as a sp., 1871) having the basal leaves pinnatifid or sub-pinnatifid, the stem leaves incise-dentate or sub-pinnatifid, the divisions dentate or pinnatifid, spreading, the calathides, flower-heads, large and borne on long peduncles, the phyllaries broad, brown, with scarious border, the outer narrow-lanceolate, pointed. Bertolini's *incisum* is described (*Arch. Fl. Ital.* 675) as having the lower leaves pinnatifid (pennatofesse) with incise-dentate divisions. Visiani's description in *Flora Dalmatica* ii., 86, 1847 runs "foliis caulinis omnibus oblongis pinnatifido-laciniato acutis achenii radiis papposis."

1393. *SENECIO AQUATICUS* × *JACOBAEA* Druce. This hybrid, discovered by Mr W. H. Beeby in Shetland (Herb. South London Bot. Institute), was published by me in *Rep. B.E.C.* 17, 1914, with the suggestion that to it may belong the *S. aquaticus*, var. *dubius* Druce *Fl. Berks* 294, 1897 which differs from *aquaticus* in the achenes being slightly hairy and in the hairs not being confined to the shallow ridges. Prof. Ostenfeld kindly sends the following note:— "When I was staying at Elstead, Surrey, in the summer of 1920 I observed that when *Jacobaea* and *aquaticus* were growing together in a wet place, a river bank of the River Wey, at a farm called Somerset Farm, a number of intermediates were present. I have no doubt that we have here the hybrid *S. aquaticus* × *Jacobaea* of which I have not any previous record. The time of flowering, and the degree of partition of the leaves were intermediate between the supposed parents. The achenes were faintly hairy as in *aquaticus*, not densely hairy as in *Jacobaea*, and the involucreal leaves—of which the photos give three series—were intermediate." The situation in which it grew is similar to that where I gathered the var. *dubius* in the meadows near Wytham and in the Kennet meadows at Southcote. To this I believe belong plants which grew near Bodorgan in Anglesey. In *Rep. B.E.C.* 290, 1915 this form is reported by the Hon. Mrs Ivo Fiennes from near Hambleton, and there I said it might prove to be this hybrid. In all these cases both species grew together. Prof. C. H. Ostenfeld's note gives a much greater definiteness to the record of the hybrid which we may now claim with some degree of sureness as a British plant.

1393 (2). *S. ERRATICUS* Bertol. *Amoen. Ital.* 92. *S. Jacobaea*,

var. *erraticus* Beck. Fl. Nied.-Oesterr. 1222. *S. barbaraeifolius* Krock. (but the binomial is not satisfactorily established, testibus Rouy & Camus). *S. aquaticus* Sm. & Sibth. Prod. Fl. Gr. ii., 178. Sub-sp. *S. aquaticus*, race *erraticus* Rouy & Camus Fl. Fr. viii., 336. *S. divergens* F. Schultz Arch. 10, 1872. See *Rep. B.E.C.* 35, 1917 where there is an account of its being recorded for Guernsey by Gay in 1832. This September Mr C. Trapnell sent me some plants which he gathered near Lyndhurst, S. Hants, growing with *S. aquaticus* and *Jacobaea* which reminded me of this plant. I submitted specimens to Dr Murr and to Kew each of whom named it *S. barbaraeifolius* Krock. The plant is very critical as we have to deal with the var. *pinnatifidus* of *aquaticus* and the hybrid of *Jacobaea* and *aquaticus*. Brébisson says it differs from *aquaticus* in its stronger and less hairy stem; its larger number of slender, open and divaricate branches; in the terminal segment of the leaves being broad, ovate and rounded at the apex, in its smaller flower-heads and in the leaves being of a more sombre green. The Abbé Coste (*Fl. Fr.* ii., 300) gives the contrasting features. *S. aquaticus*—Rameaux du corymbe étalés-dressés; lobes latéraux des feuilles caulinaires obliques. *S. erraticus*—Rameaux du corymbe étalés divariqués; lobes latéraux des feuilles caulinaires écartés de l'axe à angle droit. In the floral characters the Hampshire specimens agree with the description but the stem-leaves are not well shown in my specimens so I prefer to wait, before accepting the name, till I have seen the plant growing. The achenes are nearly glabrous, but there are a few hair-like processes on the ridges when seen under a one-inch objective. I should not be surprised to find it of hybrid origin. It may be remembered that Babington in the early addition of his *Manual* had a var. *major* of *S. aquaticus* which he queried as *erraticus* but, in later editions, he withdrew the varietal name and the suggestion.

1426. *CIRSIIUM ERIOPHORUM* Scop., sub-sp. *BRITANNICUM* Petrak in *Bibliotheca Botanica*, heft 78, Stuttgart, 1912. This, although it was reviewed in *Rep. B.E.C.* 361, 1913, has evidently escaped the notice of some of our English botanists, since our *Reports* have no general index. Cf. Thompson in *Rep. Wats. B.E.C.* 1922-3 where it is said that the Monograph is not yet published. It may be that

Petrak contemplates a new edition, but in the one referred to he deals very critically with *C. eriophorum* which he splits into 7 sub-species, our English plant being described under a doubly unfortunate name *britannicum* which he diagnoses "capitula ovata raro ovata globosa mediocria vel magna. Involucri parce arachnoidei foliola abrupte sub spinula in ligulam parvam ovatam vel ovate rotundate dilatata," as already given in these pages. *Britannicum*, as a trivial, is doubly unfortunate since, strictly speaking, our plant is English, not British. It is true Petrak (*l.c.*) cites Scotland for it but the authority in Lightfoot's *Flora Scotica* is erroneous being taken from Sibbald who said it was found "by the seaside between Blackness and Queensferry." Indeed Lightfoot himself queries it. If it were ever found there it could only be as an alien, but it is probable that the hairy form of *lanceolatus*, which does occur there, was mistaken for it. Petrak cites for his *britannicum* the plate in "Sowerby (sic) Syme *Eng. Bot.* v., t. delxxxvii." The details of the 'hüllschuppen' in his monograph are drawn from a Huntingdon specimen. He gives "locis apricis, lapidosis, siccis, elatioribus Britannicae et Scotiae" as its habitat, which is not correct as it is not an upland species. Even in Yorkshire its limit is given at 300 feet. The name is unfortunate for a second reason. There is already a *Cirsium britannicum* Scop. which Williams used, but wrongly, in the sense of the Meadow Thistle. The earliest trivial for that species is, as I have shown (*Rep. B.E.C.* 417, 1916), *pratense*, taken from Hudson's *Flora Anglica* 353, 1778. *Cirsium britannicum* Scop. was so named by him not, as Williams (*Prod.* 49, 1898) says, in the *Iter Gorizense*, but in the *Iter Tirolense* in *Ann. ii. Hist. Nat.* 60, 1769. A reference to that rare work will show that Scopoli had in mind not the Meadow but the Melancholy Thistle, the proper name of which is *heterophyllum* as it had already been established as *Cirsium heterophyllum* by Hill in *Hort. Kew.* 64, 1768, so that *C. britannicum* Scop. sinks in synonymy under *heterophyllum*. The grade of the English *eriophorum*, which Petrak suggests should be a sub-species, offers a difficulty to those of us who have not admitted such a half-way house. The *Cambridge British Flora*, while admitting sub-vars and sub-forms, does not admit sub-species, so one has to degrade them to varieties or raise them to specific rank. Much may be said for either course, but the extra

expense involved by having a sub-species grade almost prohibits admitting them to a List.

1468. *CENTAUREA ASPERA* L., var. *SUBINERMIS* DC. Prod. 6, 600. "Invol. spinis nullis aut minimis vix divergentibus," reduced by Rouy to the rank of sub-var. and described in the following terms:—"Epines des folioles médianes réduites à 3-5 spinules très grêles et courtes, peu inégales, dressées-appliquées." A specimen of *C. aspera* in Herb. South London Bot. Institute, collected by F. Townsend in Guernsey in 1851, agrees perfectly with the description quoted.

Var. *ANGUSTATA* Rouy Fl. Fr. ix., 172. "Feuilles caulinares moyennes et supérieures ± largement linéaires incisées ou dentées, quelquefois les supérieures entières; calathides ordt. plus petites et plus allongées que dans a et b; péricline d'abord oblong-conique, ovoïde à la maturité." Two specimens, also in the South London Bot. Institute, collected by E. M. Holmes in Jersey, August 1873, appear by reason of the very narrow foliage and elongated periclinal lines to be this variety. To the same is also to be referred a specimen in Herb. Brit. Mus. collected by H. Watson at Vazon Bay, Guernsey, August 1852. C. E. BRITTON.

1497. *CREPIS CAPILLARIS* (L.) Wallr., var. *ANGLICA* Druce and Thellung. *C. virens* L., var. *agrestis* auct. ang. p.p., non W. & K. *C. capillaris* var. *glandulosa* Druce, nomen Rep. B.E.C. 611, 1922. Excellit capitulis majusculis, nigricantibus, et pedunculis pilis nigris elongatis glanduliferis ± abundanter vestitis; indumentum griseum subnullum. Vera *C. agrestis* W. & K. ex descr. (See Rep. B.E.C. 574, 1916), differt involucri phyllis tomentosis et ad carinam setigeris (nec tamen glandulosis). *C. virens*, sub-sp. *agrestis* Rouy (excl. syn. W. & K.) differt involucri pilis longis plerisque eglandulosis, dum in nostra planta omnes glanduliferi sint. In Rep. B.E.C. 611, 1922, it was named var. *glandulosa*, but without a Latin diagnosis, and the name is withdrawn since there are other forms of *capillaris* which are also glandular. The var. *anglica* has been mistaken for *nicaeensis*, but in *anglica* the receptacle has not the "profunde favosum fovearum marginibus elevatis fimbriato-ciliatis" which, inter alia, characterises *nicaeensis*. Var. *anglica* is a widely distributed plant in Britain from Orkney south-

wards. I have it from Wolvercote, Oxon; Ufton, Warwick; Castlethorpe, Bucks; Roade, Northants; Ware, Herts; Tubney, Berks; Uxbridge, Middlesex; Twinstead, Essex; and Lichfield, Staffs. Dr Thellung has also named, *in litt.* May 1923, a plant as forma *griseola*. "Differt a typo varietatis involucro minus nigricante, indumento griseo copiosiore," which I gathered at Lichfield, Staffs, in 1921.

1497. *C. CAPILLARIS* (L.). Wallr., forma *GLANDULOSA* Thellung. Tall, robust plants from Hayling Island [Z 540], July 1922, have been so named by Dr Thellung. It is a not infrequent British form, and has also been mistaken for the var. *agrestis* W. & K.

1638 (21). *ANDRYALA TENUIFOLIA* Tineo. Det. by Dr THELLUNG as *A. integrifolia*, sub-sp. *tenuifolia* Thell. in Viert. Nat. Ges. Zurich lxiv., 813, 1919. Alien, Medit. austr. Radyr, Glamorgan [n. 7], R. L. SMITH.

1645. *TARAXACUM DEVIANS* Dahlst. Links of Boardhouse, Birsay, Orkney, in shell pasture, H. H. JOHNSTON in *Trans. Bot. Soc. Edin.* 105, 1921-2.

1646. *T. PALUDOSUM* Schrank, var. *LEIOCARPUM* (DC. under *palustre*). Hailey, Oxon [Y. 105], G. C. DRUCE, teste DAHLSTEDT.

1646. *T. BELLULUM* Dahlst. Native. Sweyn Holm, Orkney, H. H. JOHNSTON in *Trans. Bot. Soc. Edin.* 179, 1922-23. It occurs also in Norway.

1657. *SONCHUS ASPER* × *OLERACEUS* = × *S. PIQUETII* mihi. This hybrid is evidently of rare occurrence, although Sir Joseph Hooker said that in New Zealand such intermediates occurred. It is also given from Weimar in Germany by Dr Focke. Mr A. Bennett reported this hybrid from Dumbarton, gathered by L. Watt, in *Scot. Nat.* 268, 1890. In 1917 I found some specimens, growing with both the assumed parents, in rich garden soil at Lord Glenconner's at Wilsford Manor, Wilts. This year, in Jersey, in a Tomato garden near Rozel, two or three plants occurred with both *asper* and *oleraceus*. These have been submitted to Dr Murr, and he agrees that they have this parentage. He remarks

" achenia leviter transverse rugulosa, planta crassa, rigida, folia subnitentia, obscure viridia sed auriculis acutis ut in *S. oleraceo*." The plants are very striking in appearance owing to their conspicuous auricles. Many of the achenes are sterile. I have connected it with the name of J. Piquet, the well-known Jersey botanist.

1663 (2). TRAGOPOGON HYBRIDUS L. *Geropogon glaber* L. *T. Geropogon* Rouy. *T. glaber* Ball, non L., teste Rouy. Transcaucasia, Mesopotamia, N. Africa, Canaries. Alien, Europe mediterranean. Bristol, NOEL SANDWICH. A pretty plant with rose-violet flowers. Det. Dr THELLUNG.

1686. VACCINIUM VITIS-IDAEA L., var. OVATUM. J. HENRIKSSON in *Bot. Not.* 464, 1923. This has ovate berries.

1693 (2). ERICA STRICTA Donn ex Willd. Sp. Pl. ii., 366 = E. CORSICA DC. Alien, South Europe, Spain, Corsica, Sardinia, S. Italy. Sallagh Braes, Antrim; Donnhill, Co. Derry, R. L. PRAEGER in *Ir. Nat.*, 32, 1923. Planted or wind-blown.

1710. PYROLA SECUNDA L. For notes on this see H. Andres in Fedde Rep. Spec. Nov. Regni Veg. 21, 1923. Stud. zur Spec. Syst. der Pirolaceae. Rev. der Gattung Ramischia Opiz. Under this name Opiz separated *P. secunda*, etc., from the genus *Pyrola*, and Andres has named (*l.c.*) three vars:—*elatior* (J. Lange), Mexico; *pumila* (Paine), America, and *dispensiflora* (Neum.), Greenland.

1721. STATICE MARITIMA Mill., var. vel lusus FLORE PLENO. A very beautiful form of the holotrichous Thrift was found by Lady DAVY between Corbière and Petit Port, Jersey, in 1922. A root was brought home, and it flowered very freely this summer on a Surrey rockwork. The corolla is duplicated, the anthers and stigma being suppressed and, as many of the corollas are enrolled at the apex, it gives a raspberry look to the inflorescence.

1743. ANAGALLIS ARVENSIS L., var. PURPUREA. Plentiful on Causand seashore, Cornwall, 1923, Lady DOUIE. In this plant the corollas are a rather dull purple.

1758. CENTAURIUM SCILLOIDES (L.) Druce. Under the name

Erythraea Massonii there is a note in *Gard. Chron.* 91, 1923, recommending it as a rock-garden plant. It loves a light, fully drained soil, but at the same time does not appear happy when kept too dry. Good soakings of water during spells of dry summer weather help it greatly. It also prefers a little shade. In its Pembroke habitat it grows in full sun exposure.

1765. GENTIANA CAMPESTRIS, var. SUECICA Froelich De Gentiana libellus 92, 1796. Under the somewhat misleading name, "*G. suecica* Froelich" Mr C. E. SALMON (*Journ. Bot.* 88, 1923) describes this Gentian, and gives the contrasting features of *campestris* which he, following Murbeck, calls *germanica*. Indeed, he says that "Murbeck proposes the name *G. Wettsteinii* for the plant of our chalk downs usually known by Willdenow's name, *germanica*, but this suggestion has been generally adopted." It would seem from the context that the word "not" has dropped out of the sentence. Mr Salmon claims to have found *suecica* near the Spital of Glenshee, E. Perth, and intermediate forms from near Banavie, Westernness, and Loch Eil, Argyll. Murbeck identified Beeby's specimen from Hillswick, Ness, Shetland, as *G. suecica*, var. *islandica* Murb. This was omitted from my *Flora Zetlandica*. Murbeck raised *suecica* to the rank of a sub-species (*Act. Hort. Berg.* ii., n. 3, 10, 1892) and in *Journ. Bot.* 1, 1894, Mr Beeby made an abstract of the paper. The chief characters which distinguish *suecica* from *campestris* are that *suecica* has internodes much longer than the leaves (*campestris*, shorter or slightly longer); middle or upper stem leaves strap-shaped or oblong rounded or obtuse at apex (*campestris*, lanceolate or ovate-lanceolate, more or less acute at apex); middle stem leaves erect or erect-patent (*campestris*, spreading, the upper ones strongly so). I am afraid the characters assigned by Murbeck to *baltica* appear to break down. Of course, there is the annual and the biennial form, but the characters assigned to each do not pan out in the field. This, too, is Wheldon's experience. After much study he could not see that *baltica* was in the least worthy of specific, if indeed of varietal, rank. Two out of three of Mr Salmon's recent gatherings are said to be intermediates. I do not find that the long internodes of *suecica* are to be always correlated with patent or with rounded obtuse leaves. A Ross-shire specimen with long internodes

has patent and rather sharp-pointed leaves. So, too, is another from Wexford, and in a plant from Loch Tay side with internodes 4 inches long the lanceolate acute leaves spread at right angles from the stem. Ross-shire specimens with short internodes have erect leaves which are somewhat rounded at the apex. My plant, from Garron Tower, Antrim, has a long internode and erect leaves which are quite acute. On the contrary on the Dovrefeld, I gathered what Dr Holmboe agreed was true *suecica* which is unlike any British specimen as yet seen by me. In this the corolla was more deeply cleft than in British *campestris*. It may be that, as Mr Salmon says, there is a British plant agreeing with Murbeck's description, but I should hesitate to give it, any more than I should *baltica*, specific rank, but that, of course, expresses only an individual opinion.

1776 (3). *GILIA SQUARROSA* Hook. & Arnott Bot. Beech. Voy. 151. *Navarretia*, cf. *squarrosa* (Eschsch.) Hook. & Arnott, *l.c.* 368. Alien, America bor. occ. Det. Dr THELLUNG. Sleaford, Lincoln, Miss LANDON. Probably introduced with chicken-corn. At first sight this plant resembles *Hemizonia pungens*.

1777. *POLEMONIUM CAERULEUM*, Genetic Studies in. Prof. C. H. OSTENFELD in *Hereditas*, iv., 1923. One of the variations (var. *sibiricum*) is a form with bipinnate leaves which is thought to be parallel to the laciniate form of *Chelidonium majus* (only that behaves quite constant in culture. Among the thousands which have appeared self-sown in my garden not one reversion in leaf-form occurred). He also considers *Sambucus nigra*, var. *laciniata* and the cut-leaved form of *Rubus vulgaris* to be analogous to *sibiricum*. White-flowered forms of *Polemonium* are very common in culture, and are true albinos. In the normal hermaphrodite plant the corolla is larger than in the female plant. A micropetalous form is remarkable in that the minute corolla has very deeply cut acute lobes. Cultivation of the bipinnate forms showed that the bipinnate form is recessive. The white colour is recessive to blue colour. The crossing of females with hermaphrodites showed that the offspring is mainly female with about ten per cent. hermaphrodites.

1805. *LYCOPSIS*, cf. *ORIENTALIS*. Teste Dr THELLUNG. Alien.

Orient, Spain. A single specimen at Hayle, Cornwall, 1923, Miss TODD.

1815 (2). *MYOSOTIS SICULA* Gussone in Jersey. A. J. WILMOTT in *Journ. Bot.* 212, 1923. Found by Mr F. DRUCE and Mr WILMOTT in 1922 at the east end of St Brelade's Bay on the fixed dune between the strand and the pond. It proves, says Mr Wilmott, to be the Sicilian *Myosotis sicula* exactly agreeing with the specimens from the Loire Inférieure, Nantes. It is a small plant, 5-10 cm., and has the appressed hairs and very short style of *M. cespitosa*, but has peculiarly divaricate and flexuous branches, the corolla is minute, the nutlets only about half the size of those of *cespitosa*, being slightly more than half the length and slightly less than half the breadth. Mr Wilmott dismisses the view of Rouy, who treats the biennial French plant (except the Corsican, which he refers to *sicula*) as a var. *confusa* (*M. sicula* Gren. and Godr., non Tenore) of the sub-sp. *multiflora* Mérat of the aggregate *M. palustris* under which is also put as a sub-species *M. repens*, while *M. commutata* and *M. cespitosa* are treated as races. Rouy's arrangement does not commend itself to me. While I have felt a difficulty in making *M. repens* a full species, since there are forms which connect it with *palustris*, such difficulty is not experienced with *M. cespitosa*. Rouy, moreover, gives full specific rank to *M. sicula*, which occurs in Corsica, Sicily, Spain, Sardinia, Crete, &c., and which he says is annual. Willkomm & Lange keep all four as distinct species, and say that *sicula* differs from *cespitosa* "racemi basi non foliolatis, pedicellis brevioribus, florum etiam infimorum calyce vix longioribus, calyce fructifero campanulato-truncato, corollae adhuc minoris limbo concavo. Planta in statu fructifero 0-10 pollicaris, caule erecto basi radicante racemis floribundis minus laxifloris, demum valde elongatis, caulem superantibus." There seems nothing in the Jersey plant to take it away from this. Whatever its ultimate place may be there seems no reason to dispute its distinctness from any of our previously named forms. It has a very distinct facies of its own, and well deserves a place in our flora. In another marsh, I think in St Peter's Parish, a curious *Myosotis* of the *repens* group grew, but instead of the deeper blue of *repens* it was paler than ordinary *cespitosa*. While *cespitosa*, as its name

suggests, is a tufted plant, in the Amberley area it grew as quite a simple stemmed plant, and a similar one has been noticed in Berkshire. The genus needs critical working, and three or four years ago I suggested it to Mr A. E. Wade as a promising field of research.

1846. *SOLANUM NIGRUM* L., var. *PROSTRATUM* F. Ger. in Magnier *Scrinia* 356, 1895. St Philip's, Bristol, Miss I. M. ROPER in *Rep. Wats. B.E.C.* 209, 1922.

1869 (2). *VERBASCUM OVALIFOLIUM* Sims Bot. Mag., n. 1037. Alien, Reg. Caucasus. Hortal. Introduced into Britain in 1804 from Tauria. Cardiff, Glamorgan, 1922, Miss VACHELL. Det. Dr THELLUNG.

1869 (3). *V. PYRAMIDATUM* M. Bieb. Fl. Taur.-Cauc. i., 161. Alien, Caucasus. Hortal. Introduced into Britain in 1804. Swaythling, South Hants, 1922, J. RAYNER. A pretty plant with a large panicle of many yellow flowers. Det. Dr THELLUNG.

1879 (4). *LINARIA REFLEXA* (L.) Desf., teste Dr THELLUNG. Alien, Ital. merid., Afr. bor. occ. Adventive in Corsica, Gallia merid., Helv. Cardiff, Glamorgan, G. C. DRUCE.

1883. *L. MINOR* Desf., forma nova *GLOBOSA*. Mr C. NICHOLSON sent me in September a form of the species from Headley Lane, Mickleham, which he referred to in *Journ. Bot.* 263, 1923. The plants are very copiously branched from the base of the stem, and form globular tufts from about two inches high to the diameter of a cricket ball, or even a small basin. Whether it is merely an abnormal growth or one induced by a mite (of which I see no evidence) or to injury sustained in its early development, has to be determined. If seeds could be obtained the matter might be settled. As it is, the plant widely diverges from the type in its general appearance which recalls the "Rose of Jericho." G. C. DRUCE.

1884. *L. SPURIA* Mill., *lusus PELORIA*. A plant with tubular corollas sent from Sherborne, N. Hants, 1923, J. C. BOYS.

1895 (2). *SCROPHULARIA SCOPOLII* Hoppe ex Pers. *Syn. ii.*, 160,

teste Dr THELLUNG. Alien, Eastern Europe, Asia Minor, Himalayas. Cardiff, Glamorgan, G. C. DRUCE.

1903. DIGITALIS PURPUREA L. An extraordinary monstrosity in which the corolla is much reduced in size, being shorter than the large anthers and scarcely exceeding the sepals in length, the inflorescence with about 40 flowers, Roman Villa, Fosse Bridge, E. Gloster, Mrs IRVINE.

1907. VERONICA OFFICINALIS L., var. GLABRATA Bab. A form of this, with the capsule unnotched at the top, was found at Glen, Peebles, in 1913. The same plant was sent from the same locality—where *Euphrasia variabilis* grows—this year by Miss I. M. HAYWARD. G. C. DRUCE.

1931 (11). ORTHOCARPUS ERIANTHUS Benth. Scroph. Ind. 13. Alien, California. In a lucerne field, Frilford, Berks, June 1923, Lady DOUIE and G. C. DRUCE. A pretty and unexpected adventive, near to *Bartsia*. Det. T. A. SPRAGUE.

1938 (2). EUPHRASIA ATROVIOLACEA nov. sp. G. C. DRUCE and D. LUMB. Plant: Small, much branched; flowers, calyces and upper bracts atro-tinted, often glandular. Stem: Slender, eglandular, mostly hidden by bracts, from 2-4 cm. high, branched below, occasionally rebranched; rarely simple. Spike: Condensed, comparatively broad, few internodes visible. Leaves: Lower very small, early caducous, thick texture; 0-1 tooth on each side; at times with clothing as long and as rank as that of *curta*; at times almost glabrous; often with short glandular hairs; upper, very small, seldom 5 mm. long, rugose beneath, 2 teeth on each side; clothing as above. Bracts: Lower suberect, about 5 mm. long, rugose beneath, at most 3 teeth on each side, more often 2; sub-acute; teeth acuminate; upper acute, with acute, non-aristate teeth; cuneate-based; clasping calyx and not half its length; often beset with short glandular hairs; at times almost glabrous. Calyx: With acute or sub-acute teeth, often copiously glandular; consistently overtopping its subtending bract; veins atro-stained. Corolla: About 6 mm.; nearly uniform in size and colour; upper outside part whitish, rest deep blackish-purple; tube not lengthen-

ing; style not protruding; dries well. Capsule: When mature equalling or slightly overtopping the calyx teeth. In shell sand near Birsay, Orkney, G. C. DRUCE & R. J. BURDON, 1920.

From *curta* it differs in its usually less rank clothing, in its glandular hairs, in the colour of the flower, and in its small few-toothed bracts. From *variabilis* it differs in habit, in the nearly uniform size and colour of its flowers and in its often drying blackish. From *gracilis* and its var. *primaria* it differs in its habit, its size and its glandular clothing. From *brevipila* it differs in the size of its few-toothed leaves and bracts, the colour of the flowers, the eglandular stem and its habit. From *foulaensis* it differs in all its characters, except that of drying blackish at times. From *caerulea* it differs in its habit, size of bract, glandular and eglandular clothing and colour of flowers.

1939 (4). EUPHRASIA VARIABILIS nov. sp. G. C. DRUCE and D. LUMB. Plant: Slender, starved-looking, small bracted, often sub-mealy and glandular, very variable. Stem: Eglandular, slender, 2-6 cm. high, at times simple, often much branched, sometimes rebranched; low-down adventitious branches fairly numerous. Spike: Narrow, congested in upper part, flowering or fruiting nodes up to 12, but often few; lower internodes fairly long. Leaves: Lower obovate-cuneate with one tooth on each side; terminal lobe longer than broad; base narrowly cuneate; early caducous; 7-8 mm. long; upper ovate with 2-3 obtusish teeth on each side; base cuneate; rugose beneath; variably clothed; sometimes short glandular hairs numerous. Bracts: Sub-erect, mostly quite small, about 5 mm. long, ovate, cuneate-based, markedly rugose beneath, clasping the calyx, often not half its length; lower sub-acute with 2-3 sub-acute teeth on each side; upper indigo-stained, acuminate, with 2 or 3 acuminate, sub-aristate teeth on each side; clothing very similar to that of leaves. Calyx: With narrow acute sub-aristate teeth, often copiously glandular; consistently overtopping subtending bract; veins often indigo-stained. Corolla: Very variable in size, 5-9 mm.; variable in colour from white to deep lilac-blue; tube not lengthening; style occasionally projecting; dries usually with good non-rusty colour. Capsule: When mature slightly overtopping calyx teeth.

From *campestris* it differs in lacking glandular hairs on stem, in glandular hairs being short, in amount of branching, and in the variability in size and colour of its flowers. From *Kernerii* it differs in being glandular, in colour of flowers, in non-lengthening corolla tube, in rugosity of leaves and bracts, and in texture generally. From *gracilis* and its var. *primaria* it differs in size of flowers, in amount of branching, in its rugosity, in its glandular hairs and general colouring. From *caerulea* it differs in habit, size of bracts, amount of glandular clothing, and colour of flowers.

This pretty Eyebright was first noticed by me on a visit at Glen, Peebles-shire, in September 1918, when walking in company with Lady Glenconner and the Countess of Wemyss on a sloping hillside towards Loch Eddy. Subsequently I found it in other places on the Glen estate. It was readily recognisable from its peculiar habit and often attractive flower-colouring. On my return to England I submitted it to Mr Cedric Bucknall and he remarked that "notwithstanding the likeness of some of them to *E. Kernerii* I believe they all belong to *gracilis*—those with the large flowers to its variety *primaria* Fr. The excessive branching of some of the specimens is due to the damaged main stem." He subsequently repeated this identification. Mr Pugsley did not think it "belonged to *gracilis* but possibly to *Kernerii*." At first Mr Pearsall thought it might be so. Mr Lumb has had it under observation for some time, and was convinced of its distinctness from any known British form. This year, through the kindness of Miss I. M. Hayward, who was staying in the vicinity, and to whom I gave directions as to where it grew, we received fresh specimens in good flower, and this has enabled Mr Lumb to draw up the above description. The situation is a grassy hillside on poor soil. It occurs probably from 800 to 1200 feet, and in some quantity.

The plants gathered and examined fresh in 1923 show the same variability in the quantity of the glandular clothing, in the size and colour of the flowers, in the branching, and in the much starved-looking appearance.

1994. MENTHA AQUATICA L. Mortlake, by the Thames, Surrey, J. FRASER. He sent me fresh specimens to show that it had a strong *citrata* odour. He has cultivated it, and the odour is retained.

1999. *M. RUBRA* Sm. × *M. AQUATICA* L. With *M. rubra* at Iver, Bucks, and either a cross, as Mr. Fraser says, with *aquatica* as stated, or a reversion of *rubra* (itself a hybrid in which *aquatica* has a share) to *M. aquatica*, G. C. DRUCE.

2011. *SATUREIA CALAMINTHA* Briquet, var. *VILLOSA* (Boiss.) Druce in Rep. Bot. Exch. Club 618, 1922. In *Journ. Bot.* 190, 1923, Mr. H. W. Pugsley, under the title of "A New British Calamint," which he identifies as *Calamintha baetica* Boiss. & Reut., gives particulars of the characters of a plant he discovered in 1900 near Swanage. In my note, *Report* 618, 1922, which was based upon the statement of a Fellow who heard the communication to the Linnean Society, and which was written before I had seen a printed account, I gave the date of its discovery as 1922. That, however, was the date of its publication. I did not realise that Mr Pugsley had found it twenty-two years before. One very much regrets to see the unpleasant tone adopted by him, and the expression he sees fit to use of my making a "serious" and "false citation" when I quote the synonym *Calamintha officinalis*, var. *villosissima*, from Willkomm and Lange's *Prod. Fl. Hisp.* There is nothing incorrect or false in this citation. If there had been the correction might have been less unpleasantly put. In my account of the plant, of which at that time I had seen no British specimen, I had to give the history of its earliest trivial. That is the one which appears at the head of this paper. Boissier used *villosa* as a variety in the *Voy. Bot. Esp.* 497, 1837. In copying it in the *Prodromus* Willkomm, by a slip of the pen, wrote *villosissima*, and I know of it in that form only in that work (even if it had been the earliest publication it is invalid being in synonymy), and when cited as *villosissima* it must be given as I wrote it. I have now seen the Dorset plant. So far as description goes it seems to differ from Spanish plants in not being canescent, in one of the cymes having nine flowers, which does not well answer to "Cymis paucifloris," and in the flowers not being very large. But the genus is a fluid one. It may be noted that Rouy (*Fl. Fr.* xi., 334) puts under *S. vulgaris* Rouy not only *S. Calamintha* and *S. adscendens*, but also *S. Nepeta*. In the *Index Kewensis* *baetica* is made synonymous with *officinalis*. Further study may prove that the Dorset plant has specific value.

The synonymy of the Calamints has been greatly confused. It is clear that *villosa* (as a var.) is the earliest trivial. It was put under *C. officinalis* by Boissier and *officinalis* is by Willkomm made = *silvatica* Bromf. = *Melissa Calamintha* L. Lange, however, puts *baetica* as a var. of *menthaefolia* Host, which = *C. adscendens* Jord. and, teste Willkomm, *Thymus Calamintha* Sm. It seems that *Calamintha* as a trivial is so liable to confusion that it will be safer to use *S. adscendens* (Jord.), var. *villosa* (Boiss.) comb. nov., and retain Bromfield's trivial for the Isle of Wight plant. I collected a Calamint at Corfe Castle on July last which, teste Marquand, is the same as Mr Pugsley's plant. I am sending it for distribution through the Club.

2027. *SALVIA MARQUANDII* Druce. A specimen of this, collected by W. C. Trevelyan in the locus classicus, *i.e.*, Vazon Bay, Guernsey, 1835, has recently been presented with other plants, 1250 in all, to Kew. It was in the herbarium of the late Dr George Lloyd. See *Kew Bull.* This specimen of the very local *Salvia* is the oldest one known to me.

2053 (2). *STACHYS SALVIFOLIA* Tenore Prod. Fl. Neap. xxiv. *S. italica* auct., non Mill., teste Dr THELLUNG. Alien, Eur. mer. Blundellsands, Lancashire.

2069. *LAMIUM MACULATUM* L., *Peloria* in. See J. KLIKA in *Prestia* 56, 1923.

2073. *LAMIUM MOLLUCCELLIFOLIUM* × *PURPUREUM*, nova hybr. Garden ground at Tongue, W. Sutherland, 1917, with both putative parents. Near to the former species of which it has the calyx teeth and sessile upper leaves, but the leaves have the texture and softer pubescence of *purpureum*. It has a different tint of colour and the very long internodes and more definitely stalked lower leaves are also intermediate. The nutlets seemed sterile. G. C. DRUCE.

2082. *TEUCRIUM CHAMAEDRYIS* L., var. *HIRSUTUM* Celak. Curry Mallet, Somerset, 1922, H. DOWNES in *Rep. Wats. B.E.C.* 220, 1922, teste C. C. LACAITA.

2083. *AJUGA REPTANS* L., var. *STOLONIFERA* Bogenh. Fl. Fen. 316. Ockham Common, Surrey, May 1907, C. E. BRITTON. Rouy

(*Fl. Fr.* xi., 228) describes it as "Stolons de l'année terminés par un épi florifère à fleurs ordt. plus pâles et moins nombreuses que celles des épis ordinaires," which suggests it is a condition rather than a true variety.

2083. *A. REPTANS* L., var. *ALPINA* Koch *Fl. Germ.* 575, 1837. On Foel Fras, Carnarvon, at about 2500 ft., H. W. PUGSLEY in *Journ. Bot.* 22, 1923. Koch (*l.c.*) briefly describes it as having "stolonibus brevibus vel nullis" with a reference to Villars *A. alpina* of the *Fl. Dauph.* ii., 347. As Mr Pugsley says, this may be the alpine bugle gathered by Johnson in 1641 and referred to by him in his "Mercurii Botanici pars altera in Cambria descriptio" of that date. This has, by some botanists, been referred to *A. genevensis*, which is a most unlikely plant to grow on a cold wet Welsh mountain. I found such a stolonless plant at about 1200 feet on the Carnedd Dafydd when I visited it in 1921, but the storm of wind and rain prevented my traversing the narrow ridge which connects it with Carnedd Llewellyn, where Johnson probably saw his plant, but I hesitated to refer it to the plant of the Dauphiny which Rouy (*Fl. Fr.* xi., 230) says is *A. fallax* Borbas, *i.e.*, *pyramidalis* × *reptans* Knaf. Rouy (in a foot note, *l.c.* 232) says "L'*A. montana* Reichb. et l'*A. alpina* Vill. Dauph. ii., 347, sont des complexes mal définis dont il n'y a pas lieu de tenir compte.

2117. *CHENOPODIUM SUBFICIFOLIUM* (Murr), var. *SERRATIFRONS* Murr, teste Murr, under sub-sp. *subfificifolium*. Lichfield, Staffs, G. C. DRUCE.

2131 (2). *C. STRIATUM* (Kras.) Murr, var. *EROSUM* Murr, teste Murr. Lichfield, Staffs, G. C. DRUCE; Bristol, N. SANDWITH.

2143. *ATRIPLEX LITTORALE* L., var. *DENTATUM* Hornem., teste Dr THELLUNG. Alien. Bradford, Yorks, 1921, J. CRYER.

2169. *POLYGONUM HYBRIDS* IN HOLLAND. B. H. DANSER in *Nederl. Kruidk. Archief.* 156-164, 1921. (1) *P. CONDENSATUM* (MITE × *PERSICARIA*); (2) *P. BRAUNIANUM* (MINUS × *PERSICARIA*) which are British; *P. HYBRIDUM* (MITE × *HYDROPIPER*), to be sought for; (4) *P. WILLMSII* (MINUS × MITE) British; (5) *P. LAXUM* (HYDRO-

PIPER × ? NODOSUM); (6) *P. LENTICULARE* (NODOSUM × *PERSICARIA*). A difficulty arises as to the sense in which *P. nodosum* Pers. is used. Herr Danser does not seem to be aware that Persoon named *P. nodosum* as an unnumbered but asterisked plant subordinate to *lapathifolium* which is his usual custom for the sub-species grade, and queries "An a *Persicaria* specie diversum?" If meant in the sense of *P. maculatum* the earliest trivial is *petecticale* (Stokes). Cf. With. *Nat. Arr. i.*, 412, 1789.

2169. POLYGONUM. Bijdrage tot de kennis van eenige Polygonaceae by B. H. Danser. Reprint from *Nederl. Kruidk. Archief*. 218-250, 1920, Ingekomen, Jan. 31, 1921. A critical examination of the species of this genus in which he quotes Meisner who says "*P. Roberti* est species mixta ex *P. aviculari*, *litorali* et *Rayi* ideoque omnino delenda." Under *P. Persicaria* L. De Bruyn's paper from the same Journal, serie i, deel 1 & 3, is cited, and Danser gives var. a. GLABRIPES, racemosum pedunculis glabris; var. b. HIRSUTUM, racemosum pedunculis adpresse hirsutis; var. c. GLANDULOSUM, racemosum pedunculis glandulis sessilibus scabris. Braun (*Flora* viii., 1824) has colour varieties, i.e. a. RUBELLUM, floribus rubellis, roseis, purpureis and b. ALBIDUM floribus albidis. Gunther Beck (*lc. Fl. Germ. et Helv.*) gives also a var. TOMENTELLUM (INGANUM Gren. & Godr.), folia subtus albido-tomentosum. *P. mite*, a name which we are glad to see he retains, has two plants under it, i.e. (1) *P. LONGIFOLIUM*, foliis breve petiolatis spicis pedunculatis subpendulis incrassatis basi interruptis, floribus roseis (vel albidis) fructibusque magnis, and (2) *P. LAXIFLORUM*, caule firmulo, foliis subpetiolatis, latius lanceolatis, spicis filiformibus laxis, pendulis, interruptis, floribus hexandris, seminibus mediis acutis. Under *P. mite* is its hybrid with *Persicaria* = × *P. AXILLARE* Rigo. *P. amphibium* has two colour vars., ROSEIFLORUM, floribus laete roseis and PALLIDIFLORUM, floribus sordide vel subflavide albis also a var. BRACHYSTYLUM, stylis in perianthio inclusis filamentis eminentibus and MACROSTYLUM, stylis e perianthio eminentibus filamentis inclusis. Plants may occur as ROSEIFLORUM BRACHYSTYLUM, ROSEIFLORUM MACROSTYLUM and PALLIDIFLORUM MACROSTYLUM, but it is somewhat doubtful if any of these would bear culture tests.

2195. RUMEX. Bijdrage tot de kennis Nederlandsche Rumices by B. H. DANSER in *Nederl. Kruidk. Archief*. 167-228, 1921. *Rumex aquaticus*. Danser quotes Murbeck's paper in *Bot. Not.* for 1899 in which he says there are three distinct species in *Fl. Suecica*, *R. domesticus* Hartm., *R. conspersus* Hartm. (now admitted to be a hybrid), and *R. Heleolapathum* Drejer. Lindman keeps *R. aquaticus* and *domesticus* as distinct species. It is curious that while Holland possesses *aquaticus* it should be absent from England. Danser describes P. PATIENTIA, R. ORIENTALIS, R. FENNICUS with two varieties, R. CRISPUS, R. HYDROLAPATHUM, R. SANGUINEUS, which he keeps as the type, and the common CONDYLODES as a variety. He also names vars. TRIGRANIS and UNIGRANIS, which speak for themselves, R. CONGLOMERATUS, with var. PYCNOCARPUS, characterised by "valvulis ovato-oblongis, corrugatis, ramulis divaricato-patentibus," R. OBTUSIFOLIUS, with R. FRIESII and SILVESTER subordinate. He adds two new varieties of FRIESII—UNIGRANIS and TRIGRANIS; two variations based on the colour of the leaf-veins, CONCOLOR and DISCOLOR, also a var. based on the leaf-shape, PANDURIFOLIUS, and as adventives, R. OBOVATUS Danser, R. AURICULATUS and R. DENTATUS.

2195. RUMEX. Herr B. H. DANSER has contributed (*Nederl. Kruidk. Archief*. 229, 1921 and 1-36, 1922) two papers on the Hybrid Docks of Holland. Some which he mentions should be found in Britain. Others have already been recorded. It will be noticed that he admits the hybrid parentage of *Rumex limosus* Thuill. (*conglomeratus* × *maritimus*) which Marshall strongly controverted. Danser also thinks that *Rumex maximus* Schreber is the offspring of *Hydrolapathum* and *aquaticus*. If that be correct it would seem that the British *maximus* is either adventive or incorrectly identified because *R. aquaticus* is not English and even *domesticus* is not a south English plant. The Dutch hybrids are:— (1) *R. conspersus* (*aquaticus* × *crispus*). The point here arises—does Danser use *aquaticus* in the aggregate or in the restricted sense of *domesticus* which so far as we know is the only segregate known in Scotland. (2) *R. maximus*, already referred to. (3) *R. platyphyllus* (*aquaticus* × *obtusifolius*), which should be found in Britain as a hybrid of *domesticus*. (4) *R. Ruhmeri* (*sanguineus* ×

conglomeratus. To me this is rather a hybrid of *condyloides* × *conglomeratus*. It seems undesirable to use the name *R. sanguineus* (which is such a rare and with us adventive species) for our abundant and widely distributed woodland species. (5) *R. Sagorskii* (*crispus* × *sanguineus*), to which the same criticism applies. (6) *R. Schulzei* (*crispus* × *conglomeratus*). (7) *R. Weberi* (*Hydrolapathum* × *obtusifolius*) which occurs with us. (8) *R. Schreberi* (*crispus* × *Hydrolapathum*), which should be looked for. It also may be hidden under our *maximus*. (9) *R. Wachteri*, nov. hybr. (*obtusifolius* × *odontocarpus*, Rotterdam, and *R. Wettsteinii* (*R. odontocarpus* × *obtusifolius*) found originally in Moravia. (10) *R. Neisslii* (*conglomeratus* × *stenophyllus*). (11) *R. acutus* (*crispus* × *obtusifolius*), common in Britain. (12) *R. balatonus* (*obtusifolius* × *Patientia*). (13) *R. Areschougii* (*crispus* × *paluster*). (14) *R. heteranthos* (*paluster* × *stenophyllus*), Rotterdam, Schiedam. (15) *R. stenophylloides* (*maritimus* × *stenophyllus*), Rotterdam, Schiedam. (16) *R. Wirtgeni* (*conglomeratus* × *paluster*). (17) *R. limosus* (*conglomeratus* × *maritimus*) which is British. The paper seems to indicate that *R. palustris* Sm. (which we make identical with *limosus*) is a distinct species, and in that case Marshall's view would be justified.

2195. RUMEX. Herr DANSER in the same publication has given some studies of the species of *Rumex*—*R. auriculatus*, *R. Acetosa hortensis*, (= *R. ambiguus*) and *R. hispanicus*. Under *R. Acetosa* he gives three colour forms:—(1) var. *rubida*, panicula rubro obscuro tincta, perigonii fructiferi, sepala exteriora toto obscure rubra vel margine lato rubro maculaque, centrali viridi parva; (2) var. *rubra*, panicula rubra, perigonii fructiferi, sepala exteriora margine rubro maculaque centrali viridi; (3) var. *alba*, tota planta omnino vel fere omnino pigmento rubro destituta. There are sexual varieties as var. *feminea*, floribus femineis, and *mascula*, floribus masculinis, and plants with cross characters occur such as *R. Acetosa feminea rubra* and *mascula rubra*, etc. *R. Acetosella* has varieties based on leaf-cutting—(1) *multifida* L.; (2) *hastata* Neilr., foliis basi utrinque lacinia singula (rarissime nulla vel binis) ornatis; (3) *integrifolia* Wallr., or varieties derived from the breadth of the leaves—(1) *latifolia* Wallr.; (2) *angustifolia* Koch, or

sexual variations—(1) *feminea*, and (2) *mascula*, or based on fruit-characters—(1) *gymnocarpa* Celakov., fructibus nitidis, pergonio liberatis, and (2) *angiocarpa* (Murb.), fructibus perigonio connatis, ergo superficie iniquis haud nitidis, or from the colour of the panicles—(1) *rubida*, panicula rubro obscure tincta; (2) *rubella*, panicula paulo rubri vel subviridi. These variations—they can scarcely claim to be true varieties—may of course have cross characters, that is, var. *hastata latifolia feminea angiocarpa rubella* or *hastata angustifolia feminea gymnocarpa rubella*, etc. of which obviously an immense number may occur.

2195. *R. HYDROLAPATHEUM* Huds. × *OBTUSIFOLIUS* L. = *R. WEBBERI* Fischer-Benz. in Prael. Krit. Fl. Prov. Schlesw.-Holst. ii., 186, 1889-90. In the greater part the *R. maximus* of British authors not of Schreber, and for the greater part the var. *latifolius* Borrer. Alfriston, E. Sussex; Lewes ditches, Chichester, W. Sussex; Upper Heyford, Oxon. The first two were named by Prof. DANSEB. *R. maximus* Schreb. is a hybrid of *R. aquaticus* and *Hydrolapatheum* and is not therefore likely to occur in southern England where *R. aquaticus* (even as a variety) is absent. G. C. DRUCE.

2209 (2). *R. ARIFOLIUS* All. Fl. Ped. ii., 204, 1875, not of the younger L., nor of Aiton. The *arifolius* of L. fil. is *R. abyssinicus* Jacq. Hort. v., 48, 1776. Syn. :—[*Acetosa montana maxima*, Bauhin Pinax 114. *Acetosa montana, lato arifolio*, Boccone Mus. 165, t. 125. *Lapathum sexubis separatis, foliis sagittatis, hamis brevissimis recta divergentibus*, Haller Hist. ii., 204, n. 2040, 1768.] *Rumex Acetosa* L. Sp. Pl. 337, 1753, var. ♂ with references to Bauhin and to Scheuchzer Alp. 129 and var. e with syn. from Boccone. *Acetosa alpina* Miller Gard. Diet., n. 5, 1768. *Rumex montanus* Desf. Tabl., ed. 2, 48, 1815. *R. hispanicus* Gmelin Fl. Bad. ii., 112, 1806, not of Koch. *R. Allionii* Link Handb. i., 306, 1829. *R. sylvaticus* Roth Handb. Tent. Fl. Germ. i., 129, 1788, not of Rafinesque. *R. alpestris* Scop., not of Jacquin. *R. dimorphus* Gren. in Gren. & Godr. Fl. Fr. iii., 43, 1856. *R. Acetosa*, var. *alpestris* Hartm. Handb. Sk. Fl. Exsicc. :—Reichb. n. 4235. Icon. :—Boccone Mus., t. 125. Reichenbach

Ic. Fl. Germ. et Helv. xxiv., t. 195. Distr.:—Lapland; Sweden; Norway (Dovrefeld, 3000 ft.); Germany (Brocken); Thuringia; Schwarz; E. Bohemia; Alpes (rare); Jura; Auvergne (Mt. Doré); Vosges; Sudetica; Austria; Hungary; Transylvania; Bosnia; Montenegro; Italy; Corsica; Sardinia; Greece; Siberia; Caucasus. Descr.:—Stem simple, erect, 5-10 dcm.; stem leaves thin and soft in texture, with 5-7 prominent nerves, shortly petiolate, oval-oblong, acuminate, more or less hastate-cordate with broad sinus the auricles short, the root-leaves few, 1-2, stalked, short, somewhat rounded at top, the upper leaves narrow, amplexicaul; ochrea membranous, sometimes disappearing before the flowering period short, terminated by a truncate projection; inflorescence paniculate, with simple alternate branches, bearing 3-6 flowered ebracteate verticels, the flowers on capillary pedicels; fruit-valves medium sized, suborbicular, truncate or cordate at the base, entire, longer than the nut, and having at the base a small reflexed scale; external divisions of perianth reflexed; nut dull, yellowish-green. This species is allied to *R. Acetosa* with which, as we have seen, Linnaeus merged it as a variety, but it is kept distinct by all modern botanists. Its main differences are in its larger and often broader leaves of a softer and thinner texture, with more prominent veins, and patent auricles, entire ochrea, somewhat smaller fruit-valves and dull yellowish-green nuts. In *Acetosa* the leaves are of a firm texture, with obscure veins, long converging auricles and narrow sinus, lacinate ochrea, larger fruit-valves and blackish-brown shining nuts. British Habitat:—on shady damp mountain-cliffs, not easy of access, at about 2900 feet high on Lochnagar, South Aberdeenshire. It is indubitably native and shows another and important link with the Scandinavian flora. I am indebted to Professor Danser of Amsterdam, the well-known authority on Rumices, for its identification. G. C. DRUCE.

2210. *R. ACETOSELLA* L. As we have already said Professor DANSER has treated the variations of this plant under five heads based on "secundum foliorum lacinias basales" on the width of leaves, on the sex, on the fruit and on the colour of the panicle. (1) *MULTIFIDA* L. seems to be adventive in Britain. I have it only from Rotherhithe, Kent, 1912, W.H.G. (2) *HASTATA* Neilr., which

is represented as *latifolia* Wallr., Brandon, Warwick; Freshwater, Isle of Wight; Quenvais, Jersey, 1851, PIQUET; Ilmington, Warwick, 1847, E. C. TOWNSEND; Braid Hills, Edinburgh 1857, BELL; and *hastata latifolia*, Welwyn, Herts; Aldeburgh, Suffolk; Bute; and from other places as the combination *feminea angiocarpa*, Oxney Lode, Northants; Ilmington, Warwick; as *feminea gymnocarpa*, Frilford, Berks; Omagh, Ireland; Nash, Bucks; Freshwater, Isle of Wight; as *hastata angustifolia feminea angiocarpa*, Littlestone-on-Sea, Kent; St Helier's, Jersey; Llanderfel, Merioneth. (3) INTEGRIFOLIA Wallr., as *latifolia feminea angiocarpa*, Carbis Bay, Cornwall; Chewbrook Clough. Professor Danser has also named some of my herbarium specimens as *R. Acetosella* L., var. *denticulata latifolia feminea angiocarpa*, Crouch Hill, Oxon; Glen More, Easternness; var. *denticulata latifolia feminea*, Clifden, Galway; Connor Hill, Co. Kerry, 1906; var. *denticulata latifolia mascula*, Blackwater, Berks, 1895; Blisworth, Northants; Denbigh Hall, Bucks, 1873; Lerwick, Shetland.

2210. *R. ACETOSELLA* L., var. *NOVA MCLEANII*. Found by Prof. R. McLEAN in 1923 who says it grows in grassland on Coal Measures between Taff's Well and Taipenstar, Glamorgan. It differs from the type in having very conspicuous, silvery, transparent (scarious) bracts, those between the flowers up to $\frac{1}{4}$ in. long. At the leaf-bases the silvery scales are as much as half an inch long. The leaves are auriculate, and the plants are about 4 in. high. I have nothing like it in my herbarium. G. C. DRUCE.

2210 (2). *R. SCUTATUS* L., var. *HASTILIS* Koch Syn. 615, 1837. *Folia triangularia, acuta, dente baseos utrinque elongato hastata. Folia infima saepe ut in var. hastifolius.* Merton College Walls, Oxford, 1883; Craigmillar Castle, Midlothian; Malham, Yorks; old walls at Settle, York; Bowness, Westmorland (as the glaucous form), G. C. DRUCE; Aberdour Castle, Fife, TEMPLEMAN. Named by Prof. Danser.

2210 (13). *R. OBOVATUS* Danser. *Lapathum, Rumicis pulchri affinis. Planta omnis glabra est. Radix eius annua est vel biennis (forsan nonnunquam perennis). Caulis plerumque erectus est,*

firmulus, sed subtenuis, a basi ramosus, altitudine 60 cm. vel humilior, parte superiore sicut rami, sulcatus, et in nodis saepe ultro citroque flexus. Rami, superiores patent, angulum 45 deg. cum caule faciunt, paniculamque apertam formant; rami inferiores magis patent, paniculamque terminalem minorem ferunt, nisi plantae circumstantes eorum evolutionem prohibeant; rami infimi, si bene evoluti, basi humi fusi sunt, parte superiori adscendunt; rami omnes ad apicem foliata sunt. Folia radicalia et caulina inferiora obovata sunt, apice obtusa et rotundata, truncata vel subcordata vel subcuneata; folia caulina media obovata vel oblonga sunt, apice subacuta, basi cuneata; folia caulina superiora paulatim angustiora apice basi que acutiora fiunt; summa haud angusta sunt, elliptica vel oblonga; folia radicalia maxima longitudinem, 12 cm. non superant. Petioli foliorum radicalium lamina equilongi sunt, foliorum caulinarum gradatim breviores; folia summae paniculae sessilia sunt. Perigonii fructiferi maturi pedunculus crassus est, brevior quam valvae et articulationem incrassatam offert. Florum glomeruli inferiores remoti sunt, superiores conferti in racemos, omnes multiflori, statu maturo densi, subglobosi, foliati. Valvae anteriores $\pm 4\frac{1}{2}$ mm. longae et ± 3 mm. latae sunt, ovatae apice obtusae vel subacutae, parte basali utrinque dentibus 4 vel 5 subulatis, usque ad 2 mm. longis, praeditae, parte apicali integrae nervis prominentibus elevate reticulatae. Perigonium fructiferum adultum granulis 3 magnis, ovatis, utrinque obtusis, iniquis primum spumaceis denique verrucosis ornatum est, quarum anterior paulo maior $\pm 2\frac{1}{2}$ mm. longa. Fructus ± 2.8 mm. longus est.

R. obovatus differt a *Rumice pulchro*, cuius affinis est, praecipue ramis firmioribus brevioribusque, foliis inferioribus obovatis, florumque glomerulis densioribus, in caulium ramorumque apicibus confertis, omnibus foliatis.

R. obovatus was first noticed in Holland at Rotterdam in 1906, but was not then identified. Herr Danser gives an admirable figure with details. In Britain it was first gathered by me at Ware, Herts, in 1914 when I saw its alliance to, but its distinctness from, *R. pulcher*. Mr Horrell found it at Elland and Tingley, Yorks, before 1918. Mr N. Sandwith gathered it at Bristol, and Mr R. Grierson at Glasgow in 1920. Miss Cobbe also found it in quantity

at Hull in 1922. Dr A. Thellung was disposed to name these specimens *R. paraguayensis* Parodi (See *Rep. B.E.C.* 258, 1920, with Latin diagnosis) to which it is closely allied. Prof. Danser has kindly examined all the specimens recorded in the *Reports* as *obovatus* and passes them as correct. So, too, he does those of *R. cuneifolius* Campd. The specimen of *R. magellanicus* Griseb. (*Rep. B.E.C.* 574, 1919) he also refers to *R. cuneifolius*.

2245. *ULMUS VEGETA* Schneider (U. MONTANA × CARPINIFOLIA). Mr J. E. LITTLE in *Journ. Bot.* 201, 1923, says he has found a specimen of the Huntingdon Elm in the Sloane Herb. labelled "*Ulmus folio latissimo glabro* Buddle. The Broad-leaved smooth Wich-Elme," gathered at Danbury, Essex, in 1711. This precedes the supposed first raising of it at Huntingdon by Wood about 1746.

2247 (2). *HUMULUS JAPONICUS* Sieb. & Zucc. Alien, Japan. Cardiff Docks, Glamorgan, T. H. THOMAS. Det. Dr THELLUNG.

2258. *ALNUS INCANA* DC. (sic). Mr J. E. LITTLE in *Journ. Bot.* 146, 1923, gives an account of the Hitchin plant and a few additional localities to those mentioned in our *Reports*, i.e., Arnside, Westmorland, found by Mr CUCKNEY, and distributed through the *Watson B.E.C.*; Roudsea Wood, Lake Lancashire; Doneraile, Co. Cork, ex A. B. JACKSON. Medikus is the earliest authority with which I am acquainted for the name.

2260. *CORYLUS AVELLANA* L. In *Bot. Not.* 280, 1923, J. HENRIKSSON describes 8 varieties of the species based mainly on the fruit and capsule characters. One is untenable, i.e., *glandulosa*, since I gave the same name to a plant which has the young branches very glandular. The other vars. are *calcata*, *attenuata*, *extensa*, *complanata*, *sublecta*, and *annulata*.

2278 (2). *SALIX ROSMARINIFOLIA*. In the *List of the Plants found in the Country around Rugby* by Mr L. Cumming, the above willow is reported without date by Mr F. Thomas as "Found in two stations in Newbold (Warwickshire). The late Rev. W. R. Linton thought that it was not a native, being only an escape from gardens where it has been cultivated." From this it would appear to have

come under Mr Linton's notice. There is no reference to it in the *Cambridge British Flora* nor in Bagnall's *Flora of Warwickshire*, and further investigation seems desirable.

2294. *POPULUS CANADENSIS* Moench and *P. MONILIFERA* Ait., by K. G. HARTWIG in Mitt. Eur. Dendrol. Ges. 170-2, 1922.

2320. *ORCHIS PURPUREA* Huds. Mr H. WALKER has sent from near Wye, Kent, some plants of this handsome species, which show enormous variation in the colour, shape, and size of the flowers. Some of the flowers are more than twice the size of the others. The side lobes of one remarkable specimen were $\frac{3}{4}$ in. long, the lobes being deeply cut into nearly linear segments. In others the labellum was small and but feebly notched. In colour they varied from nearly pure white to dull purple with very dark markings. As usual, Boswell Syme in *English Botany* gives an excellent description of the plant.

2325. *O. TRAUNSTEINERI* Saut., Monographie by A. FUCHS & H. ZEIGENSPECK in Bot. Arkiv. 238-261, 1923.

2326. *O. INCARNATA* L., The British Forms of, by Rev. T. STEPHENSON, D.D., and T. A. STEPHENSON, D.Sc. *Journ. Bot.* Reprint 273, 1923. A clear history of the species in Britain is given with a good general description. They rightly say that it grows in the wettest situations and often in damp sandy places near the sea. They mention a Gloucestershire specimen from Brimsfield Bog as 51 cm. high. The variation in the width of the leaves they quite correctly attribute to habitat conditions. In exposed situations the leaves tend to become broader, when growing in herbage they are much narrower. I once gathered a plant among *Phragmites* which was very tall with quite narrow, almost linear leaves. Messrs Stephenson think my var. *pulchella* of *O. incarnata* is distinct from the same named variety of *praetermissa*, and subsequent observation inclines me to keep them apart. This, or such a form, was thought by Babington to be *O. traunsteineri* Tausch which, as Messrs Stephenson say, has no right to a place in our List. They seem a little doubtful about the var. *ochroleuca* Wüstnei occurring in Britain. The pure white-flowered form is not rare but probably is

not identical with the plant of Wüstnei. They rather question the varietal grade I have given to the dune plant, *i.e.*, var. *dunensis*, and in this they may be correct. One would not be surprised if it reverted in cultural treatment. At the same time it is such an extraordinarily beautiful and distinct looking plant on the Sands of Barry and elsewhere that it needs a name either as forma or variety. My experience also bears out the remarks they make about the comparative scarcity of the *incarnata* hybrids. This may be due to its flowering less frequently synchronising with that of its allies. They mention Col. Godfery's finding the hybrid with *Fuchsii* in Anglesey which they identify with \times *O. ambigua* Kerner. An excellent plate and four text figures of the flowers (one being the var. *pulchella*) add additional value to this useful paper. I feel a little doubtful of figure D. being *latifolia*.

2326. *O. PRATERMISSA* Druce, by Rev. T. STEPHENSON, D.D., and T. A. STEPHENSON, D.Sc. *Journ. Bot. Reprint* 65, 1923. A carefully prepared paper by these authors, who give a photograph of two specimens from Norfolk. The authors contest the view held by the late R. A. Rolfe (*Orchid Review* 165, 1920) that *latifolia* is properly a species with unspotted leaves, an erroneous idea as I have already shewn (*Rep. B.E.C.* 608, 1919) and a view which could only be substantiated by unwarrantably changing the Linnean description in one of its most important characters. To cite such a name as "*O. latifolia* L., emend. Rolfe" when it is not an emendation, but the removal of one of the chief characters is to destroy the value of original diagnosis. A plant either agrees with the original description (and can then bear the assigned name), or if does not. In the latter case another name should be found for it. There is no justification for tampering with the original name. On the other hand, if the original description is incomplete it may be supplemented with additional but they must not be contradictory characters. Even then, there is no need to add "emend." The Stephensons, father and son, state that in their view *O. praetermissa* is a thoroughly well-marked and distinct species, whose segregation has helped materially to clear up the puzzling problems connected with the Marsh Orchids. They give an excellent description of the plant and its place of growth. The largest specimen they have seen

was one sent by Mr Hunnybun from the Isle of Wight, which was 7 dm. high with a flower spike 14.5 cm. by 4 cm. In the Chichester Canal and at Frilford, Berks, I have seen equally robust specimens, but this size is exceeded by the hybrid with *Fuchsii* which occurs in both those localities. They speak of the var. *pulchella* as a distinct and beautiful plant. Any botanist who may have seen it in full flower on the Caithness pastures or on the carboniferous limestone marshy ground near Bettyhill or Ledbeg in W. Sutherland or at the base of the Cnochan Rocks in West Ross will agree that it is an extremely beautiful plant. I may say that the Rev. G. H. Harris brought back from the Faroes, which he visited this year, a plant which must, I think, be referred to this variety. It may prove that *pulchella* is a micro-species or sub-species rather than a variety. Messrs Stephenson say it is closely related to their *O. purpurella*, which usually has spotted leaves. Mr. T. A. Dymes finds that the seeds of the two plants exhibit marked differences—*purpurella* having the smallest and most dusky seed of the group, with the testal cells forming a close mesh. In *pulchella* they are much the same as those of the type, *praetermissa* having long, rather loose, testal cells. M. Sipkes (*De Levende Natuur*, 1921) has found both *praetermissa* and *purpurella* in Holland, and I have seen the former there and in Belgium. He has also described a var. *macrantha*, which has a long extension of the lip. This variety appears to be the same as the plant from Abingdon, Berks, grown at Scampston Hall by Mr W. H. St Quintin, and figured in vol. v, t. 1, *Rep. B.E.C.* 1917, in which I say that the middle lobe is longer than usual. This is an excellent paper, which is of real value to the study of the Marsh Orchids.

SEEDS OF THE MARSH ORCHIDS. Mr T. A. DYMES gave a paper on this subject at the Linnean Society Meeting of June 21, 1923. He first described the *maculata* group—(1) *O. Fuchsii* Druce. The apex of the testa is curved and pointed and the coils loose; (2) In true *maculata* (*ericetorum* = *praecox*) the kernel is about 30 per cent. larger than in *Fuchsii* or *O'Kellyi*, the coils loose and less developed than in *Fuchsii*; (3) *O. O'Kellyi* Druce has a long, almost straight, narrow seed with the coils close and pronounced; in the *latifolia* group (4) *O. praetermissa* has a long straight seed, not

much dilated above the kernel, which is about the same breadth as the adjacent portion of the testa; (5) *O. incarnata* L., with much shorter and broader seeds than *praetermissa*, greatly dilated above the kernel, which is distinctly narrower than the adjacent portion of the testa, the mesh smaller than in *praetermissa*; (6) *O. purpurella* Steph. p. & f., seeds smaller than 4 and 5, testa dusky, indented on one or both sides above the kernel and tapering to a point, mesh small. With regard to *O. latifolia* L. Mr Dymes said that it is doubtful whether there is in this country anything so called that is not a hybrid or a mongrel derived from two or more of the six plants already dealt with. Adapted from *Linn. Proc.* 48, 1923.

2485. POTAMOGETONS OF THE BRITISH LAKES by W. H. PEARSALL & W. H. PEARSALL, D.Sc., in *Journ. Bot.* 1-7, 1923. In this paper are brought together the results of the laborious investigations of the Pondweeds in the English lakes, which for some years have occupied the attention of the Pearsalls—father and son. Exclusive of the *pusillus* group, in this paper eight species and two hybrids are dealt with. The authors consider that the leaf-variations in *perfoliatus*, *praelongus*, etc., are not true hereditary variations, but are due to light-intensity and soil constituents. There are no varieties of *P. perfoliatus*, but only growth forms. They also think that the fruiting capacity of a hybrid such as *P. angustifolius* depends upon a high light-intensity. The variation of Lake-land *P. alpinus* appears also to be due to varying light-intensity. Even with *P. polygonifolius*, var. *pseudofruitans* Syme the authors consider it to be a deep water state, and they agree with Fryer, who states that "the texture and shape of leaves are too inconstant to afford satisfactory ground for varietal distinction." There is, however, something to be said in favour of some notice being taken of these varying forms which, if unrecognised in our text-books, are a source of great trouble to the student. It is an excellent and valuable paper.

2508 (2). POTAMOGETON FOLIOSUS Raf. in *Med. Repos.*, ser. 2, 5354, 1808, var. *DIFFUSUS* Arth. Bennett in *Rep. B.E.C.* 860, 1922. *P. pauciflorus* Pursh *Fl. Am. Sept.* ii., 121, 1814, and *Ind. Kew.* This American alien was discovered in the Exeter Canal, near the

Double Lock, Devon, by Mr W. S. M. D'URBAN in 1921. It has something of the look of *pusillus*. Just as another American plant, *Sagittaria heterophylla*, which is found in the Exe, has different characters from the American type which induced Mr Hiern to give it the varietal name, *iscana*, so, too, Mr Bennett considers the Devon form of *foliosus* to differ sufficiently from the type—itsself a variable species—to be worth distinguishing as var. *diffusus*, characterised by the loose branching stems, longer internodes, longer peduncles and fruits developed in larger numbers on the peduncles. The question has been asked—how came these two American species in the Exe and its canal? Miss Ida M. Roper sends the following answer:—“ I am told there need be no hesitation in putting the cause to the smart sailing vessels that have discharged salted fish in the heart of Exeter city for generations past from Newfoundland and Labrador. After the fish is landed there are always many cart loads of birch-wood and ling put on to the quay for removal as firewood, and the refuse is swept away. This wood is gathered each spring from off the moors of Newfoundland, and may well contain seeds of various water-loving plants, and the fresh water of the canal would favour germination.” We also append the following note on the plant by its discoverer, Mr W. S. M. D'Urban:—“ I went to the Exeter Canal on 18th August, 1921, to collect aquatic plants, and on my arrival at the Double Locks my attention was at once attracted by the narrow floating leaves of a *Potamogeton*. Although it was at some little distance from the canal bank I managed to get some specimens. I think it must have been a recent introduction to the canal, as I have not observed it there before, and it does not appear to have been noticed by any of the Exeter botanists who visit the canal. It, however, may have long existed in the Exe though it has only now been noticed in the canal, just as *Sagittaria heterophylla* has spread from the 'Haven' Banks of the river into the canal. In October 1911 the lock gate at Double Locks, having been found to be much decayed (being, it is said, 90 years old), was being repaired. By some unfortunate oversight the lock gate at Turf, at the entrance of the canal some 4 or 5 miles off, was left open, and the tide flowed in as far as Double Locks. When the canal was subsequently emptied it was found that large numbers of fresh water fish (pike, roach and dace) and Anodontas had been killed, and I saw

numbers of them lying dead at the bottom of the canal on 14th October. Many vessels put into Exmouth Docks and the Bight at Starcross on the western side of the river from various places. That seeds can be floated up the river by the tide is shown by the fact that seeds of Samphire (*Crithmum maritimum*) were deposited in crevices in the river wall here 5 miles from the sea by an unusually high tide and sprung up, the plants remaining for several years until destroyed by passers-by. There has been but little traffic on the canal since 1914. An occasional onion boat from Brittany and I think a schooner with salt cod from Newfoundland are all I can remember having seen going up the canal to Exeter. Formerly there was a large trade with Newfoundland, and many cargoes of salt fish arrived annually. The interiors of the holds of the vessels were lined with slabs of bark stripped off large trees, probably Hemlock Spruce. If this *Potamogeton* is found in Newfoundland it seems possible that its seeds may have been brought to Exeter adhering to the bark which perhaps had lain in fresh water in some river or lake before being brought to the coast for the use of the shipping."

2535. *SCIRPUS TABERNAEMONTANI* × *TRIQUETER* = *S. ARUNENSIS* mihi. River Arun, above Chichester, W. Sussex. The size, the glaucous colouring and its growing in the absence of *S. lacustris* point to *S. Tabernaemontani* Gmel. as one of the parents. G. C. DRUCE.

2542. *S. SETACEUS* L., var. vel forma nova *PEDICELLATA*. In *Rep. B.E.C.* 153, 1920, I drew attention to a form of this species which Lady Davy and I found near Woking, Surrey, in which some of the spikes were borne on short stalks. Dr Ostenfeld thought this might be from some of the lower flowers having dropped, but Mr Trapnell has this year sent me from Walton Moss, N. Somerset, a large plant about 11 in. high in which several of the young spikes are stalked. Others on the plant are sessile. I can find no such form mentioned. G. C. DRUCE.

2627 (2). *CAREX MICROGLOCHIN* Wahlenberg in Vet. Akad. Handl. Stockh. 140, 1803. Spica floribus fem. 4-10, masc. subquinis; fructibus reflexis, lanceolatis, arista ex ore integro exserta

filiformi recta subulatis, semiteretibus, tenuissime striatulis.
Syn.:—*Carex aristata* Clairv. Man. 209, 1811; *Uncinia microglochin* Spreng. Syst. iii., 830; *U. europaea* Gay in Flora 26, 1827. Exsicc.: Ahlberg, Kongsvold, 3000 ft., 1870, Fries Herb. Norm. iii., 85; Zetterstedt, 1870, Fl. Scand.; Unio Itin., 1828; Jamtland, Suec., Sept. 1872; Windisch-Garsten, Austr. sup., 1864, Schultz Herb. Norm.; Switzerland, 1826, Schleicher; Altai, 1827, Gebler; Bernina, Helv., 1886, Druce; Dovrefeld, Norge, 1922, Druce. Ic.: Flora Danica, t. 1402; Lindm. Svensk Fanerogam 119, f.5; Blytt Norge Fl.; Coste Fl. de Fr. iii., 493, t. 3804. Distr.: Greenland; Lapland; North Sweden; N. & S. Norway; Iceland; Savoy; Piedmont; Lombardy; South Tyrol; Bavaria; Swabia; Lithuania; Altai; Caucasus; Thibet; Himalaya; and now Scotland. The nearest ally to *C. microglochin*, and the only one for which it might be mistaken, is *C. pauciflora*. It may readily be distinguished from that by its more numerous female flowers, 4-10, as against 2-4. They are also aggregated in a denser spike, and the fruits are of a darker colour. These have a basilar setiform appendage (bristle) longer than the utricule. This is absent in *pauciflora*. The utricule is fusiform-subulate, compressed, attenuated at the base and is longly narrowed into a short beak. The British plants exactly resemble the plants I gathered on the Dovrefeld last year, and vary from 4 to 10 cm. in height. Some mid-European specimens are much taller, and reach to 20 cm. The rootstock is stoloniferous, but forms denser tufts than *pauciflora*; the leaves are chiefly basilar, are shorter than the stem, and are smooth and setaceous; the spikelet is solitary, terminal, short, and androgynous, the males about 6 at the top, the females, 4-10, below; the glumes are dull, reddish-brown, oblong (in *pauciflora* they are pale and lanceolate), the style short, included, with three stigmas; the utricles are reflexed when ripe about 6 mm. long, finely nerved, attenuated, and longer than the glume, and, as has been said, are furnished with a bristle at the anterior base which is longer than the utricule; the achene is oblong trigonous. Habitat: In rather bare, marshy places, with *Kobresia*, *Juncus triglumis* and *Carex atrofusca*, at about 2500 feet on Meall Garbh in Coire nam Buidheag (the Yellow Corrie). Discovered by Lady Davy, in company with Miss Gertrude Bacon, July 25, 1923. After 80 years the members

of the Society once again made some combined outdoor investigations. One party visited Jersey in June, and on that occasion Miss Vachell and Mr T. Attenborough added *Orchis militaris* to the Jersey flora. Other plants gathered are still under investigation. In July Mr Williamson and the Secretary visited Caenlochan, Golspie, Thurso, Bettyhill, Alltnaharra, Durness, Inchadamph, Grantown, Braemar, etc., and another party, under the leadership of Mr Foggitt, visited Forfarshire, Ben Vrackie, Sow of Atholl, Ben Lawers, Craig Cailleach, Meall Garbh, Sky, Ben Nevis, Glen Spean, etc. On the visit to Meall Garbh Lady Davy and Miss Bacon were behind the rest of the party, and in two separate boggy places each noticed a sedge resembling *pauciflora* and collected specimens. On her return to Surrey Lady Davy consulted Coste's *Flore de France* and Blytt's *Norge Flora*, and became convinced that the sedge was not *pauciflora* but *microglochin*. She sent me specimens for confirmation. A glance was sufficient to enable me to send a wire of congratulation on this important addition (which I had long sought for) to the British flora. It is especially satisfactory since Lady Davy and Miss Bacon have done a vast amount of work not only for the Wild Flower Society, for which they have been untiring referees, but for botany in general.

Lady Davy's discovery of *Carex microglochin* is so important an addition to the British flora that it was considered desirable to visit the locality to see under what conditions the plant grew. Therefore I went north to Perth, where Mr R. H. Corstorphine kindly met me and motored me to Kenmore. Two days were occupied in visiting various places in Glen Lyon. Then a third expedition was made, in company with Mr D. Haggart, Major, Mrs, and Mr Launcelot Fleming, Mrs Douie Urquhart, the Rev. W. M. Gillies, Mr R. H. Corstorphine, and Mr T. Churchill, to the Yellow Corrie in Glen Lyon, where, after a stiff walk of about five and a half miles, we found the sedge at 2500 feet altitude. It grows on the grassy mountain slopes in places where the runnels open out in flattish spaces, forming micaceous shallow bogs where the vegetation is sparse and small. It avoids the more sloping and grassy places over which the water trickles, and in which *Carex capillaris* and *C. saxatilis* delight to grow. The latter sedge occurs in a small and scattered form, but it also does grow with *microglochin*, which has

as its associates *Carex dioica*, *C. atrofusca*, a small form of *C. flava*, *C. Goodenowii*, *Juncus triglumis*, and rarely *Kobresia*. In such habitats *Carex microglochin* was tracked up to an altitude of 3000 feet. A few specimens were found as tall as five inches, but usually they are from three to four inches only. On the slopes between these micaceous bog-terraces grow *Silene acaulis*, *Saxifraga oppositifolia*, *Juncus biglumis*, *Juncoides spicatum*, *Sagina saginoides*, and other alpinics now mostly over flower. The higher rocks show *Salix herbacea* and *reticulata*, *Cerastium alpinum*, *Pseudathyrium alpestre*, *Polystichum Lonchitis*, but the *Hieracia* were over flower or non-existent. This season has been exceptionally poor in these species; indeed to most mountain vegetation the mild spring, then the heavy fall of snow in May, followed by dry weather, caused the alpine species to be very sparse and poor. On August 25th the *Carex microglochin* was over-ripe, and the fruits began to drop when gathered, so that they are not good examples for the herbarium. It is evident that *microglochin* does not like running water, but prefers a shallow micaceous bog with no great amount of competing vegetation; in fact, the conditions in which it grows in the Dovrefeld are repeated in Scotland. In Norway it is associated with *Eriophorum Scheuchzeri* and *Carex capitata*—plants at present unknown in Britain. The discovery of *microglochin* raises hopes that these and *Konigia*, *Juncus arcticus*, *Carex cespitosa*, and *Epilobium lactiflorum* may yet be found in Britain. One may add that in the Yellow Corrie *Carex pauciflora* was found plentifully at 1500 feet with *C. binervis*. G. C. DRUCE.

2643. SPARTINA TOWNSENDII Groves. A paper on the occurrence of this grass in France by MESSRS CORBIERE & CHEVALLIER is printed in the Bull. Soc. Linnéenne de la Seine Maritime iii., 1923. They say that having compared it with specimens in L'Herbier du Museum de Paris they find it "offre notamment une extrême ressemblance avec les spécimens de l'Herb. Jussieu étiquetés *S. glabra* Amer. Sept. (Torrey) 1834 et ceux de l'Herbier V. Jacquemont, Long Island (Cooper 1824). On observe la même robustesse de la plante, les mêmes feuilles, les mêmes épis et en aussi grande nombre (3 à 12) les épillets ont même forme et mêmes dimensions mais ils sont glabres dans la plante de Torrey et de Cooper. Toutefois,

dans sa Monographie des Spartina d'Amérique, E. D. Merrill (U.S. Dept. Agric. Bull. No. 9, 1902) décrit *S. glabra* Muhl., var. *pilosa* Merrill à qui il a donné comme synonyme *S. stricta* auct. Amer., non Roth = *S. stricta maritima* Scribn., qui a les épillets velus et dont la description correspond de tous points avec celle de *Townsendii*. Cette variété vit sur la côte Atlantique, de la Pensylvanie à la Floride. En comparant à ces mêmes plantes le *S. Neyrauti* Fouc. du golfe de Gascogne, on constate qu'il est tout à fait conséquent à la plante d'Amérique. En résumé, *S. Townsendii* et *S. Neyrauti* designent une même plante. Ce n'est nullement un hybride né sur les côtes d'Europe, mais c'est une plante importée de la côte Atlantique de l'Amérique du Nord, le *S. glabra* Muhl., var. *pilosa* Merrill = *S. alterniflora* Lois., var. *pilosa* Merrill. Hitchcock (*Gen. of Grasses of the United States*, Bull. 772, 1920, U.S.A. Dept. of Agric.). Son appellation d'après les règles de la nomenclature doit être désormais *S. glabra* Muhl., var. *Townsendii* (Groves) Corb. et Chev. More recently (p. 308) M. Pierre Senay records it as occurring at the Pointe du Hoc, near Le Havre.

2653. PHALARIS MINOR Retz., forma CYLINDRICA Weber et Thell. in Nederl. Kruidk. Archief. 129, 1916, and 131, 1917, et Latin descr. in Viert. Nat. Ges. Zurich 64, 700, 1919. Southampton, J. RAYNER. Det. Dr THELLUNG.

2657. ANTHOXANTHUM ODORATUM L., forma vel var. RAMOSUM mihi. Mr W. WILSON has sent me from the neighbourhood of Lumsden, N. Aberdeenshire, a specimen of the Vernal Grass in which the inflorescence is compound, consisting of five spikes, each about an inch long. G. C. DRUCE.

2662. ALOPECURUS PRATENSIS L. A specimen gathered by R. GRIERSON on the Glasgow Tips in 1922, Dr THELLUNG says recedes towards the sub-sp. *ventricosus* (Pers.) Thell.

2684. AGROSTIS ALBA L., forma nova SUBBIFLORA Kloos, in Nederl. Kruidk. Archief., 1921. Haec forma differt ab Agrostide alba normali spiculis nonnullis bifloris inter unifloras intermixtis.

2751. DACTYLIS GLOMERATA × ASCHERSONIANA. O. HOLMBERG in *Bot. Not.* 327, 1923.

2769. *POA ANNUA* L. Mr F. BAKER (*Gard. Chron.* ii., 149, 1923) asks if it is a perennial, and states that as the result of his observations he finds that in Lancashire it is a perennial, and forms a good grass for bowling-greens in many of which it forms a considerable proportion of the turf. Prof. Hackel some years ago named a plant which I collected in Caithness, var. *perennans*. Mr George Nicholson, some long time ago, in the *Gardeners' Chronicle* stated that the grass-plots near Westminster Abbey were almost entirely composed of this species. There perhaps it is in the typical annual condition.

2828 (2). *AGROPYRUM CAMPESTRE* Gren. & Godr. Fl. Fr. iii., 607. *A. glaucum* Reichb. Exc. i., 20, non Desf. Epi raide, allongé, lâche, distique, simple ou quelquefois rameux; rachis très rude, non cassant. Epillets un peu écartés les uns des autres surtout les inférieurs, dressés et appliqués contre l'axe, oblongs, comprimés, compactes et renfermant de 5 à 9 fleurs. Glumes presque de moitié longues que l'épillet, peu inégales, linéaires-oblongues, subaiguës, mucronées ou brièvement aristées, étroitement scarieuses aux bords, fortement carénées à 5-7 nervures saillantes qui atteignent le sommet. Glumelle inférieure obtuse brièvement et obtusément mucronée; glumelle supérieure ciliée. Feuilles allongées, glauques et très rudes en dessus, fermés, étalées, distiques, planes, longuement atténuées au sommet, munies à la face supérieure de nervures saillantes rapprochées, qui ne laissent pas voir le parenchyme et sont armées d'un rang de petites pointes aiguës. Chaumes dressés raides entremêlés de tige non florifères, moins étroitement fasciculés que dans *pycnanthum*. Souche longuement rampante. Plante de 6-12 décim. Gren. & Godr., *l.c.* This has small spikelets, glumes not awned and not conspicuously acute, the spikelets arranged as in *pungens*, flattened and distichous. It is a less robust plant than *pungens*; the leaves are glaucous, nearly flat and as are the sheaths and glumes, glabrous. The plant is more tufted than *intermedium* Host, the glumes, not so obtuse, are mucronate and only narrowly scarious. Chichester Harbour, West Sussex, July, 1917. Abbé Coste retains it as a distinct species. It forms a passage from *pungens* to maritime forms of *repens* though nearest to *pungens*. G. C. DRUCE.

2380. *A. REPENS* Beauv. Quack Grass. United States Dept. of Agriculture, Farmers' Bulletin, n. 1307, 1923. Gives the distribution and history of this agricultural pest. It has been found in every State north of Florida and Arizona and extends northwards to the limits of cultivation being common near Sitka in Alaska. It seldom thrives above 2000 feet altitude. It appears to have been first recognised in America by the Rev. Jared Eliot of Connecticut, a friend of Benjamin Franklin, in 1751 and in 1813 Muhlenberg detected it in New Jersey and New England. It entered Iowa and Wisconsin in 1875 and Minnesota in 1890. At the present time the scene of the most active spread is in the prairie provinces of Western Canada. It is found as a weed in Argentina and Australia. Dodoen in 1572 says "it is a naughty and hurtful weed to corne" and we may add that its earliest notice in English botanical literature is in Gerard of 1597 who says it grows "in gardens and arable grounds as an infirmitie and plague." An illustration is given of the inflorescence which shows more than one variation. Other illustrations given are of its subterranean growth and the two long curved horns at the base of the young leaf. Not only is it very destructible to small grain crops and market gardens but it acts as a carrier of *Puccinia graminis*. As one might expect from its vigorous root-development it is a poor seeder, and even the seeds are feeble germinators—from 30 to 50 per cent. only. Its best method of eradication is by shallow ploughing (3 inches, or in meadow land 3-6 in. deep) as the rhizomes can then be easily harrowed out. Deep ploughing covers them with soil and helps to spread them. Buckwheat as a cover-crop is also recommended. A fine plate of such a crop is given. Even tar-paper, as a cover, has been used, but mineral poisons and low grade oils are too expensive. Hog pasturing has been found effectual as the hogs are fond of the underground stems which are nutritious. Indeed they are useful when made into a decoction as a demulcent drink. About 250,000 pounds were annually used in the U.S., most of which came from Germany. The leaves have been used as a coarse hay which is easily harvested: indeed it forms a noticeable percentage in the hay which reaches the Boston market. As a pasture grass it quickly becomes sod-bound and dies out. It can also be used in silage. During the war the seeds were ground into

a coarse flour and were used freely in southern Bavaria where it was considered superior to other wheat substitutes. Coffee-substitute was also made from the roasted rootstock. This Bulletin shows the excellent help given to the farmer by this most energetic Department.

2830. *A. REPENS* Beauv., var. nova *LEPTUROIDES* Murr. *Planta humilis, inflorescentia rigida, compacta, folium summum haud multum superans*, J. Murr. This we gathered at Kirby-le Soken in N. Essex on June 17, 1917. The whole plant is under nine inches high. G. C. DRUCE.

2832. *A. VIOLACEUM* (Hornem.) C. Richt. *Pl. Eur. i.*, 123, 1890. See *Rep. B.E.C.* 864, 1923. I intended to send a note on this to the Distributor's *Report* last year but had not time. Lindman (*Svensk Fanerogamflora* 106) cites, with queries, as synonyms *Triticum violaceum* Hornem., *Agropyron Donianum* F.B.W. and *Triticum biflorum* Brignoli. The plant grows in turf, not in cultivated ground, on the Dovrefeld.

2866. *EQUISETUM MAXIMUM* Lam., Anomalous Traces in the Cone of. Lady ISABEL M. P. BROWNE in *Annals of Botany* 595, 1923.

2876. *PTERIDIUM AQUILINUM* Kuhn. In *Journ. Bot.* 7, 1923, W. R. MAXTON treats of the type-species of *Pteris* which is shown to be *Pteris longifolia*. Of the 19 species of *Pteris* in the *Sp. Pl.* eight belong to the section containing *longifolia*. This view is also adopted by Christensen. Our British Bracken comes under *Pteridium* which was established by Scopoli in 1760. Schinz and Keller (*Flora der Schweiz* 11, 1923), however, choose Newman's *Eupteris*, which, of course, is much later than the *Pteridium* of Scopoli.

2879. *PHYLLITIS SCOLOPENDRIUM* Newm. Under the name *Scolopendrium vulgare* Professor W. H. Lang, F.R.S. (*Journ. of Genetics* 167, 1923) has a paper on the genetic analysis of a heterozygotic plant which was supposed to have come from Skibbereen, Co. Cork. Spores were sown, and the plants behaved like a hybrid of the F 2 generation. One half of the frond of an indi-

vidual was entire, the other incised. The progeny, when the spores were sown together, showed segregation of the entire-leaved and incised-leaved characters. There were about 75 per cent. of the former and 25 per cent. of the incised. The incised-leaved plants bred true, behaving like extracted recessives. The two entire-leaved plants of the F₂ generation that have been bred from have segregated in the same way as the original plant. They behave as impure dominants, the entire-leaved character being completely dominant to the incised-leaved.

2893. *POLYSTICHUM ACULEATUM* Roth, var. *GRACILLIMUM* Cranfield. At a meeting at the Horticultural Club held on Feb. 27, 1923, at the Hotel Belgravia, Mr W. B. CRANFIELD, the President of the Pteridological Society, delivered a lecture reported in the *Gardeners' Chronicle*, 137, on Hardy British Ferns. He said that in Lowe's *Handbook* of 1908 over 1700 varieties are described, of which more than 1300 were wild finds, many of them quite unworthy of record. Since that date many more have been found. The lecture was copiously illustrated with lantern slides of the various varieties. The one figured in the *Gardeners' Chronicle* is the above, which has a singularly graceful habit. Mr Cranfield states that the spore-production in ferns is on an immense scale. It is calculated that a single vigorous plant of the Lady Fern may produce annually 1,120,000,000 spores, every one of which is capable of producing an individual plant.

NOTES ON PUBLICATIONS, NEW BOOKS, ETC., 1923.

(*Owing to exigencies of space and the erratic receipt of foreign works this is necessarily incomplete.*)

ALMQUIST, ERNST. Alexis Jordan und die Kleinarten, in Svensk Bot. Tidskrift 521, 1923. Studien über *Capsella Bursa-pastoris*, ii., in Acta Hort. Berg. 40-95, tt. 16, 1923.

ASCHERSON & GRAEBNER. Syn. der Mittel-Europ. Flora. Lfg. 107, 1923. Caryophyllaceae, Nymphaeaceae, Ceratophyllaceae, Ranunculaceae.

BATTANDIER, J. A. Essai sur les Rarétés de la Flore Algérienne, in Bull. Soc. d'Hist. Afr. du Nord 280-4, 1922.

BAYER, Dr AUG. On Protecting Nature in Slovakia, in Vestnik 108, 1923.

BOODLE, L. A. The Bacterial Nodules of the Rubiaceae, in Kew Bulletin 346, 1923.

BOSE, Sir JAGADIS CHUNDER, F.R.S. THE PHYSIOLOGY OF THE ASCENT OF SAP. pp. 277. Longmans, Green & Co., 1923; 16/-. The question how the water absorbed by the root is raised to the top of a tall tree has exercised the ingenuity of physiologists for centuries, and has received a variety of answers. These answers may be classified as either physical or physiological. The former attribute the phenomenon to the action of physical forces, evaporation, etc.; the latter regard these forces as inadequate, and urge that the energy of the plant itself must play an important or even the chief part. The physiological or "vitalistic" view has been in abeyance since Strasburger's work on the subject in 1893, whilst the physical view has been strengthened by the ingenious researches of Professor Dixon. Sir J. C. Bose now comes forward to reassert, with greater definiteness than ever before, the truth of the physiological view, and adduces in this book a mass of experimental evidence in support of his contention. The nature of his evidence is briefly this:—(1) it is well known that the movements of plants, growth, sleep-movements, etc., are affected in definite ways by changes in the external conditions—temperature, light, and moisture, and by mechanical or chemical stimulation; (2) experiment shows that the ascent of sap is affected by the changes and stimulations in precisely the same manner as are the movements. The inference to be drawn is obviously that, inasmuch as it is accepted that the movements of plants and induced changes of movement are the expression of the contractility and irritability of the living protoplasm, *i.e.*, that they are "vital" phenomena, it necessarily follows that the ascent of sap is likewise a function of living protoplasm, *i.e.*, it is a "vital" and not a "physical" process. The experimental evidence consists of a wealth of observations, substantiated by a large number of automatic records

obtained by newly devised, highly sensitive and accurate apparatus which is fully described and illustrated in the book. It points to the existence throughout the plant of certain pulsating cells which, by their alternate contraction and expansion, pump the sap upwards from the root to the topmost leaf. The actual position of the pulsating tissue was ascertained in several cases by means of a specially ingenious instrument, the electric probe, and it was found to be a ring of cells enveloping the stele in the stem of Dicotyledons, and the individual vascular bundles in that of Monocotyledons. Investigation was not, however, limited strictly to the ascent of sap; it included also the allied phenomena of transpiration and exudation (bleeding). On the same general method, but with appropriately devised apparatus, observations were made demonstrating that these are both vital functions. The question of the share of evaporation in the transpiratory process is finally determined. The primary act is the excretion of water by the living transpiring cell; evaporation merely removes the excreted water. Transpiration and exudation are shown to be closely connected; they are two modes of the excretion of liquid by the plant. Particularly interesting are the accounts of experiments relative to the effect of light of various intensity and wave-length on these processes. It will be recognised, even from this inadequate summary, that Sir J. C. Bose's book is the most important contribution of recent times to the elucidation of the problem of the distribution of water in plants. S. H. VINES.

BOSE, Sir JAGADIS CHUNDER, F.R.S. LIFE MOVEMENTS IN PLANTS. pp. xx., 599-992, tt. 107. Longmans, Green & Co., 1923. This is composed of vols. iii. and iv. of the Transactions of the Bose Institute. The present two volumes contain an account of Sir Jagadis' "investigations on geotropism, on dia-heliotropic attitude of leaves as regulated by transmitted nervous impulse, on assimilatory and dissimilatory changes under light, on new methods of recording the effects of protoplasmic changes under stimulus, and also of various methods and appliances for detection of the two fundamental reactions to which all plant movements are due." As Sir Jagadis says in his preface, "with regard to the geotropism of higher plants, electric investigations have been described which

lend support to the theory of statoliths, indeed practically confirm it. Investigations by means of the electric probe have made it possible to explore the interior of the plant, and map out the excitatory changes from layer to layer under the stimulus of gravity." The work gives an explanation of the wonderful series of experiments the author has devised. To those who have seen him perform these very delicate investigations he seems to have justified his contentions; indeed his claim "that it is possible to unravel the complexity, and discover a generalisation for the life-movements in plants" seems fully warranted. The results of these experiments show how closely related is the whole of animate nature, and that vegetable tissue seems to be as responsive to poisons, irritants or punctures as that of animals.

BOTANICAL ABSTRACTS. Published monthly under the control of Botanical Abstracts, including Societies now represented, and the Members of the Board of Control. Williams and Wilkins Co., Baltimore, U.S.A. Editor in Chief, J. R. Schramm, Nat. Research Council, Washington, D.C.; Taxonomy of Vascular Plants, J. M. Greenman, Missouri Botanical Garden, St Louis, Missouri; Assistant Editor, E. B. Payson, University of Wyoming, Larimie, Wyoming, U.S.A. Vol. xii., 10 dollars 80 cents, post paid. A cumulative index to vols. 1-10 is now ready. The author's index contains about 26,000, and the subject index 60,000 entries, and occupies a volume of about 500 pages, price about 10 dollars. Address—Botanical Abstracts, Ithaca, New York, U.S.A.

BOTANY, JOURNAL OF, 1923. Edited by J. Britten. Price, 22/6. Among other papers, some of which are mentioned under the species, there are three by Mr H. N. Dixon on Dr Stirton's New British Mosses Revised, p. 10, 46, 69. Notes on Carnarvonshire Plants, by H. W. Pugsley, p. 19. Distribution of *Euphrasia* in Cornwall, by F. Rilstone, p. 54. Spitsbergen Lichens. This refers to specimens gathered on the Oxford University Expedition in 1921 by R. Paulson, p. 77. *Statice vestita*, a Dalmatian plant, with a plate by C. E. Salmon, p. 97. Cryptogams from the Antarctic, by O. V. Darbishire, p. 105. *Dryadodaphne*, a new Genus of the Lauraceae, from New Guinea, by S. Le M. Moore, p. 109. George

Clifford's Herbarium and the Hortus Cliffortianus, by A. B. Rendle, p. 114. *Thymus lanuginosus* in Herb. Miller, by A. J. Wilmott, p. 136. Ehrhart and the Supplementum Plantarum, by J. Britten, p. 148. Variable Aestivation of *Ranunculus bulbosus* and *R. acer* by L. A. M. Riley, p. 209. A New *Veronica* from Bulgaria. This is named after our member, Mr W. B. Turrill, *V. Turrilliana*. It belongs to the *Chamaedrys* section, and occurs at Malko Tirnova in south-eastern Bulgaria, by Prof. N. Stojanoff and B. Stefanoff, p. 219. *Lloydia serotina* by J. Britten, p. 225. *Echium polycaulon*, by C. C. Lacaïta, p. 259. The Saline Flora of Staffordshire, by Rev. H. P. Reader, p. 278. Notes on some Oriental Onosmas, by C. C. Lacaïta, p. 280. New Guinea Plants, by H. O. Forbes, Supplement.

BOWER, Prof. F. O. THE FERNS (FILICALES). Analytical Examination of the Criteria of Comparison. An enquiry into the method of comparative study of the class of Filicales, due attention being given to the Fossils which illuminate their history. Vol. 1, pp. x., 259, and 307 figures. Cambridge University Press, 1923; 30/-. The clarity of style which greets him in the preface puts the reader at once into full sympathy with the important work. Taking as his text a sentence of Stevenson's, he tells us that to travel hopefully is the chosen pursuit of all who study large groups of organisms with a view to reducing them to order, so as to throw light on their origin and evolution. In such quests, he warns us, "no one need expect under present conditions to arrive at the final destination of complete and assured knowledge. If any one should indulge this hope his disappointment is certain. . . . It is in the pursuit of evolutionary history, not in the arrival there, that the true blessedness of the morphologist lies." To take part in such a quest the student can have no better guide than this beautifully prepared and copiously illustrated volume, which reflects great credit upon its author and upon the Cambridge Press, which has produced it in so good a guise. We are also very glad to see that the author has adopted the nomenclature of Fern names used by Christensen in his *Index Filices*, so that the Hartstongue is *Phyllitis scolopendrium*, the Male Fern, *Dryopteris Filix-mas*, the Jersey Fern, *Anogramme leptophylla*, and the Bracken, *Pteridium*

aquilinum. In connection with this comes a minor criticism. The reader should have seen that only one name is used for a genus. In the case of the Male fern and its allies, actually four names are employed. On p. 2 it stands rightly as *Dryopteris* (*Nephrodium*); on p. 326 it is *Lastraea* (more correctly *Lastrea*); on p. 323, etc., it is *Nephrodium*, and in the Index, p. 351, by a slip, it is *Drynaria*. Probably no other botanist could have presented such a philosophical study of Fern history as Prof. Bower. It is indispensable to any laboratory worker or teacher on a subject which lies outside the range of most field-botanists' investigations. Yet the able manner in which most difficult points are explained and demonstrated suggests the desirability for all those who can spare the expense to have it on the shelves of their library. The concluding volume, we trust, will soon be produced, laborious though its production must be, yet "the true success is to labour."

BOTANISKA NOTISER, 1923. As usual, this publication contains many papers of interest. Einige neue *Alchemilla* arten von Mt. Elgon, E. Africa, by Th. C. E. Fries. Sp. nonnullae novae Marocco by S. Murbeck. Svenne Polygon arter by G. SAUNNERSON.

BRAUN-BLANQUET, J. et MAIRE, R. Contributions à l'Etude de la Flore Marocaine. Bull. Soc. d'Hist. Afrique du Nord 13-22, 180-195, 1922; 73-77, 1923.

BRITISH BRYOLOGICAL SOCIETY. Report for 1923. President, Mr H. N. Dixon; Gen. Secretary, Mr D. A. Jones, M.Sc.; Secretary, Miss E. Armitage; Treasurers, Mr J. A. Wheldon, M.Sc., and Rev. R. Jackett. An excellent Report of 40 pages, with obituary notices of W. H. Pearson and William Ingham.

BRITTON, N. LORD, & ROSE, J. N. THE CACTACEAE. Descriptions and Illustrations of Plants of the Cactus Family. Vol. iii., pp. 255, tt. 24. Washington, Carnegie Institute, 1922.

BULLETIN SOC. BOT. DE FRANCE, 1923. *Spartina* in the French Flora, p. 54.

CHASE, AGNES. FIRST BOOK OF GRASSES. The Structure of Grasses explained for Beginners. Rural Text-Book Series. Ed.,

L. H. Bailey. pp. 121. The Macmillan Co., New York, 1922; 6/-. Miss Chase is an acknowledged expert on the grasses, and one feels confidence in her not only thoroughly knowing the subject, but how to teach it to others. Hence although the examples selected by her are grasses of the United States, yet any British botanist who wishes to understand what they are accustomed to think a difficult group will do well to study this excellent text-book, for by its aid half the British genera will be made intelligible, and the remainder will easily fall into their proper places. As she says, this primer is really an elementary study of the morphology of the spikelet. She illustrates the distaste which beginners have for technical terms by saying no boy learns a trade, no girl learns to sew, without learning the names of the tools used. It is easier to say glume than the little green scale on the outside of the thing with the seed in it. The tools needed for the examination of grasses are few—a lens, magnifying about 10 diametres, and one or two dissecting needles. The nail of the left forefinger is most useful in dissecting. A scalpel is useful, but the small sharp blade of a penknife will answer instead. Black paper or cardboard is recommended to be used on which to place the spikelets, as the hairs on the different parts show up well on this background. A typical flower has (1) first glume, (2) second glume, (3) lemma, (4) palea. (The genus *Poa* is characterised by its 5-nerved keeled lemma). In this latter point the grass differs from a sedge as the latter never has a palea. Glumes and lemmas are, morphologically, reduced leaves: the lower pair not flower-bearing, are glumes, the flower-bearing ones are lemmas. A spikelet consists of glumes and florets in two ranks and alternate on the rachilla, the florets consisting of lemma, palea and enclosed flower. The teaching in this elementary portion is concise and clear, and the diagrammatic summary of the primary characters of the tribes excellent. An outline study of a grass plant is given, suggesting points to be observed. An example is also selected by which a grass may be run down by a Key, but it is most wisely added, "the name reached in the key is verified or rejected by reading the description in the text and noting how the characters of the plant agree with those specified. When the description does not apply to the plant in hand, one must return to the key and try again."

CHIPP, T. F. Notes on Upper Guinea Flacourtiaceae, in Kew Bulletin 265, 1923. New Species of *Rinorea* from West Africa, *l.c.* 289, 1923.

CLEMENTS, FREDERICK E. The Ecological Method in Teaching Botany, in New Phytologist 98, 1923. Contents, Methods and Measurements in the Teaching of Elementary Botany, *l.c.* 191, 1923.

COATES, H. A PERTSHIRE NATURALIST: CHARLES MACKINTOSH OF INVER. pp. xx., 244, tt. 32. T. Fisher Unwin, 1923; 18/-. Charles Mackintosh was born in 1839. He was the son of a weaver at Inver, near Dunkeld. Like Robert Dick and George Don, he had the love of nature, and during his long round of about 16 miles as a village postman on a weekly wage of 16/- he found time to collect and study not only the flowering plants and ferns, but the cryptogams, especially the Basidiomycetes of his area. He added four species new to science, and thirteen new to Britain. Dr Buchanan White introduced me to him in the eighties, and I found him keen and intelligent. He died last year.

COCKAYNE, DR L. FLORA OF NEW ZEALAND IN DIE VEGETATION DER ERDE. Edited by Prof. A. Engler and Prof. O. Drude. Vol. xiv., pp. xxiii., 364, 2 maps, tt. 65. G. E. Stechert & Co., New York. This is well executed, both from a floristic and from the ecological side. The alpine flora of these beautiful islands is especially noteworthy as nearly 50 species are confined to the mountains, which have in addition nearly 500 lowland species. No fewer than 561 species are endemic. The outlying islands of the group have 55 endemic species. The presence of the sub-antarctic element in the flora, Dr Cockayne thinks, points to a former bridge of land or chain of islands which linked the group to an antarctic continent or to South America or Tasmania. Hybridism in the New Zealand Flora, in New Phytologist 105, 1923. The writer has divided the natural hybrids which occur in New Zealand into two groups:—(1) hybrids between species, and (2) hybrids between the varieties within an aggregate species. About 128 hybrids are given, but he thinks the number is certainly too small. Of the 'hybrid between species of wide range, often belonging to the same associations, which frequently grow in close proximity,

where the opportunity for crossing is at the maximum " the number is 27, those when the " parent species only meet occasionally " number 13. Of " hybrids between species of different, but considerable, latitudinal range, which, from a definite point, grow in close proximity for a certain distance " 30 occur. The hybrids in the closely allied groups (4) and (5), the latter of which consists of hybrids between species usually growing under dissimilar ecological conditions which occasionally come together, number 50. Hybrids between species of more or less limited range which frequently grow together number only 5. Mr Cockayne makes no allusion to the interesting fact which Sir Joseph Hooker mentions that *Sonchus asper* and *oleraceus*, which very rarely hybridise in Britain, do so frequently in New Zealand. The examples he draws from native plants are highly instructive. My own experience suggests that plants brought from a different area are more apt to hybridise than when two species live side by side in their native home, so too when the health of the species has been reduced and its life is at a low ebb. In certain genera where the mutual sterility of the allied species has broken down, the offspring, when fertile, seem more prone to cross with other species. Such fluid genera as the Roses, Brambles, Willow-herbs leap to the mind, and they stand in a somewhat different category to wind-fertilised plants such as the willows and grasses.

CORREYON, H. Album der Orchidées. 66 coloured plates, pp. 66, 1923.

CUMMING, LINNAEUS. LIST OF THE PLANTS FOUND IN THE COUNTRY AROUND RUGBY. pp. 48, 1923. Our member has performed a useful service in bringing together the various plant-records connected with the district surrounding Rugby School, of which for many years he was the popular Science Master. The former list, published by the Natural History Society of the School, was issued about 1875, and was restricted to ten miles around Rugby. The present area is not so strictly limited, since we notice Barnack in Northamptonshire is quoted for *Hippocrepis*, *Astragalus danicus*, *Aceras*, *H. Gymnadenia* and *Orchis pyramidalis*. If that distance from Rugby has been

uniformly adopted the List might have been greatly increased in numbers. Edgehill, Kenilworth, and Groby Pool in Leicester are also given. Indeed *Anemone Pulsatilla*, *Hypochaeris maculata*, *Senecio integrifolius*, *Orobanche major* are, among others, plants of the Barnack area. *Melica nutans*, the two Hellebores, *Melampyrum cristatum*, *Orchis praetermissa* are also in the vicinity. It would have been well to have put the name or initials of county in which the plants occur, as it is not easy for the stranger to know which is meant, or whether the species is common to two or three counties, if indeed Leicestershire localities come in. Among the queries which arise in going through the List we may select a few. *Fumaria muralis*, Rectory garden at Harborough Magna, W. O. Wait. This is almost certainly an error. Probably *F. Boraei* is the plant meant. *Lepidium (heterophyllum) alatostylum*, Ufton Wood. Has this been seen by an authority? Bagnall does not record it. I have seen *L. campestre* there. Surely *Viola silvestris* is to be found in the area. It is plentiful in Whittlebury Forest, Northants, and Ufton Wood, Warwick. On the other hand I have not seen *V. canina* (which is said to be common) near Rugby, a district, however, of which I have only a slight knowledge. *Elatine hexandra*. "Seeds of this species came down from a specimen of *Montia* gathered in a cart rut at Frankton Wood," seems cryptic, and requires elucidation. "*Rosa agrestis inodora*." Bloxam's plant from Harborough Magna is *R. Blondaeana*. "*R. Andrzejovii Sherardi*" can hardly be guessed at. The difficulty of using a specific name in two senses is to be seen under "*Crataegus Oxyacantha* L., the Hawthorn Hedge Plant," which is said to be doubtfully wild. *C. oxyacanthoides* is presumably meant, but it is certainly native in Ufton Wood and elsewhere. It is not the common hedge plant, that being *monogyna* as almost invariably sent out by nurserymen. By "*Callitriche palustris*" *C. stagnalis* Scop. is presumably meant. I have seen it near Rugby. *Crepis taraxacifolia*, only given for Bretford, is common. I have seen it at Ufton Wood, etc. One very much doubts the record of *Hieracium crocatum*. I have seen *H. brunneocroceum* on the railway between Rugby and Coventry. Is not *Leontodon nudicaule* to be found in the area? Baxter found *Jasione montana* on the Hill Morton Road. Perhaps it has been destroyed. There was a small

but rich bit of heathland there. Surely *Cynoglossum* is found nearer Rugby than Barnack. It is plentiful at Cosgrove, Northants, and I have seen it about Stratford-on-Avon. *Cuscuta epithymum* is not the Flax Dodder. *Euphrasia nemorosa* occurs in the area. *Polygonum mite* is given from "watery places" without precise locality. Bagnall does not include it for Warwickshire. Is it correctly named? The difficulty which arises when a name has been used in two senses is met with in regard to the Elm. Which "*Ulmus glabra*" is intended? I have seen the Wych Elm, *U. montana*, and the smooth Wych, *U. carpinifolia*, in the area as well as the English Elm and Plot's Elm. Two only are mentioned, neither native. It would be interesting to know if *Carpinus* is native in Brandon Wood. It is said that "*Quercus Robur* in hedges and woods is not naturalised." Presumably it is a true native of the area. *Salix rosmarinifolia* is reported by Mr Thomas from two stations in Newbold, as an escape from gardens where it has been cultivated. Additional information on this would be greatly valued, as so little is known about its existence in Britain. *Populus nigra* is doubtless *P. serotina* which occurs near Rugby, but I have seen the true *P. nigra* near Tamworth, etc. It is more than likely that the *Orchis latifolia* mentioned is really *praetermissa*, and that the *O. maculata* "from all our woods" is almost certainly *O. Fuchsii*. *Habenaria bifolia* may be added to the List. I saw it in Ufton Wood last year. Do both *Juncus compressus* and *Gerardi* occur at Napton reservoir? Bagnall thought all the Warwickshire plants belonged to *Gerardi*. *Carex extensa* from canal side near Hill Morton is an error. It is a littoral species. Mr Cumming kindly sent me the specimen, which is not *extensa*, but an abnormal form, possibly of *C. acutiformis*. *C. Oederi* from a pool outside Brandon Wood is most likely *C. flava*, var. *oedocarpa*, which occurs. Another misnomer is *Koeleria vallesiana* from the slopes of Brandon Castle. If correct, it would be a very important record. Of course *Melica nutans* means *M. uniflora*. The true *M. nutans* occurs in Northants in Bedford Purlieus. One wonders if the unlocalised *Bromus arvensis* is correctly named. It is only adventive in Britain. The Dallington *Valerianella* proves to be *V. olitoria*, not *eriocarpa*. Mr Cumming, as the pages of our *Reports* show, has devoted much attention to Rubi, and a considerable number of im-

portant records have been made by him which enrich our *Reports*. We are especially glad to see that Botany is once again coming into its own at Rugby.

CURTIS' BOTANICAL MAGAZINE, under the editorship of Dr O. Stapf, is having a new lease of life, and has produced some excellent numbers during the year. Annual subscription, 63/- net. H. F. Witherby, 326 High Holborn, London. 165 of the early drawings, 1830-1834, for Curtis' *Bot. Mag.* have recently been presented to the Royal Gardens, Kew, through the kindness of Mr A. Bilney, who had previously given them to the Horticultural Society. See *Kew Bulletin* 176, 1923.

DALGLEISH, E. FITCH. OUR WILD FLOWERS AND HOW TO KNOW THEM. pp. 127. Thornton Butterworth, London, 1923; 4/-.

DALLIMORE, W. & JACKSON, A. BRUCE. A HANDBOOK OF THE CONIFERAE, INCLUDING GINKGOACEAE. pp. xii., 574, tt. 32. Edwin Arnold, London; 42/-.

DALLMAN, A. A., F.C.S. THE FLORA OF FLINT AND DENBIGH. To subscribers, 21/- a copy. Orders to A. A. Dallman, 17 Mount Road, Higher Tranmere, Birkenhead. The work promises to be a very complete and scientific one, and should be supported as far as possible by our members.

DANSER, B. H. Bijdrage tot de kennis van eenige Polygonaceae, in *Nederl. Kruidk. Arch.* 208-249, 1920. De *Nederl. Polygonum-bastaarden*, *l.c.* 154, 1921. Bijdrage tot kennis der *Nederl. Rumices*, *l.c.* 167-228, 1921. De *Nederl. Rumex-bastaarden*, *l.c.* 231-271 et no. ii., *l.c.* 1-36, 1922. Contribution à la Systématique du *Polygonum lapathifolium*, a thèse, in aula der Universteit van Amsterdam, June 29, 1921. Five new *Rumex* hybrids in Holland, in *Rec. des Trav. botan. Heerlandsis* xix., 293, 1922. Describes *Rumex Kloosii* (*dentatus* × *maritimus*), *R. Didericae* (*maritimus* × *obovatus*), *R. Thellungii* (*dentatus* × *obovatus*), *R. Hagensis* (*Patientia* × *pulcher*), and *R. upsaliensis* (*dumosus* × ?).

[DAY, F. M.] FLOWER LIST. The Downs School, Colwall, 1923. This is a list, arranged in the alphabetical order of the English

names, of about 440 species found within reach, that is about 4 miles, of Colwall School, near Malvern, mostly on the Herefordshire side of the Malvern Hills. It seems quite carefully and accurately prepared, and includes some interesting plants, including the introduced *Bupleurum fruticosum* and *Polemonium caeruleum*. *Rumex sanguineus* is doubtless a misnomer for *R. condylodes*. There is no mention of *Sagina Reuteri* (which may be outside the zone) nor are the Rubi, Rosaceae, Hieracia and Naiadaceae included.

DOBBIE, H. B. NEW ZEALAND FERNS. pp. 394. Whitcombe and Tombs, 1921; 35/-.

DOMIN, Prof. KARL. Dichotomy and Chorisis. Bull. Intern. de l'Acad. de Sciences de Bohême, April, 1923. Contributions to the Morphology and Teratology of Plants, *l.c.* May 1923. Coleophylly in *Ranunculus bulbosus*. Evolution of leaves in *Sambucus nigra* and *Ononis spinosa*. An interesting ecological form of *Thymus ovatus* Mill. The coalescence of the flower-bearing stems of *Ranunculus Ficaria*. A simple sympodium in *Capsella Bursa-pastoris*. A Phytogeographical Outline of the Zonal Division in the Western Carpathians besides some general remarks on the main Forest Trees. Fac. des Sciences de l'Univ. Charles, 1923. A delightfully interesting account of a fascinating district illustrated with beautiful photographs of the High Tatras, the Barrens of Liptov, the limestone Alps of Bela, the virgin beech forest in Western Slovakia, and of *Pinus Cembra* in the High Tatras. Outlines of the Flora of Slovakia and Subcarpathian Russia and its Classification in Natural Districts, in Vestnik, 23, 1923. New Additions to the Flora of Western Australia. pp. 123, Prag, 1923. The paper was prepared in 1912 and its publication has been delayed owing to the war. Much of it is from unworked up material collected by Capt. A. A. Dorrien-Smith, D.S.O., and Dr E. Clement which is at Kew. A large number of new species are described including *Protea glabriflora*, *Corospermum Dorrienii*, *Grenvillea crassifolia* and *Loboana*, *Dryandra Dorrienii*, *Leptomeria Rohleanae*, *Billardiera Dorrienii*, *Mirbelia trichocalyx*, *Jacksonia calycina*, *Gastrolobium crispifolium*, *Dillwynia incerta*, *Acacia Inceana*, *A. cupularis*, *A. Goadbyi*, *Pelargonium Haviasae*,

Boronia Vilhelmii, *B. tenuior*, *B. integrifolia*, *Platytheca juniperina*, *Amperea Podyperae*, *Stackhousia occidentalis*, *Hibbertia quadricolor*, *Chamaelaucium confertiflorum*, *Melaleuca Dorrien-Smithii*, *Eucalyptus agnata*, *E. Dorrienii*, *Lysinema Ewartianum*, *Solanum Inceanum*, *Calocephalus Priceanus*, etc.

DREWITT, F. DAWTREY. THE ROMANCE OF THE APOTHECARIES GARDEN AT CHELSEA. pp. 106. Chapman & Dodd, Ltd., London and Sydney, 1923. The history of so early an established Physic Garden as that at Chelsea, which is the second oldest in England, dating as it does from 1670, cannot be without romance. It was an idealistic institution associated with commercial surroundings. Founded by the Apothecaries Company, whose motto is "Opiferque per orbem dicor" it mingled in symbiotic union the professional and the commercial; and the garden was an evidence of the Company's appreciation of the higher mandate. Thomas Johnson, a celebrated botanist, and an old member of the Apothecaries Company, was one of the founders of Botanical Field Clubs. He was himself an explorer of the mountains of Wales, became the author of the *Mercurius Botanicus*, and edited the second edition of Gerard's *Herbal* in 1634. He had a shop in Snow Hill close to the Fleet and there, says Dr Drewitt, he showed the first bunch of bananas to be seen in London, which he hung in his window from April 10 to June 10, 1633. This bunch of bananas is engraved on the artistic title page of the *Herbal*. Dr Drewitt narrates in a graceful style the Garden's history through the various reigns, and illustrates the text with some charming photographs. Its history was not unchequered. Like the apothecaries themselves the garden was always in a condition of straitened means, albeit they started with a moderate rental of £5 per annum. At that time, Dr Drewitt reminds us, Chelsea was in the country—"it had its cornfields, pasture, common land, and its village by the water. It was bounded on three sides by rivers—two of them small streams." The largest, the Westbourne brook, formerly flowed by Westbourne Terrace into Hyde Park. Of this stream the present Serpentine is a relic. Half a century later Sir John Hill had his physic garden on its banks not far from Lancaster Gate where in an inundation great harm was done to his treasures. Dr Drewitt points out that the

huge iron tube which can be seen over the heads of passengers at Sloane Square Station conveys the water of this old Westbourne brook to the Thames near the grounds of Chelsea Hospital. At the time of the Garden's foundation many fish were caught in the Thames at Chelsea Reach and the nets had good hauls of salmon in the spring. In 1682 the garden was visited by Dr Hermann of Leyden. Many of his specimens were acquired by Sherard and are now at Oxford. Four Cedars of Lebanon were obtained from Leyden and of these one remained as recently as 1903. In 1732 they bore the first cones produced in Britain. The immortal Ray alludes to the Chelsea Cedars in his Philosophical Letters. The author gives a pleasing account of the discovery of Cinchona, of the appointment of Samuel Doody and James Petiver, the latter acting as Demonstrator of Botany. Dr Drewitt alludes to the grotesque and imperfectly drawn depiction of animals by Petiver and other scientists of his time as compared with their excellent delineation of plants. He explains this as being caused "by the plants being more accessible, and that they were perfect sitters. Not so the Animals." Yet in the early ages of man, in the pictures drawn by the Cave Men, the reverse occurs. The animals caught in the chase or which they had domesticated are drawn with realistic vigour while scarcely a representation exists of a plant or tree. Even in the early ages of Greek art the figures, for instance, on the Vaphian cup of the bulls in fierce action are so finely depicted that the race of the animal may be recognised, whereas the trees under which the combat or the capture takes place are so conventionally drawn that it is rather a guess than a real identification which enables one to suggest they are olives. About the year of the great Storm Sir Hans Sloane became the landlord and in 1722 he conveyed the Physic Garden with its greenhouses, etc., to the Company for a yearly payment of £5. There were conditions attached to this agreement which were made in the interests of general science. An excellent account is given of Sir Hans Sloane and the history of his illness. It might well be made more widely known, now that tuberculosis is so much in evidence on public platforms or in the public press. When a lad of 16 Sloane had severe haemorrhage and was laid up for three years, yet he mended and in time became a most popular and successful physician dying at the advanced age of 93. This

case is almost paralleled by that of Sir Andrew Clark. His life is not the least romantic episode which Dr Drewitt has so skilfully detailed in these delightful pages. Sloane founded the British Museum. Sloane Street commemorates his name and life and not unhappily, as we are told, "it is very long, obviously prosperous and perfectly straight." Then comes the advent of the Millers, and we are told how Philip published his *Gardeners' Dictionary* in several editions. One of these, issued in 1754, is the earliest botanical book to appear after the first edition of Linnaeus *Species Plantarum* in 1753. This work of Miller's has been ignored by continental compilers, yet Linnaeus generously and justly said it is a "Dictionary not only of Horticulture but of Botany." Linnaeus visited Miller but Miller was not impressed with him and thought him ignorant, especially of Botany, but it must be borne in mind that Miller resented the ignoring of some of the Tournefortian genera. Sir Hans Sloane, too, was bored with Linnaeus. At Oxford Dillenius received him coldly and in an aside to Dr Shaw said "this is the young man who would bring confusion into Botany," but hearing Linnaeus discuss *Linaria Cymbalaria* so excellently he became an admirer and in a few days offered to divide his not too liberal stipend if he would stay and work with him at Oxford. This offer was not accepted, but in return Linnaeus connected the name of Dillenius with the *Dillenia*, a genus of plants "of all plants the most distinguished for the beauty of its flowers and fruits as Dillenius is distinguished among botanists." And so with one link after another with the past the charming narrative goes on, so that in addition to the work of Field and Semple on the Chelsea Physic Garden we have this eminently readable book which has made the dead bones of the past live again.

ELEY, CHARLES. GARDENING FOR THE TWENTIETH CENTURY. pp. 256, tt. 28. John Murray, London, 1923. This clearly printed, well written, and copiously illustrated volume is designed to interest beginners in the most fascinating of all pursuits and to lead him or her in the right paths, so that their efforts may be of more than transitory value and produce gardens of real beauty. The author, years ago, was introduced to one of the leading lights on garden lore. At the end of a most useful interview the renowned horticul-

turist asked of his interviewer "Who was it inoculated you?" He was told. "Well," was his comment, "you got hold of the right virus." The reader of Mr Eley's book may certainly claim that he went to the right source for information and if he has not been a complete success, the failure—greater or less—will be in no sense due to the manual he has consulted. Many of the beautiful illustrations have already appeared in the pages of *Country Life*. Mr Eley gives great praise to the Royal Botanical Gardens at Kew, and rightly so, since their contiguity to the besmirched neighbourhood of a great Capital with its unstinted smoke-cloud renders the success it has reached all the more praiseworthy. But as Mr Eley says, the time has come when another garden or gardens for the wonderful output of Chinese discoveries, due to such explorers as Farrer, Kingdon Ward and others, should be established in Britain. As he points out the wonderful Arnold Arboretum in Massachussets has been increased to 250 acres with an endowment of well nigh a million dollars. Edinburgh and Glasnevin are rightly praised as is Cambridge Botanic garden with its many fine trees. The Oxford garden possesses the finest *Sophora japonica* in Britain but the area is too small for large trees. It is high time that the University of Oxford established an Arboretum to link up the grounds of Magdalen College with the Parks, and its outgrowth into the Marston fields and this, without any huge expenditure, might well be made of extraordinary beauty and utility, although the limey gravel alluvium would necessarily shut out many species. The author's hints on public parks and how they should be planted, are most valuable. One is glad to see that due commendation is given to the arrangement of the Victoria Park at Bath which is a delightful thing of its kind. How little attention, and that too frequently not of the right order, is paid to the planting of parks or open spaces in Britain. Yet the English people are notoriously fond of flowers as the thousands who visit Bushey Park on Chestnut Sunday show. In 1921, 1,236,308 people visited Kew despite the prosaic journey from the Metropolis. Mr Eley has a charming chapter on the delights of Canon Ellacombe's garden at Bitton which although not larger than two acres had an extraordinary number of interesting trees and shrubs. One may also recall the great beauty and interest of St John's garden at Oxford which, like

Canon Ellacombe's at Bitton, had a presiding genius in the late Rev. H. J. Bidder. There are excellent chapters on garden-making and on the choice of soils, "the ideal being a deep and sandy loam free from lime." Two important factors to bear in mind are "wind and excessive sunshine" and the motto to remember is "festina lente." "Repose should be the prevailing characteristic of a satisfactory garden" and a loggia is a most desirable addition. Having acquired a suitable site the question arises as to what plants should be put in it. On this critical subject excellent advice is given. For shade purposes, in gardens large enough to hold them, young trees of the Horse Chestnut are recommended. They should be planted in an irregular group about 14 feet apart. This will give room enough for tea-parties to shelter under. The Norway Maple is also suitable for such a purpose. The Black Italian Poplar is recommended as a quick growing tree, but to the writer it is the abomination of desolation when planted in small gardens or near a house and, Mr Eley says, "planters who rightly value the blessings of posterity will avoid the use of them." But a good word may be said in favour of *Quercus Cerris*. Personally I love the *Ilex* if there are red brick walls about. Box hedges, too, in a sunny corner near an old brick wall are delightful. One is glad to see a good word is said in favour of the cheerful *Viburnum Tinus*, and the bright *Berberis stenophylla*. The Bamboos are warmly praised and an excellent figure of *Arundinaria fastuosa*, which has erect stems over 20 feet high, is given. He rightly says the maker of a permanent garden must resign himself to the prospect of constantly and vigilantly moving certain of his plants from time to time. How true this is will be acknowledged by any visitor to Westonbirt, for there he will see what magnificent effects have been obtained by careful and thoughtful removals of shrubs and trees to the most suitable situations. The author is strong in his praise of yew hedges and holly holds a good second place. He correctly alludes to the neglect of the hornbeam in England. Anyone who has seen the walls of verdure given by the hedges of Hornbeam at Versailles or Schönbrunn will feel what justice there is in his complaint. He gives due praise to the evergreen oak as a material for a tall hedge. How well it forms a background for a pergola of rambler roses may be seen at Goodwood. Mr Eley brings into notice the

Chinese *Lonicera nitida* as having great claims for those who want a hedge of 3 to 6 feet within the garden. There is a suggestive chapter on Conifers and a very useful one on Maples, *Aesculus* and other deciduous trees. Mr Eley's name is connected with the very beautiful hybrid, *Pyrus Eleyi*, a crab-apple with reddish-purple foliage, rich vinous-red clustered flowers, and purplish-red fruit like a Morella cherry. Good illustrations are given of it in several stages of growth. A high place is given to the silver lime, *Tilia petiolaris*, with its cascades of foliage. One lingers over each page of this well written book and one is tempted to quote freely from it, but enough has been said to prove that it is a work which should be in the possession of all those who love gardens and gardening. To any who are tempted to begin gardening the advice of the author is "Do not loiter too long at this entrance gate, but drive steadily on, and good luck to you."

EVANS, A. H. THE NATURAL HISTORY OF WICKEN FEN. Edited by J. Stanley Gardiner, F.R.S. and A. G. Tansley, F.R.S. Bowes and Bowes, 1923. In this compact and useful little work our member, Mr A. H. Evans, gives (1) The Fens of the Great Level, their Drainage, and the effects on the Flora and Fauna; (2) Full List of Plants growing in the Old Fen Land at Wicken; (3) The Terriers of Wicken and Burwell Fen Estates. Mr W. Farrer supplies part (4), the Lepidoptera of Cambridgeshire. The English Fenland Mr Evans estimates as having an area of about 73 by 36 miles. It lies in the counties of Lincoln, Norfolk, Suffolk, Cambridge, Northamptonshire and Huntingdonshire. The present Wash is a diminished remnant. The island of Ely is one of the ridges of the Jurassic beds which escaped the cutting out of the fen-basin. Five separate horizons of submerged forests have been determined in the peat districts, the two lowest of yew and oak, the two next of fir, and the highest of alders, willows, hazels and even gorse. These five periods of forest growth were followed by five periods of swamp which were sufficient to kill large trees. The earliest post-glacial vegetation must have consisted of plants which grew with their roots or even their stems in water. The Romans, during their occupation, set about a wide system of drainage banking out the sea along the coast line of Lincolnshire, Cambridgeshire, and part

of Norfolk. They cut the Car Dyke from Lincoln into Cambridge-shire as a catchwater for the upland streams. Six and a half centuries passed between the departure of the Romans and the appearance of the Norman invaders without witnessing any great extension of the drainage system. Mr Evans quotes a vivid description from the twelfth century *Liber Eliensis* which shows the condition of things at that time "when Stags and Roes were to be found in its groves." The history of the drainage scheme carried out by the Earl of Bedford and his fellow adventurers which was completed in 1653 is given. Whittlesey Mere was drained in 1851-2 which resulted in the extinction of the Large Copper Butterfly. The special object of this book is to describe Wicken Fen which, owing to the generosity of Mr G. H. Verrall and of the Hon. N. C. Rothschild, has been definitely preserved in its undrained and uncultivated condition for the nation. It consists of over five hundred acres, and it is hoped that eventually about six or seven hundred acres may be secured. No one can speak with greater knowledge about the Birds than Mr Evans. He tells us that the Bittern boomed in this area until 1868. A full list of the plants growing in the old fen land at Wicken is contributed. It numbers about 190 species. Among the more interesting are *Ranunculus Lingua*, *Viola stagnina*, *Rhamnus Frangula*, *Aster salignus* (but another species is said also to grow there), *Liparis Loeselii*, *Orchis praetermissa*, *Potamogeton coloratus*, *Cladium*, *Schoenus*, *Carex lasiocarpa*, *C. elata*, *C. paradoxa*, *Alopecurus fulvus*, *Calamagrostis canescens*, and *Dryopteris Thelypteris*, *Senecio paludosus* being extinct. I think, however, *Carex Oederi* may be added to the list. The rare pondweed hybrid, *P. perpusillus* Hagstr. = *P. coloratus* × *pusillus* was found by Mr Bennett in Burwell Fen which may be just outside the limit from which the list is prepared. We may congratulate the author on compiling so useful a handbook and may take this opportunity of saying how pleased Mr Evans's numerous friends will be to hear of his recent doctorate.

FYSON, Prof. P. F. THE INDIAN SPECIES OF ERIOCAULON. pp. 88, tt. 51. Methodist Publishing House, Madras, 1923.

GAMBLE, J. S. FLORA OF THE PRESIDENCY OF MADRAS.

Ebenaceae to Scrophulariaceae. pp. 769-962. Adlard & Son & West, Newman, London; 1923; 10/-. *Neohouzea*. A New Genus of Bamboos, in Kew Bulletin 89, 1923.

GANDOGER, M. L'Ascension du Mont Ida, Ile de Crète. Bull. Soc. Bot. France, 80-84, 1922.

GARDENERS' CHRONICLE, 1923. Price 6d weekly. 5 Tavistock Street, Covent Garden, W.C.2. This publication maintains a high standard of excellence. On p. 8 there is an illustration of *Iris germanica* taken from an old MS., presumably, as Mr Savage says, of about 1500, which is preserved in the town of Poitiers in the Bibliothèque Municipale. There are fifty pages of rather coarse vellum painted with 101 subjects which, with the exception of two, are native to the district round Poitiers. The figures are painted in body colour, a similar method to that employed in the brush-drawing of the Dioscoridean plants of the sixth century. The inscriptions are written, says Mr Savage, in the fine rubricating ink that never seems to fade and comprise the names of the plants, with in some cases the medicinal qualities, and even the habitats. Mr Kingdon Ward continues his interesting account of his seventh Expedition into China and enumerates a wonderful list of species. Ken Wood. One hundred acres of this estate have been purchased at £1350 per acre the whole of which has been obtained by voluntary subscription. It will eventually be handed over to the London County Council. No part of the woodland has been acquired, but it is hoped that the habitat of the May Lily, *Unifolium Bifolium*, may be protected. A few more acres have been subsequently obtained. An illustration is given of *Ceropegia Brownii* at the base of a huge boulder in Uganda which is said to be its only known habitat. On p. 77 valuable details about Jane Loudon are supplied by Mr Britten. On p. 92 Mr Savage returns to the subject of flower-painters and gives a fascinating account of Jean Bourdichon (1457-1521) who prepared a vellum manuscript called *Livre d'Heures de la Reine Anne de Bretagne* which is preserved in the Bibliothèque Nationale and at one time belonged to Louis XV. who allowed the botanist Antoine de Jussieu to take it home for study. "Never before or since has such a wonderful prayer-book been

produced, for the beautiful miniatures of plants which decorate it constitute a valuable early Florilegium. It contains 3337 paintings of divers plants. They are executed in body colour on a gold ground which is edged at the side with bright red, the same colour forming a base for the French name which is written in gold." Beautiful illustrations of the Black Currant, as painted by Bourdichon, are given. Camus gave a complete account and an alphabetical list, under the old French names, of the plants painted by the artist in the *Journ. de Botanique* vol. viii., 1894. Prof. Small, p. 244, gives the results of propagating by cuttings in acidic media. It has been found that watering cuttings of Privet, *Veronica*, *Chrysanthemum*, etc., with 1 in 10,000 of acetic acid stimulated in a marked degree the striking of these plants. Illustrations are given to show this. On p. 260 Mr Savage gives the earliest illustration of the Potato plant from a painting in the Plantin-Moretus Museum at Antwerp. The painting was sent to Clusius in 1589. See his *Rariorum Plantarum Historia*, 1601. Mr Savage says it is reasonable to suppose that *Solanum tuberosum* originated in Chile. It is called to mind that the portrait of Gerard affixed to his *Herbal* of 1597 in which he is depicted as holding a potato plant in his hand, bears the date 1598 in its description. On p. 320 there is an excellent account of Patrick Neill of Edinburgh, the author of *A Horticultural Tour*, published in 1823. Much interesting material is given, but there is no reference to his friendship with George Don. Neill took a great interest in him and in his children, and he wrote a Biographical Sketch of Don. See *Scots Mag.* July 1809. On p. 329 an account is given of the presentation of Dr Lloyd's herbarium to Kew. The plants, 250 in number, were collected in 1825-43, and include some Channel Isles specimens—*Ononis reclinata*, *Ornithopus pinnatus*, and *Salvia Marquandi*. p. 359 gives an account of the Tercentenary of the Oxford Physic Garden, and on p. 22, July, pt. 2. is printed the address delivered by Sir David Prain on that occasion. On p. 52 there is a portrait of Sir W. Thiselton-Dyer. On p. 169 *Anemone ranunculoides* is said to be native of some districts in England. This is not correct. It is only rarely naturalised in Britain. p. 172 gives an account of a garden of Evergreen Shrubs at Malonya in Czechoslovakia. On p. 219 *Erica vagans* L., var. *St Keverne* is

said to be one of the most striking and valuable additions that have been made to our garden *Ericas* for some years. On p. 244 there is a portrait of Dr Daydon Jackson, the genial Secretary of the Linnean Society.

GATES, R. RUGGLES. A Peculiar Type of Variability in Plants, in Journ. of Genetics 13, 1923, with 24 text figures. Further valuable notes on *Oenothera* and *Nicotiana*, especially in connection with the size of corolla in cultures of *O. biennis* and *rubricalya* crosses.

HANDEL-MAZZETTI, Dr H. Floristische Mittheilungen aus dem Salzkammergute, in Verh. Zool.-Bot. Gesell. in Wien, p. 118, 1923. Shows that *Thymus pulegioides* L. is the oldest name for the plant we formerly called *T. Chamaedrys* in Britain = the *T. ovatus* Miller. Nachträge zur Monographie der Gattung *Taraxacum*, in Oster. Bot. Zeit. 254-275, 1923.

HARVEY-GIBSON, R. J. BRITISH PLANT NAMES AND THEIR DERIVATIONS. pp. v., 50. A. & C. Black, London; 2/6.

HEGLI, G. ILLUSTRIRTE FLORA VON MITTEL EUROPA. Fig. 1247-1278, 1279-1381. F. J. Lehmann, München, 1923.

HJELT, H. CONSPECTUS FLORAE FENNICAE, vi. Scrophulariaceae-Dipsacaceae. H. Schildt, Helsingfors, 1923.

HOLM, THEO. Report of the Canadian Arctic Expedition, 1913-8, vol. v.

HUGHES, D. K. The Genus *Panicum* of the Flora Australiensis. *Streptolopus*, a new genus of the Gramineae from Angola, in Kew Bulletin, 171, 1923.

HUTCHINSON, J. Contributions towards a Phylogenetic Classification of Flowering Plants. Kew Bulletin 65 and 241, 1923. This able paper treats of the genera of the Ranunculaceae and Anonaceae. The author agrees in keeping Papaveraceae and Fumariaceae distinct. He would also separate *Hepatica* from *Anemone*, but still unites *Pulsatilla* with *Anemone*. A most useful Key to the genera is given. The affinity of *Rhododendron micran-*

thum, l.c. 299. *Primula calcophila*, the so-called wild form of *P. sinensis*, l.c. 99. In conjunction with Mr J. Burtt Davy a Revision of *Brachystegia* is given p. 129-163, 1923.

IRISH NATURALIST, 1923. Edited by R. L. Praeger. See *Erica stricta* in Co. Down, etc.

JACKSON, Dr B. DAYDON. LIFE OF LINNAEUS. Translated and adapted from the Swedish of Professor Fries. pp. xiv., 416. H. F. & G. Witherby, 1923; 25/-. Dr Jackson, who has done such good service to botanists by his "Index Kewensis," his "Glossary of Botanic Terms," his "Index to the Linnean Herbarium," and other works, has much increased our obligations to him by translating and condensing Professor Fries' Life of Linnaeus, and adapting it to English readers by explanations of Swedish life and terms which, without this help, would be difficult for us to comprehend. The interesting explanation which he gives of the surname of Linné will probably be new to many of us. From the genealogical tables given we learn that up to the time of the father of the great botanist the succeeding generations had been simply called (as was formerly the custom in Wales and part of England) by the addition of "son" or "dotter" to the Christian name of the father. Thus his father was Nils Ingemarson, his grandfather Ingemar Bengtsson, while his grandmother was Ingrid Ingemarsdotter, and her mother was Ingjerd Svensdotter. But his father, Nils Ingemarson, added to these names a surname, "Linne," invented from a famous Lime tree (in Swedish "Lind") which was an object of much superstition in the neighbourhood. From the same tree Nils' brother-in-law took the name of Tiliander, the last half being Greek, while yet another branch of his relatives chose a name, Lindelius, seemingly from the same tree. A superstition arose in these families that, if one of the three main branches of the tree should die, the corresponding family would die out. By 1823 the tree was dead, but we are not told by the genealogists whether all three families have died out. Plant lore seems thus to have been a favourite subject of the families on each side, and to have enshrined itself in the very name of the great botanist, giving us also another example of heredity culminating in the production of a genius.

Carl Linné was born 1707 in a cottage in the village of Rashult, in the tenth year of the reign of that extraordinary warrior, Charles XII., whose life and eccentricities have been so well described by Voltaire. Soon after the birth of Carl his father became rector of Stenbroholt, and moved into the parsonage there. In this place was spent his childhood in the midst of botanical studies, his father having imbibed from his uncle, Sven Tiliander, a love of botany and of gardening, with which he speedily imbued his little son. In 1714, at the age of seven, he was sent to school at Växjö, and we have an interesting picture of school life and of the then "curriculum." The boy soon acquired the name of "the little botanist," but his teachers seem to have been dissatisfied with his progress in every thing except physics and mathematics. The rest of the course consisted of Hebrew, Greek, Theology and Metaphysics, as a preparation for the priesthood, which was the destiny of most of the students. At the age of 16 he passed into the "Gymnasium"—the Upper School—and came under the guidance of Lannerus, the Rector, who, being a lover of plants, encouraged him and helped him in his study of them. He was also befriended by Rothman, the "lector," who was sure that the boy would become a famous doctor and who, as long as he lived, was almost a second father to him. Rothman also impressed upon him a very needful truth for those days—that a mere knowledge of names was not botany, and that in describing and classifying one must know the structure of the flowers, as, *e.g.* it was at that time set forth by Tournefort. After 12 years of Växjö school it was time for him to go to a university, and he returned home to prepare for this advance. It has been the fate of many a distinguished man to encounter opposition on the part of his parents to the life which his tastes and genius marked out for him, and Linné was an example of this wayward fate. His parents were agreed in the wish that he should become a priest but, after a struggle, they had to consent that he should become a physician. His first University was Lund, where Stobæus helped him much, and allowed the young enthusiast the run of his library and museum. But Dr Rothman advised him to go to the greater university of Uppsala, and from 1728 to 1731 he was a student there. We have now given us a most interesting picture, well worth perusal, of the state of the University and of

the students' life there. On his leaving home his parents could only provide him with a sum equivalent to £7 10s, so that we are not surprised to learn that he was soon plunged into the direst poverty. So poor was he that he even applied for the post of gardener in the botanic garden. But, as usual, his genius and enthusiasm soon made him a new friend, and this was Dean Olof Celsius, D.D., who in 1729 found him in the botanic gardens sitting and describing plants. Astonished at the knowledge of Linné, he treated him almost as a son, and invited him to share his meals. And it gives us a charming idea of the character of Linné to see how many friends he attracted to himself all through his life.

But the University seems to have been, at least as regards Botany and Medicine, in a most deplorable condition. The professors of Medicine, Rudbeck and Roberg, almost entirely neglected to lecture, and the "Medical Adjunct," Nils Rosen, was travelling abroad. The University Hospital was in a very bad state, and possessed no facilities for clinical teaching, not even a chemical laboratory. Equally deplorable was the condition of the Botanic Garden, and the only compensation was that our student had the use of the fine library, and that Roberg allowed him the use of his library as Stoboeus had done at Lund. About this time he made the acquaintance of Vaillant, who had written a tract on the sexes in plants, and the result of this was that Linné also wrote on the subject. His tractate gained him such an increased reputation that, though only 22 and still a student, he was asked to lecture in the Botanic garden.

Dr Jackson now graphically describes Linné's journey to Lapland. The reason for this expedition was that the collection which Rudbeck had made there had been destroyed in a disastrous fire. His adventures were such that one feels astonished that he ever returned to Uppsala. Food was scarcely to be got, and, when it was, it cannot be said that fish garnished with maggots was a tempting dish. There was also the sporting chance of being "potted" by a Lapp who might be suspicious of a stranger. On one occasion a bullet just missed him. But the whole story must be read to be appreciated. The term 1733-1734 was his last student year, and in 1734 he began other travels abroad. At Hamburg we have the amusing story of a strange monster which belonged to a

burgomaster. It possessed seven ferocious heads, but the experienced naturalist quickly perceived these to have belonged to seven weasels, whose conjoined body had been covered with a snake skin. The King of Denmark had offered £4,500 for this marvellous production of nature, but the burgomaster had been rich enough or foolish enough to refuse the money. No doubt the diagnosis of Linné soon leaked out, and for fear the burgomaster should make trouble over it Linné fled from Hamburg. At Leyden he was fortunate enough to secure a patron who paid for the printing of his celebrated "Systema Naturae." This modest production consisted of only eleven folio pages. At Leyden, too, he became acquainted with Boerhaave, a great physician, who persuaded him to look after the health and the zoological and botanic gardens of a wealthy man, Clifford, who took great interest in these subjects. This was at Hartecamp, a place between Leyden and Haarlem, and was the headquarters of Linné till in 1737 he thought it time to return home and claim his bride, to whom he had been engaged since 1735.

But to us the most interesting episode of this period is his visit to England where in Oxford he encountered Dillenius. "Encountered" is the right word, for at first Dillenius was extremely antagonistic, and called him "this young man who is bringing botany into confusion." However, Linné at last persuaded him to a conference, with the result that Dillenius was persuaded of the correctness of the views of Linné, and they became such friends that Dillenius tried to persuade him to settle in Oxford, and parted from him with tears in his eyes. From 1738 to 1741 he practised as a physician at Stockholm with such success that he was in attendance on the Queen who, as well as the King, was much interested in his botanical work. But the work of a Doctor was not really to his liking, and after his marriage he returned to Uppsala. There he was diligent in teaching and publishing and in getting the Botanical garden into order. Uppsala remained his home until his death. He was appointed by the King Professor of Medicine and Botany.

Dr Jackson now gives us Linné's own description of himself, for Linné was almost as fond of writing autobiographies as was Gibbon. "Rather short than tall," he tells us, "more lean than fat, with muscular limbs, large head, brown hair, brown eyes, pale

face, eyesight excellent, teeth bad, no ear for music." One of his pupils says that he was moderate in food, very abstemious in (alcoholic) drink, but drank coffee and used tobacco to excess. His son tells us "He rose early, lit his fire, and sat down to work. If he felt in the least tired he threw himself on his bed, slept at once, and was up again and at work in a quarter of an hour." We may well believe that there was great attraction in his character from the way in which, wherever he was, he gained friends and patrons. But for this he could never have surmounted the difficulties caused by his poverty. We gather too that, like his parents, he was of unfeigned piety. Over his bedroom door was inscribed, "Innocue Vivito, Numen Adest," and his queer little tract, "Nemesis Divina," consists of cases in which he thought that sin brought punishment in this world. Some are extremely amusing. He also, like Robinson Crusoe, drew up a list of things in his life for which he had reason to be thankful.

His great gift to the Naturalist world was his enforcement of the necessity of method and classification. "I was born a Methodist," he says. He classified mammals, birds, fishes, insects, even stones, as well as plants. In botany he first followed Tournefort, but soon rejected his system. After reading Vaillant he wrote (as we have seen) on the sexual system in plants, and adopted this as the basis of his classification, but he well knew that this was only an artificial system, and not the true system of nature, since it brought together, in many cases, plants of widely different nature. He tried therefore all his life to work out a true system in which affinities were to be determined by the sum of the characters of organs. He clearly set forth some natural families and laid the foundations of a true natural system. But he saw great difficulties in the way, and urged this plan upon others, saying it is "The first and last of desirable botanic objects." Like other men of genius, he was far sighted as to many points of future science, especially in botany. He studied the geographical distribution of plants, perceived the metamorphosis of leaves into pistil and stamen and floral envelopes, the discovery of which has been too hastily attributed to Goethe, and examined hybridisation, seed dispersal, sleep of plants, and protective growth. He surmised, in a lecture, that some diseases might be caused by minute animals or plants, and that

fermentation and putrefaction might be produced in like manner. As regards the theory which we too fondly conceive to be the discovery of our own days, Evolution, he began with laying down the principle that "Species tot numeramus quot diversae formae in principio sunt creatae," but in later writings he speaks of certain species as being "the daughter of the preceding species," which clearly involves some anticipation of Lamarck and other evolutionists, but, of course, without the conception of either of the *methods of its working* advanced by Lamarck or by Darwin. Another of his gifts to system was the introduction of the "trivial" names instead of the long and inconvenient descriptions which we find in their place before his time.

His health was extremely bad in the later years of his life, yet he lived to be 71, and died January 10, 1778. Ten years later the Linnaean Society was founded, and this keeps before us the name of the greatest botanical genius and the pioneer of classification in natural history.

DEUS CREAVIT, LINNAEUS DISPOSUIT.

And the importance of his work will be all the more clearly seen if we reflect that the classification of plants and animals must necessarily lead to the idea of family relationships, and so to our modern philosophy of natural history.

Professor Fries' Life will have left very small gleanings as to Linné for any future students of his life and work, and Dr Jackson's translation will doubtless remain for English readers *the* storehouse for all things relating to Linné, and a necessity for those who wish to extend their knowledge of the most interesting period in the history of botany. F. BENNETT.

JAMIESON, H. G., M.A. ILLUSTRATED GUIDE TO THE TREES AND FLOWERS OF ENGLAND AND WALES. pp. 148. Simpkin; Marshall, Hamilton, Kent & Co., London, 1923; 3/6. This little work gives a key to the Flowering Plants of Britain, with little illustrations of the flowers or important diagnostic characters. The Apetalae are omitted as well as the Pondweeds, etc. It will assist the beginner to overcome some of the stumbling-blocks which lie in his path.

JOHNSON, STANLEY C. GRASSES AND RUSHES, AND HOW TO KNOW THEM. WILD FRUITS AND HOW TO KNOW THEM. FLOWERING

SHRUBS AND HOW TO KNOW THEM. Holden and Hardingham, London; 2/- each.

JOHNSTON, Col. H. H. Additions to the Flora of Orkney, in Trans. Bot. Soc. Edin. 98, 1920-21.

KEW BULLETIN, 1923. Published by H.M. Stationery Office. This very useful and inexpensive publication contains an excellent Biography of Sir Isaac Bayley Balfour, and one reprinted from *Gard. Chron.* of H. J. Elwes. There is also a reference to the death, through a motor accident in Uganda, of Richard Arnold Dummer (p. 94). An announcement is made which will give British Botanists great pleasure, that our Editor and Distributor of last year's *Report* has been appointed assistant in the Herbarium (p. 128). There are "Diagnoses Africanæ," ten new species, on p. 180. On p. 239 there is a paper on "The Citation of Generic Names in the Index Kewensis." In the early volumes this dates from 1737, a date more recently altered to 1753, in order to comply with the *Vienna Actes*. It is suggested that for the earliest valid citation Dalla Torre and Harms' *Genera Siphonogamarum* should be consulted. This is jumping from the frying-pan into the fire, since the authors of the *Genera* have, in scarcely any instance, cited Hill's *British Herbal* or Miller's *Gard. Dict.*, so that *Asteriscus*, *Larix*, *Melilotus*, *Abutilon*, *Arisarum*, *Onobrychis*, *Lens*, *Castanea*, *Alnus*, and a multitude of other names have belated authorities cited for them. Adanson's *Famille des Plantes* is very frequently cited instead of the earlier work of Miller. This I pointed out in the pages of this *Report*, 426-440, where a full list of Miller's names, which have precedence over those given in the *Index Kewensis* or in most cases over those used in the *Genera*, are given.

KIRKWOOD, ESTHER J. C. PLANT AND FLOWER FORMS. Studies of Typical Forms of Plants and Plant Organs. A series of eighty full-page plates of Typical Plant Forms, Floral Diagrams, Sections, etc., intended primarily as an accompaniment to the ordinary textbook, but able, it is believed, to give pleasure to the many lovers of flowers and plant-life who are happily independent of teaching and examinations. Sidgwick & Jackson, Ltd., London, 1923; 7/6. The illustrations are well drawn and clearly repro-

duced and, although technical terms are perhaps too freely used, the drawings serve in most cases to explain them, hence the work is recommended to supplement an ordinary text-book which too often lacks such help. One mis-statement, doubtless due to the use of an old Manual, should be corrected in a future edition—namely this, “the Bee Orchid is not found in Scotland or Ireland.” This should be altered to “rarely,” since *O. apifera* has been found both in Ireland and Southern Scotland. The terms sympodium and monopodium might have been more clearly described. A useful Summary of Botanical Terms and a good Index are given. The glossary might have been made more useful by appending the page and figure which illustrate the particular word. The dissections of the Gramineae are good and useful, but examples of *Poa*, *Avena*, and *Agrostis*, etc., might well have been included.

KOORDERS, S. H. EXKURSIONSFLORA VON JAVA. G. FISCHER, Jena, 1923; 7 marks.

LARTER, C. E. Some Features of Plant Distribution in Devon. in Journ. Torquay Nat. Hist. Soc. 1923. On p. 34 it is stated that *Cicendia (Microcala) filiformis* growing in the Farrington district is said by me in Hayward's *Bot. Pocket Book* 132, to grow in Guernsey only. This is not so. I state that *C. pusilla* (a different species) is known from Guernsey only. *Herniaria glabra* L. (Miss Carr Smith) in the Torquay district and *Arenaria tenuifolia* L. are claimed as New County Records.

LEWIS, F. J., D.Sc. and TUTTLE, GWYNETH M., M.Sc. On the Phenomena attending Seasonal Changes in the Organisation in Leaf-Cells of *Picea canadensis* (Mill) B.S.P. New Phytologist, December 1923.

LINDSAY, ARCHDEACON T. S., B.D. PLANT NAMES. Nature Lovers' Series. The Sheldon Press, London, 1923; 2/6. Botanical names are not popular with the young botanist but they are indispensable. Even with their variation and instability they are greatly in advance of any so-called popular names which have a higher degree of variability and an immensely greater degree of uncertainty. The possession of this portable and well-printed

little work is strongly to be urged upon botanical beginners who dread the uncouthness of such names as *Deutzia* or *Helichrysum*. A perusal of this work will explain the reason for the use of certain names, their derivation, and much interesting material which hangs round them, and the reader will begin to realise that there is meaning and a plan which runs through such a deadly array of names as a *List of British Plants* contains. He will begin to distinguish those which are derived from the Greek (whence Botany sprung) and Latin, and he will begin to realise how significant such a name as *Erodium* becomes when its etymology is explained. A glance is given at plant history, beginning with Theophrastus and then carried on by Dioscorides and Pliny. The reader is told that our garden *Fuchsia* is named after the great herbalist, Leonard Fuchs, and that *Magnolia* commemorates Magnol. The author shows how in pre-Linnean days the name of a plant was a description of it. A tendency exists to-day to revive a lengthy nomenclature. The novice at Latin pronunciation will be comforted by the advice—"pronounce the names in any way you like, preferably in the customary way." Archdeacon Lindsay is frank enough to give a chapter on "Names whose meanings are not known." We are told that the Guelder Rose was originally the Elder Rose. The plant names which are derived from their Habitat, Use, Place of Origin, and many others are tersely discussed. There is a useful Index. The volume will give its user much food for thought. The price is very reasonable, and the work ought to have a ready sale.

LINNEAN SOCIETY, PROCEEDINGS OF THE. February 25, 1923. Canon G. R. Bullock-Webster exhibited a collection of thirty varieties of *Chara hispida*. He explained that in that genus varietal names are discarded as the variation is so great and so frequent that confusion would be the result were it attempted. March 15. Mr W. E. Hollows sent from Exmouth specimens of *Ranunculus Ficaria* with unusually bleached flowers. April 12. Dr Rendle describes the fruit of *Hippuris vulgaris*. The Linnean Gold Medal was awarded to Thomas Frederick Cheesman for his work on the New Zealand Flora. June 21. Mr T. A. Dymes describes the Seeds of the Marsh Orchids, a valuable contribution. June 7. The Geographical Distribution of some Transvaal Leguminosae, J.

Burt-Davy. Nov. 15. The Flora of Solomon's Pool, Miss E. M. Blackwell. It contains *Chara connivens* and *C. contraria*. Near by is *Euphorbia allepica*. Nov. 29. The Onosmas of Linnaeus and Sibthorp, Mr. C. C. Lacaíta. On the Function of the Bladders in *Utricularia vulgaris* L., C. L. Withycombe.

LITTLE, J. E. Notes on Norfolk Plants, in Trans. Norf. and Norw. Nat. Soc. 374, 1922-3. The plants noted are chiefly for the district of Wells, and include *Sonchus arvensis*, var. *angustifolia* Meyer, *Juncus diffusus* Hoppe, *Potamogeton panormitanus* Biv. (this I recorded in *Rep. B.E.C.* 141, 1884, for the first time as British from Wolferton, the specimen being subsequently verified by Dr Hagström) and a var. of *Rumex Hydrolapatheum* with narrowed leaf bases.

MACKENZIE, J. S. F. WILD FLOWERS AND HOW TO NAME THEM AT A GLANCE WITHOUT BOTANY. Ninth edition. pp. 228. Holden & Hardingham, London, 1923; 2/-.

MACSELF, A. J. ALPINE PLANTS. pp. 205. Thornton Butterworth, London, 1923; 7/6.

MACWATT, JOHN, M.B. THE PRIMULAS OF EUROPE. pp. 208, tt. 8 coloured, 41 plain. Country Life, Ltd., Tavistock Street, London, W.C.2, 1923; 12/6. For many years the enterprising publishers of *Country Life* have gladdened thousands of readers by producing one of the most charming illustrated weekly publications in existence. It gives specially artistic views of the stately homes of England and its Isles, of Country pursuits, and most truthful representations of animal and plant life. In a distant century what a mine of information it will afford to the historic student who may perhaps gaze with astonishment at the artistic pictures of those beautiful dwelling-places of distinguished families when by the agencies of universal suffrage, by that time perhaps, extended to children out of arms, all gradations of class have been brought to the same dead level of a drab uniformity. Not only are we indebted to the publishers for this splendid publication, but from time to time for specially valuable hand-books treating of Gardens and things pertaining thereto, and, as in the above instance, for

works pertaining to a special group. This, on the Primulas, is to be highly recommended since in its comparatively few pages much valuable information is compressed which enlightens not only the grower of these somewhat fastidious garden pets, but is of distinct value to the general botanist and gardener. The illustrations are good, and the photographic reproductions, due to the skill of Miss Cameron of Duns, are vivid and real. There is a useful bibliography of the Genus, and a description and Key of the 30 European species. We are sorry to see that *P. scotica* is not illustrated, but it is fully dealt with in a sub-specific sense. Under *P. elatior* it is stated that "it is a moot point with some whether the Oxlip (*P. elatior*) is a hybrid . . . or a natural species." In these days surely there are no botanists of the first order who do not consider it a true species. In its distribution throughout Europe it is by no means always associated with what have very erroneously supposed to be its parents—*veris* and *vulgaris*. *P. acaulis* (L.) Hill Veg. Syst. viii., 25, 1765 is used as the name of the Primrose instead of *P. vulgaris* Huds. Fl. Ang. 70, 1762. In so doing the oldest trivial is retained. Sibthorp's Olympian red-flowered Primrose (*P. rubra* S. & S.) appears as a variety, not as a species as it was originally described. Hoffmannsegg re-named it *P. Sibthorpii*. Is the Eastern plant identical with our Western colour-form? *P. Sibthorpii*, says the author, is the original source of varieties in colour of the Primrose, or, in other words, is a parent of all our colour Primroses. The beautiful blue primrose was, we are told, raised by the late Mr G. F. Wilson of Oakwood, Wisley. The Polyanthus, generally supposed to be a hybrid of the Primrose and Cowslip, has a wide range of colour variations. The Cowslip is named *P. officinalis* L. Veg. Syst. 25, 1765. In the first edition of the *Species Plantarum* Linnaeus called it *P. veris*, var. *officinalis*. Here again the earliest trivial (as a variety) is retained, but in this case *P. veris* seems preferable as that is the earliest specific name. *P. anglica* Pax is a hybrid of the red-flowered Primrose, and the Cowslip "sometimes found wild—it is the most abundant garden Primula in cultivation." The beautiful albino form of *P. farinosa* was found by Mrs Saunders in the meadows of Wennington estate, Lancashire. It is said that the seeds of *farinosa* readily and quickly germinate within a week or two after sowing, provided this is done

as soon as ripe. No notice is taken of the varieties described by Dr Heslop-Harrison. *P. scotica* is treated, as we have said, as a sub-species or variety of *farinosa*, but its distinctive characters are as great as those of *P. stricta*, which is accorded full specific rank. Physiologically *scotica* differs in the seed "taking a longer time to germinate—they generally lie dormant until the spring after they have been sown . . . and may even take two years." *Scotica*, too, has three flowering seasons from June to September. For these, among other reasons, the plant seems to demand specific, not varietal, rank. The descriptions and details of the remaining species, which are not native of England, are concise and adequately given, with notes on their history and methods of cultivation. Full justice is done to the charming section of Auricula, and welcome points in its long history are given. The author cites the earliest known figure from Mathiolus *Neues Kreuterbuch* of 1563, but the Auricula is also mentioned by Fuchs. Lobel, in the *Stirpium* of 1605, shows that purple, white, and rose-coloured plants were in cultivation, and Gerard in 1597 has six varieties. His figure of the type Auricula "is an exact copy of that of Mathiolus." The diseases and pests of the Primula are not forgotten, and hints are given as to their avoidance or destruction. The handbook deserves a large circulation, as it bears witness to personal knowledge of the subject, and to careful compilation. It is one of the best of its kind we have met with.

MARIE-VICTORIN, Frater. LES FILICINEES DU QUEBEC. Supp. Rev. Trim. Canad. ix., 1923, pp. 98. A Thesis for Doctor of Science at the University of Montreal. This is an excellent account of the Ferns of a very charming district. The book is well printed. It has short notes on the Physiographie, Phytogéographie, Ecologie, and Traitée systématique des espèces. The arrangement differs from that of Christensen in that it begins with *Osmunda*. The extra-Canadian distribution of the ferns is given. *Struthiopteris germanica* is put under the genus *Pteretis* of Rafinesque, which has priority over that of Willdenow. Some authors put it in *Onoclea*, which dates from 1753. It was first mentioned by Cordus in 1561. A novelty comes in in regard to the large genus which Adanson in 1763 named *Dryopteris*, which is adopted by Christensen in his

Index Filicum. Bro. Marie-Victorin uses instead *Thelypteris* of Schmidel Icon., ed., 2, 45, 1862, which is one year earlier than that of Adanson. As the genus contains about 1000 species considerable changes will take place if *Thelypteris* is chosen. *Dryopteris* *Thelypteris* is replaced by *Thelypteris palustris* Schott Gen. Fil 10, 1810. Why not choose *Thelypteris Thelypteris*? The original trivial should be maintained even at the cost of risibility. Nieuwland has made most of the new combinations. See *Amer. Midl. Nat.*, i., 226, 1910. The Bracken is put under *Pteridium*, the Canadian analogue being *P. latiusculum*. There are 12 species of *Botrychium* in the area. A good bibliography and index are also supplied. The Doctorate seems well deserved.

MATTHEWS, J. R. The Distribution of certain Portions of the British Flora. Plants restricted to England and Wales. *Annals of Botany* 277-298, 1923. In this excellent and thoughtful paper Mr Matthews, by the aid of some well designed maps, has dealt very ably with the history and causes of recent plant distribution that is recent in a geologic sense. A brief survey of the divergent views held regarding the origin of the British flora is given. The source and distribution of 266 species which are restricted to England and Wales are then considered. A map illustrates the range of these species. The general conclusion is reached that this limited portion of our flora has been derived mainly by advance through France in post-glacial times. A detailed analysis shows that nearly 50 per cent. of the group is of great rarity. Excluding some 30 species which are boreal or western outliers (some as relics of a former arctic flora, others, possibly, as recent introductions) this rare element is centred along a coastal belt from Cornwall to Norfolk. Certain areas of concentration are found to exist indicating, it is believed, points of arrival and establishment rather than areas of retirement. These features provide a clue to invasions, and details are given for four small assemblages which may be regarded as having followed different migratory paths. An invasion from the east and another from the south are distinguished, and between these two lines the main portion of the English flora has probably advanced. In addition to the cartographic studies presented, the results are expressed in terms of Willis's "Age and

Area" theory of distribution. It is shown that "by trying to discover disturbing factors and allowing for these, the results obtained are consistent with this hypothesis in its broad outlines, although on a first analysis the theory may not appear to be particularly applicable. When one thinks of aquatics and their introduction by wildfowl one cannot help doubting any conclusions that may be arrived at. A long period of time to account for plant-introduction in many cases is not demanded. Doubtless since steam and electricity have come in to quicken journeys the pace of plant introduction has been immensely quickened. We have seen in less than a century *Veronica Tournefortii* and *Matricaria suaveolens* spread into every county. *Crepis taraxacifolia*, *Senecio squalidus*, *Epilobium angustifolium*, *Sisymbrium altissimum* are also widely spread across Britain, the *Epilobium* having also a northern range, while *Juncus tenuis* has a more discontinuous distribution. The occurrence of *Prunella laciniata*, *Galium sylvestre* in its southern form, *Salvia pratensis* and *Orchis hircina* are due perhaps to several causes not remotely connected with man and his operations. *Hydrilla* and *Tillaea aquatica* are two recent discoveries. The former must be owing to water-fowl, the latter possibly so. Until we possess a much more complete knowledge of the flora of our natural sheets of water it will be unwise to draw conclusions from the insufficient details we now possess.

MOLL, Dr J. W. and JANSSONIUS, Dr H. H. BOTANICAL PEN PORTRAITS. pp. viii., 472, tt. iii, royal 8vo. Martinus Nijhoff, The Hague, 1923; 30 guilders or 12 dollars. This important contribution to our knowledge of the structure of 100 medicinal plants or such parts of them as are used in medicine is written in English. The following is the definition of the title which at first sight suggests portraits of botanists. "They are produced by an improved mode of description, that may be called the 'Portraying method.' It is based upon the Linnean method of description, well known in Phytography. The Linnean method shows three prominent characters, viz. a strict order in the arrangement of the facts described, the use of well defined technical terms and a kind of telegram style. In Micrography two additional principles are wanted. The descriptions of sections in various directions must be

combined into a 'perspective description' reproducing the tissues as bodies with three dimensions. In the second place the division of Anatomy into Cytology, Histology and Microscopical Anatomy must be emphasised. The Portraying method brings into the descriptions the knowledge of 'habit,' generally considered of the utmost importance but at the same time intuitive and unsuitable for reproduction. It is an extension of the Linnean method, but the use of terminology is more restricted in order to give fuller scope to the natural powers of observation of the investigator. Thus a Pen Portrait may reach the utmost completeness allowed by the present state of science, a factor of the most vital importance in the description of living organisms. This method will restrict the use of illustrations within narrower bounds. The application of the method of Pen Portraits on a more extensive scale has hitherto been limited to the micrography of woods and, in the 4th edition of the *Pharmacopoea Neerlandica*, to the description of drugs and their powders. In both cases it is proved to be a powerful scientific instrument. But it is fit for a far wider application and this book tries to pave the way in that direction. To make a good Pen Portrait is not an easy task, least of all in Micrography. Therefore 100 Pen Portraits are offered to serve as examples for the description of all the several parts of the higher plants. They will materially help botanists wishing to use this method, who will find moreover in the preface a somewhat detailed exposition of the principal features of the portraying method, whilst 'guiding schemes' have been added, which proved necessary for the construction of descriptions of this kind. At the end of the book an elaborate glossary is added in which the exact meaning of all anatomical terms may be found." The object of the work is to give somewhat elaborate descriptions of the microscopic characters of a certain number of vegetable drugs. Macroscopic characters, it may be mentioned, are also added. Just as a systematic description of plants should be made in a uniform, and in as terse and distinctive a manner as possible, so too should the descriptions of the microscopic character be guided by definite rules. Therefore, to make this quite clear, no less than twenty pages are devoted to the "Guiding Schemes." Such schemes, as the authors say, "are bad masters but good servants. They will show you a safe and easy

way through the trodden paths of science, leaving your mind free to make new and original observations." Great praise is given to Linnaeus for his introduction of organographical terminology, especially as developed in his *Philosophia Botanica* (misprinted *Botonica*). The advantages and disadvantages of terminology are obvious. Terminology allows us to express many things by a single word but the curse of modern science is the excessive multiplication of the terms so that, as has been said, systematists are strangled by their terminology. But no morphologist, ecologist, or physiologist is able to cast the first stone. The special disadvantage urged by the authors is that it necessarily introduces a certain abstraction and generalisation leading to the inverse of the knowledge of "habit," which is justly considered to be highly important. They show how the drawback may be avoided. The Linnean descriptions, they say, are characterised by a peculiar style, that is, a sentence is allowed for every part of the plant—calyx, corolla, stamens, etc. Verbs are rigorously avoided and thus a "telegram" style was originated containing no superfluous word. The advantages of this style are its brevity and automatic order. Its brevity makes the description more digestible, avoids unnecessary repetitions, gives a maximum of information in a minimum of words, and any part or parts of it may be consulted. This method applied to the structure of vegetable drugs is what Pen Portraits mean. It is most important to the student of pharmacognosy and he who wishes to take a prominent part in such work must be prepared to carry out this line of work. In toxicology, so far as poisoning from crude drugs is concerned, this method is essential. To such workers Pen Portraits must be an imperative need. The methods of examination are described and the reagents necessary for investigation are detailed. A good glossary is supplied, and also a copious bibliography. One is glad to see that while advocating and elaborating minute histological work, the authors by no means sneer at "habit" or "rule of thumb" or more correctly the work of the acute macroscopic observer. The weakness of the latter lies in the fact that it is merely a personal possession, that it cannot be handed on from one to another as can a carefully written description. The authors tell us that Auguste Pyrame De Candolle possessed a gift of knowing by the "habit" alone the various

seedlings which were to be planted out in the Botanical Garden at Geneva. It was a surprise to a visitor to Rothamsted to see a lad name at once a portion of a leaf or stem from a quantity of cut hay. This knowledge when fully developed is a wonderful possession for the field botanist. A patch of colour on a hill, a tuft by the roadside, a waving band of green in the stream are recognised long before any detail can be seen. When I was examining in *Materia Medica* in London, some years ago, the candidates were shown only the dried and shrivelled leaves of various drugs. *Conium* in this state was frequently unrecognised. One day, however, a candidate who had looked at it with a magnifier at once identified it. I asked him how he knew it. He told me the apices of each leaflet or leaf-division had a minute whitish mucro and in that way it differed from any other British plant at all resembling it and he was found to be correct. He had seized upon an important diagnostic character which the examiner himself had not considered to be peculiar to *Conium*. The authors acknowledge that a certain number of characters will defy all attempts at analysis and record, so a certain scope for "habit" will remain. But it will diminish as science proceeds. The importance of drawings is not overlooked. "They can give very interesting and even essential characters which cannot appear in a description" although descriptions may attain "the highest possible degree of completeness compatible with the present state of science." The figures of Dodonaeus and Fuchs are said by the authors to be "vastly superior to any product of the present age." Surely the draughtsmen of the plates in the Herbals of Fuchs (why was not that of Brunfels mentioned) and Dodonaeus cannot be said to be more accurate or more artistic than those of Bauer of two centuries later, however much their statement may be true of the present age limners. They rightly hold that plant descriptions on the contrary improve and tend to improve. How good they can be made is amply illustrated in the pages of "Pen Portraits."

MURBECK, S. Contr. à la Connaissance de la Flora du Maroc. Pteridophyta-Leguminosae. Geraniaceae-Composées. Lunds Univ. Arssk. 76, 1922 and 1-68, 1923.

MURR, Prof. Dr JOSEF. NEUE UEBERSICHT UBER DIE FARN- UND BLUMENPFLANZEN VON VORALBERG UND LIECHTENSTEIN. 1 Heft, pp. 144, & 2 Heft, pp. 288, 1923. Our valued critical expert on the Chenopods has, under great difficulties, produced two parts of the above Flora which treat of the Filices to the Scrophulariaceae, the work being arranged according to Engler's system. Ten pages are devoted to the names of those from whom help in one way or another has been obtained or are cited as authorities. Christensen's arrangement and terminology of the Ferns has not been followed and *Nephrodium*, which includes *Phegopteris*, still does duty for *Dryopteris*, and *Scolopendrium* for *Phyllitis*. A locality for the very rare hybrid fern, *Dryopteris remota*, is given—Spondawald bei Frastanz. Not only native species but adventives and planted shrubs and trees are included in the Flora. A very good photograph of *Deutzia gracilis* exhibiting a seasonal dimorphism is given. The Canadian Water Thyme is given as *Helodea*—surely a mischievous alteration especially as it is without the synonym *Elodea*. *Vulpia dertonensis* is given for *Festuca bromoides*, and our *Avena pubescens* masquerades as *Avenastrum pubescens* Huds., a name certainly never used by Hudson. *Juncus tenuis* is spreading through the area as it is elsewhere on the continent. One wonders how many British botanists would recognise *Bulboschoenus maritimus* for *Scirpus maritimus* and what advantage is gained by splitting up the Linnean genus *Scirpus* into 7 or 8 genera. Of the Palmate Orchids *O. incarnata* and var. *ochroleuca*, *O. traunsteineri*, *O. latifolia* from the Matlerjoch at 1,800 metres, *O. cordigera*, *O. sambucina* and *O. maculata* are given. The invalid genus name, *Epipactis* Adans., is retained and *E. sessilifolia* is used for the earlier *Helleborine purpurata*. A good critical account of the Salices is given which includes 5 new hybrids. Our Japanese *Polygonum cuspidatum* is changed to *Pleuropteris cuspidatus* H. Gross. The Chenopods, as one might expect, are very thoroughly treated and three pages are devoted to the phylogensis of the genus, with a plate illustrating the leaves of several species and hybrids, including the newly described *C. Drucei*, a hybrid of *album* × *Berlandieri* and *striatum*. *Minuartia* is used instead of *Arenaria* or rather *Alsine*. *Silene vulgaris* Garcke is used in the sense of *S. inflata* with vars. *rubra* Ram., *brachiata* Garcke and *latifolia* (Mill.).

Our Water-cress appears as *Cardaminum Nasturtium* Moench. A hybrid, which ought to be found in Britain, of *Cardamine hirsuta* and *sylvatica* has the elegant name of *C. Zahlbruckneriana* O. E. Schulz. Wallflower is disguised under the name *Erysimum cheiri* Cr. Can there be any scientific advantage in thus varying the name? Among the Potentillas Dr Murr names two or three new hybrids—one, *P. Beckii*, is probably British. He claims *P. Crantzii* and *Tabernaemontani*, both British species, for its parents, *i.e.* *P. Crantzii* × *verna*. Under *Crataegus*, *C. macrocarpa* Heg. & Heer is said to be a hybrid of *monogyna* and *oxyacanthoides*. A variety of *Geranium Robertianum* is described as “var. *villosulum* Murr, caulibus, superiore foliorum parte, calycibus villosis” from Tosters which must be near to our *hispidum*. The hybrid *G. Oenense* J. Murr (*molle* × *pusillum*) should be looked for in Britain, as also *G. Stokeri* which is *superpusillum* × *molle*. A hybrid of *Pimpinella major* and *Saxifraga* is mentioned which also should be borne in mind. *Arctous alpina* is put in a separate genus from *Arctostaphylos Uva-ursi* Spreng. Under *Lappula echinata* Gilib., Dr Murr describes a “var. *mollita*, tota planta molliter pubescens, inflorescentia compactor,” which occurs in Britain. Several good plates of plant photographs are given including one of his *Calamintha Degenii* and his var. *Elizabethae* of *Campanula Trachelium*. We shall warmly welcome the concluding parts of this suggestive and useful *Flora*.

NATURE. Weekly, price 1/-. Editor, Sir R. Gregory. Publishers, Macmillan & Co., St Martin's St., London, W.C.2.

NEMEC, Prof. Dr B. Studies from the Plant Physiological Laboratory of Charles University, Prague, 1923. The Constancy of the Living Substance by W. Lepeschin. Selektions und Kreuzungs-Experimente mit albomakulaten (weisbunten) Mimulus Rassen, Dr Artur Brozek.

NEW AND NOTEWORTHY ORCHIDS. Oakes Ann., Boston. pp. 99, 1923.

ORCHID REVIEW, 1923. Edited by Gurney Wilson, F.L.S.

OSTENFELD, Prof. C. H. Critical Notes on the Taxonomy and Nomenclature of some Flowering Plants from Northern Greenland, tt. 3, fig. 4, lxiv., København, 1923. *Deschampsia arctica* (Trin.) Ost., *D. pumila* (Ledeb.) Ost., *Potentilla Petersenii* (Rydb.) Ost. and *Melandryum pauciflorum* (Ledeb.) Ost. are new combinations. Our *Arenaria rubella* is put as *Minuartia rubella* Graebn. *Braya Thorild-Wulffi* Ost. is a new species appropriately named after the explorer who lost his life there. Flowering Plants and Ferns from Wolstenholme Sound (76 deg. 30 N. lat.) and Two Plant Lists from Inglefield Gulf and Inglefield Land, N.W. Greenland. København, 1923. Ostenfeld enumerates the different sources from which these Lists are gathered. As the result 95 species are now enumerated. The number for the whole of N.W. Greenland is estimated at 115. Among the additions are *Saxifraga Hirculus*, var. *propinqua* Simm. and a hairy variety of the true *Dryas octopetala*, var. *argentea* A. Blytt. The Second Thule Expedition was for the investigation of the north coast of Greenland in 1917. One of the noteworthy plants obtained was *Mertensia* or *Pneumaria maritima*. Dr Wulff obtained from Agassiz Land 44 species, which include *Dryopteris fragrans*, *Woodsia glabella*, *Hierochloa alpina*, *Poa arctica*, *Trisetum spicatum*, *Hesperis Pallasii*, and *Saxifraga cernua*, a foot high. Six species were also obtained by Capt. G. Hansen from the third Thule Expedition at Cape Leipner, 78 deg. 44 N. lat. The Vegetation of the North Coast of Greenland based upon the late Dr Th. Wulff's Collections and Observations, Second Thule Exped. Gronland Nordkynt, 1916-8, n. 9, København, 1923. Dr Wulff was a trained botanist who had previously visited Spitzbergen in 1899. At one time he visited the Isle of Wight and made some observations on the dwarf plants of the downs. Like so many of these arctic journeys, the Thule expedition had a series of misfortunes to meet with. As Ostenfeld says, the members had to fight for their bare existence, and hunger and misfortune were their daily guests. When they had traversed the big ice-cap and descended south of the Humboldt glacier near Cape Agassiz on the 24th August 1917 they were weakened by hunger and exhausted by their efforts. Dr Wulff was very ill, and could hardly walk, yet, though unable to collect, made notes or dictated them to his friends. A few days later he laid himself down and let the others proceed so as to save

themselves. The last words in his diary are sadly pathetic. "Straining walk until 29 Aug. 12.30 a.m. without finding any game. I am half dead, but found *Woodsia*. Retired to rest at 7 p.m. and I will not be a hindrance to the movements of my companions on which their rescue depends." Wulff's photographs were all lost, and his body lies in the bitter north where so much of his work had been done. Up to his visit only ten species were known from North Greenland. His collection contains 70 species, and Ostenfeld thinks further exploration will not add materially to the List. The plants were gathered from 81.25 deg. to 83.6 deg. N. Lat. The species are mostly circumpolar, being, in fact, arctic species of a very wide range. A few, *Melandrium triflorum*, *Taraxacum arctogenum*, and *Braya Thorild-Wulffi* have not been found outside Greenland, 7 are exclusively Arctic-American species, 4 are Arctic-American which also have reached Arctic-Eurasia, while *Draba Adamsii* and *Taraxacum arcticum* are Arctic-Eurasian species which have reached their westward limits in Greenland. Four species of *Taraxacum* were found, a variety of *Erigeron uniflorus*, and an extraordinary form of *Minuartia Rossii* which is figured. It may be mentioned that all the 70 species are perennial, and are low growing herbs or very small shrubs with but little power of vegetative reproduction. The stem of *Salix arctica*, probably fifty years old, does not reach half an inch in diameter. The period of hibernation, in which little development of the plant takes place, lasts between 9 and 10 months of the year, but the buds hibernate in a very advanced state so that when the short summer comes they are enabled to grow very quickly, and they flower very shortly after their long winter sleep. *Saxifraga oppositifolia* is the earliest plant to flower. Since there are so few insects the plants, in the majority of cases, must be either self-pollinated or wind-fertilized. Dr Ostenfeld, as is customary in his papers, makes many pregnant suggestions, and he has also prepared some excellent illustrations not only of the plants but of the country in which they grow.

PETCH, T., B.A., B.Sc. THE DISEASES OF THE TEA-BUSH. pp. 220, tt. 3 coloured, 69 plain. Macmillan & Co., 1923; 20/-. Considering that the British Empire has over a million acres in India

and Ceylon under tea-culture, the necessity for an authoritative manual on the diseases which affect the Tea-Bush is at once apparent. In 1903 Watt and Mann enumerated about a dozen diseases, but they recognised that diseases were not only increasing in number but in virulence every season. This is the curse of culture. Whenever large quantities of plants or animals are grown together in more or less artificial conditions disease is sure to come. Ceylon has afforded a terrible instance in the Coffee disease (*Hemileia vastatrix*) which destroyed that important product in that beautiful isle, as another disease led to the practical extermination of the Orange culture in San Miguel and, until M. Pasteur's classic experiment, the silk-culture in France. In Mr Petch's manual 60 diseases have been differentiated. Tea is grown under favourable conditions of light and air with not excessive humidity, and with systematic root-feeding by manure. The periodic pruning is all to the good, for in doing this an opportunity arises of getting rid of various diseases. The tea-bush, moreover, is a hardy plant, but opinion seems to tend towards the belief that, as is natural, the older plants are more subject to disease than the young bushes. In order to make the work more intelligible to the layman a preliminary chapter treats of the classification of Fungi. Necessarily from the fact that the important part of the tea-plant to the grower is the leaf, any disease attacking it is more likely to attract attention. Except for the Blister-blight of Northern India, at present the leaf-diseases are not of a sufficiently serious character to arouse general alarm. The methods for the control of such diseases are—(1) Plucking and burning diseased leaves, (2) manuring and general cultivation, (3) spraying. In one case, on an estate, over 40,000 pounds of diseased leaves were collected in a single year and burnt. The collectors were special coolies. Spraying with Bordeaux mixture is rather objected to by some since it is thought that traces of copper in the tea might prejudice its sale, but careful experiments show that any fear of such contamination is groundless as eight teaspoonfuls of tea, enough for eight breakfast cups, obtained from sprayed bushes, contained only .0002 grams of copper, an inappreciable amount. In pruned tea there would, of course, be no copper present in the succeeding leaves. The various diseases are carefully described and illustrated by useful and excellent figures.

The diseases of the stems are also thoroughly described, as are those attacking the roots. Curiously several diseases are due to the decayed stumps of shade-trees. Just as Cocoa in the West Indies must have a partial shade given it—one of the most beautiful effects of colour in the world is that given by the Central American Bois Immortelle with its reddish flowers—so in Ceylon the graceful Australian *Grevillea robusta* is used to protect the tea from the too vigorous rays of a tropical sun. Therefore when a *Grevillea* is to be got rid of the stump should not be allowed to rot in the ground. Worse even than *Grevillea* is the *Albizia moluccana* which Mr Petch suggests should not be used at all. In Chapter vii. some most valuable Mycological notes are given. There is an adequate Bibliography. Mr. Petch is to be warmly congratulated upon the preparation of such a standard work.

PFEIFFER, N. E. MONOGRAPH OF THE ISOETACEAE. pp. 79-232, tt. 8. Missouri Botanical Garden, 1922; 1 dollar. This excellent Monograph gives the history of the genus. The name was first employed by Linnaeus in the *Skansa Resa* of 1751 and definitely established in the *Species Plantarum* of 1753 with *I. lacustris* as the species. Milde in 1867 raised the number of species to 15, while Baker in his *Fern Allies* increased the number to 46. Underwood in *Our Native Ferns and Fern Allies* first used Isoetaceae as the name for the Family. Dillenius was the first to publish the vernacular name of Merilyn's Grass in his *Historia Muscorum* of 1741. The author discusses other vernacular names, the economic uses, general morphology and ecological relations of the genus, and he supplies keys to the 63 species which he describes. He places our Guernsey plant, which comes from Lancrese (not Laucresse) Common, as the form *subinermis* Dur. which is synonymous with the var. *scutellata* A. Br., 1883. No mention is made of the solitary specimen which was found at the Lizard, Cornwall, by Mr F. Robinson. See *Rep. B.E.C.* 693, 1919. For *I. echinospora* Dur. only one British locality is given, and that from Gay's Herb., ex Llyn "Padark" by which Padarn is meant, but it occurs also in Wales and Ireland. Under *I. lacustris* no Irish localities are given, and Cwm y Glo is misspelled "Crom y glo." No varieties are included not even that which was described as a species in *Journ. Bot.*

as *I. Moorei* by D. Moore. The book is well printed, and must prove useful to every student of the group.

PRAIN, SIR DAVID. Gilbert White as a Botanist. A paper read at a meeting of the Gilbert White Fellowship on 7th April 1923. In his usual charming manner Sir David Prain deals with the subject. He tells us that in 1768 Gilbert White sent Pennant a list of Selborne birds using the scientific names employed by Linnaeus, but when in 1769 he sent various lists to Mr Harrington the scientific names supplied were those employed by Ray. The reason has been suggested by Dr Drewitt. In his charming story of the Chelsea Physic Garden, he tells us how the young Linnaeus had heard of the place, and how in 1736 he decided to visit England to see it. Linnaeus had just evolved a new system of classification, more workable than any method which had preceded it. But he came to England too soon. English botanists, worthy men all, were not ready to receive the new teaching. Linnaeus, says Dr Drewitt, "came to London with a cordial letter of introduction to Sir Hans Sloane from Dr Boerhaave." The letter stated that Sir Hans Sloane was the only man worthy of an introduction to Linnaeus, and Linnaeus the only man worthy of an introduction to Sir Hans, a statement as stilted as untrustworthy, since in Dillenius there was a man not unworthy to be classed with either. As Sir David says, the pretty speech fell flat—Sir Hans was bored by Linnaeus. Perhaps he tried that most efficient way of boring by trying to tell all he knew. Linnaeus then went on to Chelsea and saw Miller, who received the revolutionary Swedish botanist in the same way and thought him ignorant, especially of Botany. Miller was a Tournefortian, and naturally resented the changes made by the Swedish botanist. As will be remembered, he also came to Oxford, where after a preliminary passage at arms Linnaeus so impressed Dillenius that he offered to share his stipend with Linnaeus if he took up his residence at Oxford. Sir David has done the best he can to show Gilbert White as a botanist, but it must be admitted that, careful observer as he was, he made no substantial addition to our knowledge of British botany.

PRESLIA. The Report of the Czechoslovak Botanical Society of Prague, 1922, published in 1923, pp. 156, has a portrait of Dr

Bohumil Nemeč, President, with a short biography and a chronological list of his publications since 1895. Dr A. Brožek contributes an able genetical paper on a "Summary Report in a case of Cumulative Factors in the Inheritance of the Spots of the Flowers in the Hybrids of *Mimulus tigrinus-luteus* × *M. quinquevulnerus-rubinus*." Dr Domin describes a new Australian genus of the Leguminosae as *Nemicia* named after the President of the Society. Under it are put *N. atropurpurea* Domin, comb. nov. (the old *Oxylobium atropurpureum* Turcz.), and eleven other species of which *N. luteifolia*, *N. vestita* and *N. Dorrienii* are new species from Western Australia. Dr Dostal contributes a paper treating of the production of tubers in *Ranunculus Ficaria* and the accompanying diminution of seed-production. Dr J. Klika contributes a paper on the peloria of *Lamium maculatum*. Frant A. Novak gives an account of "The Limestone Districts in the Little Carpathian Mountains; their Significance in the Phytogeographical Uniformity of this Range." Descriptions of the new plants are given. These include *Hieracium Nemeči* and, from waysides in Bratislava, *Stellaria media*, nov. var. *glutinosa*. J. Rohlena gives additions to the Flora of Dalmatia, and Dr J. Vilhelm describes Hybridism in the Grimmiaceae.

RIDLEY, H. N., F.R.S. THE FLORA OF THE MALAY PENINSULA. vol. ii. Gamopetalae. pp. vi., 672, 1923. L. Reeve & Co., London; 42/-.

RILEY, L. A. M. Contributions to a Flora of Sinaloa, in Kew Bulletin, pp. 103, 163, and 333, 1923. There are several new species described. Sinaloa is situated on the Pacific littoral of Northern Mexico.

ROBINSON, E. KAY. NATURE LESSONS WITH PLANTS. pp. 136. Holden & Hardingham, London, 1923; 2/-.

ROBSON, FORSTER. OUR WAYSIDE TREES AND HOW TO KNOW THEM. pp. 125. Thornton Butterworth, London, 1923; 4/-. BRITISH TREES AND HOW TO NAME THEM AT A GLANCE WITHOUT BOTANY. pp. 148. Holden & Hardingham, London, 1923; 2/-.

ROHLENA, JOSEF. *Plantae Montenegrinae Novae vel Rariores*. Vestnik, p. 70, Prague, 1923.

SAMPSON, H. C. *THE COCONUT PALM: THE SCIENCE AND PRACTICE OF COCONUT CULTIVATION*. pp. xv., 262, tt. 40. J. Bale, Son & Danielsson, London, 1923; 31/6.

ST. JOHN, HAROLD. *A Botanical Exploration of the North Shore of the Gulf of St Lawrence in 1915*. Canadian Dept. of Mines, memoir 126. 622 species were noted.

SANTOS, JOSE K., Ph.D. *Differentiation among Chromosomes in Elodea*, in *Botanical Gazette*, vol. 75, 42, 1923.

SARGENT, CHARLES SPRAGUE. *MANUAL OF THE TREES OF NORTH AMERICA (EXCLUSIVE OF MEXICO)*. pp. 910, with 783 illustrations from drawings by Charles Edward Faxon and Mary W. Gill. Second Edition. Constable & Co., London. Preface dated December 1921; 45/-. One cannot resist quoting in full from the cover—"This new edition of the *Manual* contains the results of forty-four years of continued study of North American Trees carried on in every part of the United States and many foreign countries. As the standard work in its field, it should have a place not only in public and college libraries, but in the private libraries of all who are interested in the subject, while the extent and importance of the revisions it has now undergone will, we believe, make this new issue indispensable to every owner of the original edition." It is one of the pleasantest books we have seen for some time, plainly bound, nice paper, excellently printed, copiously and beautifully illustrated, and full of a wealth of descriptive matter which is well arranged and most clearly written, every page speaking for the intimate acquaintance which the author has of the trees he writes about. Would there were more of such manuals. Directly it was received came an opportunity of testing it. An *Amelanchier* had been sent from Hampshire. Critics had suggested two different names for it. Sargent quite definitely showed that both were wrong. It is *A. laevis* which has been confused with *A. canadensis* L. The descriptions are terse and to the point. One is not distracted by irrelevant matter or repeated characters which are common to other members

of the group. In fact, they are written by a man who knows what to say and how to say it. In this comparatively small and handy volume 717 species of trees are described belonging to 185 genera. It is illustrated by 783 figures, of which 141 are additional to those given in the first edition. It is arranged in the order of Engler's *Pflanzenreich*, and the book is so good that even this is pardoned. There is an analytical key to the genera given which is based on characters derived from the leaves, an obvious advantage since these are available for the greater part of the year, whereas fruit or flowers might be out of season or out of reach. The American Hawthorns, which are to trees what the Asters and British Hawkweeds are to herbaceous plants, number no fewer than 137. Of English youth it was said that their aspirations were expressed by uttering, "it is a fine day, let us go out and kill something." The saying was paraphrased in connection with Sargent—"It is a good day for a walk, let us go out and find a new *Crataegus*." Usually he did, and he shows us how to distinguish it. One ought also to say that the distribution of each species is very fully given, the height of the tree also added, sometimes even the thickness of the bark when that is a differentiating character. The vernacular names and the derivations of the scientific names are also supplied. There is a capital index and one index only, a good glossary, and a useful map. We notice that the synonyms given are not numerous. The authority cited is occasionally at variance with the *Kew Index*, and apparently not always the oldest name employed. For instance *Ulmus fulva* is used but the earlier *U. pubescens* Walt. is not given even in synonymy. There are 54 species of *Quercus*, but the authority for *Q. coccinea* and *Q. palustris* is given as "Meunch," the *Index Kewensis* gives Wang. and Du Roi respectively. Both are earlier than Moench if that is the author meant. But these are trivial matters. It has been a real joy to go through the book, and when we remember the magnificent *Sylva* from the same pen, one feels it is a privilege to offer personally the warmest tribute to this really great systematist, and to thank him for this latest evidence of his great knowledge and powers.

SAYCE, Rev. Canon A. M., D.Lit., LL.D., D.D. REMINISCENCES.
pp. 485. Macmillan & Co., London, 1923; 18/-. Although im-

mediately outside our range of study, few of our members will resent a short notice of Canon Sayce's charming book, with its delightful reminders of energetic work, of exciting incidents of travel, of personal friendships, of successful explorations, of multitudes of witty anecdotes, and the hundred and one things which are so pleasantly told by a man who knows how to get at the heart of things, and, because he has given of his best to others, has received an unstinted meed of kindness from all sorts and conditions of men. Like Sir Hans Sloane, who lived to be a nonagenarian, Dr Sayce came into the world a delicate child, as he says, "a child with a cough," which developed into pulmonary mischief, and he was often pointed at as one who was not long for this world. He was so delicate that ordinary school work was beyond him. Sloane, too, it will be remembered, developed tuberculosis, had violent haemorrhage, yet, after a delicate life, died of something else than lung mischief when he was over ninety. Dr Sayce has all his long life been something of a creaking door. Yet although typhoid, practical loss of sight, jaundice, pneumonia, asp-bite in which he had the courage to apply the hot cautery himself, and broken limbs have in turn come to him they have left him well nigh unscathed. His Celtic temperament accounts for some of his charm of manner, and makes him a general favourite. Although he does not admit it, there is a remnant of Calvinism in his nature since he almost accepts the doctrine of predestination which he has turned to advantage in crucial times in his career. His ancestors were from Glamorganshire, but one of them came from Conway with a pedigree, tracing descent from Constantine and Julius Caesar. He tells us that the early Victorian age was almost as fatal to works of art preserved in the country houses of England as it was to the village churches, or as the sack of the Summer Palace at Peking by the British and French Barbarians was to the works of art in the Far East. He may well say so, for when I was there in 1907 the path leading by the palace was still, to a great part, made up of fragments of priceless oriental china which had been ruthlessly smashed by the marauders. He remembers ancient pieces of Dresden china being kept in the nursery at his relatives. I, too, remember at one of the stately homes of England seeing two priceless Dresden figures being actually ridden on by the children, yet they had escaped injury. He narrates a story by an

eye-witness of the death of the Duke of Clarence who when he was drowning in the butt of Malmsey came once to the surface and, as he did so, gasped out "What rogues these wine merchants are!" and then sank for ever. He tells us that Max Muller once said to him at the commencement of his career, "Remember that if you want to make discoveries you must be content to make mistakes" —a very good piece of advice for the young botanist, to which may be added the comment made by Linnaeus, "every one makes mistakes, happiest is he who makes the fewest." To this may be added, "he who never makes a mistake never makes anything." He tells us that Canon Tristram, the botanist, was one day lunching with Routh, the aged President of Magdalen College, when Routh told him that he was present at the Coronation of the last King of Poland. As joining up the link with the past or rather in adding another link, one may say that Mrs Fleming, the grand-daughter of Canon Tristram, was one of the party who gathered *Carex microglochin* last August in Glen Lyon. Routh used to say that he had spoken to a lady whose grandmother had played with the children of Charles the First when they were at Oxford. I once told this link to the Empress Eugénie when she capped it by saying that she had a lady-in-waiting whose grandfather was a page to Louis the Fourteenth, and although I felt I was treading on thin ice I ventured to tell her that once in Spain in the early eighties I had spoken to an aged goatherd who had as a boy heard the guns at the battle of Trafalgar. Dr Sayce gives a personal example of a link with the past. His father was born in 1804, and at the age of seventeen attended the funeral of his grandmother who was born in 1739. Her husband was taken to see Lord Lovat, who was born in 1660, when a prisoner in the Tower. Green, the historian, was a Magdalen School boy, and once had a prize given him by Dr Routh, who said to him, "Shake hands with me." Green did so; then he said, "Boy, remember you have shaken hands with a man who has seen Dr Johnson." This led Green to read about the great Lexicographer and his contemporaries, and the result was the *Short History of the English People*. When Sayce was in Palestine he found *Papyrus* growing in a marsh bounded on the north by the Nahr Falaik. One cannot give anything like a detailed list of his journeys. He has travelled over a great part of the globe, and has

made excavations in Egypt, Syria, etc. One may say of him, as of Palgrave, "Ulysses, many travelled man." In this charming volume he has, what is often missing from books of travel, made the pages redolent of wit and humour, and if, as I have been told, he never kept a diary, then his memory must be of the highest order. We used to meet frequently in past days at a niece of Tennyson's, when one found his conversation not less vivacious than the "Reminiscences" which will charm its many readers.

SCHAFFNER, J. H. How to Distinguish the North American Species of *Equisetum*, in Amer. Fern Journ. 33-40, 1923.

SCHINZ, Prof. Dr HANS, & KELLER, Prof. Dr ROBERT. FLORA DER SCHWEIZ. I Teil. Excursionsflora. pp. xxxvi., 792, 1923. This, the fourth edition of a most popular and useful Swiss Flora, is a model of accuracy and portability. There are 2587 numbered species but this gives an inadequate idea of the number described because many plants which we are accustomed to see treated as species are sunk to the grade of unnumbered sub-species. For instance, all the Taraxaca are grouped under one numbered species, the Hieracia are reduced to 34 species, *Pilosella* and *Peleterianum* being kept separately, and only 63 Rubi are numbered. There is a very complete and correct Index. The species are arranged according to Engler's System of which Dr Schinz is a great supporter. One ought to say that the numerous varieties and introduced plants are dealt with in a separate volume. In our *Report* for 1919, p. 599, the excellent *Svensk Fanerogamflora* of Prof. C. Lindman was reviewed and there it was stated that those who expected, if the *Vienna Actes* were strictly followed, the Botanical Millenium would soon arrive, would be somewhat disappointed when they tried to identify as British plants *Cuviera europaea*, *Zerna sterilis*, *Aronicum paludosum*, *Naumburgia thyrsiflora*, etc. A comparison of the names used for the same species in the Swedish and the Swiss Floras and Dr Murr's *Flora of Voralberg and Liechtenstein* gives one much food for thought as showing what divergences, not only in names, but in sequence of species, arise even if the same System and the same Rules are followed. Space will only allow of a very few of these name-divergences to be noticed. It

may be stated that Lindman does not include the Ferns and Vascular Cryptogams in his Flora. The initials (L) refer to Lindman's Flora, (M) to Murr's Flora, and (S) to Schinz and Keller's Flora.

Eupteris aquilina Newm. (S) = *Pteridium aquilinum* Kuhn (M).

Phyllitis Scolopendrium Newm. (S) = *Scolopendrium vulgare* Sm. (M).

Dryopteris Villarsii (Bel.) Woynar (S) = *Nephrodium Villarsii* Beck (M).

D. austriaca (Jacq.) Woynar (S) = *Nephrodium spinulosum* Strempel (M).

D., sub-sp. *dilatata* (Hoffm.) S. & T. (S) = *N. austriacum* (Jacq.) Fritsch (M).

D. Linnaeana C. Christ. (S) = *N. Dryopteris* Mich. (M).

Onoclea Struthiopteris (L.) Roth (S) = *Struthiopteris germanica* Willd. (M).

Equisetum maximum Lam. (S) = *E. Telmateia* Ehrh. (M).

Sparganium angustifolium Michx. (S) = *S. affine* Schinz (M & L).

Oryza oryzoides (L.) (S & L) = *Leersia oryzoides* (M).

Phalaris arundinacea L. (S) = *Typhoides arundinacea* Moench (L & M).

Phleum phleoides (L.) Simonk. (S & L) = *P. Boehmeri* Wibel (M).

Agrostis alba L. (S) = *A. stolonifera* L. (L).

A. capillaris L. (S) = *A. tenuis* Sibth. (L & M).

Avena pubescens Huds. (S) = *Avenastrum pubescens* Huds. (sic) (M).

Atropis distans (L.) Griseb. (S) = *Puccianellia distans* Parl. (L).

Panicum sanguinale L. (S) = *Digitaria sanguinalis* Scop. (L & M).

P. Ischaemum Schreb. (S) = *Digitaria linearis* Crép. (L) = *D. filiformis* Koel. (M).

Vulpia bromoides Dum. (S & L) = *V. dertonensis* Volk. (M).

Bromus erectus Huds. (S) = *Zernera erecta* Panz. (L).

B. pratensis Ehrh. (S) = *B. commutatus* Schrad. (L).

Elymus europaeus L. (S) = *Cuviera europaea* Koel. (L).

Scirpus maritimus L. (S & L) = *Bulboschoenus maritimus* Palla (M).

Blasmus compressus Panz. (S) = *Scirpus compressus* Pers. (L).

Trichophorum caespitosum Hartm. (S) = *Scirpus germanicus et austriacus* (L).

Eleocharis pauciflora Link (S) = *Scirpus pauciflorus* Lightf. (L).

Schoenoplectus lacustris Palla (S) = *Scirpus lacustris* L. (L).

Nymphozanthus luteus (L.) Fernald (S) = *Nuphar luteum* Sm. (L).

Ranunculus flaccidus Pers. 1795, (S) = *R. trichophyllus* Chaix = *R. paucistamineus* Tausch (L).

Erucastrum gallicum (Willd.) O.E. Sch. (S) = *Hirschfeldia Pollichii* Fritsch (L).

Brassicella Erucastrum (L.) O.E. Sch. (S) = *Brassica Cheiranthos* Vill. (L).

These examples will afford illustrations of divergences from a uniform system. If this applies to names it even more applies to grades, about which necessarily there are always likely to be differences of opinion. "The fewer the grades the fewer the differences." When one stands on the quicksands of species, sub-species, varieties, sub-varieties, forms, and sub-forms, with a rule that does not disqualify any variation in name whenever the plant is altered in grade one faces an appalling instability. The permanence of a trivial in whatever grade to which it may be transferred should be a rule without exception.

The standard of this Swiss Flora is extraordinarily high. We welcome the retention of such genera as *Rhinanthus*, *Helleborine*, *Centaureum* and *Statice*. We rejoice to see that *Rubus nessensis* takes, as it should, the place of the much more recent *R. suberectus* since the retention of the latter in some of our recent Floras could only be excused by ignorance of the facts or by the most special of pleadings. Anderson, when he used the name *suberectus*, distinctly says that he alters the name *nessensis* because it grows elsewhere than Inverness and that *suberectus* is the same plant. We notice, too, that both *Epilobium tetragonum* L. and *E. alpinum* L. are used as in our *List*. The genus name *Anthriscus*

is changed to *Chaerophyllum* Haller Hist. St. Helv. of 1768 which was restored by Schinz & Thellung in 1909. In the *Flora of Berkshire*, 1897, the almost identical *Cerophyllum* Link was used. The latter name really dates from Fabricius Enum. Hort. Helmst. 36, 1759, but it is perhaps put outside the pale of post-Linnean citation. The authors are usually loyal to the retention of the earliest trivial but under *Anagallis* they retain the more recent *caerulea* instead of *femina* which was restored by Miller and is used even by Cibo before 1540. One is glad to see that *Gentiana germanica* and not *G. Wettsteinii* is used, that the earlier *Lappula* is used instead of the more recent *Echinosperrum*, that *Prunella* is still spelled with a *P*, and that the Calamints are included in *Satureia*. One may add that among the numbered species many more or less fixed hybrids are included, such as *Carex xanthocarpa*, *Mentha gentilis*, *M. rubra*, *M. piperita* and many others, a wise course. Under *Euphrasia* are grouped *Bartsia viscosa* and *Odontites* and *serotina* the two last as distinct species. We offer our heartiest congratulations to the authors on the completion of such a thoroughly excellent Flora.

SCHLECHTER, R. Mitteilungen über Europäische und Medit. Orchidien. iv. *Serapias*.

SCHONLAND, S. Introduction to South African Cyperaceae. Dept. of Agric. of S. Africa, n. 3 & 4.

SCHROETER, Prof. C. DAS PFLANZENLEBEN DER ALPEN. pp. vi., 366, tt. 5. Zurich, A. Raustein; 10 marks.

SCHULZ, O.E. Pars II. Pflanzenreich, 84 heft, 1923. Cruciferae-Brassicaceae.

SCOTT, DUKINFIELD HENRY. EXTINCT PLANTS AND PROBLEMS OF EVOLUTION. Founded on a Course of Public Lectures delivered at the University College of Wales, Aberystwith in 1912. pp. 240, tt. 63. Macmillan & Co., London, 1923; 10/6. This excellent course of Lectures, which has been rewritten for this work, puts in a clear perspective the various arguments which have been from time to time, with greater or lesser force, put forth by their advocates. The consensus of opinion seems to demand the adoption of a general

theory of evolution, and those who are its most active agents and not less those who may be antagonistic as well as those Gamaliels who seem to be a growing number, are alike indebted for so able and so fair a presentment of the case. It is refreshing to find from the pen of a great student of the subject such modest confessions of ignorance respecting many questions. They contrast favourably with the positive and dogmatic statements which some of the exponents of modern thought express on subjects which lie far beyond our ken. They remind us of the old expression in a Biblical commentary when not only the year, month and day, but the actual hour was given when the world was created. A century or less hence some of the modern pronouncements which have been made with equal force and inaccuracy will appear just as ridiculous. Dogmatic statements on the shadiest of shady evidence do not advance but actually retard the progress of knowledge. One feels that too much word-spinning on many subjects is used and that the time given to such debatable subjects might with greater advantage be devoted to true research. It seems difficult for this generation to believe that there was a time when "Darwin was almost like a bad word, which one did not dare to utter, lest it shock one's elders" or that as one preacher said Darwinism was "the offspring of a diseased mind." That feeling has been lived down, and Darwin's apotheosis has been witnessed. Now the pendulum is swinging back and there arises a scientific doubt respecting not so much the views actually expressed by Darwin as by those semiparasites who gather round a great name and seek for a notoriety by out-Darwinising Darwin. The perusal of this able presentment induces the reader (even if not so minded already) to assent to the necessity for the adoption of some theory of evolution. In passing we are glad to see that Dr Scott has not omitted reference to the permanence of the microspecies, for instance of *Erophila*, and he states that Dr Lotsy holds as the result of experiments that they are apogamous. This has also been asserted of the *Hieracia* and *Taraxaca*. Hybrids are practically absent from the three groups. (I am excluding the section *Pilosella* of the *Hieracia*). The question arises—what is the age of an individual apogamous *Erophila* or *Taraxacum*? Can a plant go on indefinitely reproducing itself apogamously? Experiments yearly on the offspring of an *Erophila* are needed to see (1) if

in a period of years it dies out as the Potato weakens if not cross-fertilised, or (2) if after a period of apogamous growth it does not crave for and obtain a proper cross. In such a case, if a cross with its own form occurs, what is the resulting progeny? It is assumed that the fixity of characters in these micro-species proves (1) that they are distinct species, or (2) that the fixity of characters, which is not denied, is merely like a cutting of one individual which, of course, comes true. But it must be remembered that there are other large and very variable genera such as the *Rosae*, *Rubi*, and *Euphrasiae* which do hybridise and yet those uncrossed by another species are said to breed true and, though not apogamous, act as other microspecies. Again, no more variable genus exists than the Shepherd's Purse. Is apogamy present there? There is an immense amount of research needed on this subject. Dr Lotsy believes that crossing is a most important factor in Evolution and to a field botanist like himself it is an attractive theory. It appears to me that if in a locality where there are a few individuals of one species and a multitude of a second species a cross arises, the chances are of course great that it should be recrossed from time to time with the plants which are in greater abundance. It may be in a few years that the influence of the original cross has been stamped out. The question presents itself—is the plant then in the same mood as one that has never had such a cross? The answer seems to me to be in the negative. The plant seems much more prone to variability and not necessarily in the direction of either of its parents. Much has been written about Phylogeny, which Dr Lotsy severely says is no science but a product of fantastic imagination. We are glad to see that the doctrine of "inherited memory" has been ably and fairly stated by Dr Scott but, as he says, at present it is all pure hypothesis which awaits the result of extended cultural operations carried on through many generations. Dr Scott then presents a most valuable treatment of the fossil vegetation of the world of which he is a great authority, tracing it backward from the most recent flora through the Tertiary Period, the Cretaceous with the oldest known flowering plants and on back to the Mesozoic age, the Permian Transformation, the Carboniferous flora with its extinct group, the Seed-Ferns, and the Upper and Lower Devonian formations which exhibit the oldest known land plants. The Rhynie

discoveries do not remain unnoticed. The book is well printed and excellently and copiously illustrated, and is undoubtedly one of the cheapest books on the subject of Plant Evolution which has been issued in recent years.

SEWARD, Prof. A. C. A SUMMER IN GREENLAND. pp. 100, tt. 29. Cambridge University Press, 1922; 7/- . This little work is well illustrated and excellently printed. It is prefaced by a brief sketch of the discovery of Greenland and its physical characters. To hear of the sunshine of Greenland comes as a surprise to one who has explored the windy and well nigh sunless Faroes and Shetlands. In the district where Prof. Seward made his special work the annual rainfall is only about 9 inches. The extreme south of Greenland is formed by the granite headland of Cape Farewell, which is on the latitude of the southern extremity of the Shetlands. Thence to the northern extremity it is 1700 miles—a distance as great as from Balta to Morocco. Greenland has an average breadth of 600 miles, and an area about four times as great as that of France. The fossil-bearing rocks of the Disko ravines were an especial object of interest to Prof. Seward, and in these Cretaceous and Tertiary beds he found slabs of rock on which were clearly outlined impressions of large leaves like those of the Plane or Tulip tree, twigs of Conifers allied to, and identical with, the Sequoia, and in sedimentary rocks associated with basaltic lavas at Sabine Island and in Cretaceous sediments on Upernivik Island fossil leaves indistinguishable from the Ginkgo of Japan and China. Prof. Seward states that out of the 400 species which make up the whole of the Greenland Flora of the present day only one, *Potamogeton groenlandus*, is peculiar to this icy area. The remainder are either American or semipolar plants. To illustrate the statement that the climate of Greenland was warmer in Cretaceous times it is said that a species of Breadfruit was discovered by Prof. Wathorst in 1883 on the Coast of Disto Island. The Greenland mountains are much higher than those of Shetland or the Faroes, reaching as they do to 4000 feet near the coast, and to 10,000 feet in the interior. From these elevations glaciers of great size—one, the Humboldt Glacier, is 60 miles in breadth—creep to the sea, where the glacier shows as a cliff of 300 feet high. Pieces break off and form icebergs

sometimes of enormous size. The booming of the breaking icebergs is often the only sound that disturbs the silence of an arctic night. The Umanak Fjord is beautifully represented on t. 16 with its scattered icebergs, but black-and-white, after all, does scanty justice to the colours presented on a sunny day when some of the floating icebergs are rosy-tinted, others banded with strips of lapis lazuli hue or with the colour of the green-blue of a sparrow's egg. An interesting account is given of the Eskimos and their government. The chapter on Greenland vegetation is a very pleasing one. Evidently, short as is the Greenland summer there must be more sunshine than in the Shetlands and Faroes. Very many species occur which have failed to reach either of those groups of islands. Illustrations are given of a bogland covered with *Eriophorum Scheuchzeri* (spelled *Scheucherzi*). He speaks of darker and more brilliant Dandelions, but these are not identical with our British species. The more powerful sunlight is evidenced by the fruiting of *Vaccinium Myrtillus*, which rarely fruits in Shetland. *Sedum*, the beautiful *Diapensia* and two species of the delightful *Cassiope* flourish. Prof. Seward thinks that *Phyllodoce caerulea* may have originated in the Northern Pacific region probably in the latter part of the Tertiary epoch long before the Glacial period. As the climatic conditions in the north became more severe it gradually migrated to the south, where it is still represented in the central Pyrenees and in Japan. As conditions ameliorated the species returned to the north or ascended to the higher regions or more southern latitudes. On the other hand it is suggested that *Cassiope tetragona* began its wanderings in East Central Asia. *Archangelica* is native and has stems a yard high. It is used by the Eskimos as an article of food. On the whole the Greenland vegetation competes in the show it makes with that of warmer countries, and is in some respects superior. The effect of spring is the "miracle of the Earth reclad." Annuals are very rare. Only 4 or 5 species complete their life-cycle in one season. The Antarctic region is separated from the nearest land by the turbulent Southern Ocean, so that the Flora of that wind-swept and desolate region within the Antarctic circle possesses not a single flowering plant, and the most southerly grass known to occur (*Deschampsia antarctica*) grows only as far south as 62 degs., which is the equivalent in the north

to the latitude of the Faroes and Finland. The book is pleasantly written, and gives a vivid description of Greenland. One only regrets that more room could not be found for a complete list of the Greenland Flora.

SMALL, Prof. J. & ADAMS, Miss F. M. J. Yohimbe Bark, *Corynanthe Yohimbe*. S. Africa Pharm. Journ., March 22, 1922. More about the Erectness of Plants. Proc. Belfast Nat. Hist. & Phil. Soc., February 22, 1922. See Gard. Chron. May 5, 1923.

SMITH, A. BERNARD-. POISONOUS PLANTS OF ALL COUNTRIES. Ed. 2, pp. 112. Baillière, Tindal and Cox, London, 1923; 6/-.

SMITH, Prof. W. WRIGHT and SMALL, Prof. J. *Formania*: a new Genus of the Compositae from Yunnan belonging to the Chrysanthemidae. Trans. Bot. Soc. Edin. 92, 1922, with a species *F. mekongensis* from West China. The genus is named after the Rev. Adam Forman, one of the chief organisers in Scotland of the supply of Sphagnum for war-dressings. *Parasenecio*: a new Chinese genus of the Compositae with the species *P. Forrestii*, l.c. January 22, 1920.

SMITH-PEARSE, Rev. T. N. HART, O.M. Hand-List of Flowering Plants of the District of Marlborough and Ten Miles Round, 1919, with MS. additions up to 1922. A very useful and valuable list of 792 plants with 18 additional in MS. *Viola cornuta* is said to be established on Medwyn Common where *Botrychium* still occurs. Among the recent unpublished additions are *Hieracium praecaltum*, *Eleocharis acicularis*, *Orchis praetermissa*, *O. maculata* vera, *Helleborine purpurata*, *Polygonum maculatum*, var. *incanum*, *Orchis morio* × *maculata*, and *Mentha piperita*. The publication of this List and the recent acquisition of a splendid and nearly complete collection of the British species of plants which has been presented, in memory of her son, Alan, an old Marlburian, by Mrs Wedgwood must prove a great stimulus to the study of botany, especially of the flora which is in the immediate neighbourhood of the College. It will greatly assist in producing a complete Flora of the county now so badly needed.

SPRAGUE, T. A. Notes on *Heliocarpus*, in Kew Bulletin 348, 1923. Two new species are described.

TAHOUREDIN, C. B. Some Notes on British Orchids. pp. 12, 1923. Privately printed. Some very interesting points are brought out in this brochure. Under *O. mascula*, a plant was gathered at Brightling, Sussex, with a flower spike 7 inches long and over 40 flowers. A peloric form was noted near Ockley, Surrey. White-flowered specimens came from Alkham, E. Kent, and Woolwich Wood. Colonel Godfery sent a fine specimen of *O. latifolia* (whatever that may be) from the New Forest, and Mr Dix says it grows in marshy fields at Beaulieu, Hants. *Orchis praetermissa*, hybridised with *O. Fuchsii*, was found at Ham Ponds, Sandwich, and its var. *pulchella* was sent from Muthill, Perth, and Dornoch. *Orchis incarnata* was got at Ham Ponds, Kent; Cheshire sand dunes, and Dornoch. The two last seem to be var. *dunensis*. At Dornoch what may be *O. incarnata* × *praetermissa* occurred. We are told that 26 specimens of *Orchis hircina* bloomed at Adisham, E. Kent. Six white specimens of *Habenaria Gynnadenia* occurred at Ham Ponds, one of which was peloric. At Ditchling a specimen of *Ophrys apifera*, with the sepals nearly white and the lip yellow-green, was found. Photographs of the New Forest *Spiranthes aestivalis* and of the Irish *Spiranthes* from Lough Neagh are given. Of *Cephalanthera Damasonium (grandiflora)* three etiolated specimens grew at Barham, Kent, in which the stem and leaves were of a light straw colour. A good plate of the two-flowered specimen of *Cypripedium Calceolus* is also included.

TANSLEY, A. G. PRACTICAL PLANT ECOLOGY: A GUIDE FOR BEGINNERS IN FIELD STUDY OF PLANT COMMUNITIES. pp. 228. Allen & Unwin, London, 1923; 7/6 net. ELEMENTS OF PLANT BIOLOGY. pp. 410. Allen & Unwin, London 1923; 10/6.

VESTNIK. Reports of the First Congress of the Czechoslovak Botanists in Prague under the Presidency of the Committee in 1923. pp. 114. This affords a striking proof of the interest taken in Botany in the new Republic.

WASHINGTON. United States Department of Agriculture,

Bureau of Plant Industry. As is usual the year witnesses a prodigious output of literature by this department. The Inventory of Seeds and Plants received from March 21, 1920, to March 31, 1921, published in 1923, covers the numbers 49124 to 52854. The introductory statements by Mr David Fairchild, the Agricultural Explorer in Charge, are always readable and valuable and bear witness to a driving power which is not always characteristic of European Government Departments. While the greater part of the "Introductions" are outside our scope yet many of the notes teem with interest. One regrets that space does not allow of a fuller quotation. Pub. No. 62, under 49256, is an excellent plate of the very showy *Buphane disticha*, well named the Fire Lily of the Victoria Falls. The Buckwheat is named *Fagopyron vulgare* Hill, an accidental though excellent binomial which was subsequently used by Nees. Under 50300 is *Rubus nutkanus* Moc., the unprickly Salmon berry of Alaska, now naturalised in Forfarshire and elsewhere. It is stated that the seeds germinate after being fully 15 years underground. *Vicia dasycarpa* Ten. (50318), a common adventive in Britain, is said to produce good seed crops. In n. 64 Mr Fairchild says that the Giant Bamboo of the Malay Peninsula, *Dendrocalamus giganteus* (51026), attains a height of more than a hundred feet, and that the beautiful Puka tree, *Meryta Sinclairii* (51049), has the largest leaf of any New Zealand plant. Originally only one tree was known, then 27 others were discovered in some small islands of the Hauraki Gulf. It must be one of the rarest trees in the world. *Chenopodium album* (51214), which is frequently alluded to as an excellent edible vegetable, is said to be one of the principal crops of the Hill Tribes of the Western Himalayas. A good illustration is given of a magnificent *Hibiscus* (50693), *H. Brackenridgii*, from Hawaii. It has deep canary-yellow flowers six inches across. Few flowers are edible, or rather are used as foodstuffs, yet the pale cream-coloured corollas of the Indian Mowra, *Madhura indica* (51155), form an important article of diet in the Central Provinces of India, where it is estimated over 1,000,000 people consume something like 80 pounds each per annum. When fresh they are extremely sweet with a peculiar pungent flavour but, when dried, they have a fig-like taste. By fermentation they afford mowra spirit, about 90 gallons of a 95 per cent. spirit being

yielded by a ton of flowers. The nuts yield about 35 per cent. of a fatty substance which is used for soap or candle making. The sweetness is chiefly due to the presence of invert sugar (40-70 per cent). During the war acetone was obtained from the flowers. It is now suggested that the flower is an available source for the production of motor spirit. *Cotoneaster Simonsii* (51493) is said to be used in Nairobi for forming ornamental hedges. A hybrid of the Black and Lombardy Poplar \times *Populus Charkoniensis* (51381) is said to be the most rapid growing poplar known. It has been introduced into the States from Orleans, France. *Cotoneaster microphylla* Wall. (51843) is native to China and the Temperate Himalayas from 4000 to 10,000 feet. It is strange how well it has adapted itself to low altitudes in our less sunny climate. *Vicia Cracca* L. (52270), a native of both hemispheres, is said to be worth attention as a fodder crop. *Trifolium subterraneum* (52335) is mentioned as being one of the most nutritious plants known to agriculture. *T. glomeratum* (52356), on a small strip of extremely fertile volcanic land between Mount Gambier and Mount Schank, Adelaide, covers much of the pasture land to the exclusion of most other plants. After being grazed for some months it will make a dense mass 2-2½ feet high, which is cut for hay. It also grows well in soils low in phosphatic content.

WASHINGTON JOURN. AGRICULTURAL RESEARCH. G. 304, vol. xxxiv., n. 7, May, 1923. Spores in the Upper Air. E. Stakman, A. W. Henry, G. C. Curran & W. N. Christopher. These experiments were carried out in order to see to what height spores of pathogenic fungi, etc., may be present in the upper air. Airplanes were used in preference to balloons, kites or other similar devices because long distances could be covered in a short time, sporetraps could be exposed easily at different altitudes, and the direction of flight could be changed at will. Ordinary microscopic slides, 3 x 1 in., smeared lightly with vaseline on one side, were exposed in different ways. Three of these are described. The results showed that there are many fungus spores at altitudes as high as 11,000 feet above the earth's surface. Spores of *Alternaria* were the most numerous, but there were also spores of *Puccinia*, *Cladosporium*, *Tilletia Ustilago* and other genera. Some special experiments were

made over Barberry bushes. At 12,000 feet one spore was detected, but at 2000 feet 6, and at 1000 feet 15 were obtained. Even 25 miles away, at 2000 feet, one spore was obtained from an exposure of 3 minutes. On a single slide exposed for 5 minutes at an altitude of 10,500 feet near Fort Crook in Nebraska 224 spores were caught. At an elevation of 8000 feet 827 spores of known identity, and about 200 of unknown identity, were obtained. The highest altitude at which slides were exposed was 16,500 feet in Texas, or more than 3 miles above the surface of the earth, when two urediniospores of what appear to be *Puccinia triticina* were caught. Illustrations of the traps are given. The results show how not only plant but human diseases may be spread far from the starting point. They suggest that experiments on a larger scale at lower elevations might detect small seeds, etc., and thus help to account for the wide dispersal of plants, so many authorities nowadays doubting the possibility of wind carriage for more than a very limited distance.

WATSON BOTANICAL EXCHANGE CLUB. The Thirty-ninth Annual Report. Distributor, J. E. Little. Hon. Sec., H. Stuart Thompson. 2735 specimens were sent in for distribution. There is an allusion to our *Cirsium eriophorum* being different from the Continental plant. See *Rep. B.E.C.* 361, 1913. The Secretary seems to have overlooked the fact that Petrak has already written a paper on "Der Formenkreis des *Cirsium eriophorum* (L.) Scop. in *Bibl. Bot.*, heft 78, 1912, in which he makes our English plant a subspecies under the ill-chosen name *britannicum*—ill-chosen for two reasons (1) that it is an English, not a Scottish-English, plant; (2) because *britannicum* has already been used as a trivial for *pratense*. This was an error, because Scopoli's plant was *heterophyllum*. There are brief biographies of A. R. Waller and Canon Vaughan. On p. 228 I am asked if I did not mean *Carex muricata* Goodenough not of Linnaeus. The answer is no. I meant *C. muricata* L. Sp. Pl. which should not be used in the sense of *C. Pairaei*. The description in the *Sp. Pl.* covers our common form and does not restrict it to *Pairaei*. It is true a specimen of *Pairaei* is in the *muricata* cover in the Linn. Herb., but there is no evidence that the specimen was before Linnaeus when he wrote the *Sp. Pl.* The

synonyms do not refer to *Pairaei* nor does it grow "in nemoribus humentibus." The Club is to be congratulated upon an excellent Report. With reference to the *Verbascum Lychnitis*, var. *micranthum* (Moretti) mentioned on p. 219 Mr Dunn's conclusions, let me say, were that this represents *V. Lychnitis* type (after the removal from that originally compound species of *V. pulverulentum* by Villars) and that our common British *Lychnitis* with larger flowers is the var. *album* (Mill.). In that way it is shown in my *List* and in Hayward's *Pocket Book*.

WEAR, SYLVANUS. A Second Supplement to, and Summary of Stewart and Corry's *Flora of the North-East of Ireland*. Published by the Belfast Naturalists' Field Club. pp. 129, 1923, with portrait of the compiler, and an introduction by R. Lloyd Praeger. We heartily congratulate Mr Wear on the excellent manner in which he has compiled the very numerous additions to the old Flora of an interesting area, including, as it does, the great sheet of water, Loch Neagh, with its shores here and there showing *Dryas Hookeri* and *Spiranthes Romanzoffiana*. Of the latter a splendid photograph is given. The remarkable point about its occurrence in the north of Ireland is that it escaped observation until 1892. Is it a recent arrival, or an overlooked species? It is now known for five counties in the north, while the Bantry Bay locality no longer yields it. The statement that it was destroyed there (*Country Life* Sept. 16, 1922) by the field being ploughed and planted with crops as long ago as 1886 is incorrect. Mr A. H. Evans has seen it in flower there since that time, and in 1906, when I last visited the Cork locality, the field where it used to grow was a rough damp pasture and not tilled. The statement in the preface that *Zannichellia polycarpa* has not been seen since 1890 is scarcely correct. I collected it there with Stewart in 1898, although at that time its existence was rather precarious, as the water was much polluted. One notices the omission of the branched variety *polycephalum* of *Cirsium pratense* which I gathered on Formoyle Hill, Londonderry in 1912. It is often mistaken for the hybrid with *palustre*. One may also add *Potamogeton perfoliatus*, var. *ovalifolius* Wallr. and *P. panormitanus* Biv. from the River Bann near Toome bridge where I gathered them in August 1909. Among the interesting

additions are the discovery of *Carex extensa* on the shores of Lough Neagh, *Potamogeton coloratus*, *Stellaria Dilleniana*, *Orchis pyramidalis*, etc. One notices that *Glyceria festuciformis* is still retained both in the text and introduction. It says that "elsewhere than the Strangford Lough and the Shannon estuary it is exclusively Mediterranean in its range." My contention is (1) that the Strangford Lough plant is identical with the plants of Chichester and Pagham Harbour, Sussex, and those from Hants and Dorset, and (2) that none of these is identical with the Istrian *Glyceria festuciformis*, but that they are a well characterised variety of *Glyceria maritima* which I have named var. *hibernica*. Hackel in 1893, I believe, named the Shannon plant (which I have not collected) var. *Foucaudii*, and that plant is not "confined elsewhere to the Mediterranean." His original plant came from Charente Inférieure and from the Isle of Grain, Kent. More recently Dr Stapf named a plant *festuciformis* which was found at Egloshayle Marsh, Cornwall (*Rep.* 636, 1922) but I have seen no specimens. Dr Stapf referred my Sussex plants to *maritima*, and on October 30, 1916, wrote from Kew, "In my opinion there is no *festuciformis* in the British Isles. Your specimens from the south of England and the one from Ireland are *A. maritima*, var. *Foucaudii*. They are at any rate indistinguishable from a specimen named by Hackel *Foucaudii*." Stapf goes on to say that "*festuciformis* seems confined to the coasts of Southern France, Italy, the Balkans, Southern Russia, and Persia, the last three of which are extra-Mediterranean. It is only fair to add that *festuciformis* is a highly critical species—if indeed it deserves that grade—and that the Istrian type is not identical with the Irish or with any English specimen I have as yet seen.

WEATHERWAX, P. THE STORY OF THE MAIZE PLANT. pp. xv., 247. Chicago, The University Press; 1.75 dollars.

WILD FLOWER MAGAZINE. We heartily congratulate Mrs Dent upon the great success which her Society has attained, and upon her rallying round her such enthusiastic workers. Naturally, with so many young members, wrong identifications will occasionally be made, but on the whole there is an extraordinary improvement, in

part owing to the vigilant part taken by the Branch Secretaries. Among the queries for the year which these records evoke are *Peucedanum palustre* from Essex or Shropshire and Hants, *Carex elongata* and *Hypochoeris maculata* from Northumberland and *Stachys germanica* for Kent or Sussex. Interesting papers are printed, including those on the Spider Orchis by H. S. Salt, Salzburg plants by J. A. Codrington, Lesser Celandine Counts by J. Parkin, Frequent Mistakes by Lady Davy, and Scotch Plants by R. W. Butcher. We are told that *Urtica pilulifera* has been found in Devon. Can a specimen be produced? The Ventnor *Cotoneaster* is not *vulgaris* but the Indian *C. microphylla*.

WILLMOTT, ELLEN. THE GENUS ROSA. 2 vols., with 130 superb Plates, printed in colour by Alfred Parsons, £26 10/-, or in one payment of £3 10/- and eleven monthly instalments of £2 2/- each.

WOODHEAD, T. W. Botanical Survey and Ecology of Yorkshire: Being the Presidential Address delivered to the Yorkshire Naturalists' Union at Scarborough, December 9, 1922. Reprinted from the Naturalist, pp. 97-128. Illustrated with excellent portraits of John Phillips, John Gilbert Baker, F. Arnold Lees, J. Fraser Robinson, William West, Charles Crossland, Robert Smith, William G. Smith, and L. C. Miall. The mere glance at these portraits reminds one how old one is becoming, and what a pleasure it is to have known such a series of great workers and painstaking observers as these men were. Eheu fugaces! Dr Woodhead has given an entirely worthy notice of these men and their work in his stimulating address. As he says, the members of this vigorous Union are drawn from all sorts of people, "even the Presidents have been Bankers and Butchers, Doctors and Drapers, Civil Servants and Chemists, Printers and Parsons, both Church and Dissent—including Bishops, Manufacturers and Merchants, Professors and Teachers, and even (why even) Museum Curators, not to mention Lords, Baronets and Knights." Among these worthies it is pleasing to note that Botany stands very high, including, as it does, the veteran J. G. Baker, once Secretary of this Society; F. Arnold Lees, once Secretary of the Botanical Record Club, and author of one of our best local Floras; and that monument of persistent

algological work, William West. The address concludes with a very excellent account of the development of ecologic study of the great area embraced in the Yorkshire Union. There is a most useful Bibliography.

YAPP, Prof. R. H., M.A. BOTANY. A Junior Book for Schools. pp. 199. University Press, Cambridge, 1923; 3/6. The number of Botanical text-books rival the sands of the sea in multitude, yet anyone who is acquainted with Prof. Yapp will at once grant that he is not likely to repeat well-worn facts or recapitulate the commonplace. Therefore we find in this portable and convenient text-book an original outlook and treatment. The drawings which illustrate it are original, and they are the more excellent because they have been reduced from much larger scale drawings. The language used is clear and welcomingly free from unnecessary details, and those appalling and repulsive so-called scientific names which some botanists think it necessary to use or invent to give an air of distinction to the dreary pages they occupy, hoping probably to produce an impression 'of what a clever young man this clever young man must be' who can thus so successfully obscure a subject in itself not too free from obscurity. For elementary work this book is warmly recommended. It deserves a large circulation. The book is extremely well printed, excellently arranged and copiously illustrated. The employment of two distinct kinds of type assists in bringing the salient points into proper prominence. The Dovey Salt Marshes in 1921. Records the occurrence there of *Spartina Townsendii*, but Prof. Yapp kindly tells he has since learned that it was intentionally introduced. The Concept of Habitat. Journ. Ecol. x., May 1922 being the Presidential Address to the British Ecological Society at the Manchester Meeting, December 17, 1921. The definition of the word habitat—a dwelling place, a place of abode is given, but he extends the meaning so as to include not only the abode itself, but also, in so far as it affects the inhabitants, the conditions obtaining in the abode, *i.e.* the ecological factors. In this sense habitat corresponds more or less closely to the English Environment or to the word "milieu" as used by the French and "standort" by many German writers. The definition in the *Oxford Dictionary*, for which I am partly

responsible, is "the locality in which a plant or animal naturally grows or lives; habitation. Sometimes applied to the geographical area over which it extends or the special locality to which it is confined; sometimes restricted to the particular station or spot in which a specimen is found, but chiefly used to indicate the kind of locality, as the seashore, rocky cliffs, chalk hills, or the like." After well-reasoned arguments Prof. Yapp distinguishes four main classes of habitats—(1) The Successional; (2) The Communal; (3) The Individual, and (4) the Partial Habitat. Prof. Yapp concludes by urging the formation of an Ecological Herbarium and on this subject we hope to print an appeal from him at no distant date. As he says, the ordinary herbarium does not supply the kind of information which a student of ecology requires but which many of our members would be in a position to supply.

OBITUARIES.

BARCLAY, WILLIAM, A.L.S. Born at Tulloch, near Perth, March 19, 1846; died at Perth May 10, 1923. A long life well spent may be written of William Barclay, even if only for the fact that the greater part of it was devoted whole-heartedly to the training and education of the young. It is not given to all who choose teaching as a profession to find their efforts rewarded always with some fair measure of success, and if William Barclay ever had any doubts, those who had the good fortune to pass through his hands can look back and provide the answer. His first teaching appointment, after having served an apprenticeship in Perth and a College training in Edinburgh, was to Glenrinnies School in Banffshire. There he remained for fully five years and developed that affection for the north which drew him back again for many a summer holiday. In 1871 he returned to his native city as headmaster of Watergate School, where he remained until 1884 when he was promoted to the new and larger Western District School, the work of which he directed with much ability until he retired in 1911. In Perth not

only did he take an active interest in educational affairs, but he was also a prominent and helpful citizen, lending much assistance in the management of the Royal Infirmary and acting as Convener of the Books Committee of the Sandeman Public Library from the time of its foundation. The countryside always appealed to Barclay and before he commenced Field Botany as a serious study, he seldom missed an opportunity of following the angler's art, noting meantime the virtues of Perthshire's varied streams and, no doubt learning also something of the county's floral wealth. Association with Buchanan White brought him definitely into the botanical field and the task of preparing a Flora of Perthshire which White had set his mind on accomplishing was entered into by Barclay with genuine enthusiasm. During the years of active field work, Barclay contributed numerous papers towards a fuller knowledge of the distribution of Perthshire plants, most of which have appeared in *Trans. Perth. Soc. Nat. Sci.* Thus did he materially aid in the collection of data on which White's "Flora of Perthshire" was based, and more than is generally known did he participate in the labour of seeing that work into print, after the death of its author. There is no need to dwell here on all Barclay did to promote the study of Perthshire Botany. Suffice it is to say that his interest and enthusiasm never lagged and in the activities of the Society of Natural Science in Perth he played a leading part, first as Editor of its publications for 12 years and then as its President for 11 years. He recognised that finality in Natural Science is not easily, if ever, attained, and in 1912 he was able to draw up a long report on additions to the list of Perthshire plants which had been made since the publication of Dr White's "Flora" in 1898. Thus it was that Barclay came to know Perthshire well. Few parts of it were unfamiliar to him and a wide knowledge of the history and of the romance of Scotland's premier county, in addition to his botanical acumen, made him an ideal leader at a field excursion. It was then, indeed, that one found him at his best. He was not a very frequent visitor to the south, but there must be many members of this Society who have corresponded with him and so have learned something of his characteristic straightforwardness and of his ever ready willingness to help. Others have sought his aid in finding some of Britain's rarest plants and

whether they knew it or not have more than once incurred his displeasure because of the number of specimens collected, so jealously did he guard the botanical treasures of his own county. His actual discoveries in the nature of additions to the British Flora are relatively few, but of general interest are *Poa palustris* found in 1889 in the marshes of the Tay and *Potamogeton venustus* from the River Earn in 1915. It is perhaps by his contributions to the study of the genus *Rosa* that Barclay is best known. For a number of years he corresponded with Professor Crépin of Brussels as well as with other continental authorities on that baffling genus, and with the help thus obtained he published from time to time his observations on the Scottish material he had collected. His chief paper in this connection appeared in *Ann. Scot. Nat. Hist.*, 1896 under the title "Notes on Scottish Roses." Although he had ample material and opportunity to increase the number of varietal names, especially in the northern *glauca-coriifolia* derivatives of the aggregate *canina*, he deliberately refrained from doing so. Hair-splitting did not appeal to him. Only once, and after much careful study, did he describe as new a form of *R. coriifolia* under the name *R. subcoriifolia* in *Ann Scot. Nat. Hist.*, 1899. In his latter years he collected little else but roses and as his views matured he gave expression to them in a number of papers published in *Proc. Perth. Soc. Nat. Sci.* 1911, 1915 and 1916. These contain much valuable information and deserve from rhodologists more attention than they have received. His own name is commemorated in *Rosa Barclayi*. In the early part of the present year Barclay was recommended for election as an Associate of the Linnean Society. He lived just long enough to learn that the honour had become his, for his death occurred only seven days after the date of election. The writer knows well how greatly he prized the honour, which was but the just reward of one who had devoted much time and thought to the study of Nature's ways. His wife predeceased him only about four months and I think he never quite recovered from the loss of her who had been his life-long companion.

J. R. MATTHEWS.

One cannot allow the notice of Mr Barclay's death to pass by without bearing testimony to his merits. Our Exchange Club Section is especially indebted to him for his most willing and able criticisms on the plants sent in. As Mr Matthews has so well said,

his knowledge of Scottish Roses was unique and his contributions to the *Proceedings of the Perthshire Society of Natural Science* have not received adequate attention. These numerous local Journals are apt to act as a mausoleum for the contributions they publish. It would be so useful if a précis of them could be sent to our *Report* which would cause them to be more easily accessible. I had known Mr Barclay for many years and never allowed a visit to Perth to take place without calling on him and his good wife. He showed me *Alchemilla argentea* growing near the railway at Perth, and although far from gardens I expected it was of garden origin. He also took Mrs Wedgwood and myself to see the *Ledum* near the Bridge of Allan. It was in poor condition and barren. How any one could have imagined it native there it is hard to say. It grew under the shade of planted spruce and larch and it was in such small quantity and bad condition that I could not say whether it was *palustre* or *latifolia*. We also visited Methven bog where *Scheuchzeria* once luxuriated but where a colony of gulls had probably destroyed it. Near by we saw the Perthshire *Carex magellanica*—but not quite typical. In the Dovrefeld in 1922 we saw it with *limosa* and *rariflora* in close contiguity. One hopes to see a memorial tablet to Mr Barclay placed in the Entrance Hall to the Museum in which he took such interest and for which he did such real service. I shall be glad to receive subscriptions for such a purpose, which I trust will meet with the approval of the Perthshire Society with which he had for so long a time been connected.

BIDDER, Rev. H. J. Born at Mitcham, Surrey, 1847; died at Oxford, November 1923. He was the son of the "calculating boy," and if he did not inherit his father's wonderful arithmetical genius, he had a magnificent memory for plant names. He was educated at Harrow, matriculated at Corpus Christi College, Oxford, became a scholar of University College and took a First in the Final School in 1870. In 1873 he was elected to the Fellowship at St John's College and took Orders, becoming Curate of St Giles. Then he went to the College living in a pleasant neighbourhood at Fyfield in Berkshire. In 1880 he became Vicar of Holberton in his father's County of Devon. In 1887 he came back to Oxford as Vicar of St Giles, an office which he held to 1903. For many years he was burser of his

College and signalised his occupancy of that office by forming a most beautiful rock-garden which he filled with rare plants, many of his own collecting in the Pyrenees and Alps. He had the knack of making plants grow and to look at home. It was amazing to see the result with such a meagre staff, but his head gardener was equally a flower-lover and not a whit less industrious. Mr Bidder made hundreds of people happy, and none could visit the lovely garden of St John's without feeling the 'charm of Oxford' and experiencing the soothing influences of the spacious expanse of well-shaven turf, the stately masses of foliage of the Horse-chestnuts, the caws of rooks in immemorial elms, the gracious parterres of white and pink *Fraginella* of which he was a most successful cultivator, the hoary walls serving as a chaste back ground for the delicate blue of *Ceanothus* or the purple blossomed *Clematis*. These wrought upon the wearied worker from some dry-as-dust study or from the midst of the noise and rattle which in an increased degree seems to be the inevitable penalty laid on those who live near the hub of the universe and upon the toilers in mine or workshop from the busy midlands. Mr Bidder did not suffer fools gladly, nor did he welcome the over-dressed, or perchance the under-dressed, and gushful ladies from suburbia, to whom his blue poppies, his foamy pyramids of the Crustacean Saxifrage, or his delicate *Erodiums* were alike 'thrilling.' To these he could be scathingly sarcastic. But see him with Miss Willmott or with Canon Ellacombe, and there was no trouble he would not willingly take to give them of his best. For many years he was Curator of the Botanic Garden and we always felt the better of his wise advice and willing help. Should some special seed be wished to grow one felt that to no one could it be more safely trusted than the Bursar, and many curious plants from Salonika saw daylight in Oxford. I had known him well for forty years and his death was a distressful severance of a link. He had not been ailing long—indeed it seemed a very short time since he was showing me some of his more recent acquisitions which were additional beauties on his well planted rockery about which one will now see mostly ghosts of the past. To the School of Forestry at Oxford he rendered most valuable aid and mainly through his influence and exertions Bagley Wood itself was devoted to its service.

HAWLEY, Sir HENRY CUSACK WINGFIELD, Bart. Born December 23, 1876; died November 18, 1923. He was the son of the fifth Baronet (the mother of the first Baronet was aunt to Sir Joseph Banks). He was educated at Eton and Magdalen College, Oxford, and then went to the Bar. He served in France during the Great War. Succeeding to his father in 1909, he married in 1913 Marjorie Florence Curteis, and leaves a son David Henry, the present Baronet. He joined our Society and was able to record a new locality for *Lobelia urens* not far from his own beautiful estate at Lytchett Maltravers, near Poole, in Dorset where, as he says, it seems certainly native. But his special interest lay not with flowering plants but with the lower Fungi and he was an acknowledged authority on Pyrenomycetes.

PLYMOUTH, THE FIRST EARL OF. Robert George Windsor-Clive. Born August 27, 1857; died at Great Cumberland Place, London, March 8, 1923. At his Worcestershire residence, Hewell Grange, in the latter part of the eighteenth century, George Don, the Scottish botanist, was an under-gardener. Lord Plymouth was the son of the Hon. Robert Windsor-Clive who died when the boy was two years old. At the age of twelve, on the death of his grandmother, he became the fourteenth Baron Windsor. Lord Windsor was educated at Eton and St John's, Cambridge, and married Alberta, daughter of Sir A. Paget, long our Ambassador at Rome. In 1905 the old peerage in his family was revived and he was created Earl of Plymouth. He had a very beautiful estate at St Fagan's, Glamorganshire, and to the neighbouring town of Cardiff, of which he was Lord Mayor in 1895, he presented part of his demesne—called the Great Wood. During the War he threw all his energies into the work of raising and equipping recruits. He was a model nobleman. One who belonged to the so-called idle class, he was always working at some patriotic movement. He was a cheery chairman of meetings, a liberal supporter of Science, Art and Exploration. It must be remembered that he saved the Crystal Palace and its grounds from the speculative builder. He himself gave £30,000 to the purpose and made himself responsible for the collection of nearly a quarter of a million pounds. The retention of such a splendid open space and Paxton's palace is due to his public spirited generosity.

He was chairman of the trustees of the excellently arranged Tate Gallery, and in the Queen Victoria Memorial Scheme he was a moving and inspiring spirit. How much he was appreciated by "his own people" will be seen by a letter in the *Gard. Chron.* p. 154, 1923.

ROTHSCHILD, THE HON. NATHANIAL CHARLES, D.L. Born May 9, 1867, the second son of Lord Rothschild; died at Ashton Wolds, Northamptonshire, October 12, 1923. Married in 1907 to Rossika, third daughter of Capt. A. E. von Wertheimstein of Nagy-Varad, Hungary, by whom he had one son and three daughters. He was educated at Harrow, where he produced a volume on the local Lepidoptera, and Trinity College, Cambridge, taking honours in part 1 of the Natural Science Tripos and becoming M.A. in 1901. He was from a youth fond of Natural Science. I remember him telling me that his father bought for him one of the founders' shares in the Burmah Ruby Mines and that it so appreciated in value as to be worth more than he thought a boy ought to have, so he gave him a microscope instead, a gift which after all opened to him a vista of things more precious, if not so expensive, as rubies. So that beginning with insects he specialised on fleas and when he was only twenty read a paper on two new species of that active, if not popular, family. On this group he became the acknowledged authority and he spared neither pains nor expense in working out the subject. His unrivalled collection was presented to the Natural History Museum and the gift was endowed with means for its upkeep. One of his last contributions on this subject was a report on the Siphonoptera collected in the Norwegian Expedition to Nova Zembla in 1921. His knowledge of British Lepidoptera was of a high order and he made a fitting President for the Entomological Society in 1915 and 1916, to which he gave a very able Presidential address, and to which he was a generous donor. He had a great liking for British Orchids and had paintings made of many forms by one of our members, Mr Bedford. He also purchased a very complete collection of water-colour paintings made from living specimens by Lady Davy. These, with other paintings of the genus *Iris*, he left to the national collection at Cromwell Road. It was owing to his love for

these groups that I owed the honour of his acquaintance, which in time ripened to a genuine friendship. By his kindness I stayed at Tring and made a fruitless search for *O. militaris* near that town in both counties. Its disappearance is a mystery. He placed his old bachelor residence at Ashton at my disposal and there I have had many pleasant visits since one was unshackled from society conventions and could make the day's arrangements as one liked. From that delightful and hospitable residence, with the beautiful view of Oundle Church, its luscious meadows, and the great school, made so great by Sanderson's personality, the country round was pretty thoroughly explored. It was a visit to the White Water, with its masses of Marsh Orchids, which led to my being able to segregate *O. praetermissa* and its numerous hybrids. There in the avenue—a natural hedgerow—the Rose was found which I named *R. Rothschildii* a fairly distinct form not confined in Northamptonshire to that locality. The genus *Iris* was his great favourite. He had all, or nearly all, of the European species growing in his garden. He was especially glad to receive the Lincolnshire *Iris spuria* which I went to its locality to gather and, through my friend, Mr Sherring, the yellow-flowered *I. foetidissima* from Dorset. Both flourished well in his Ashton garden. He had a good knowledge of Hungarian plants in the identification of which he was greatly aided by Herr Degen. He was the Founder of the Society for the Protection of Natural Areas and a most liberal contributor to its funds. He also gave unsparingly of his time in order to have the whole of the areas of Great Britain which had a remarkable fauna and flora scheduled. Of these areas he obtained full particulars, not only of what species grew there or frequented them but also who was the last owner and what was its approximate value. All these details were scheduled and kept strictly private. In this work he had in me a most willing coadjutor. The correspondence was colossal. Several of these areas one had to visit—one to an estate belonging to the Marquis of Lansdowne at Clooney on Kenmare Bay, when I had the opportunity of seeing Derreen, then a beautiful oasis where Bamboos and Eucalyptus of many species flourished in rank luxuriance, while the Azaleas and Camellias—it was early April—recalled the Azores. There had been an unusual fall of snow that year so that the distant Reeks looked like the snow capped Alps

across the shimmering wavelets of Kenmare Bay. Alas one had to report adversely against the purchase of the beautiful valley. Had there been no population another verdict might have been given. It was felt that no security against trespass could be enjoyed. Now Derreen is devastated but Clooney remains, probably little changed. The journey was not fruitless, however, for a *Taraxacum* gathered has since been named as a new species, at present known only from Ireland. The Saltings on the Kirby le Soken marshes and Ray Island, Wood Walton and Monks Wood were also explored. The excursion by the International Society of Phytogeographers through the British Isles in 1911 with its enthusiastic account of Blakeney which appeared in our *Report* made Mr Rothschild determined to purchase it. He allowed me to act as treasurer and negotiator. My four months in bed from phlebitis was made less trying from the fact that I was able to obtain the requisite funds and to purchase the shingly stretch. Of course the chief supplier of the sinews of war was Mr Rothschild. I took it not as the least of many of his kindnesses that from time to time he came to spend the week-end or his Sunday during that enforced period of rest. It was through his energy that the Society became possessed of a Charter and he most generously gave Wood Walton Fen which I had recommended him to acquire because it was the home of some wonderful marsh violets and a rare *Luzula*. It was also a good place for Lepidoptera. Here he planted *Sonchus palustris* and the Fen ragworts, a fact which may as well be put on record, and here, too, he sought to introduce the continental form of the Large Copper which has so mysteriously become extinct as a British insect. Not only did he make this handsome gift but he endowed it. He was the right hand of his father in the great house of Rothschild with all its responsibilities. He was Chairman of the Alliance Assurance Company, owner of a Gold Assay Works, Deputy-Lieutenant of the City of London. High Sheriff of Northamptonshire, a land owner and a hundred and one other things. He had too many irons in the fire. His mind was always at work. When staying with him at Arundel House, when I was dozing in the morning, he would be dictating letters from his bathroom to his typist. This too full life reached its climax during the Great War for, in addition to the worries and responsibilities of business which Lord Rothschild's patriotic service to the nation

naturally threw on him, he became a most responsible member of the Munitions Committee so that when I saw him in London in 1915 he looked overdone. That was the last time I saw his father, who had as usual come in for a few minutes romp with his grandchildren. Few people would have realised that it was the great financier who was playing woolly bear with his loved little ones. Then came his father's death. We pressed him very hard but without success to get away to Sutherlandshire for a complete change. He thought it over but felt bound to keep to the oar with the inevitable penalty of a complete nervous breakdown from which he never recovered. As time went by some months in each year were spent in Switzerland and Italy but the mischief had been done, the iron had bit too deep. Although I saw but little of him since the years of the great war our correspondence was maintained to the end. In June he sent me a marsh orchid from Marsworth, Bucks, which is *O. praetermissa* × *Fuchsii*. Within a fortnight of his lamentable death he had made enquiries about the habitats of *Milium* in Scotland and meditated a hunt in search of some insect which fed on it. Of his myriads of acts of kindness most people will never know. I chaffed him about the very affectionate terms I had heard him spoken of at Bettyhill last July. When he and his family were last there (Mrs Rothschild then found *Rhinanthus major*) a poor woman had lost her only cow. She went round with a paper asking for donations to buy another. Mr Rothschild, hearing of this, enquired if it were a genuine case and finding it was gave the landlord £15 to buy her another which, as may be imagined, filled the poor body's heart with a never ending gratitude. Showing me the cow and its calf with great pride, when she realised that I knew her benefactor, it was not only a sight for, but the cause, of sore eyes. I told him of the spell he had cast but suggested that after all it might only be a case of calf-love. To our Society he was a generous member. On one occasion when he thought some injustice was done he wrote a kindly letter saying "I detest injustice and I feel sure that have tried (and I am glad to say have failed) to treat you most unjustly. Will you accept the enclosed as a donation." So our Benevolent Fund benefited by the extent of twenty pounds. The sympathy of us all goes out to Mrs Rothschild and the fatherless children. We hope that Victor, who has inherited

his mother's beauty and, we trust, his father's kindness of heart, will be imbued with the same spirit of genuine helpfulness and sympathy, and have the rapid, alert mental powers of him who has been so prematurely snatched from us in the prime of a most useful life.

TEMPERLEY, NICHOLAS. Born at Hexham, Northumberland, 1844; died at Gateshead, September 30, 1923. He came to Newcastle in 1863 to manage in the Close a wholesale corn and provision business which belonged to his father. Two years later he became a partner and continued in business at Newcastle till 1908 when he retired. He succeeded to the Presidency of the Tyneside Sunday Lecture Society on the death of its former President, the Right Hon. Thomas Burt. He became much interested in Agricultural Research, was an authority on the early churches of his native country, and was accorded the Gilchrist Medal at Cambridge about ten years ago. He was a member of the Royal Archaeological Society and was a keen member of the local Natural History Society and of the Royal Arboricultural Society, being a member of the Council. He was a frequent attendant at its excursions both in Britain and abroad. He became connected with our Society in 1917. Later, when I made his acquaintance, I found that he had travelled much on the continent, and was interested in Italian Art. Not only had he a good knowledge of the local flora of which from time to time he sent in some interesting notes, but his love for the Alpine plants of Italy and Switzerland was keen to a degree. His public work at Gateshead was much appreciated. He acted as Magistrate for that town for 31 years. His interest in Botany did not end with the higher plants. He was a member of the Mycological Society and attended their meetings and fungus forays. He also belonged to the Moss Exchange Club. He lived a full life and looked much younger than his years.

WILKES, Rev. WILLIAM. Born at Ashford, Kent, 1843; died at Shirley, Surrey, 1923. He was educated at Clapham School and Pembroke College, Cambridge, where he graduated in 1866. He acted as Curate at Croydon Parish Church till 1879 when he was appointed Vicar of Shirley. He came of a family interested in

Horticulture and at the early age of 23 he was made a Fellow of the Royal Horticultural Society. In 1881 he was chosen Chairman of the Floral Committee. His great floricultural achievement was the production—after years of careful labour—of the Shirley Poppy. Of this work a notice will be seen under *Papaver Rhoeas* in this *Report*. It is not a hybrid of two species but a selected strain of the Common Red Poppy and forms one of the most pleasing additions to the garden as its range of colours is varied and the texture of its petals is so delightful from their satiny sheen. The stamens, too, differ from the type in being yellow coloured. Indeed its whole appearance is most dainty and pleasing. When the Society was in difficulties in 1888 Mr Wilks came to its aid and reconstructed it, becoming its Honorary Secretary. He lived to see the membership raised from 1000 to 16,000, to see the Society with a large income, a substantial reserve, and a fine Library. He edited its Journal, which contains much matter of value, and many able articles. When he retired from his living at Shirley in 1912 he devoted his time to his favourite pursuit. Latterly he acted as paid Secretary to the Horticultural Society. He gave 25 years' service in that office and on his retirement in 1913 a substantial cheque and a silver salver were presented to him. He was granted a permanent seat on the Council. He died in the house he had built near the Vicarage at Shirley. He was a man of great tact and with excellent business methods. Horticulture has lost a most able exponent and an industrious disciple. He joined our Society in 1918. By his will the ultimate residue of his estate, valued at about £28,000, will eventually go to the Horticultural Society.

WILLIAMS, FREDERICK NEWTON. Born at Brentford, Middlesex, March 19, 1862; died in the West Middlesex Hospital, Isleworth, March 6, 1923. He qualified as a medical practitioner after studying at University College and St Thomas's Hospital in 1883. He was a good linguist, an accomplished Latin scholar, and possessed a clear, terse style of writing. Known to me for years, I found him a mass, but not unpleasing mass, of contradictions. A surgeon, who made no success at his profession, he allowed the opportunities of making a profitable practice to slip by unheeded. A student of plants, he mainly studied them in the herbarium. He was a most strenuous

worker at Kew and could accurately copy out quantities of details, however crabbed the hand and however carelessly written, but he scarcely deigned to look at a growing plant. He yawned when I showed him some of our Oxford treasures, and even some alpine *Cerastia* in my garden were rapidly passed by. A literary man and a good linguist, he had not read Balzac or Victor Hugo; a Freemason—not of England but of France (what a world of difference that implies); a free-thinker, but fond of ornate ritual; a student, as I have said, of dried plants and of printed floras who got his relaxation but not on the cliffs of the Scottish hills. Holborn Hill was his mountain climb and Piccadilly his inspiration. He was by nature a kindly and friendly person, though his comments on his contemporaries are incisive and, however amusing, are not always of the kindest. He was a hard worker at a subject for a time, but he did not “carry on” well or we might have had contributions to British Botany of the highest value from his pen. His uncompleted “*Prodromus Florae Britannicae*,” which he began publishing in 1901, is a case in point. There is an enormous amount of laborious compilations from herbarium specimens and from published works, but he used the Latin tongue for its vehicle and thus, at a stroke, cut himself away from a profitable publication and a large clientèle. During the many years of its preparation we had a voluminous correspondence. He was an excellent letter writer, and one could fill a volume of the *Report* with extracts. In the arrangement of his work he follows Engler. Perhaps all of us will eventually be chained to its oars. He refused to admit any descriptions of hybrid plants or those that were not assuredly native. The results were curious. The Mints, of which one reviewer said “the treatment was masterly” only had five species described. So, in that most variable genus, no description is given of a single variety. *M. piperita*, *M. rubra*, *M. verticillata* and *M. gentilis* are therefore ignored so that a very large proportion of individual mints which the botanist would meet with in the field could not be identified correctly if he relied solely upon the *Prodromus* for assistance. Of course he gives a list of such and other hybrids, but that does not aid in the recognition. Yet under *Plantago maritima* and *Coronopus* a large number of varieties are described but alas not always correctly identified. He mistook, for instance, the Steep

Holme plant for *P. serraria* and the Dorset *ceratophyllon* for *macrorrhiza*. But his literary notes on the histories of the species are extremely valuable and it is to be greatly hoped that the part in MS. which is given to the National Herbarium may some day be published. In his nomenclature he followed no rule or rather he did not follow the International Rules and he boldly wrote *Belladonna trichotoma* instead of *Atropa Belladonna* and *Stramonium foetidum* instead of *Datura Stramonium*. It is quite true that Linnaeus wickedly and wantonly altered Tournefort's names in many cases, but it is too late now to revert to the pre-Linnean names. Williams wrote all the trivial names with a small letter. He adopted *Pervinca* instead of *Vinca* but omits all reference to *V. major* since it is naturalised only. He adopts *Blackstonea* as Hudson originally spelled it. He rightly adopts *Pneumaria* Hill—*Mertensia* ought never to have been included in the nomina conservanda. Curiously *Scrofularia* (as he spells it) *vernalis* is admitted, but it is no more indigenous than *Vinca major*. He uses *Euphrasia officinalis* in the sense of *Rostkoviana* and identifies *E. latifolia* and *foulaensis* as *E. arctica* Lange. But we are developing into a criticism of his British Flora rather than an appreciation of a much valued member. The very differences here mentioned show that Williams was no mere copyist. He had original ideas and often these were, in a high degree, suggestive and not infrequently correct. The Caryophyllaceae was his favourite group. He published an *Enumeratio Specierum Varietatumque Generis Dianthus* from Brentford in 1885, and in 1889 his *Notes on the Pinks of Western Europe*. He was the first to identify the *Dianthus* of Jersey as *D. gallicus*. Our members were delighted to see this growing in May last year at St Ouen's Bay. In the *Journal of the Linnean Society* for 1893 he published a *Monograph of the Genus Dianthus*, in 1896 a *Revision of the Genus Silene*, and in 1898 a *Monograph of the Genus Arenaria (excluding Alsine)*. Many papers on the same family were published in the *Journal of Botany*, including his discovery of the green foliaged *Stellaria Dilleniana* (223, 1910). This was first published in our *Report*, 413, 1909, as *S. palustris*, var. *viridis*. Babington (*Man.* 58, 1874) says the plant is usually glaucous (thus assuming the existence in Britain of a green foliaged plant). See also *Rep. B.E.C.* 546, 1910. He also contributed to the *Journal of Botany*

a valuable paper on a *Critical Study of Ranunculus aquatilis*, var. *γ*, pp. 11, 44, 1908, in which he kept *Drouetii* and *trichophyllus* distinct species. In 1917 he wrote a *Monograph of the Genus Sagina* as a Supplement for our *Report*. In 1908 he began a valuable contribution on *The High Alpine Flora of Britain* in the pages of the *Annals of Scottish Natural History*, which with additions and corrections we hope at no distant date to republish in our *Report*. He was also a contributor to that excellent, but alas defunct, periodical, the *Bulletin L'Herbier Boissier*, and he wrote in Italian a paper in one of the Botanical journals of that country. His biography of Theodore Caruel (*Journ. Bot.* 258, 1899) is excellently written. There is an able memorial notice by Mr Britten in *Journ. Bot.* 249, 1923. Until the last three years he came to see me occasionally for the week-end, a visit I always enjoyed, for he was a good conversationalist. He steered clear of Botany, whereas in his correspondence he adhered closely to it, interpolating his notes here and there with some attic salt and sometimes with points flavoured with an acidulous radical. In this way he resembled a Master of the Temple who when visiting the Athenaeum uttered mordant epigrams, leaving absent members' characters unassailed. Williams, however, had no personal enmities. His botanical letters were excellent. One such lies before me, written when he was preparing his account of the genus *Thymus* for his *Prodromus*. It will be remembered that in that work he used *T. ovatus* Miller instead of *T. Chamaedrys* which British botanists had for some years misused. In my *List* of 1908 I had revived Miller's name. As will be seen Ronniger in this *Report* has shown that *ovatus* Miller is outdated by *T. pulegioides* L. And he has also stated that *T. lanuginosus* Mill. is British. Williams (Jan. 10, 1910) writes that "he does not want to see my array of *Thymus* as he is not examining more at present. . . . I am afraid a good deal remains to be done with the British forms, and I have but very crude opinions about them at present. Meanwhile I have carefully examined Miller's type-specimen of *T. lanuginosus* in Herb. Brit. Mus. It agrees fairly well with his description, and is a hairy plant without stolons, though not having enough to be called '*lanuginosus*,' though, of course, the indumentum may probably have been rubbed. Still it quite sufficiently agrees with the description. The specimen is not dated, but the locality given

(Forest of Fontainebleau) is that given in the *Gard. Dict.* [but cf. Wilmott in *Journ. Bot.* 136, 1923]. I have not succeeded in matching any British specimen with it [As will be seen Ronniger identifies my Gloucestershire plant as being that species]. He adds, "I found in Herb. Brit. Mus. a specimen from Tongland, Kirkcudbrightshire, which agrees exactly with *Origanum vulgare*, var. *megastachyum* Koch in Mert. & Koch *Deutsch. Fl.* iv., 304, 1833. Probably it occurs elsewhere. This Scottish specimen exactly matches the excellent plate in Brotéro *Phytogr. Lusitan.* sel. ii., 91, t. 113, 1827, which might have been drawn from it." In April 1919 he writes saying he is "keeping up *Rubus nessensis* (instead of *suberectus*)." He agrees that it is the earliest correct name. Just before he had sent me a complete list of Middlesex Rubi. This MS. of British Rubi includes 64 sub-species, of which 34 occur in Middlesex. He believes *Arctostaphylos* Sprengel to be a nomen nudum and in the *Prodromus* used *Uva-ursi* (Tourn.) Miller 1754. It may be added that he was the first to draw attention to Miller's *Abridgment of the Gardeners' Dictionary* of that date, which is one of the earliest botanical works published after the first edition of the *Species Plantarum* of 1753. In February 1918 he gives a luminous account of the air-raid when eleven explosive bombs fell on Brentford, killing 10 people and maiming about 50 others; destroying the South Western Railway Station and the Waterworks opposite to the Kew Herbarium. He was also on duty at Covent Garden during the great air-raid. "It was a sickening spectacle. Four explosive bombs had crashed through the lift-shaft of the John Bull Office, tore through three concrete floors, and crashed among the refugees who had crowded below. [Here the details are too awful to quote.] Up to yesterday 57 bodies had been recovered, and there may be a few more buried in the ruins. Poison-gas bombs were certainly used, and the murderous raiders all escaped. I enclose a provisional list of British Orchidaceae with dates to every name—if you care to make use of it pray do so. . . . You will notice that *Ophrys* is cited as of Miller 1754, where it is first used in more or less its current sense. '*Ophrys* L.' is a hopeless muddle. . . . I quote 'Aiton f.' for several genera as well as many cruciferous ones . . . for the plain reason that throughout the whole of Aiton's *Hort. Kewensis* (both first and second editions) the name

of Robert Brown is not once in evidence. . . . You can do what you please about *Sagina*. I have no doubt that it is amenable to correction here and there in details. I should gladly accept your corrections and emendations. *S. Reuteri* is quite stable. . . . My MS. of Orchidaceae (not quite finished) fills 53 pages. It is in the form of later parts of the *Prodromus* but rather fuller in critical notes, with full list of altitudes for all the species, compiled from many sources. [It also contains notices of hybrids]. Watson's altitudes are only taken in default of any others for the same plant, as he had no instrument other than the old-fashioned sympiesometer for accurate measurement, and those of his vertical records I have checked are all too high, including those found (possibly in a balloon) beyond the limits of perpetual snow. There are no limits of perpetual snow in Scotland since the Glacial Period." He then gives me an example of his treatment of a species of Orchid in the *Prodromus*, i.e., "*Cephalanthera rubra*. In woods and bushy places; in Gloucestershire only. First recorded as a British plant on Hampton Common, Gloucestershire, by Mrs Smith of Barnam House in that neighbourhood, *Eng. Bot.* t. 437, 1797, under the name *Serapias rubra*. The specimen in Herb. Brit. from Sowerby's herbarium was used for the figure mentioned, and is labelled Miss (?) G. Smith, Hampton Common, Gloucestershire, 29 June 1797. Syme (*Eng. Bot.* ix., 128, t. 1483, 1869), gives the additional locality of 'Pitchcombe Wood, whence I have been favoured with fresh specimens by Mr G. S. Wintle, and with dried ones by Dr St. Brody, gathered in 1864-65,' the latter also in Herb. Brit. dated 1864. More recent specimens in Herb. Brit. are from Woodchester (Rev. H. P. Reader, 1880) and from Glad (sic) Valley, Stroud (E. M. Day, 1911). In Herb. Watson are also specimens from Pitchcombe Copse (Rev. H. P. Reader, 1879) with a note on the label 'said also to be found at Dursley.' There is no confirmation of the recent occurrence of the plant in the original locality of Hampton Common." On my Orchid paper he adds, "I am sure that the hybrid dilutions of British Orchids are quite different from Continental ones." Again "*Puccianella*" is certainly the correct name for *Atropis*. Parlatore, 1848, gives quite excellent descriptions of all the species in his *Fl. Italiana*. The former name prevails in nearly all N. American Floras, and the correct name of *Glyceria Borreri* Bab. is *Puccianella*

permixta Parl. *Glyceria rupestris* is an impossible name." Later on he writes, "I had overlooked your lucid note in *B.E.C.* 432, 1916. As you say, of course, it is not a rock-plant at all so the name is not only untenable but erroneous." In December 1918 he says (too severely) of the Linnean species, "they are merely labels and there is no description at all but merely a string of hap-hazard synonyms. I am correcting the errors in my copy of the *Cambridge Flora*. They appear to be interminable." He regards *Festuca elatior* L. as represented in the first edition too vaguely and in the second edition as two (probably more) species, and neither comes up to the Hudsonian standard of clearness. So he adheres to *F. pratensis* Huds. combining with it Syme's *elatior* and making the less common form var. *arundinacea* nobis. Even the Chauvinist Swede, Wahlenberg, *Fl. Upsala*, 1820, suggested the dropping of the Linnean specific *elatior*. "As you have pointed out the case for *Helleborine* is undoubted." He was much interested in the discussion on *Orchis latifolia* (or as he wrote it *latifolius*) and one cannot resist quoting a note on the subject, too incisive as it is. "With all due respect to Mr. . . . his brain consists of watertight compartments. He will twist and hammer and knead together the scattered items of an Orchid and draw inchoate conclusions from the limited data available. But when the next problem presents itself he is quite unable to utilise the last mortar from the last brick, to associate together and co-ordinate the characters of the next brick—or to synthesise the conclusions which a scientific systematist would draw from many sources. For this reason his numerous annotations have little connection with each other, and are frequently mutually contradictory. He cannot see the wood for the trees. As you point out he would look at Gerard's woodcut of *latifolius* but would not go beyond the outline, and it would not occur to him to trace back the origin of the woodcut, or to find out if it had been modified from another which had seen active service. Linnaeus' synonyms frequently afford comic relief to the heavy dullness of his diagnoses. Linnaeus had a number of favourite authors or 'Totems,' others were 'Taboo' and, therefore, like the ancient church customs, in his references some are to be 'abolished' and some 'retained.' And so, having made up his mind previously as to the category, when he was perched on his stool at his desk, he

was able to limit the number of books to be within reach of his left arm, while his right hand continued to scribble. When both categories failed him he was able to send his assistant secretary or factotum to an adjoining room which contained his herbarium to fetch out a Swedish specimen whereon to base his type description of an European plant of possibly wide variation. [cf. *Orchis maculata*]. Sometimes the factotum brought the wrong sheet of specimens, and sometimes, which was better (or worse) for subsequent reference, stowed it back in the wrong cover (the separate sheets within each cover were not clearly inscribed and rarely numbered)." In the same year, 1918, he writes to say that *Orchis incarnata*, var. *ochroleuca* is not *O. ochroleuca* of Wüstnei 1854 or of Reichb. 1830, but var. *ochroleuca* Boll. Arch. Fr. Nat. Mecklenb. xiv., 307, 1860 (see Aschers. & Graeb. iii., 720). As regards Orchid genera, "I view with suspicion the application of all generic names previous to Richard 1888, such as *Epipactis* Haller, which as you say = *Goodyera* 1813, and think that many of them should be scrapped. *Helleborine* is well defined by Tournefort, and is adopted with hardly any modification by Miller in 1754, as you have done." One could go on for pages quoting from this huge and most interesting correspondence. The letters were always welcome and suggestive and few genera of British plants were not at some time or other touched on. For the last two or three years the letters had dropped off. I was afraid in some way I had unwittingly annoyed him, but discovered that depression, owing to straitened means and probably failing health, were the cause of their well nigh cessation. The last time I saw him was at the Kew Herbarium where he was getting material for his *Prodromus*, which he was destined never to see published. He suffered from cardiac affection and gangrene, and met his end in a nursing home. His death cut off a career which might have been brilliantly successful. It was the irony of fate that such a workman should be used for uncongenial work. As an endowed student of a great herbarium he might have made a great clearance of useless material, and perchance have prepared a great Vegetable System for the production of which his critical and extensive knowledge were very great assets. One feels intensely sad at his (for a botanist) premature death, and for the saddened conditions by which his later days were surrounded. Personally I owe

much to him as a warm supporter of our Society, for his proof-reading, not only for the *Reports* but for the *Adventive Flora of Tweedside*, for his voluminous correspondence, and for his genial and kindly good-fellowship.

NEW COUNTY AND OTHER RECORDS.

ABBREVIATIONS.—*Rep. B.E.C.* = *Report of the Botanical Society and Exchange Club*; *Wats. B.E.C.* = *Report of Watson Botanical Exchange Club*; *Gar. Chron.* = *Gardeners' Chronicle*; *Nat.* = *The Naturalist*; *Journ. Bot.* = *Journal of Botany*; † = *Adventive*; * = *New County Record* (in the case of adventive plants this is only rarely added); ! placed after a plant signifies that the compiler has seen a specimen; ! placed after a locality that the compiler has seen it there; × placed between two scientific names means that the plant is a hybrid; 52, &c., numbers following a county, refer to the Watsonian vice-county in *Topographical Botany*; [] enclosing a record mean that confirmatory evidence is needed, or that the plant is not British.

17. *MYOSURUS MINIMUS* L. Between Exmouth and Budleigh Salterton, May 1923. Confirmative of an old record in the *Flora Devoniensis* of 1829, C. W. GARDNER.

22. *RANUNCULUS BULBOSUS* L., var. *DUNENSIS* Druce. The members of the Society, on their visit to Jersey in June, paid attention to this form. Although very many specimens were examined, not a cormless plant could be found. There seems good reason to believe that the *R. Aleae* of the *Cambridge Flora* was founded on an abnormal form of this dunal plant which forms a striking feature of the flora, DRUCE. Var. *FLORE PLENO*. Great Bookham, Leatherhead, Surrey, 1881, C. ORCHARD in *Gard. Chron.* 10, 1923.

23. *R. LINGUA* L. Gailey Reservoir; Hoar Cross, Stafford, the former an almost glabrous plant, DRUCE and Sir R. CURTIS.

26. *R. SCOTICUS* Marshall. In several lochs near Loch Erribol, W. Sutherland, DRUCE and WILLIAMSON.

†28. *R. SARDOUS* Cr. *Bowling Distillery, Dumbarton; Riddings, Lanark, GRIERSON, teste THELLUNG.

31. *R. MURICATUS* L. Naturalised in the Scillies, Cornwall, DOWNES.

38. *R. TRICHOPHYLLUS* Chaix, var. *RADIANS* (Revel). Stream at Elliot, Forfarshire, R. and M. CORSTORPHINE. Det PEARSALL. Var. *GODRONII* (Gren.). Quarry Pool, Westerton Toll, Auldbar, Forfarshire, R. and M. CORSTORPHINE. Det. HIERN.

41. *R. PELTATUS* Schrank. Deanscales, Cumberland, TEMPLEMAN. Var. *TRUNCATUS* (Koch). Kingthorpe Hall, Levisham, N. Yorks, FLINTOFF. Var. *PSEUDOFLUITAUS* (Newb.) Syme. *River South Esk, near Powmouth, Forfarshire, R. and M. CORSTORPHINE.

42. *R. BAUDOTII* Godr., var. *CONFUSUS* (Godr.). Llanelly, Carmarthen, HAMER.

47. *R. FIGARIA* L., flore pleno. The Drum, Midlothian, D. ARMSTRONG in *Gard Chron.* 27, 1923.

†60. *DELPHINIUM AJACIS* L. Glasgow, GRIERSON. Det. THELLUNG. Buildwas, Salop, MELVILL.

†61. *D. ORIENTALE* J. Gay. Willoughby Gorse, 2 miles from the malt houses, Sleaford, 1922, Miss LONDON. Det. THELLUNG.

†68. *ACONITUM NAPELLUS* L. Marwell, S. Hants, Miss WILLIAMS; Sibton Abbey Wood with *Spiraea salicifolia*, *Paeonia* species, and *Helleborus foetidus*, all probably introduced, REDGROVE.

†71. *PÆONIA OFFICINALIS* (L.) Gouan. Corstorphine Hill, Edinburgh, BELL.

77. *CASTALIA ALBA* Link, var. *OCCIDENTALIS* (Ostenf.). Altnaharra, W. Sutherland; Achiltibuie, W. Ross, DRUCE.

†*79. PAPAVER SOMNIFERUM L. In potato field, Kyle of Loch Alsh, W. Ross; Bonar Bridge, E. Ross, DRUCE.

80. P. RHOEAS L., var. STRIGOSUM Boenn., var. PRYORII Druce. Christchurch, S. Hants, Miss S. G. ROOKE.

†90. GLAUCIUM CORNICULATUM Curt. Christchurch, S. Hants, Mrs ROTHWELL and RAYNER.

†91. ROEMERIA HYBRIDA DC. Cardiff, Glamorgan. Det. THELLUNG.

†95. HYPERICUM PROCUMBENS L. Cardiff, Glamorgan. Det. THELLUNG.

†97. CAPNORCHIS FORMOSA (Walp.). One clump in a wood, West Bergholt, N. Essex, Miss FROST, ex G. C. BROWN.

†98 (2). C. CANADENSIS (DC.) Druce. Millom, Cumberland, Mrs MASON.

104. FUMARIA CAPREOLATA L., var. BABINGTONII Pugsl. Falmouth, Cornwall, Miss TODD.

106. F. PURPUREA Pugsl. Between Ilfracombe and Chambercombe, N. Devon, 1891, as *pallidiflora*, BAILEY.

107. F. BORAEI Jord. Melmerby, Cumberland, Rev. W. W. MASON.

108. F. MURALIS Sond. Trigoney, E. Cornwall (Miss Todd's locality), Mrs WEDGWOOD; probably this, teste PUGSLEY, from Bradninch, N. Devon, Lady DOUIE.

109. F. BASTARDI Jord. Corfe, Dorset; *Seascale, Cumberland. DRUCE; Glamorgan, WEBB; Lizard, Cornwall, Miss TODD.

110. F. OCCIDENTALIS Pugsl. Housel Bay, Cornwall, 1923. Miss TODD.

122. RADICULA NASTURTIUM Druce, var. MICROPHYLLA (Reichb.)

Druce. Galway, Mrs EVANS. Particularly abundant in 1923 and often a conspicuous feature, as near Witney, Oxford, DRUCE.

124. *R. SYLVESTRIS* Druce. Fordham, Cambridge, H. K. A. SHAW.

†131. *BARBARA INTERMEDIA* Bor. Aldbourne, Wilts, Miss TODD.

†132. *ARABIS TURRITA* L. Christchurch, S. Hants, Miss S. G. ROOKE.

142. *CARDAMINE PRATENSIS* L., flore pleno. Rather plentiful about Port Eynon, Glamorgan, Miss PHOEBE SYMONS.

†*144. *C. IMPATIENS* L. In the High School Grounds, Sleaford, Lincoln, Miss LANDON.

145. *C. FLEXUOSA* With. Woodbridge, E. Suffolk, H. K. A. SHAW. It is still a desideratum for W. Suffolk.

†149. *LUNARIA REDIVIVA* L. Hedge, Llanyfelach, Glamorgan, WEBB.

†150. *L. ANNUA* L. Haverford West, Pembroke, DRUCE.

†*162. *DRABA MURALIS* L. On a cottage garden wall at North Aston, Oxford, H. POWELL. Confined to this one place in the county for which it is a new record. I could find no clue to its introduction. The tenants had been in the cottage for many years. In great quantity in a wood clearing, Wye Downs, E. Kent, Miss M. COBBE. New to Kent, but doubtless adventive. In a Nursery at Winchester, 1923, adventive, DRUCE.

†176. *HESPERIS MATRONALIS* L. Near Banbury, on a railway siding, (?)Northants, LAMB; abundant in Heythrop Park, Oxon, DRUCE; Hinton, S. Hants, J. VOISE.

†184. *SISYMBRIUM ALTISSIMUM* L. A very tall specimen at Ashstead, Surrey, Miss WILKINSON; Carmarthen, HAMER; Aldbourne, Wilts, Miss TODD; Silloth, Cumberland, DRUCE; Ruswarp, Thornton Dale, N. Yorks, FLINTOFF; between Henton and Shefford, Beds,

WILD FL. SOCIETY. Var. RIGIDULA Thell. Hull Docks, Yorks, Miss M. COBBE.

†185. S. ORIENTALE L. Galway, Mrs EVANS; Bullingdon, Oxon; Silloth, Cumberland, DRUCE; Bitterne, S. Hants, RAYNER.

†187. S. LOESELII L. Bristol, Mrs SANDWICH. Det. THELLUNG. Oil Works, Hull, Miss M. COBBE.

†188. S. IRIO L. Barry, Glamorgan, R. L. SMITH.

†191. S. POLYCRATIUM L. Bristol, N. SANDWICH.

†198. ERYSIMUM REPANDUM L. Ware, Herts, Mrs WEDGWOOD; South Stoke, Oxon, DRUCE; Leverton, Lincoln, Rev. W. W. MASON; Christchurch, Hants, Mrs ROTHWELL and RAYNER. Det. THELLUNG.

†200. CONRINGIA ORIENTALIS Dum. Basingstoke, N. Hants, BOYS; Bitterne, S. Hants, RAYNER; Lichfield, Staffs, DRUCE and Sir R. CURTIS; Edenhall, Cumberland, GAMBIER-PARRY.

†201. C. AUSTRIACA Sweet. Builth, Brecon, Hon. Mrs A. LEITH.

†203. CAMELINA SYLVESTRIS Fries. Llanelly, Carmarthen, HAMER. Det. THELLUNG.

†211. BRASSICA CHEIRANTHOS Vill. Radyr, Glamorgan, R. L. SMITH. Det. THELLUNG.

†*215. B. NIGRA Boiss. Dumbarton, GRIERSON.

†218. B. JUNCEA Coss. Between Truro and Malpas, Cornwall; Penarth, Glamorgan, STORRIE; Headington, Oxon; Lichfield, Staffs, DRUCE; Galway, Mrs EVANS. Det. THELLUNG.

†222. B. GALLICA (Willd.) Druce. Christchurch, S. Hants, Miss S. G. ROOKE.

†224. B. INCANA Schultz. *Abundant throughout the Isle of Thanet, E. Kent, Miss M. COBBE; Grange Town, Glamorgan, WADE; Barry, Glamorgan, R. L. SMITH.

226. *DIPLOTAXIS TENUIFOLIA* DC. †*Above Ystalyfera, Brecon, J. A. WEBB; very abundant throughout Thanet, Miss M. COBBE.

†227. *D. MURALIS* DC. Hoar Cross, Staffs, DRUCE and Miss D. MBYNELL; on railway near Grosmont, N. Yorks, FLINTOFF.

†228 (2). *ERUCA CAPPADOCICA* Reut. Flaxfield, Upper Swell, Gloster, v.-c. 33, Mrs C. WILDE, teste THELLUNG.

232. *BURSA ANGLICA* (At.). Par, Cornwall, Miss TODD; Swanage, Dorset; Byfleet, Surrey; Biddesden, Wilts, DRUCE.

232. *B. BATAVORUM* (At.). Freshwater, Isle of Wight; Frilford, Berks, DRUCE; Godalming, Surrey, RAYNER.

232. *B. BRITTONII* (At.). N. Stoneham, S. Hants, RAYNER; Martyr Worthy, N. Hants; Hoar Cross, Staffs, DRUCE.

232. *B. DRUCEANA* (At.). N. Stoneham, RAYNER; near Cambridge; Tenby, Pembroke; Pontac, Jersey; Yardley Gobion, Northants; Kemble, N. Wilts; Westonbirt, Gloster, DRUCE; Mevagissey, Cornwall [No. 1], Miss TODD.

232. *B. GALLICA* (At.). Hanslope and Lacey Green, Bucks; Ashton, Northants; Silloth, Cumberland; these may have come with other aliens, DRUCE; Syston, Leicester, HORWOOD.

232. *B. GERMANICA* (At.). Pentewan, Cornwall [No. 2], Miss TODD; Bidston, Cheshire; Banbury, Oxon, DRUCE.

232. *B. LAEVIGATA* (At.). Sibford, Oxon, DRUCE; Colchester [No. 1946], Essex, BROWN.

232. *B. MEDITERRANEA* (At.). Silloth, Cumberland, DRUCE.

232. *B. ORIGO* (At.). Christchurch, S. Hants, RAYNER.

232. *B. PATAGONICA* (At.). Kew, Surrey [No. 5], Miss TODD.

232. *B. TREVIRORUM* (At.). Sibford, Oxon, DRUCE; N. Stoneham, S. Hants, RAYNER.

232. *B. TURONIENSIS* (At.). Par [Nos. 3 & 4], Cornwall, Miss TODD; Corbière, Jersey; Tenby, Pembroke; Tipton, Staffs, DRUCE.

233. *CORONOPUS DIDYMUS* Sm. Little Faringdon, Berks, F. STONE; *Woodbridge Station, E. Suffolk, H. K. A. SHAW.

†235. *LEPIDIUM GRAMINIFOLIUM* L. Near Warlingham, Surrey, A. BEADELL; Barry Docks, Glamorgan, R. L. SMITH.

†237. *L. DRABA* L. Cladagh, Galway, Mrs EVANS.

†239. *L. PERFOLIATUM* L. Sandy, Beds, Hon. S. PEEL; Colwyn Bay, Denbigh, BOYDON RIDGE.

†240 (2). *L. NEGLECTUM* Thell. Bristol, N. SANDWICH; Riddings, Coatbridge, Lanark, GRIERSON. Det THELLUNG.

246. *L. SMITHII* Hook. Still at Leafield, Oxon, H. POWELL.

†247 (4). *L. DENSIFLORUM* Schrad. By Newton Abbot Canal, S. Devon, C. E. REYNOLD; Woodbridge, E. Suffolk, H. K. A. SHAW; Christchurch, S. Hants, Mrs ROTHWELL & RAYNER; Hertford, DRUCE & Miss TROWER; Glasgow, Lanark, GRIERSON. Det. THELLUNG.

†247 (5). *L. BONARIENSE* L. Swaythling, S. Hants, RAYNER. Det. THELLUNG.

250. *THLASPI PERFOLIATUM* L. On a wall, plentifully, at Frampton Gloster, Miss D. CATOR.

†253. *IBERIS UMBELLATA* L. Railway bank, Achterneed, E. Ross, WEBB.

†258. *VOGELIA PANICULATA* Horn. Near Basingstoke, N. Hants, BOYS.

†260. *MYAGRUM PERFOLIATUM* L. Carmarthen, HAMER. Det. THELLUNG.

†268. *RAPISTRUM RUGOSUM* All. Hayle, Cornwall, Miss TODD. Det. THELLUNG; Galway, Mrs EVANS.

†269. *R. LINNAEANUM* Boiss. & Reut. Grosmont, N. Yorks, FLINTOFF. Det. THELLUNG.

275. *RAPHANUS MARITIMUS* Sm. Cladagh, Galway, Mrs EVANS.

281. *RESEDA ALBA* L. Christchurch, S. Hants, Miss S. G. ROOKE.

293. *VIOLA SYLVESTRIS* Kit., var. *PUNCTATA* Druce. Baydon, Wilts, Miss TODD. Var *PSEUDOMIRABILIS* Greg. Braemar, S. Aberdeen, DRUCE.

*295. *V. RUPESTRIS* Schm., var. *GLABRESCENS* Neum. Oxwich Bay, Glamorgan, DRUCE. Det. Mrs GREGORY. Near Brackley, Northants, DRUCE. *V. RUPESTRIS* or perhaps \times *CANINA*, var. *GLABRESCENS*. Cnochan, W. Ross, DRUCE.

296. *V. CANINA* L., var. *PUSILLA*. Caenlochan, Forfar, DRUCE. Var. *LANCEOLATA*. East Dereham, Norfolk, Mrs RUSSURIM. Det. Mrs GREGORY. Var. *CALCAREA*. Lancrese, Guernsey, KING.

298. \times *V. SEPINGOLA* Jord. Sydmonton, N. Hants, Miss TODD.

*300. *V. CALCAREA* Greg. In a calcareous pasture, with *Potentilla verna*, at Ledstone Park, Leeds, N. W. Yorks, W. A. SLEDGE. Det. Mrs GREGORY.

*303. *V. LEPIDA* Jord. Side of Wick River, Caithness, DRUCE, teste DRABBLE; Stromness, Orkney, JOHNSTON in *Trans. Bot. Soc. Edin.* 102.

*303. *V. VARIATA* Jord. Chippenham, Cambridge [aa. 297]; Charlbury, Oxon, DRUCE.

304. *V. OBTUSIFOLIA* Jord. Lizard, Penteway, Cornwall, Miss TODD, teste DRABBLE.

304. *V. SEGETALIS* Jord. St Anne's on Sea, W. Lancs, C. BAILEY, as *arvensis*, teste DRABBLE; Dolgelley, Merioneth, BARTON.

304. *V. RURALIS* Jord. Stokenchurch, Oxon; Frilford, Berks [aa. 224], DRUCE, teste DRABBLE.

306. *V. CURTISII* Forst. Sandy coasts of Down and Antrim, S. B. BENNETT.

306. *V. PESNEAU* Lloyd. *Bissell Wood, Churchill, near Kidderminster, Worcester, C. REA. An excellent N.C.R. *Dunnet Links, Caithness, DRUCE; Sanday, Orkney, JOHNSTON.

310. *POLYGALA DUBIUM* Bellynck. West Ilsley, Berks; Princes Risborough and Ivinghoe, Bucks, DRUCE; Fritchley, Derby, 1900, W. R. LINTON, as *oxyptera*. To this Mr C. E. SALMON refers a specimen determined by Herr FREYN as *P. serpyllacea*, var. *mutabilis* from Aberfraw, Anglesey, gathered by me in 1899, DRUCE.

†327. *GYPSOPHILA PORRIGENS* Boiss. Bristol, N. SANDWITH.

†330 (2). *G. ELEGANS* Bieb. Bullingdon, Oxon, DRUCE; Ridings, Lanark, GRIERSON. Det. THELLUNG.

†331. *SAPONARIA VACCARIA* L. Honor Oak, London, 1923, L. B. LANGMEAD; Patshull, Staffs, Lady J. LEGGE; Elliott Common, Thornton Dale, N. Yorks, FLINTOFF.

†332. *S. OFFICINALIS* L. Bank on moor, Grudie, E. Ross, WEBB.

336. *SILBNE INFLATA* Sm. Sandwick, Orkney, JOHNSTON, *l.c.*

†336. *S. BRACHIATA* Jord. Silloth, Cumberland, DRUCE.

†338. *S. CONICA* L. In immense quantity, in lucerne field, Frilford, Berks, specimens distributed this year, DRUCE; Barry, Glamorgan, R. L. SMITH.

†341. *S. DICHOTOMA* Ehrh. Cardiff, Glamorgan, Miss VACHELL.

†350 (2). *S. STRICTA* L. Glasgow, GRIERSON. Det. THELLUNG.

359. *LYCHNIS ALBA* Mill., with green flowers. Radyr, Glamorgan, R. L. SMITH.

367. *CERASTIUM ARVENSE* L. Barry, Glamorgan, R. L. SMITH;

Forfar, as a form with narrower leaves than the English plant,
DRUCE & Lady DAVY.

370. *C. VULGATUM* L., var. *NEMORALE* Uechtr. Penygroes, Carnarvon, Miss TODD. Var. *SERPENTINI*, Ivinghoe Beacon, Bucks, P. RICHARDS.

372. *C. PUMILUM* Curt. Borth, Glamorgan, CUMMING; in great quantity, and in good flower, on Furzy Lynam, near Stanton St John, Oxon, 1923, DRUCE.

373. *C. SEMIDECANDRUM* L. A luxuriant, large-leaved plant at Byfleet, Surrey, Lady DAVY.

374. *C. TETRANDRUM* Curt., forma *CONGESTUM* Druce. Tenby, Pembroke, DRUCE.

*380. *STELLARIA NEGLECTA* Weihe. On gravel, near the Cynon, between Hirwain and Lhwydeleod, Brecon, WEBB; as *umbrosa*, *wood at Gloddaeth, Carnarvon, PUGSLEY in *Journ. Bot.* 19, 1923.

†387. *ARENARIA BALEARICA* L. Roadside near Clapham, York, J. N. FRANKLAND; near Bradford, York, CRYER; dry hedge, Falmouth, Cornwall, ex THURSTON.

394. *A. TENUIFOLIA* L. Plymouth District, *Journ. N. H. Soc. Torq.* 57, 1923.

403 (2). *SAGINA SCOTICA* Druce. Caenlochan, Forfar. Plants grown for many years in my garden at Oxford, continued in flower till November last year, DRUCE.

406. *S. APETALA* L. Woodhall Spa, Lincoln, ALSTON; an eglandular form, with pedicels shorter than calyx, flowers often nearly sessile, sepals blunt, Lessnes Woods, Belvedere, Kent, St J. MARRIOTT. Var. *PROSTRATA* S. Gibs. Aldbourne, Wilts, Miss TODD.

407. *S. MARITIMA* Don. Shoreham, Sussex, Lady DAVY; Fowey, Cornwall, Miss TODD. Var. *PROSTRATA* Towns. On clinkers at Fishguard, Pembroke, DRUCE.

1K
408. *S. PROCUMBENS* L. A double-flowered form at Littlestone, Kent, Lady DAVY.

*410. *SPERGULA SATIVA* Boenn. Dolgelley, Merioneth, BARTON.

413. *SPERGULARIA SALINA* Presl. In an inland situation near Tixhall, Staffs, Sir R. CURTIS & Father READER.

415. *S. RUBRA* Presl. A robust form at Radyr, Glamorgan [No. 47], R. L. SMITH; Charleston, Cornwall, Miss TODD.

†418. *CLAYTONIA ALSINOIDES* Sims. Ulleswater, Westmorland, Countess of CARLISLE.

421. *MONTIA VERNA* Neck., var. *INTERMEDIA* (Beeby) Druce. St Brelade's, Jersey; Dolgelley, Merioneth, BARTON.

†428. *HYPERICUM CALYCIUM* L. Near the railway above Plockton, W. Ross, WEBB.

†438. *H. LINARIIFOLIUM* Vill. As an adventive near Buildwas, Salop, W. B. ALLEN & J. C. MELVILL. — Salop

443. *ALTHAEA HIRSUTA* L. Although so very abundant near Headington last year, the same locality, which had remained undisturbed, afforded not a single plant in 1923. OK

†445. *LAVATERA CRETICA* L. Between Truro and Malpas, Cornwall, 1922, Miss TODD. Det. THELLUNG.

†449. *L. TRIMESTRIS* L. Grosmont, N. Yorks, 1922, TAYLOR, ex FLINTOFF. Det. THELLUNG. Near Colchester, N. Essex, F. J. SMITH.

452. *MALVA SYLVESTRIS* L., var. *ACUTILOBA* Celak. Whitchurch, Hereford, Miss TODD; Barry, Glamorgan, R. L. SMITH.

†454. *M. PUSILLA* With. Near Great Oakley, N. Hants, Dr D. SCOTT; Morecambe, Lancashire, WHELDON; Maryburgh, Lanark, GRIERSON. Det. THELLUNG.

- †462. *TILIA TOMENTOSA* Moench. "Between Egton and Egton Bridge, N. Yorks, FLINTOFF.
- †463. *T. PLATYPHYLLOS* Scop. Sibford, Oxon, DRUCE.
- †465. *T. ULMIFOLIA* Scop. Blymill, Staffs, DRUCE & Sir R. CURTIS; Sibford, Oxon, DRUCE.
- †473. *GERANIUM MACRORRHIZUM* L. Still growing on walls at Postbridge, Dartmoor, Devon, H. DOWNES.
- *474. *G. SANGUINEUM* L., var. *LANCASTRIENSE* With. Seascale, Cumberland, TEMPLEMAN, and noticed there in 1923 by Dr HELLON & DRUCE.
- †475. *G. VERSICOLOR* L. Vicholez, le Haut, Jersey, BOT. SOC. EXP.
- †476. *G. NODOSUM* L. Raglan, Glamorgan, WEBB.
477. *G. SYLVATICUM* L., sub-var. *ROSEUM* Druce. Braemar, S. Aberdeen, DRUCE.
- †479. *G. PHAEUM* L. Langley, Bucks, 1922, GWATKIN; Kirkby-under-Wood, near Bourne, Lincoln, Miss LANDON.
- †479 (2). *G. ENDRESSI* Gay. Near Warlingham, Surrey, BEADELL.
481. *G. PYRENAICUM* Burm. f. Raglan, Glamorgan, 50 years since last record, WEBB.
483. *G. ROTUNDFOLIUM* L. Abundant at West Caistor, E. Norfolk, REYNOLDS. Var. *ALBUM*. Near Galway, Mrs EVANS.
487. *G. LUCIDUM* L. Rocks, Ythan Valley, at Woodhead, Fyvie, N. Aberdeen, Rev. F. TURREFF.
488. *G. ROBERTIANUM* L., *var. *HISPIDUM* Druce. Deep Dale, Buxton, Derby, DRUCE. An interesting extension of its range.

Berry Head is its only other recorded place of growth. Var. RUBRICAULE Horn. Norman Bay, Sussex, H. L. GREEN.

*497. ERODIUM LEBELII Jord. Llanfairfechan, Carnarvon, PUGSLEY in *Journ. Bot.* 20, 1923.

497 (2). E. PIMPINELLIFOLIUM Sibth. Near Potterne, Wilts, GWATKIN; St Aubin's, St Ouen's, Jersey, DRUCE; Christchurch, S. Hants, RAYNER.

503. LIMNANTHES DOUGLASII Hook. Near Brighton, Sussex, Miss COTTIS; Medstead, on a common near Alton, Hants, Miss M. L. WILLIAMS.

†505. OXALIS CORNICULATA L. Cerist railway track, Merioneth, BARTON. Var. PURPUREA Parl. Bempton Lane, Bridlington, N. Yorks, FLINTOFF.

†506. O. STRICTA L. Swaythling, S. Hants, RAYNER.

†511. IMPATIENS BIFLORA Walter. River Stour, S. Hants, Miss S. G. ROOKE.

†512. I. PARVIFLORA DC. Right bank of Severn, Worcester, HAMER.

†513. I. GLANDULIFERA Royle. Patshull, Staffs, Lady J. LEGGE; by a brook at Lindfield, Sussex, Miss COTTIS; Dolgelly, Merioneth, BARTON.

518. RHAMNUS FRANGULA L. Near Bonskied House, E. Perth, WEBB.

*519. R. CATHARTICUS L. Lough Neagh, Co. Down, STELFOX in *Irish Nat.* 96, 1923.

†522. VITIS HEDERACEA L. In plenty on a tip, Bayswater Lower Sketty, Glamorgan, WEBB.

The adventive species of Leguminosae have been determined by Dr Thellung.

†531. *LABURUM ANAGYROIDES* Med. Near Blair Athol, E. Perth; Strathpeffer, E. Ross, WEBB.

†532. *L. ALPINUM* Presl. Frequent in woods near Pitlochry, E. Perth; in Blackmur Wood, E. Ross, WEBB.

540. *CYTISUS SCOPARIUS* Link, var. *PROSTRATUS* (Bailey) Druce. Near St David's, Pembroke, GREEN, ex ARNETT.

†540 (2). *C. MONSPESSULANUS* L. Naturalised at Budleigh Salterton, S. Devon, Commander WALKER.

547. *TRIGONELLA M. ORNITHOPODIOIDES* (DC.) Druce. Borth, Glamorgan, CUMMING.

†550. *T. HAMOSA* L. Londonderry, DRUCE.

†551. *T. MONSPELIACA* L. Bristol, N. SANDWITH.

†552. *T. CORNICULATA* L. Barry, Glamorgan, R. L. SMITH.

†555. *T. BESSERIANA* Ser. Between Truro and Malpas, Cornwall, Miss TODD.

†562. *MEDICAGO FALCATA* L. East Moor, Cardiff, Glamorgan, Miss VACHELL; Christchurch, S. Hants, Mrs ROTHWELL & RAYNER; Silloth, Cumberland, DRUCE. Var. *TENUIFOLIOLATA* Vuyck. Bowling, Dumbarton, GRIERSON.

†564 (2). *M. VARIA* Mart. Silloth, Cumberland, DRUCE & WILLIAMSON.

†566. *M. ORBICULARIS* All. Radyr, Glamorgan, R. L. SMITH.

†571. *M. TRIBULOIDES* Desf. Bristol, N. SANDWITH.

†572. *M. TRUNCATULA* Gaertn. Cardiff, Glamorgan, R. L. SMITH.

†574. *M. TUBERCULATA* Willd. Dewsbury, York, H. BROOKE.

†575. *M. MUREX* Willd. Radyr, Glamorgan, R. L. SMITH.

- †576. *M. ACULEATA* Gaertn. Cardiff, Glamorgan, R. L. SMITH.
- †579. *M. HISPIDA* Gaertn., var. *APICULATA* (Willd.). Cardiff, Glamorgan, R. L. SMITH.
- †581. *M. MINIMA* Desr. Radyr and Barry, Glamorgan, R. L. SMITH. Var. *LONGISETA* DC. (*RECTA* Willd.). Wye, Kent, Miss A. B. COBBE.
- †595. *MELILOTUS ALBA* Desr. Teigngrace, Devon, Mr TREGALE in *Trans. Dev. Ass.*, 1922.
- †596. *M. ARVENSIS* Wallr. Silloth, Cumberland, DRUCE.
- †597. *M. INDICA* All. At Countess Wear, S. Devon, 4½ feet high, D'URBAN; Frilford, Berks, very fine, DRUCE.
599. *TRIFOLIUM PRATENSE* L., var. *PARVIFLORUM* Bab. Ufford, Suffolk, H. K. A. SHAW; with crimson calyces, Hayling, S. Hants, Miss HILLARD.
- †603. *T. CHERLERI* L. Radyr, Glamorgan, R. L. SMITH.
- †606. *T. ANGUSTIFOLIUM* L. Barry Docks, Glamorgan, R. L. SMITH.
- †608. *T. INCARNATUM* L., var. *STRAMINEUM* Presl. Odiham, N. Hants, DRUCE.
611. *T. ARVENSE* L., var. *STRICTIUS* Koch. Frilford, Berks, DRUCE; St Helens Spit, Isle of Wight, Miss PALMER. Var. *LONGISETUM* Boiss. Radyr, Glamorgan, R. L. SMITH.
619. *T. STRIATUM* L., var. *ERECTUM* Gasp. Near Launceston, Cornwall, W. WISE; Hothfield, Kent, Miss A. B. COBBE.
621. *T. FRAGIFERUM* L. Between Speeton Raome and Keighley Gap, N. Yorks, FLINTOFF.
- †622. *T. RESUPINATUM* L. Wye, Kent, Miss A. B. COBBE;

Barry Docks, Glamorgan, R. L. SMITH; Christchurch, S. Hants, Mrs ROTHWELL & RAYNER.

+623. *T. TOMENTOSUM* L. Bristol, N. SANDWITH.

+628. *T. REPENS* L., var. *PHYLLANTHUM* Ser. Rottingdean, Sussex, Miss COTTIS.

+629. *T. MICHELIANUM* Savi. Christchurch, S. Hants, Mrs ROTHWELL & RAYNER.

632. *T. GLOMERATUM* L. Very luxuriant (15 inches high) at St Ouen's, Jersey, DRUCE; Woodbridge, E. Suffolk, H. K. A. SHAW; Christchurch, RAYNER & Mrs ROTHWELL.

633. *T. SUFFOCATUM* L. Extremely luxuriant at Hayling Isle, S. Hants, this year, Miss HILLARD; Woodbridge, Suffolk, H. K. A. SHAW.

+645. *LOTUS EDULIS* L. Radyr, Glamorgan, R. L. SMITH.

646. *L. ULIGINOSUS* Schkuhr, var. *GLABER* Bréb. Dovey, Cardigan; Dolgelly, Merioneth, BARTON; Melmerby, Cumberland, Rev. W. W. MASON.

648. *L. TENUIS* W. & K. Ellerburn Bank, Thornton Dale, N. Yorks, FLINTOFF.

+651. *GALEGA OFFICINALIS* L. Cardiff, Glamorgan, Miss VACHELL.

+656. *ASTRAGALUS HAMOSUS* L. Radyr, Glamorgan, R. L. SMITH.

+666. *CORONILLA VARIA* L. Grosmont, N. Yorks, FLINTOFF.

+669 (2). *ORNITHOPUS ROSEUS* Dufour. Abundant and luxuriant at Pyrford, Surrey, Miss MILLER and Lady DAVY. Distributed this year.

670. *O. PINNATUS* Druce. In four of the Scilly Islands. It likes twining itself among dead shoots of heather, H. DOWNES.

- †676. *CICER ARIETINUM* L. Barry, Glamorgan, R. L. SMITH.
- †678. *VICIA TENUIFOLIA* Roth. Near Warlingham, Surrey, BEADELL; Dewsbury, Yorks, H. BROOKE. Det. THELLUNG.
- †681. *V. VILLOSA* Roth. Penarth, Glamorgan, WADE; Warlingham, Surrey, BEADELL; Christchurch, S. Hants, Mrs ROTHWELL and RAYNER. Det. THELLUNG.
- †683. *V. DASYCARPA* Ten. Warlingham, Surrey, BEADELL; Bristol, Mrs SANDWICH; Radyr, Glamorgan, R. L. SMITH; Sleaford, Lincs, Miss LANDON; Swaythling, S. Hants, RAYNER. Det. THELLUNG.
- †684. *V. PSEUDOCRACCA* Bert. Radyr, Glamorgan, [n. 30], R. L. SMITH. Det., as probably this, THELLUNG.
- †686. *V. CALCARATA* Desf. Bristol, Mrs SANDWICH. Det. THELLUNG.
- †687. *V. BITHYNICA* L. Radyr, Glamorgan, R. L. SMITH; Woking and Weybridge, Surrey, Lady DAVY; the Scillies, H. DOWNES; Henfield, Sussex, Miss COTTIS.
688. *V. SEPIUM* L., var. *OCHROLEUCA* Bast. Between Nailsworth and Kingstoke, Gloster, J. H. ADAMS; Wymondham, Norfolk, Miss POMEROY.
- †690. *V. NARBONENSIS* L. Near Warlingham, Surrey, BEADELL. Var. *SERRATIFOLIA* Jacq. Bristol, Mrs SANDWICH; Barry, Glamorgan, R. L. SMITH.
691. *V. LUTEA* L. At Sand Flatts, Thornton Dale, Yorks, FLINTOFF.
698. *V. ANGUSTIFOLIA* Reich., var. *ALBA*. Cliff at Kettleness, N. Yorks, FLINTOFF.
700. *V. LATHYROIDES* L., var. *ROBUSTA*. Ampthill, Beds, DRUCE. Bee
- †707. *LENS CULINARE* Med. Woodbridge, E. Suffolk, H. K. A. SHAW.

712. *LATHYRUS MARITIMUS* Big. Between Whitstable and Herne Bay, Kent, Miss A. B. COBBE.

†718. *L. HIRSUTUS* L. In a field near Rousse Tower, Guernsey, TRAPNELL; sand flats, Thornton Dale, N. Yorks, FLINTOFF; Woking, Surrey, Lady DAVY.

†721. *L. CICERA* L. Radyr, Glamorgan, R. L. SMITH. *FORMA ANGSTIFOLIA* Thell. Bristol, N. SANDWITH.

†726. *L. APHACA* L. Barry Docks, Glamorgan, R. L. SMITH.

737. *PRUNUS AVIUM* L. Contin, etc., E. Ross; Gareloch, Tallo-dale, etc., W. Ross, WEBB.

†745. *SPIRAEA DOUGLASSII* Hook. Sand pits, near Boxhill, Surrey, SALT; Contin, E. Ross, WEBB.

The Rubi have been determined by Rev. H. J. Riddelsdell.

*776. *RUBUS MERCICUS* Bagn. Stanway, N. Essex, BROWN.

794. *R. COLEMANNI* Blox. Near Cannock, Staffs, DRUCE.

*810. *R. MUCRONATUS* Blox. Parson's Heath, Colchester, N. Essex, BROWN.

*814. *R. VESTIFORMIS* Rogers. By the road between Kilsby and Daventry, H. J. RIDDELSDELL in *Rugby Rep.*, 1923.

*815. *R. RADULOIDES* Rogers. High woods, Colchester, N. Essex, BROWN.

*822. *R. LEYANUS* Rogers. With above, BROWN.

*857. *R. KOEHLERI* W. & N., var. *COGNATUS* N.E.Br. Berechurch, N. Essex, BROWN.

*861. *R. VIRIDIS* Kalt. With above, BROWN.

†878. *R. SPECTABILIS* Pursh. Burn of Laro, Rousey, Orkney,
H. H. JOHNSTON.

†887. *FRAGARIA CHILOENSIS* Duch. Escape in many places in E.
Norfolk, B. REYNOLDS.

†896. *POTENTILLA INTERMEDIA* L. Silloth, Cumberland, DRUCE;
Leckwith, Glamorgan, R. L. SMITH.

901. *P. REPTANS* L. A small form, with narrow, non-contiguous
petals, Colwyn Bay, Denbigh, BOYDON RIDGE. Var. *MOLLIS* Borbas.
Crabbe, Jersey, *Bot. Soc. Exp.*

†906. *P. NORVEGICA* L. Christchurch, S. Hants, Mrs ROTHWELL
and RAYNER.

909. *ALCHEMILLA ALPESTRIS* Schm. Cortachy, Forfar, with *A.*
MINOR Huds. and *A. PRATENSIS* Schm., DRUCE; the last at Dolgelly,
Merioneth, BARTON.

*910. *A. ARGENTEA* Don. By the roadside near Honeybarrel,
Kildrummy, N. Aberdeen, "not a garden outcast," W. WILSON.

†915. *AGRIMONIA AGRIMONOIDES* L. Quite naturalised and
established near Welbeck, Notts, GOULDING.

†918. *POTERIUM POLYGAMUM* W. & K., var. *STENOPHYLLUM*.
Orecombe Cliff, Exmouth, S. Devon, D'URBAN.

The Roses have been determined by Col. A. H. Wolley-Dod.

*926. *ROSA GLOBULARIS* Franch. Lorton, Cumberland, DRUCE.

928. *R. ANDEGAVENSIS* Bast. Sibford, Oxon, untypical, DRUCE.

*932. *R. HEMITRICHA* Rip. Gailey Reservoir, Staffs; near Dun-
stable, Beds, DRUCE.

934. *R. GLAUCA* Vill., var. *SUB-CANINA* Christ. Binscarth,
Orkney, JOHNSTON, *l.c.*

935. *R. CORIIFOLIA* Fries, *var. *PRUINOSA* W.-Dod. Glen Lyon, M. Perth, DRUCE.

939 (2). Group *ACICULATAE*. Helpstone, Northants, [n. 2414], DRUCE.

940. *R. CARIONII* Rip. Horsepath, Oxon, DRUCE.

941. *R. TOMENTOSA* Sm., *var. *PSEUDOCUSPIDATA* Rouy. Lorton, Cumberland; Chinnor Hill, Oxon, DRUCE. *Var. *FOETIDA* (Bast.). Llanberris, Carnarvon, Miss TODD.

942. *R. OMISSA* Déség. Kingston Hill, Oxon, DRUCE. Var. *RESINOSOIDES* Crép. Rousay, Orkney, JOHNSTON, *l.c.*

943. *R. MOLLIS* Sm., var. *CAERULEA* (Woods). Stockton-on-Tees, Durham, J. E. NOWERS; *var. *GRENIERII* (Déség.). Glen Lyon, M. Perth, DRUCE.

950. *R. PIMPINELLIFOLIA* L., var. *ROSEA*. St Ouen's Bay and Quenvais, Jersey, DRUCE.

+952 (2). *R. RUGOSA* Thunb. Mead Moor Woods, Gower Penrice, Glamorgan, WEBB; Cover Wood, Gomshall, Surrey, Miss A. COTTIS; near Alness; gravel pit at Stittenham, E. Ross, WEBB.

*954. *PYRUS COMMUNIS* L. La Moye Point, Forest, Guernsey, TRAPNELL.

+959. *P. INTERMEDIA* Ehrh., agg. Llanberis, Carnarvon, Miss TODD.

966. *CRATAEGUS MONOGYNA* Jacq., var. *INCISIFOLIA* Druce. Gailey Reservoir, Staffs; near Salford, Beds, DRUCE. Var. *QUERCIFOLIA* Loud. Naworth, Cumberland; Gailey Reservoir, Staffs, DRUCE.

967. *C. OXYACANTHOIDES* Thuill., with large, feebly lobed leaves, Hallilin Farm, Chelsham, Surrey, BEADELL. Var. *ERIOCALYX* Druce. Darenth, Kent, St. J. MARRIOTT.

†972. *COTONEASTER MICROPHYLLA* Wall. Roadside near Stow on the Wold, Gloster, BUTCHER; Pitlochry, E. Perth, WEBB; Brean Down, near Somerset, TRAPNELL.

†972 (2). *C. SIMONSII* Baker. Near Ridge, Dorset, in hedge far from houses, DRUCE and VAN DE WEYER.

†972 (3). *C. FRIGIDA* Lindl. Twenty feet high at Thatcham, Sussex, F. R. BROWNING, ex Miss COTTIS.

†991. *SAXIFRAGA GEUM* L. Woods and side of stream, Fyvie, N. Aberdeen, Rev. F. TURREFF.

†992. *S. ROTUNDIFOLIA* L. Naturalised on a bank of the burn between Campsie and Strathblane, Stirling, GRIERSON.

†1001. *RIBES UVA-CRISPA* L. Moulin, Kinnaird, E. Perth, WEBB.

†1003. *R. RUBRUM* L. Moulin, E. Perth, WEBB.

†1004. *R. ALPINUM* L. Thurso, Caithness; Kenmore, M. Perth, DRUCE; Moulin, E. Perth; Dalnave, E. Ross, WEBB.

†1004 (2). *R. SANGUINEUM* L. Jamestown, E. Ross, WEBB.

†1012. *SEDUM REFLEXUM* L. Contin, E. Ross, WEBB.

†1016. *S. ALBUM* L. Lough Neagh, Antrim, Mrs WEDGWOOD.

†1021. *S. SPURUM* Bieb. On walls near Southton, H. L. GREEN. Det. THELLUNG.

†1044. *LYTHRUM MBONANTHUM* Link. Robroyston, Lanark, GRIERSON.

†1045. *L. HYSSOPIFOLIA* L. Meanwood, Leeds, BUTCHER; Sussex, SALT.

†1052. *EPILOBIUM ROSEUM* Schreb. Hoar Cross, Staffs, DRUCE.

†1061. *OENOTHERA BIENNIS* L. Wymondham, Norfolk, Miss POMEROY. Det. THELLUNG. Colchester waste ground, BROWN.

1062. *O. GRANDIFLORA* Ait. Hitchin Hill, Herts, self sown, LITTLE. Det. WILMOTT.

†1062. *O. LACINIATA*. Bristol, N. SANDWITH.

†1067. *O. SINGUATA* L. Christchurch, S. Hants, Mrs ROTHWELL & RAYNER.

†1070. *O. TENELLA* Cav. Sleaford, Miss LONDON; Penarth. Canton, Cardiff, R. L. SMITH. Det. THELLUNG.

†1071. *FUCHSIA RICCARTONI* Hort. Near Kyleakin, Skye, WEBB. Col. H. H. Johnston says that the Orkney *Fuchsia* has been determined at Kew as *F. macrostemma*, but as it was planted on the moor it does not come into our List.

1072. *CIRCAEA LUTETIANA* L., var. *CORDIFOLIA* Lasch. Dolgelly, Merioneth; Llymfaut, Montgomery, BARTON.

†1077. *MESEMBRYANTHEMUM EDULE* L., var. *FLAVUM*. Naturalised on Dawlish Warren, Devon, D'URBAN.

†1081. *ERYNGIUM PLANUM* L. Welbeck, Notts, GOULDING. Probably, THELLUNG.

†1091. *BUPLEURUM LANCIFOLIUM* Horn. Barry Docks, Glamorgan, R. L. SMITH.

†1097 (2). *APIUM LEPTOPHYLLUM* (Pers.) P.J.M. Cardiff. Glamorgan, Miss VACHELL; Portishead, N. Somerset, Mrs SANDWITH. Det. THELLUNG.

K †1101. *AMMI MAJUS* L. Saltwood, Kent, very luxuriant specimens in lucerne field, Mrs GIBBINGS.

†1102. *A. VISNAGA* L. Glasgow, GRIERSON.

1108. *SISON AMOMUM* L. Within the boundary of Worcester city, HAMER.

†1109. PRIONITIS FALCARIA Dum. In arable ground, Wallingford, Berks, known for some years and not disturbed by agricultural operations, R. HUTCHINSON; in immense quantity and thoroughly naturalised at Swalecliffe and about Sibford, Oxon, DRUCE; near Pinton, Hitchin, Herts, getting to be a pest, VAN DE WEYER.

*1119. CHAEROPHYLLUM TEMULUM L. Lough Neagh, Co. Down, STELFOX in *Irish. Nat.* 96, 1923.

†1128. ANTHRISCUS CEREFOLIUM Bess. Potterne, Wilts, GWATKIN; North Aston, Oxon, DRUCE.

*1134. OENANTHE CROCATA L. Luton Hoo Park, Beds, *Saunders Fl.*

*1135. O. PIMPINELLOIDES L. Weybridge Common, Surrey, Lady DAVY. What is almost certainly this species was found on Epsom Racecourse by C. E. BRITTON in 1918, but it lacks fruit and root.

*1136. O. SILAIFOLIA Bieb. Buildwas, Salop, MELVILL.

*1137. O. LACHENALII Gmel. Rumney, Monmouth, WADE; Gravenhurst, Beds, *Saunders Fl.*

1147. ANGELICA SYLVESTRIS L., var. DECURRENS Wallr. Near Lumsden, N. Aberdeen, WILSON; Hoar Cross, Staffs; St David's, Pembroke, DRUCE.

†1148. ARCHANGELICA OFFICINALIS Hoffm. Canal, Woodlesford, Leeds, BUTCHER.

*1152. PEUCEDANUM OSTRUTHIUM Koch. By the river at Cortachy, Forfar, a new county record, DRUCE.

†1152 (2). P. GRAVEOLENS Benth. Marcham, Berks, DRUCE.

†1153. HERACLEUM VILLOSUM Fisch. Potter Heigham, Norfolk, RAYNER; railway bank beyond Skewen, Glamorgan, WEBB; road-

side between Wick and John o' Groats, Caithness, DRUCE; Ferry-side, Carnforth, HAMER. Well photographed in *Gard. Chron.*

†1154. *H. SPHONDYLIIUM* L., var. *ANGUSTIFOLIUM* Huds. Near Thornton Dale, N. Yorks, LAWSON, ex FLINTOFF.

1169. *CAUCALIS NODOSA* Scop., var. *PEDUNCULATA* Druce. St Ouen's, Jersey, *Bot. Soc. Exp.*

†1171. *C. LATIFOLIA* L. Near Taunton, Somerset, W. D. MILLER.

1172. *HEDERA HELIX* L., var. *SARNIENSIS* Druce. Near Penzance, Cornwall, DRUCE.

1174. *CORNUS SUBCICA* L. Hole of Horcum, N. Yorks, FLINTOFF.

†1177. *SAMBUCUS RACEMOSA* L. Near Warlingham, Surrey, BEADELL.

1178. *S. NIGRA* L., var. *LACINIATA* L. Escape at Barton, Beds, *Saunders Fl.*

1179. *S. EBULUS* L. Thornton Dale, N. Yorks, FLINTOFF.

1184. *LONICERA CAPRIFOLIUM* L. *Native looking in Catcombe Wood, near Hilmarton, Wilts, Lady DAVY; Ridgmont, Pulloxhill, Beds, *Saunders Fl.*

†1187. *L. XYLOSTEUM* L. Near Fernhill, Carmarthen, HAMER; Nowarth Castle Dene, Cumberland, DRUCE.

†1189. *LEYCESTERIA FORMOSA* Wallich. Abergarwed, Resolven, Glamorgan, WEBB.

†1210. *ASPERULA ARVENSIS* L. Robroyston, Glasgow, GRIERSON.

~~Keep~~ †1223. *VALERIANELLA ERIOCARPA* Desv. *Thorp Pit, Staines Lane, Surrey, Lady DAVY; *near Wye, Kent, Miss COBBE; *Meole Brace, Salop, J. C. MELVILL.

- †1242. *GRINDELIA SQUARROSA* Dunal. Ware, Herts, GRAVESON.
- †1245. *SOLIDAGO CANADENSIS* L. Fort William, Westerness; Beaully Bridge, Easterness, WEBB.
1248. *BELLIS PERENNIS* L., var. *DISCOIDEA*. Dunnet, Caithness, DRUCE.
- †1253. *ASTER LAEVIS* L. Lough Neagh, Tyrone, in large masses, T. GREEN in *Irish Nat.* 107, 1923.
- †1255. *A. NOVI-BELGII* L. Par, St Austell, Cornwall, Miss TODD. Det. THELLUNG.
1258. *A. TRIPOLIUM* L., var. *DISCOIDEUS* Reichb. Cliff near Wilsthorpe, south of Bridlington, N. Yorks, FLINTOFF; a pretty form of the rayed plant, with small leaves, in a salt marsh near Lelant, Cornwall, Mrs BROWN.
- †1262. *ERIGERON BONARIENSE* L. Gloster, GAMBIER-PARRY. Det. THELLUNG.
- †1264. *E. MUCRONATUS* DC., var. Wallfoot between St Lawrence and Niton, Isle of Wight, RAYNER.
1269. *FILAGO MINIMA* Fr., var. *PROSTRATA*. Forest, Guernsey, TRAPNELL.
1271. *ANAPHALIS MARGARITACEA* C. B. Clarke. Yarcombe, Devon, Mrs NORTHCOTE in *Trans. Dev. Ass.* 1922; Randwick, E. Gloster, about a mile from nearest house, NEMES.
- †1278. *GNAPHALIUM UNDULATUM* L. Guernsey, TRAPNELL.
- *1279. *INULA HELENIUM* L. Lease Rigg Farm, Grosmont, Yorks, known for 50 years, FLINTOFF; Strathpeffer, E. Ross, WEBB.
- †1284. *I. VISCOSA* Ait. East Moors, Cardiff, Miss VACHELL; Barry, Glamorgan, R. L. SMITH.
1286. *PULICARIA PULICARIA* (L). = *P. PROSTRATA* Aschers Penarth, Cardiff Glamorgan, probable adventive, R. L. SMITH.

- †1291. *AMBROSIA ARTEMISIFOLIA* L. Christchurch, S. Hants, Mrs ROTHWELL & RAYNER; Cardiff, Glamorgan; Silloth, Cumberland, DRUCE.
- †1302. *HELIANTHUS LAETIFLORUS* Pers. Chipping Norton, Oxon, DRUCE.
- †1312. *GALINSOGA PARVIFLORA* Cav. Leckwith, Glamorgan, R. L. SMITH.
- †1314. *MADIA SATIVA* Molina. Cardiff, STORRIE. Det. THELLUNG; Brislington, Bristol, GAMBIER-PARRY.
- †1315. *HEMIZONIA PUNGENS* T. & G. Sleaford, Lincoln. Miss LANDON; near Woodbridge, E. Suffolk, H. K. A. SHAW.
- †1317. *H. KELLOGGII* Greene. Sleaford, Lincoln, Miss LANDON; Saltney, Flint, D. THOMAS, ex WHELDON. Det. THELLUNG.
- †1322. *TAGETES MINUTA* L. Bristol, N. SANDWICH.
- †1324. *ANACYCLUS RADIATUS* Lois. Cardiff Docks. This confirms Riddelsell's naming of the B. form. See *Rep. B.E.C.* 172 .1905. Barry, Glamorgan, R. L. SMITH. Det. THELLUNG.
- †1325. *A. VALENTINUS* L. Bristol, N. SANDWICH.
- †1327. *ACHILLEA TANACETIFOLIA* All. Barry Dock, Glamorgan, R. L. SMITH.
1329. *A. MILLEFOLIUM* L., very near to *A. setacea* W. & K. Hanslope, Bucks, DRUCE; Pyrford, Surrey, Lady DAVY.
- †1338. *ANTHEMIS TINGTORIA* L. Buildwas, Salop, MELVILL.
- †1340. *A. COTA* L. Glasgow, GRIERSON. Det. THELLUNG.
1343. *A. ARVENSIS* L. Near Bentley Common, Staffs, ex Sir R. CURTIS.
1344. *A. RUTHENICA* M.B. Bowling Distillery, Dumbarton, GRIERSON. Det. THELLUNG.

- †1348. *A. MIXTA* L. Bristol, N. SANDWICH.
- †1357. *CHRYSANTHEMUM CORONARIUM* L. Glasgow, GRIERSON; Cannock Chase, Staffs, DRUCE.
- †1362. *MATRICARIA SUAVEOLENS* Pursh. Guernsey, TRAPNELL; Fishguard, Pembroke, DRUCE.
- †1370. *ARTEMISIA SCOPARIA* W. & K. Bristol, N. SANDWICH.
- †1380. *A. BIENNIS* Willd. Christchurch, S. Hants, Mrs ROTHWELL & RAYNER.
- †1383 (2). *A. LUDOVICIANA* Nutt., var. *GNAPHALODES* (Nutt.). Avonmouth Dock, Gloster, N. SANDWICH; Radyr, Glamorgan, R. L. SMITH. Det. THELLUNG.
1384. *TUSSILAGO FARFARA* L. A small leaved barren form with leaves $\frac{1}{2}$ - $1\frac{1}{2}$ in. long by $\frac{3}{4}$ - $1\frac{1}{8}$ broad, in the Yellow Corrie of Glen Lyon, M. Perth. Probably this was the plant which Don mistook for *Homogyne*, DRUCE.
1393. *SENECIO AQUATICUS* Huds., var. *PENNATIFIDUS* Gren. & Godr. Potterne, Wilts, GWATKIN; Llynfant, Montgomery, BARTON; either this or the true *erraticus* from the New Forest, S. Hants, TRAPNELL. Hants
- †1396. *S. SQUALIDUS* L. Sir ROGER CURTIS and myself noticed this in great quantity on the slag heaps near Walsall, Bentley Common, Ocker Hill and Tipton, Staffordshire to which it had spread from the adjoining railway. It was also seen near the Wren's Nest and on the top of Dudley Castle. Cirencester, Gloster, GREENWOOD.
- †1399. *S. VISCOSUS* L. On slag at Grosmont, N. Yorks, FLINTOFF.
- †1402. *S. CINERARIA* DC. Hayling Island, S. Hants, Miss HILLARD.
- †1410. *CALENDULA OFFICINALIS* L. At Kemble Junction, Wilts;

near Tenby, Pembroke; quite naturalised near St. Peter's and Gorey, Jersey, DRUCE.

†1411. *C. ARVENSIS* L. Pyrford, Surrey, Lady DAVY. Det. THELLUNG.

†1412. *CRYPTOSTEMMA CALENDULA* Druce. Cardiff, Glamorgan, R. L. SMITH.

*1420. *ARCTIUM NEMOROSUM* Lej. Llynfant, Montgomery, BARTON.

†1422. *CARDUUS NUTANS* L., var. *MACROCEPHALUM* (Desf.) Bristol, N. SANDWICH.

1424. *C. CRISPUS* L. The true plant, The Chantries, Shalford, Surrey, H. W. MONCKTON. A hybrid of this with *C. ACANTHOIDES* occurred at Marston, Oxon, DRUCE, teste THELLUNG.

†1431. *CIRSIUM TUBEROSUM* All. Barry Dock, Glamorgan, R. L. SMITH. Det. THELLUNG.

†1432. *C. OLERACEUM* Scop. Well established by a ditch in Burnage, near Manchester, H. BRITTEN, jun. This is, I think, the only record for Britain. The Lincolnshire record of 1823, *i.e.*, between Market Deeping and Crowland, I have vainly searched, DRUCE.

1432 (2). *C. POLYANTHEMOS*, var. *CRETICUM* Fiori & Paol. Marston, Oxon, DRUCE, teste THELLUNG.

1433. *C. SETOSUM* Bieb. Christchurch, S. Hants, Mrs ROTHWELL & RAYNER.

1433. *C. ARVENSE* Scop., var. *MITE* Koch. Balmoral, Aberdeen, Hon. Mrs ADEANE; Llety Rhys, Brecon, WEBB.

1434. *C. PALUSTRE* × *ARVENSE*. Cardiff, Glamorgan, Miss VACHELL. Probably, THELLUNG.

1445. *SAUSSUREA ALPINA* DC. Near Achnashellach, W. Ross. WEBB.

1449. *CENTAUREA JACEA* L., sub-sp. *JUNGENS* Gugler, var. *VARISQUAMA* Guglor. Fort Doyle, Guernsey, TOMLIN; Sommeilleuse, St Andrews, Guernsey, TRAPNELL; Exmouth, S. Devon, Miss TODD.

1451. *C. NEMORALIS* Jord. Naworth Castle, near Askerton Castle, Vale of Lorton, Cumberland, DRUCE; Dolgelley, Merioneth, BARTON. Var. *SUBINTEGRA* Britton. Dolgelley, Merioneth, BARTON; Cannock Chase, Staffs; Swanage, Studland, Dorset; Wood Perry, Tadmarton, Oxon, DRUCE; Sommeilleuse, Guernsey, TRAPNELL, with f. *RADIATA*.

1451. *C. OBSCURA* Jord. Drig, Cumberland; Keltney Burn, Kenmore, Mid Perth [500]; Tadmarton, Oxon, DRUCE; Dolgelley, Merioneth, with f. *PINNATIFIDA* and f. *ELONGATA*, BARTON.

1451. *C. DRUCEI* Britton. Tipton, Cannock, Staffs, DRUCE.

1456. *C. SCABIOSA* L., f. *DUMETORUM* Beck. Stow Wood, Oxon [398]; Swanage, Dorset, DRUCE. Var. *INCISA*, but not extreme, Frilford, Berks [302], DRUCE. Forma *CRETACEA* Beck. Bettyhill W. Sutherland, DRUCE.

The above Centaureas determined by C. E. Britton.

†1459. *C. DIFFUSA* Bieb. Bristol, N. SANDWITH.

†1465. *C. CALCITRAPA* L. Bradford, Yorks, CRYER.

†1476. *CARTHAMUS LANATUS* L. Cladagh, Galway, Mrs EVANS; Bristol, Mrs SANDWITH.

†1477. *C. TINCTORIUS* L. Stoughton, Guildford, Surrey, ^{SUR} CLARKE; Warlingham, Surrey, BEADELL; Hayling Isle, S. Hants, Miss HILLARD. Var. *INERMIS* Schweinf. Dynas Powis, Glamorgan, R. L. SMITH.

1478. *SCOLYMUS HISPANICUS* L. Barry Dock, Glamorgan, R. L. SMITH.

1479. *S. MACULATUS* L. Bristol, N. SANDWITH.

1480. CICHORIUM INTYBUS L. On the metamorphic limestone country round Moulin, E. Perth; Jamestown, E. Ross, WEBB.

1489. PICRIS HIERACIOIDES L., var. UMBELLATA Schultz. Tewkesbury, Gloster, Miss TODD.

†1495. CREPIS NICAEBENSIS Balb. Totternhoe, Harlington, Lea-grave, Beds, *Saunders Fl.*; Railway bank at Newton, near Rugby, Warwick, *Rugby List*, 1923.

1502. C. TARAXACIFOLIA Thuill., var. SUBINDIVISA Druce. Near Cambridge; Marston, Oxon, DRUCE.

†1503. C. SETOSA Hall. f. Between Dunmer and Popham Lane, N. Hants, RAYNER.

Mr J. Cryer has determined the Hieracia save where otherwise stated.

1505. HIERACIUM PILOSELLA L., var. CONCINNATUM F.J.H. St Peter's, Jersey, DRUCE.

†1510. H. PRAEALTUM Vill. Still in great plenty on the railway bank between Hanslope and Castlethorpe, Bucks, where it has been growing for over twenty years. Specimens are distributed through the Club this year, DRUCE.

†1511. H. STOLONIFLORUM W. & K. Still more plentiful in the same locality. It has now established itself on the western side of the railway and is likely to extend. Specimens are distributed this year. DRUCE.

1512. H. AURANTIACUM L. Chalk Hill, Kent, known for 60 years,—*Country Life* 429, 1921.

*1512. H. BRUNNEOCROCEUM Pugsf. In the churchyard of St Chads, Lichfield, Staffs, DRUCE & Sir R. CURTIS; Grosmont, N. Yorks, FLINTOFF; Tintern, Monmouth, N. SANDWITH.

1513. H. ANGLICUM Fr., var. LONGIBRACTEATUM F.J.H. Cnochan Rocks, W. Ross and W. Sutherland, DRUCE. Var. CERINTHIFORME

Backh. Braemar, S. Aberdeen; Ben Heasgarnich, M. Perth,
DRUCE.

1514. *H. LANGWELLENSIS* F.J.H. Thurso, Caithness, 1923,
DRUCE.

1518. *H. HOLOSERICUM* Backh. Meal Garbh, W. Sutherland,
July 1923, DRUCE.

1528. *H. MARSHALLI* Linton. Yellow Corrie and Roro Corrie,
Glen Lyon, M. Perth, DRUCE.

†1537. *H. PULMONARIOIDES* Vill. Kenmore, M. Perth, whence
Mr Pugsley recorded it. Evidently the plant is an alien from the
adjoining Taymouth policies, DRUCE.

*1539. *H. LEYI* F.J.H. Smoo Cave and Bettyhill, W. Suther-
land, July 1923, DRUCE.

1540. *H. SCHMIDTII* Tausch, var. *CRINIGERUM* Fr. Bettyhill,
W. Sutherland, DRUCE and WILLIAMSON, teste CRYER.

1542. *H. RUBICUNDUM* F.J.H. Bettyhill, W. Sutherland,
DRUCE. Var. *BOSWELLI* (Lint.). Smoo Cave, W. Sutherland,
DRUCE.

1543. *H. CALEDONICUM* F.J.H. Bettyhill, W. Sutherland,
DRUCE. Det. PUGSLEY.

1547. *H. SOMMERFELTII* Lindeb. This has seeded very plenti-
fully in my garden at Oxford from Clova specimens. It has spread
to an adjoining wall. DRUCE.

*1548. *H. HYPOCHAEROIDES* Gibs. Caenlochan, Forfar, a seedling
specimen, DRUCE.

*1550. *H. BRITANNICUM* F.J.H. Bettyhill, W. Sutherland,
DRUCE.

1554. *H. PSEUDONOSMOIDES* Dahlst. From the old locality,
Tomintoul, Banff, July 1923, DRUCE.

1565. *H. MACULOSUM* Dahlst., var. Glasnevin, Dublin, DRUCE.
- *1565. *H. SILVATICUM* Gouan, var. TRICOLOR W.R.L. Smoo, W. Sutherland, July 1923, DRUCE.
1571. *H. CILIATUM* Almq. Smoo, W. Sutherland, DRUCE and WILLIAMSON.
1582. *H. PETROCHARIS* Lint. Caenlochan, Forfar, DRUCE; Crochan, W. Ross, DRUCE and WILLIAMSON, teste CRYER.
1585. *H. EXPALLIDIFORME* Dahlst. Clova, Forfar, DRUCE.
1589. *H. EUPREPES* F.J.H., var. GLABRATUM Lint. Caenlochan, Forfar, July 1923, DRUCE.
1603. *H. ORARIUM* Lindeb., var. FULVUM F.J.H. Scrabtsar, Caithness, July 1923, DRUCE.
1607. *H. MACULATUM* Sm. Railway near Ashton, Northants, DRUCE.
1609. *H. SCIAPHILUM* Uechtr. A very curious plant, with very small heads and a numerously flowered panicle, the phyllaries with many yellow-headed glands, near the Wren's Nest, Staffs, on limestone, DRUCE and Sir R. CURTIS.
1626. *H. STICTOPHYLLUM* Dahlst. Symington, Lanark, 1909; Oykeel Bridge, E. Sutherland, 1923, DRUCE.
1629. *H. TRIDENTATUM* Fr. Wood Perry, Oxon, DRUCE.
1630. *H. RIGIDUM* Hartm. Russel's Water Common, Oxon, DRUCE.
1634. *H. AURATUM* Fr. Glen Lyon, M. Perth, DRUCE.
1641. *HYPochaeris glabra* L. Plentiful at Frilford, Berks; local, but fine, near Stow Wood, Oxford, DRUCE; at Poringland, Norfolk, $1\frac{1}{2}$ feet high, Miss TODD. Berks
Norf.

*1645. *TARAXACUM FULVUM* Raunk. Fiquet Bay, Jersey, DRUCE.

*1646. *T. VALDEDENTATUM* Dahlst. Hardwick House, Oxon, DRUCE.

*1646. *T. NORDSTEDTII* Dahlst. Rotherfield, Oxon, DRUCE.

*1646. *T. NAEVOSUM* Dahlst. Sibford, Oxon; Cortachy, Forfar; Hursley, S. Hants, DRUCE; Stromness, Orkney, JOHNSTON, with *T. NAEVOSIFORME* Dahlst.

*1646. *T. UNGUILOBUM* Dahlst. Isgarth, Lady, Sanday, Orkney, JOHNSTON, *l.c.*

1646. *T. FAROENSE* Dahlst. Near Muckle Water, Rousay, Orkney, JOHNSTON, *l.c.*

1649. *LACTUCA SERRIOLA* L. Colchester, Essex, BROWN and DRUCE; Cirencester, Gloster, GREENWOOD; Cardiff, Glamorgan, Miss VACHELL; Bristol, N. SANDWITH; Brighton, Sussex, Miss COTTIS; Barry, Glamorgan, R. L. SMITH.

†1653. *L. TATARICA* C. A. Mey. Galway, Mrs EVANS.

†1653 (3). *L. MACROPHYLLA* A. Gray. Garden weed, Melmerby, Cumberland. The Patterdale locality in the last *Report* is in Westmorland. Rev. W. W. MASON.

+ 1655. *SONCHUS PALUSTRIS* L. Waveney, in both Suffolk and Norfolk, W. G. CLARKE; Horsey, E. Norfolk, R. GURNEY. Suf
Norf

1656. *S. ARVENSIS* L., var. *GLABRESCENS* G.G. & W. Avonmouth Dock, Gloster, N. SANDWITH.

1657. *S. ASPER* Hill, var. *GLANDULOSUS* (Coss.) Druce. Naworth, Cumberland, DRUCE. Var. *PUNGENS* Bisch. Biddesden, Wilts, DRUCE. Var. *INTEGRIFOLIUS* Lej. Rozel, Jersey; Fishguard, Pembroke; Westonbirt, Gloster, DRUCE. × *OLERACEUS*. This rare hybrid occurred near Rozel, Jersey, on rich garden soil, DRUCE.

1658. *S. OLERACEUS* L., var. *CILIATUS* (Lam.) Druce. Bulling-

don, Fishguard, Pembroke; Studland, Dorset; Seascale, Cumberland, DRUCE. Var. TRIANGULARIS Dum. Ocker Hill, Tipton, Staffs; Martyr Worthy, N. Hants; Biddesden, Wilts, DRUCE.

†1660. TRAGOPOGON PORRIFOLIUS L. Easton Maudit, Northants, Miss VENABLES, ex H. L. GREEN; Lambay, Co. Dublin, STELFOX in *Irish Nat.* 88, 1923.

*1662. T. ORIENTALIS L. Hanslope, Bucks, DRUCE.

1666. JASIONE MONTANA L., var. LATIFOLIA Pugsl. Common in Guernsey, TRAPNELL; Plemont, etc., Jersey, DRUCE. A form near LITTORALIS, Lancrese, Guernsey, TRAPNELL.

†1674. CAMPANULA RAPUNCULOIDES L. Near Tandridge, Surrey, Rev. E. C. CRUTWELL; spontaneously in a garden near Chesterfield, Derby, DRABBLE; *Kenilworth, Warwick, *Rugby List*, 1923.

1684. VACCINIUM ULIGINOSUM L. Peat bog, Brampton, Cumberland, FLINTOFF, the typical, glabrous plant at a very low altitude.

1686. V. VITIS-IDAEA L. Tun Tor, Dartmoor, Devon, seen by Mr D'URBAN in 1866.

1691. ARCTOSTAPHYLOS ALPINA Spreng. On Meal Garbh, W. Sutherland, in some plenty, DRUCE.

†1691 (3). GAULTHERIA SHALLON Pursh. Southampton Common, S. Hants, RAYNER.

1694. ERICA CINEREA L., with corolla replaced by leaves. Maltesmoor, Sidmouth, Devon. See *Rep. B.E.C.* 289, 1918, where a similar form but with reddish leaves was sent by Lieut. R. WHYMPER from near Wool, Dorset.

1695. E. TETRALIX L., in a somewhat similar condition. Sent by the Hon. Mrs LEITH from Rhyador, Radnor "× CRAUFORDII." This does not appear to have been properly diagnosed and described. It is not a hybrid but a form in which the corolla is flore pleno, *i.e.*, one within the other.

1696. × *E. WATSONI* Benth. This seems to flower earlier than *E. ciliaris* as it was in good bloom on July 31 when *ciliaris* was just opening, DRUCE.

1699. *E. VAGANS* L. (See *E. mediterranea*, *Rep. B.E.C.* 387, 1918, for which it was mistaken). Sandy tract in East Riding, Yorks, probably introduced with Rhododendrons, J. FRASER ROBINSON, in litt. It is also the *E. Tetralix* from Tadmarton Heath, Oxford, as recorded by BEESLEY. Specimens have recently come into my possession which show that they were wrongly named. The heath, with other introduced species, is no longer to be found at Tadmarton, DRUCE.

†1706. *RHODODENDRON PONTICUM* L. Kerrysdale, Glencarron, W. Ross, WEBB; Braemore, W. Ross, seeding freely, DRUCE.

*1707. *PYROLA ROTUNDIFOLIA* L., var. *MARITIMA* (Keny.). On the Durham coast, J. H. HARRISON. *Dur*

1708. *P. MEDIA* Sw. Cortachy, Forfar, JAMES & DRUCE.

1711. *MONESES UNIFLORA* A. Gray. In immense quantity in a larch wood near Golspie (a second locality), flowering freely. The flowers have a delicious fragrance. A schoolboy said they called them cowslips, DRUCE. *Scot*

1712. *HYPOPITYS MONOTROPA* Crantz. On Culbin Sands, Easternness, PATTON & STEWART.

*1723. *HOTTONIA PALUSTRIS* L. On Culbin Sands, Easternness, new to Scotland, PATTON & STEWART; between Hatfield Woodhouse and Lindholme Moor, West Riding, Yorks, FLINTOFF.

1740. *TRIENTALIS EUROPAEA* L., forma *NANA* Druce. On the Isle of Noss, Shetland, the specimens only 1-2½ in. high, THOS. MAINLAND.

*1746. *SAMOLUS VALERANDI* L. Dovey Junction, Montgomery, BARTON.

†1747. *SYRINGA VULGARIS* L. Postcombe, Oxon, DRUCE; hedges north of Evanton, E. ROSS, WEBB.

†1748. *FRAXINUS EXCELSIOR* L., var. *DIVERSIFOLIA* Ait. Near Egton Bridge, N. Yorks, doubtless planted, FLINTOFF.

†1751. *VINCA MINOR* L. Alness, E. ROSS, WEBB.

1755. *CENTAURIUM VULGARE* Rafn. *St Helen's Spit, Isle of Wight, C. J. GREEN in *Hb. Druce*; 7 or 8 miles from sea at Cefn, Glamorgan, P. RICHARDS; *Marlborough Drive, New Forest, S. Hants, B. KING. An interesting N.C.R.

1763. *GENTIANA LINGULATA* Ag., var. *PRAECOX* Raf. Distributed this year from Ivinghoe Beacon, Bucks, where it occurred in great quantity and in good condition; Dunstable Downs, Beds; *Barnack, Northants, DRUCE.

1764. *G. GERMANICA* Willd. Sundon, Beds, Miss BROWN & Lady DAVY; near Albury, Bucks, P. RICHARDS. × *PAMPLINII* Druce. Albury, Bucks, P. RICHARDS.

1765. *G. CAMPESTRIS* L. Very luxuriant at Roro, Glen Lyon, Mid Perth, specimens up to 15 inches high, growing with var. *ALBA*. Mrs FLEMING & DRUCE. Var. *BALTICA* (Murb.). Seascale, Cumberland, HELLON & WILLIAMSON.

†1768. *COLLOMIA GRANDIFLORA* Dougl. Railway cutting, Malvern Link, Worcester, T. J. WALL. Det. THELLUNG.

†1771. *GILIA CAPITATA* Sims. Barry, Glamorgan, R. L. SMITH; Bristol, N. SANDWITH; railway bank, Carmarthen, HAMER. Det. THELLUNG.

1777. *POLEMONIUM CAERULEUM* L. Pexton Moor, Thornton Dale, N. Yorks, among bracken, "truly wild," FLINTOFF; †Llangower, Merioneth, BARTON.

†1780. *PHACELIA TANACETIFOLIA* Benth. Horsepath, Oxon, by roadside, in some quantity, T. J. WALL. Det. THELLUNG. See *Report* 848, 1922.

†1787. *LAPPULA ECHINATA* Gilib. Woodbridge, E. Suffolk, H. K. A. SHAW; Sherborne St John, N. Hants, H. L. GREEN; Shalford Park, Surrey, CHASE; Trewsbury, Gloster, Miss D. CATOR; Barry, Glamorgan, R. L. SMITH.

1789 (4). *BENTHAMIA INTERMEDIA* (F. & M.), teste Kew. Near Knocking, Beds, so abundant in arable fields as to be pest, Miss MALDEN, ex DRUCE.

†1789 (5). *B. MENZIESII* (Nels. & McBr.). Hungerford, Berks, VAN DE WEYER; Abbey Wood, W. Kent, St J. MARRIOTT; Hayling Isle, Miss HILLARD; Ware, Herts, DRUCE; Dewsbury, Yorks, H. BROOKE; Lingfield, Sussex, Rev. E. C. CRUTWELL; Patshull, Staffs, Lady J. LEGGE. Det. THELLUNG.

†1792. *SYMPHYTUM PEREGRINUM* Ledeb. Bexhill, Sussex, BOYS; Naworth, Cumberland; Dunstable, Beds, DRUCE. × OFFICINALE. Goring, Oxon, DRUCE.

†1793. *S. ORIENTALE* L. Freemington, N. Devon, TRETHERY. Specimens distributed this year. Caistor St Edmund, E. Norfolk, B. REYNOLDS.

†1800 (2). *ANCHUSA OCHROLEUCA* M. Bieb. Hayle, Cornwall, Miss TODD. Det. THELLUNG.

†1800 (3). *A. PROCERA* Bess. Hayle, Cornwall, Miss TODD; Sleaford, Lincs, Miss LONDON; Ware, Herts, Mrs WEDGWOOD. Det. THELLUNG.

†1808. *PULMONARIA OFFICINALIS* L., agg. Okehampton, Devon, Mrs REYNOLDS.

1811. *PNEUMARIA MARITIMA* Hill. North shore of Loch Linnhe, Moidart, near Redfour Ferry, Mrs R. MCKENNA.

1813. *MYOSOTIS PALUSTRIS* Hill, var. *STRIGULOSA* Reichb. Marlesham, E. Suffolk, H. K. A. SHAW.

1821. *M. LUTEA* Pers., var. *PALLIDA* (Bréb.). St Catherine's, Jersey, also with pure yellow flowers, DRUCE.

1823. LITHOSPERMUM PURPUREO-CAERULEUM L. In good flower in April at Oxwich, Glamorgan, DRUCE; found in new locality near Parkmill, Glamorgan, WEBB.

†1826. ECHIMUM ITALICUM L. Sheen, Surrey, Lady VICTORIA RUSSELL.

†1827. E. PLANTAGINEUM L. Barry, Glamorgan, R. L. SMITH.

1839. CUSCUTA EPITHYMUM Murr. Cogan Pill, Glamorgan, R. L. SMITH. Det. THELLUNG.

†1848. SOLANUM ROSTRATUM Dunal. Warlingham, Surrey, BEADELL.

1854. ATROPA BELLADONNA L. Farleigh, Wilts, GWATKIN.

†1855. DATURA STRAMONIUM L. Wye, Kent, Miss A. B. COBBE; Sibford, Oxon, F. LASCELLES.

†1855 (2). D. FEROX L. Pilton, Devon, W. P. HIERN in *Trans. Dev. Ass.* 78, 1922.

1856. HYOSCYAMUS NIGER L. Bentley Common, Staffs, ex Sir R. CURTIS.

†1857. H. ALBUS L. Barry, Glamorgan, R. L. SMITH.

†1860. VERBASCUM PHLOMOIDES L. Swanage, Dorset, DRUCE.

†1861. V. THAPSIFORME Schrad. Swaythling, S. Hants, RAYNER; Swanage, Dorset, E. W. NICHOLSON. Det. THELLUNG.

†1863. V. VIRGATUM Stokes. Teignmouth, Devon, Miss TODD; Canton, Glamorgan, R. L. SMITH; near the railway between Gosmont and Goathland, N. Yorks, FLINTOFF.

†1864. V. BLATTARIA L. (ALBUM). Ledbury, Hereford, Miss TODD.

†1865. V. PULVERULENTUM Vill. Barry, Glamorgan, R. L. SMITH; Christchurch, S. Hants, RAYNER.

1866. *V. LYCHNITIS* L. × *THAPSUS* L. Westwell, Kent, Miss
JEFFREY & Miss COBBE.

1867. *V. NIGRUM* L. Canton, Glamorgan, R. L. SMITH; Gros-
mont, N. Yorks, FLINTOFF. Var. *ALBUM*. Grangetown, Glamorgan,
R. L. SMITH. Det. THELLUNG. A hybrid of it at Radyr,
Glamorgan [64], R. L. SMITH.

†1869. *V. CHAIXII* Vill. Canton, Cardiff [63], R. L. SMITH.
Det. THELLUNG.

1873. *LINARIA VULGARIS* Mill, var. *PELORIA*. Plymouth, Devon,
N. SANDWITH.

†1876. *L. BIPARTITA* Willd. Riddings, Lanark, GRIERSON.
Det. THELLUNG.

†1877. *L. PURPUREA* Mill. Ahascragh, Galway, J. AINSWORTH.

1878. *L. REPENS* Mill × *VULGARIS*. Grangetown, Glamorgan
[58], R. L. SMITH.

†1886. *L. CYMBALARIA* Mill, var. *ALBA*. In some quantity and
seeding true, Penzance, Cornwall, shown to me by Mr THURSTON;
also from the walls of the Canal, Bolton-le-Sands, Lancs, Miss R.
BRIGHT; Newlyn, Norfolk, COOPER; Bishopsbourne, Kent, Miss
PALMER.

1893. *SCROPHULARIA ALATA* Gilib. River above Musselburgh,
Midlothian, FOGGITT.

†1896. *S. CANINA* L. Radyr, Glamorgan [79], R. L. SMITH.
Det. THELLUNG.

†1898. *MIMULUS GUTTATUS* DC. By the Cynon, near Hirwain,
Brecon, WEBB; near Sidmouth, G. T. HARRIS in *Trans. Dev. Ass.*
1922.

†1898. *M. LUTEUS* L. Sandside Bay, Deerness, Orkney, JOHN-
STON. Identified by W. B. TURRILL as the S. American species.

†1899. *M. MOSCHATUS* Dougl. Between Ambleside and Grasmere, Westmorland, T. B. BLOW; Ceinws, Montgomery, BARTON.

†1903. *DIGITALIS LUTEA* L. Near Looe, Cornwall, Mrs R. R. ROBERTS.

†1904. *ERINUS ALPINUS* L. Walls at Babraham, Cambridge, Viscountess GREY; Morham, East Lothian, R. P. BROTHERSTON in *Gard. Chron.* 256, 1923.

1908. *VERONICA CHAMAEDRYS* L., var. *PROCERA* Willk. Near Penzance, Cornwall, DRUCE.

1912. *V. ANAGALLIS-AQUATICA* L. Between Galway and Barna, Galway, D. C. MURRAY.

*1930. *V. SCUTELLATA* L. Dolgelley, Arthog, Merioneth, BARTON.

*1931. *EUPHRASIA STRICTA* Host. Holland, South Ronaldshay, Orkney, JOHNSTON. (This should be submitted to various experts. It is somewhat doubtful as a British species).

1932. *E. BOREALIS* Wettst. Cnochan, W. Ross, DRUCE; Durness, W. Sutherland; *Chippenham, Cambridge, DRUCE; *Magilligan, Londonderry, S. A. BENNETT.

1933. *E. BREVIPILA* B. & G. Ivinghoe Beacon, Bucks; Dunstable Downs, Beds; Wareham and Corfe, Dorset; Ballater, S. Aberdeen; Bettyhill, Durness, W. Sutherland; Cnochan, W. Ross; Rescobie, Forfar; John o' Groats, Caithness, DRUCE; Magilligan sandhills, Londonderry, S. A. BENNETT.

1934. *E. NEMOROSA* Pers., var. *CILIATA* Drabble. Swanage, Dorset; St Ouen's and Plemont, Jersey; Ketton Stone Pits, Lincs; Wakerley, Northants; Westwell, Oxon, DRUCE; Pilligreen, W. Sussex, BURDON; Freshwater, Isle of Wight, Lady DOUIE; Magilligan sandhills, Londonderry, S. A. BENNETT.

*1934 (4). *E. CONFUSA* Pugsl. Nant Francon, Carnarvon, PUGSLEY in *Journ. Bot.* 22, 1923.

1935. *E. CURTA* Fries. Farr, W. Sutherland; Holburn Head, Caithness, DRUCE. Var. *GLABRESCENS* Wetts. Seascale, Cumberland, DRUCE.

1936. *E. OCCIDENTALIS* Wetts. Quenvais, Jersey, DRUCE; Vazon, Guernsey, TRAPNELL; Saunton, N. Devon, Miss TODD; *Ivinghoe Beacon, Bucks, DRUCE.

1939. *E. MICRANTHA* Reichb. (*GRACILIS* Fr.). Erriboll, near Ben Hope, W. Sutherland, DRUCE; near Goathland, N. Yorks, FLINTOFF.

1940. *E. SCOTICA* Wetts. Bettyhill, Durness, W. Sutherland; Ullapool, W. Ross; Urrisbeg, Galway, 1921, DRUCE.

†1940 (2). *E. MINIMA* Fr. Gairy Hill, S. Ronaldshay, Orkney, JOHNSTON, *l.c.*

1941. *E. ROSTKOVIANA* Hayne. New Forest, S. Hants, Lady DOUIE.

1943. *E. KERNERI* Wetts. Cranbourne Chase, Dorset, MELVILL; Hertford, ANSELL; Bradninch, N. Devon, Lady DOUIE; Anglesey, S. A. BENNETT; Swanage, Dorset, DRUCE.

Many of the Eyebrights have been kindly determined by Mr D. Lumb, and Mr W. H. Pearsall has also given assistance.

1951. *RHINANTHUS MAJOR* Ehrh. Bettyhill, W. Sutherland, DRUCE.

~~1966. *OROBANCHE MAJOR* L. (*ELATIOR*). Westwell, Kent, Miss M. COBBE.~~

~~1971. *O. MINOR* Sutt. *Carmarthen, HAMER; Barry, Glamorgan [70], R. L. SMITH; on clover, Menmor, Galway, Mrs EVANS.~~

*1975. *UTRICULARIA VULGARIS* L. and 1978. *U. MINOR* L. Dovey Junction, Montgomery, BARTON.

†1986 (3). *VERBENA HASTATA* L. Christchurch, S. Hants, Mrs ROTHWELL & RAYNER.

1988. *MENTHA ROTUNDIFOLIA* Huds. Wigton, DRUCE; Limpsfield, Surrey, CRUTWELL; *Ridgmont, Beds, *Saunders Fl.* × *SPICATA*. Carnow Downs, Feock, Cornwall, 1907, DAVEY.

*1989. *M. ALOPECUROIDES* Hull. Garden origin, Mere, Wilts, W. HERRIDGE; Llanfairfechan, Carnarvon, PUGSLEY in *Journ. Bot.* 22, 1923.

1990. *M. LONGIFOLIA* Huds. Marham, W. Norfolk, ROBINSON; †Evie, Orkney, JOHNSTON.

1990. × *M. VILLOSA* Huds. Marham, W. Norfolk, ROBINSON.

*1992. *M. CRISPA* L. Of garden origin, Torquay, S. Devon, W. HERRIDGE.

1993. × *M. PIPERITA* L., forma. Brailes, Wilts, 1922, C. P. HURST. See *Rep.* 851, 1922. When fresh it had a strong scent of citron, and is perhaps similar to Mr White's *M. citrata* from the Mendips. An autumnal specimen of the Wilts plant had a peppermint odour. Dr THELLUNG refers it to *piperita*.

1994. *M. AQUATICA* L., var. *HIRSUTA* (Huds.) × *LONGIFOLIA*. Waterford Marsh, Hertford, 1846, ANSELL. Var. *vulgaris* (Sole). Earthcott, Alveston, Gloster, E. NELMES.

1996. × *M. VERTICILLATA* L., var. *RIVALIS*. Llanwarne, Hereford, B. KING.

1997. × *M. GENTILIS* L. Near Sennen, Cornwall, Mrs MARGARET BROWN; Swaythling, S. Hants, RAYNER; *Sibton, E. Suffolk, REDGROVE.

1999. × *M. RUBRA* Huds. Near Ray Island, N. Essex, 1922, DRUCE; near Waggoner's Wells, Surrey, C. P. HURST.

2000. *M. ARVENSIS* L., var. *PRAECOX* (Sole), teste J. FRASER.

Thornton Reservoir, Leicester (see *Report* 583, 1916), A. E. WADE,
as *M. sativa*, var. *rivalis*.

†2009 (2). SATUREIA MONTANA L. Winchester, Hants, RAYNER.

2010. S. MENTHIFOLIA (Host) = SYLVATICA Bromf. There is a
specimen from South Baddesley, S. Hants, in *Hb. Kew*.

2011. S. CALAMINTHA Scheele, var. BRIGGSII Druce. Gt. Orme,
Carnarvon, H. KEW; near Dartford, Kent; Corfe, Dorset, DRUCE.

2013. S. ACINOS Scheele. Barry, Glamorgan [46], R. L. SMITH.

*2016. CLINOPODIUM VULGARE L. Llyfnant Valley, Montgomery,
BARTON.

†2017. MELISSA OFFICINALIS L. Offley Hay, on a common,
Staffs, DRUCE and Sir R. CURTIS; Cerris, Merioneth, BARTON.

†2025. SALVIA NEMOROSA L. Par, Cornwall, Miss TODD. Det.
THELLUNG.

†2031. S. VERTICILLATA L. Grosmont, N. Yorks, FLINTOFF;
Buildwas, Salop, MELVILL.

†2039. DRACOCEPHALUM PARVIFLORUM Nutt. Near Warlingham,
Surrey, BEADELL.

*2042. SCUTELLARIA GALERICULATA L. Dovey Junction, Mont-
gomery, BARTON.

2047. MELITTIS MELISSOPHYLLUM L. Sterfield English, Hants,
H. L. GREEN.

†2048. SIDERITIS MONTANA L. Christchurch, S. Hants, Mrs
ROTHWELL & RAYNER.

2056. STACHYS SYLVATICA L. Monstrosity. See E. M. CUTTING
in *Ann. Bot.* 405-25, 1921.

2056. × S. AMBIGUA Sm. Tapton, Derby, DRABBLE.

- *2058. *S. ARVENSIS* L. Dovey Junction, Montgomery, BARTON.
- †2059. *S. ANNUA* L. Linkenhorn, Cornwall; Christchurch, S. Hants, Mrs ROTHWELL & RAYNER; Cardiff, Glamorgan, Miss VACHELL.
- †2059 (2). *S. RECTA* L. Barry, Glamorgan, R. L. SMITH.
2062. *GALEOPSIS TETRAHIT* L., var. *NIGRICANS* Bréb. Wenvoe, Glamorgan, R. L. SMITH; Studland, Dorset, DRUCE.
- †2069. *LAMIUM MACULATUM* L. Buckenham, E. Norfolk, B. REYNOLDS; roadside between Hirwain and the Brecon border, Glamorgan, WEBB.
- †2082. *TEUCRIUM CHAMAEDRYIS* L. Minchinhampton Common. Gloster, Dr PEGLER.
2085. *AJUGA GENEVENSIS* L. Adventive at Hayle, Cornwall. As I expected this is the plant which was first recorded as *A. pyramidalis*. Dr Pegler's specimen proves it to be *A. genevensis*.
- †2088. *PLANTAGO PSYLLIUM* L. Bristol, N. SANDWITH. Det. THELLUNG.
2090. *P. CORONOPUS* L., var. *TENUIFOLIA* Wirtg. Near Cardiff, Glamorgan, Prof. D. McLEAN; a minute form, with nearly entire leaves, in a wet turfy place, Seascale, Cumberland, Dr HELLON.
2092. *P. LANCEOLATA* L., var. *TIMBALI* (?). Frilford, Berks, DRUCE.
- 2100 (3). *P. ARISTATA* Michx. Bristol, Gloster; Portishead, Somerset, N. SANDWITH.
- 2102 (11). *PARONYCHIA POLYGONIFOLIA* L. Bristol, N. SANDWITH.
- *2103. *HERNIARIA GLABRA* L. Near Torquay, Devon. See *N.H. Journ. Torquay*, 361, 1923.

2110. *AMARANTHUS RETROFLEXUS* L. Cardiff, Glamorgan, Miss VACHELL; Uxbridge, Middlesex, DRUCE; Barry Dock, Glamorgan, R. L. SMITH. Var. *DELILEI* Thell. Par, Cornwall, Miss TODD. Det. THELLUNG.

†2112. *A. ALBUS* L. Bristol, N. SANDWITH; Par, Cornwall, Miss TODD. Det. THELLUNG.

†2114. *A. CHLOROSTACHYS* Willd., var. *PSEUDORETROFLEXUS* Thell. = *A. POWELLII* Wats. Bristol, N. SANDWITH. Det. THELLUNG.

The Chenopods have been determined by Dr Murr.

2117. *CHENOPODIUM RUBRUM* L., var. *PSEUDOBOTRYODES* Wats. Frensham, Surrey; Hurst, Berks; Holy Isle, Northumberland, DRUCE. Dr Murr refers them to *botryodes* Sm., but this plant does not appear to be well understood on the continent.

2121. *C. URBICUM* L., var. *INTERMEDIUM* Koch. Aberthaw, Glamorgan, Lady DAVY.

2122. *C. MURALE* L. Barry, Glamorgan [104], R. L. SMITH; Uxbridge, Middlesex, Lady DAVY.

†2123. *C. OPULIFOLIUM* Schrad. Stoneferry, Hull, Yorks, Miss A. B. COBBE.

2124. *C. ALBUM* L., var. *VIRIDE* (L.). Sibford, Oxon; Lichfield, Staffs; Swanage, Dorset, DRUCE. Var. *BERNBURGENSE* Zhack. Bristol, N. SANDWITH. Var. *LANCEOLATIFORME* (Murr). Hull, Yorks, Miss M. COBBE; Bradford, Yorks, DRUCE. Var. *SUBFICIFOLIUM* (Murr). Hull (as var. *serratiforme*), Miss M. COBBE; Cannock Chase, Staffs; Silloth, Cumberland, DRUCE. Var. *VIRIDESCENS* (St. Am.). Exeter, Mevagissey, Cornwall, Miss TODD; Lichfield, Staffs, DRUCE. Var. *GLOMERULOSUM* Reichb. Lichfield, Staffs; Sibford, Oxon, DRUCE.

†2124 (2). *C. LANCEOLATUM* Muhl. Walsall, Staffs, DRUCE.

†2125. *C. LEPTOPHYLLUM* Nutt. Swaythling, Christchurch, S. Hants, RAYNER. Det. Kew.

2126. *C. FICIFOLIUM* Sm. Wye, Kent, Miss M. COBBE.

†2127. *C. GLAUCUM* L. Goonhavern, Cornwall, RILSTONE; Faverham Quay, Kent, Miss M. COBBE.

†2130. *C. AMBROSIODES* L. Bristol, N. SANDWICH.

†2131. *C. BOTRYS* L. Cardiff, Glamorgan, R. L. SMITH.

†2131 (2). *C. STRIATUM* Kras. Hull, Yorks, Miss M. COBBE, and as var. *EROSUM*. × *HIRCINUM*. Meanwood, Leeds, BUTCHER. × *HAYWARDIAE* Murr. Oil works, Hull, Miss M. COBBE.

†2131 (4). *C. BERLANDIERII* Moq. Ware, Herts, DRUCE.

†2135 (5). *MONOLEPIS NUTTALLII* (R. Sch.) Greene. Loseley, Guildford, Surrey, CLARKE.

2153. *ATRIPLEX PEDUNCULATA* L. Still in W. Suffolk, STANLEY REDGROVE. *Suf.*

†2153 (10). *AXYRIS AMARANTOIDES* L. Shalford, Surrey, CHASE; Warlington, Surrey, BEADALL; Tilehurst, Berks, MURRAY.

†2155. *KOCHIA SCOPARIA* Schrad. Bristol, Mrs SANDWICH.

2168. *SALSOLA KALI* L., var. *TENUIFOLIA* Mey. Faversham. Kent, Miss M. COBBE.

†2168 (2). *PHYTOLACCA DECANDRA* L. Eastleigh, S. Hants, RAYNER; roadside, Malvern, Worcester, TOWNDROW. The older name is *P. americana* L., which dates from the first edition of the *Species Plantarum*.

2184. *POLYGONUM AEQUALE* Lindm. Silloth, Cumberland; Walsall, Staffs, DRUCE.

2184 (4). *P. CALCATUM* Lindeb. [Ref. No. 2480]. West End Common, Esher, Surrey, 1921, BRITTON, teste DANSER.

†2191. *P. CUSPIDATUM* S. & Z. Pitlochry, E. Perth, WEBB;
Lichfield, Staffs; Braemore, W. Ross, DRUCE.

†2191 (2). *P. SACHALINENSE* Schm. Braemore, W. Ross, DRUCE.

†2193. *FAGOPYRUM TATARICUM* Gaertn. Barry, Glamorgan, R.
L. SMITH.

2201. *RUMEX SANGUINEUS* L. Grange Lane, Blackhill, Glamor-
gan, WEBB.

*2207. *R. MARITIMUS* L. Near Falfield, W. Gloster, E. NELMES.

†2210. *R. MAGELLANICUS* Gris. Avonmouth, Bristol, N.
SANDWITH.

†2210. *R. OBOVATUS* Dans. Possil, Lanark, GRIERSON.

†2216. *HIPPOPHAE RHAMNOIDES* L. Gairloch, W. Ross, WEBB.

2218. *THESIUM HUMIFUSUM* DC. Barry, Glamorgan, R. L.
SMITH.

K
†2229. *EUPHORBIA VIRGATA* W. & K. ~~Greenhithe, Kent, RED-~~ ^{Saw!}
GROVE; Radyr, Glamorgan, R. L. SMITH. Det. THELLUNG. War-
lingham, Surrey, STANSFIELD; Hassocks, Sussex; Thames, near
Wallingford, Berks, HUTCHISON; Station yard, Aylesford, Miss M.
COBBE; near Six-mile Bottom, Cambridge, DRUCE. ^{Saw!}

†2230. *E. CYPARISSIAS* L. Cholsey, Berks, Miss NEILD.

†2234. *E. FALCATA* L. Cardiff, Glamorgan, R. L. SMITH. Det.
THELLUNG.

2236. *E. EXIGUA* L., var. *RETUSA* DC. Stockton, Rugby.
Rugby List, 1923.

†2243. *MERCURIALIS ANNUA* L. Glasgow, GRIERSON.

2244. *ULMUS MONTANA* Stokes, var. *MONSTROSA*. Near Eyton
Bridge, N. Yorks, FLINTOFF.

2246. U. PLOTH Druce. Near Stafford, DRUCE.
- †2248. CANNABIS SATIVA L. Patshull, Staffs, Lady J. LEGGE.
- †2249. FICUS CARICA L. Chesil Beach, Dorset, a fair sized plant, DRUCE & VAN DE WEYER; near Mumbles Head, Glamorgan, WEBB.
2250. URTICA DIOICA L., var. MICROPHYLLA Hausskn. Church End, Finchley, both as a roundish and as an elongated-leaved form, DRABBLE; Brendon, Devon, WATERFALL in *Trans. Dev. Ass.* 78, 1922.
- †2253 (5). HELEXINE SOLEIROLII Req. In the drain round Long Ashton Church, N. Somerset, Miss I. M. ROPER; on a wall at Pill (*H. T. Gibbons*), Axbridge Church, Somerset, H. S. THOMPSON; Bassett, S. Hants, RAYNER.
- †2258 (2). ALNUS INCANA Medik. Arnside, Westmorland, PEARSALL; Melmerby, Cumberland, Rev. W. W. MASON.
2259. CARPINUS BETULUS L. *Isle of Wight, ex MILLER CHRISTY. Var. PARVIFOLIA Miller Christy. Near Stokenchurch, Oxon, DRUCE.
- †*2267. SALIX PENTANDRA L. Legrave, Beds, *Saunders Fl.* Probably planted.
2269. S. ALBA L., var. VITELLINA (Sm.). Gailey Reservoir, Staffs, DRUCE.
2269. × S. VIRIDIS Fries. A large leaved form, Hardwick House, Oxon, DRUCE and Lady ROSE.
- k 2270. S. TRIANDRA L. Darenth River, Kent, St. J. MARRIOTT. but the female catkins from the same locality are S. UNDULATA Ehrh., teste FRASER.
- †2272. S. DAPHNOIDES Vill. Gailey Reservoir, Staffs, DRUCE.

2273. *S. VIMINALIS* L., var. *LINEARIFOLIA* W. & G. Gailey Reservoir, Staffs, DRUCE.

†2293. *POPULUS TACAMAHACCA* Mill. Gailey Reservoir, Staffs; Glen Lyon, M. Perth, DRUCE.

†2294 (4). *P. LAURIFOLIA* Ledeb. Roro, Glen Lyon, M. Perth; Aberdeen, DRUCE.

2296. *CERATOPHYLLUM SUBMERSUM* L. Brading Water, Whitstable, Kent, DIGHTON.

*2297. *HYDROCHARIS MORSUS-RANAE* L. In a pithole near Box, Wilts, Mrs COLVILLE.

2303. *CORALLORRHIZA TRIFIDA* Chat. In plenty on damp places, Culbin Sands, Easternness, PATTON and STEWART.

2306. *LISTERA CORDATA* Br. Golspie, E. Sutherland, Prof. T. L. GRIFFITHS; Shipley Bridge, Brent, Devon, FURSE.

2308. *SPIRANTHES SPIRALIS* C. Koch. Under the name, *S. autumnalis*, Prof. Bower, of Glasgow, recorded in *Nature* 185, 1923 the finding of this Orchid in 1921 in two stations about a mile apart "very sporadically in the woods about Carr Bridge." Specimens were not preserved, but "their characteristic smell and spiral spikes interested our table at the hotel. . . I am pretty sure we were not mistaken in the plant. I have known it since I was a boy." On p. 291 of the same journal Miss E. P. Smith, of Edinburgh, says she too found it on Docharn Craig, a small hill (1250 ft.), near Carr Bridge in the summer of 1921. She describes finding "it in the wood which is on the northern side, and its floor is covered with *Vaccinium* spp., mainly *Oxycoccus* mixed in places with *Erica Tetralix* and *cinerea*. Earlier in the season *Pyrola rotundifolia* and *Trientalis europaea* were abundant. Only one species of the *Spiranthes* was discovered although a careful search was made of the whole wood. The specimen was unfortunately lost in its transit to the South." With reference to these records I must say that I have still great doubt of the accuracy of the identification. It is not only

such a great extension of the known range of the plant, since *Spiranthes* is not on record for Scotland, but the habitat is so different from its normal one. Moreover, I sent Miss Smith unlabelled specimens of *Vaccinium Vitis-idaea* and *Goodyera repens*, and she recognised them as the plants she recorded as *Oxycoccus* and *Spiranthes*. It may be added that the vernacular name of Cranberry is on Speyside wrongly applied to *Vitis-idaea*. Is it possible that an abnormal specimen of *Goodyera* may have been mistaken by Prof. Bower for *Spiranthes*? It is most unlikely that it should grow in a pine wood on acid soil. But we have another Scottish record in the same paper by Mr J. B. Simpson, who claims to have discovered several specimens in the Isle of Coll, Argyllshire, one of which was sent to a competent botanist, Mr Burgess, of Forres, who corroborated the identification. Both these botanists seem to be acquainted with *Goodyera*, so it would seem that there was one found there. The Coll locality is a more likely one than Speyside, but in answer to my question as to whether it was found on shell-sand Mr Simpson tells me they grew "in peaty soil overlooking beach deposits in part, but sometimes only on gneiss. But the soil may be limey, as there is a good deal of marble in the rocks near." There is just a chance of the Coll plant proving to be *S. Romanzoffiana*, which is, after all, the most likely one to occur. The matter deserves further investigation not only in Coll, but in Easternness. Sir Herbert Maxwell at one time thought he had seen *Spiranthes* in Speyside, but starveling *Goodyera* might have been mistaken for it. On present knowledge I hesitate to include it as a Scottish plant. G. C. DRUCE.

2313. CEPHALANTHERA DAMASONIUM Druce. Near the Gogmagogs, Cambridge, H. K. A. SHAW. *coll.*

2316. HELLEBORINE VIRIDIFLORA (Reichb.). Wood near Exeter, D. PEGLER.

*2321. ORCHIS MILITARIS L. On the Quenvais, Jersey, Miss VACHELL and T. ATTENBOROUGH. A solitary specimen which had been broken by a passer-by was sent me for examination. On soaking out the flower it proved to be this species, the leaves having the characteristic coumarin odour, DRUCE.

2324. *O. MORIO* L., var. *CHURCHILLII* Druce. Tenby, Pembroke, DRUCE.

2326. *O. INCARNATA* L., b. *PULCHELLA* Druce. Beadnell, Northumberland, R. B. COOKE; Holmsley Bog, Surrey, J. FRASER in *Gard. Chron.* 347, 1923; Lumsden, N. Aberdeen, WILSON; Braemar, S. Aberdeen; Dunnet, Caithness, DRUCE. × *PURPURELLA*. Beadnell, Northumberland, COOKE.

2326 (2). *O. PRAETERMISSA* Druce. Plumpton, Sussex, Miss COTTIS; Chippenham, Cambridge, DRUCE; Darenth, Maidstone, Kent, St. J. MARRIOTT; Stoneham, S. Hants, abundant, RAYNER; Kingsthorpe, York, J. GREEN; Ellers Marsh, Thornton Dale, N. Yorks, FLINTOFF. Var. *PULCHELLA* Druce. Emdale, N. Lancs, PEARSALL; Beadnell, Northumberland, COOKE; Lumsden, Aberdeen, WILSON; Rescobie, Forfar; Braemar, S. Aberdeen; Tomintoul, Banff; Carr Bridge, Grantown, Easternness; Bonar Bridge, E. Ross; Golspie, E. Sutherland; Dunnet, Caithness; Durness, Smoo, Ledbeg, etc., W. Sutherland; Cnochan, W. Ross, DRUCE.

2326 (2). *O. PRAETERMISSA* × *FUCHSII*. Marsworth, Herts, Hon. N. C. ROTHSCHILD.

2326 (2). *O. PRAETERMISSA* × *MACULATA*. Carmarthen, HAMER; Cnochan, W. Ross; Dingwall, E. Ross, DRUCE.

2326 (2). *O. PRAETERMISSA*, var. *PULCHELLA* × *MACULATA*. Bettyhill, Durness, W. Sutherland; Cnochan, W. Ross, DRUCE.

2326 (3). *O. PURPURELLA* Steph. Ireleth, N. Lancs, PEARSALL; Beadnell, Northumberland, COOKE; Braemar, S. Aberdeen, DRUCE.

2327. *O. MACULATA* L., vera. Inchnadamph, W. Sutherland; Cnochan, W. Ross, DRUCE; Ireleth, N. Lancs, PEARSALL. Var. *LEUCANTHA* Druce. Arrochar, Dumbarton, Miss G. YOUNG; Altnaharra, W. Sutherland; Braemar, S. Aberdeen, DRUCE.

2327 (2). *O. FUCHSII* Druce. Ivinghoe Beacon, Bucks, abundant, DRUCE; Marlborough, Wilts, G. PEIRSON; Darenth, Kent, St. J. MARRIOTT; Wye, Kent, Miss COBBE; Cortachy, Forfar, DRUCE.

2327 (3). *O. O'KELLYI* Druce. *Dunstable Downs, Beds; *Ivinghoe Beacon, Bucks, DRUCE; Charlbury, Oxon, 11½ in. high, POWELL.

2328. *O. LAXIFLORA* × *MORIO* = *O. ALATA*. Still at St. Ouen's Pond, Jersey, *Bot. Soc. Exp.*

*2331. *O. HIRCINA* Crantz. Near Burnham, N. Somerset, 25 plants scattered over a considerable area but near an unoccupied house. There seems no evidence of its being planted in the garden and thus to have escaped, Miss STEWART, ex W. D. MILLER; near Puddleinton, Dorset, Mr LOVELACE, ex Mr HERRIDGE; near Hadiscoe, E. Norfolk, the specimen had about 60 flowers on it, H. K. A. SHAW; Border of Wood, Wye, Kent, the third specimen seen there this year, Miss A. B. COBBE.

2335. *OPHYRS APIFERA* Huds. Near Buildwas, Salop, MELVILLE; *on chalk debris near Magheramorne, Larne, Ireland, Capt. CHASE. See *Irish Nat.*, 96, 1923. Var. *FLAVESCENS* Rost. Charlton Adam, N. Hants, BOYS.

2335 (2). *O. TROLLII* Heg. Baunton, near Cirencester, Gloucester, GREENWOOD; *Brighton, on downs, Sussex, PAYNE, ex Miss COTTIS; *Laugharne, Carmarthen, HAMER; *Seaton, Devon, STANLEY BURR in *Dev. & Ex. Gaz.*

2337. *HERMINIUM MONORCHIS* Br. Between Hartingdon and Sundon, Beds, *Saunders Fl.*

2338. *HABENARIA GYMNADENIA* Druce. Lewes, Sussex, H. CARTER; most abundant at Ivinghoe, Bucks, with var. *ALBA*, as the dense-flowered plant, DRUCE.

2340. *H. VIRIDIS* Br. Near Presteigne, Radnor, Mrs DEBENHAM.

2350. *IRIS FOETIDISSIMA* L., var. *CITRINA* Bromf. Langton Matravers, Dorset, VAN DE WEYER.

†2353. *HERMODACTYLIS TUBEROSUS* Mill. Flowering at Ludgevan, Cornwall, March 18, 1923, where Mr THURSTON showed it me.

†2354. CROCUS BIFLORUS Mill. *Penrice Green, Glamorgan,
WEBB.

†2366. NARCISSUS MAJOR Curt. With the foregoing, in great
luxuriance, DRUCE.

†2372. N. BIFLORUS Curt. Ide, Teignmouth, S. Devon, Miss
CRESSWELL in *Trans Dev. Ass.*, 1922.

†2390. ASPHODELUS FISTULOSUS L. Warlingham, Surrey,
BEADELL; Seaton, Devon, *Trans. Dev. Ass.* 1922.

†2393. ALLIUM AMPELOPRASUM L. Quite naturalised near the
Madingley road, Cambridge, Miss G. BACON.

†2394 (2). A. SATIVUM L. Naturalised in a field at Renmore,
Galway, Mrs EVANS. Det. THELLUNG; Wiseman's Bridge, near
Tenby, Pembroke, T. J. WALL.

K. 2396. A. VINEALE L., var. BULBIFERUM Syme. Swalecliffe,
Whitstable, Kent, Miss COBBE.

†2401. A. TRIQUETRUM L. Naturalised near Tenby, Pembroke,
DRUCE.

†2402. A. CARINATUM L. Upton on Severn, West Gloster, Miss
TODD; river above Musselburgh, Edinburgh, FOGGITT.

2403. A. OLERACEUM L. Upton on Severn, W. Gloster, Miss
TODD.

2405. A. SCHOENOPRASUM L. Builth, Brecon, Hon. Mrs A.
LEITH.

†2407. MUSCARI RACEMOSUM Lam & DC. West Dean, Wilts, H.
L. GREEN; Leagrave, Beds, *Saunders Fl.*

†2408. HYACINTHUS COMOSUS L. West Harling Heath, Nor-
folk, Lady DORBEN FITZROY & Miss DUNLOP; Hayling Isle, S. Wilts,
Miss HILLARD.

2410. *SCILLA AUTUMNALIS* L. Barry, Glamorgan, R. L. SMITH.
- †2411 (2). *S. HISPANICA* Mill. Near Tenby, Pembroke, DRUCE.
- *2425. *PARIS QUADRIFOLIA* L. On an islet in Loch Awe, near Inchnadamph, vide spec., DRUCE. An interesting locality.
2433. *JUNCUS SUBNODULOSUS* Schrank. Epping Forest, Essex, Miss TROWER.
2435. *J. ARTICULATUS* L. A monstrosity caused by *Livea juncorum*, Cape Wrath, W. Sutherland, The Rt. Hon. HAROLD BAKER.
2437. *J. BULBOSUS* L., var. *ULIGINOSUS* (Fries). Ashdown Forest, Sussex, Lady DAVY; Loch Achray, Perth, Miss TROWER.
- †2450. *JUNCOIDES NEMOROSUM* Morong, var. *RUBELLUM* (Hoppe) Druce. St Blazey, Cornwall, Mr MEDLEN, ex THURSTON; between Wyndcliff and Tintern, Monmouth, Miss M. COBBE.
- *2452. *J. PILOSUM* Morong. Near St Peter's, Jersey, W. H. JONES.
- *2462. *SPARGANIUM NEGLECTUM* Beeby. Dovey Junction, Montgomery, BARTON.
2478. *ELISMA NATANS* Buch. Chasetown, Staffs, L. B. LANGMAN.
2489. *POTAMOGETON ALPINUS* Balb. By the railway between Levisham and Goathland, N. Yorks, FLINTOFF.
2493. × *P. GRAMINEUS* L., var. *WOLFGANGII* (Kihl.). Loch of Tankerness, Orkney, JOHNSTON, *l.c.*
2495. × *P. NITENS* Web., var. *SUBPERFOLIATUS* Hagstr. Thurso River, Caithness, above the town, DRUCE & WILLIAMSON.
- *2508 (2). *P. PANORMITANUS* Biv. Pwll, Carmarthen, HAMER, teste BENNETT.
- *2509. *P. RUTILUS* Wlfg. Loch of Ayre, Holm, Orkney, JOHNSTON.

*2532. *SCIRPUS SYLVATICUS* L. Westoning Flitwick, Beds.
Saunders Fl.

2545. *S. COMPRESSUS* Pers. Bogs near Basingstoke Canal.
Woking, BEADELL. *Beds*

2552. *RYNCHOSPORA FUSCA* Ait. Acharacle, Modart, Mrs R.
McKENNA. *Surr*

*2553. *R. ALBA* Vahl. Dovey Junction, Montgomery, BARTON.

2557. *KOBRESIA BIPARTITA* Dalla Torre. In the Yellow Corrie,
Glen Lyon, M. Perth, DRUCE.

K 2560. *CAREX ACUTIFLORA* Ehrh., var *COMPOSITA*. Darenth river,
near Shoreham, Kent, M. HORNER.

2561. *C. VESICARIA* L. A sterile form from a pasture, Merton,
Oxon, perhaps a hybrid with *C. gracilis*, with which it grew, DRUCE.

2562. *C. SAXATILIS* L. With rounder female spikelets than
usual, Yellow Corrie, Glen Lyon, M. Perth, DRUCE.

2564. *C. INFLATA* Huds. An extraordinary nearly sterile form.
Some of the female spikelets have male flowers at the apex, and some
of the male spikelets show male flowers in the centre. The lower
female spikes are lax-flowered and are sometimes compound. Sent by
Mr TEMPLEMAN from Cogra Moss, Lamplugh, Cumberland, in 1922.

2566. *C. HIRTA* L., var. *HIRTIFORMIS* Pers. Oxley, Watford,
Weybridge, Surrey, TRETHERY.

2567. *C. PENDULA* Huds. Banks of Lune, between Casterton
and Barbon, L. Lancs, PEARSALL.

2569. *C. STRIGOSA* Huds. In woods near Radnage, the second
known habitat in Oxon, found by GAMBIER PARRY and N. SANDWICH.

2570. *C. HELODES* Link. Rozel, Jersey; between Weymouth
and Portland, Dorset, DRUCE.

2573. *C. DISTANS* L. Charlbury Moor, Oxon, DRUCE.
2574. *C. PUNCTATA* Gaud. Corbière, Jersey, in Lady Davy's locality, in some quantity, *Bot. Soc. Exp.*
2575. *C. FULVA* Host. Chippenham, Cambridge, DRUCE.
2576. *C. LEPIDOCARPA* Tausch. Charlbury Moor, Oxon, DRUCE.
× *C. XANTHOCARPA* Degl. Brittas Pond. Co. Dublin, STELFOX in *Irish Nat.* 39, 1923.
2577. *C. OEDERI* Retz. Little Frensham Pond, Surrey, BIDDISCOMBE.
2586. *C. TOMENTOSA* L. Frampton, Gloster, Miss D. CATOR; *Westwell, Oxon, just in the county, N. SANDWITH with GAMBIER PARRY. A splendid New County Record. S. Cerney, W. Gloster, GREENWOOD.
2588. *C. DIVERSICOLOR* Cr., var. *COMPOSITA*. Alltnaharra, W. Sutherland, DRUCE.
2611. × *C. AXILLARIS* Good. Near Cheddar, N. Somerset, Lady DAVY.
2615. *C. PAIRAEI* Schultz. St. Peter's, Jersey, DRUCE.
2616. *C. DIVULSA* Stokes. Mont Orgueil, Jersey, DRUCE; Presteigne, Radnor, Mrs DEBENHAM.
2617. *C. PANICULATA* L. Large stools, 5-6 feet high, in the Scilly Islands, H. DOWNES. Var *SIMPLEX* Peterm. Hampton Lodge Puttenham, Surrey, BIDDISCOMBE; S. Cerney, W. Gloster, GREENWOOD; × *C. BOENNINGHAUSIANA* Weibe. *Hothfield Heath, Kent, Miss COBBE; *Hazely Heath, N. Hants, Lady DAVY.
2619. *C. DIANDRA* Schrank. Odiham, N. Hants, Lady DAVY; Rescobie, Forfar, DRUCE. Var. *MAJOR* (Kolh.). Druce. Runham, E. Norfolk, B. REYNOLDS.
2623. *C. DIVISA* Huds., *var. *CHAETOPHYLLA* Steud. In several

places in Surrey. The rhizomes travel at great length in the soil and the crowns are crowded here and there, J. FRASER. This comes nearest the Spanish plant of any I have personally seen from Britain. The plant recently distributed through the *Watson B.E.C.* by Mr H. S. Thompson does not conform to the description of *chaetophylla*. Surrey

2628. *C. PULICARIS* L., forma *MONTANA* Pugsl. Ledbeg, W. Sutherland, DRUCE.

†2632. *PANICUM CRUS-GALLI* L. Barry, Glamorgan, R. L. SMITH.

†2634. *P. SANGUINALE* L. Abundant in the Tomato houses in Guernsey, TOMLIN.

†2637. *P. CAPILLARE* L. Cardiff, Glamorgan, Miss VACHELL; Radyr, Glamorgan, R. L. SMITH.

†2653. *PHALARIS MINOR* Retz. Bowling, Dumbarton, GRIERSON. Det. THELLUNG. *Frilford, Berks, DRUCE; Barry, Glamorgan, R. L. SMITH.

†2656 (2). *P. ANGUSTA* Nees. Possil, Coatbridge, Lanark, GRIERSON. Det. THELLUNG.

2665. *ALOPECURUS BULBOSUS* Gouan. Rumney Marsh, Monmouth, WADE.

2673. *PHLEUM PRATENSE* L., var *LONGIARISTATUM* Parn. Patterdale, Westmorland, Rev. W. W. MASON. Var. *NODOSUM* L. Boscoven, Cornwall; without awns, Bedminster, Bristol, N. SANDWITH. Var. *INTERMEDIUM* (Jord.). *Radnage, Bucks and Oxon, DRUCE.

2674. *P. ALPINUM* L. At 2300 ft. above Crowdundle Beck on the South Side of Cross Fell, about 20 yards from the Westmorland Boundary which is formed by the Beck, W. WILSON.

†2681. *P. SUBULATUM* A. & G. Glasgow, GRIERSON. Det. THELLUNG.

- †2683. *AGROSTIS VERTICILLATA* Vill. Southwick, Sussex, F. R. BROWNING, ex Miss COTTIS; Meanwood, Leeds, BUTCHER.
- †2690. *POLYPOGON MONSPELIENSIS* Desf. Southwick, Sussex, Miss BACON; Christchurch, S. Hants, Mrs ROTHWELL and RAYNER.
2694. *CALAMAGROSTIS CANESCENS* Druce. Near Corfe, Dorset, DRUCE.
- †2697. *DEYBUXIA FILIFORMIS* Druce. (*D. retrofracta* Willd.). Bradford, CRYER; Meanwood, Leeds, BUTCHER.
- †2698. *GASTRIDIVM VENTRICOSUM* S. & T. Mayboro, Lanark, GRIERSON.
2699. *APERIA SPICA-VENTI* Beauv. Martlesham, E. Suffolk, H. K. A. SHAW.
- *†2700. *A. INTERRUPTA* Beauv. In immense quantity at Frilford, Berks, specimens distributed this year, DRUCE.
2701. *AIRA CARYOPHYLLEA* L., var. *MULTICULMIS* (Dum.). Pyrford, Surrey; Frilford, Berks, DRUCE.
- †2704. *LAGURUS OVATUS* L. On a wall, Porthcawl, Glamorgan, WEBB.
2712. *DESCHAMPسيا FLEXUOSA* Trin., var. *MONTANA* (Huds.). Craig Gledsiad, Brecon, Mrs WEDGWOOD.
2717. *AVENA FATUA* L., var. *PILOSA*. Cardiff, Miss VACHELL.
- †2719. *A. STRIGOSA* Schreb., sub-sp. *GLABRESCENS* Marq. St. Ouen's, Jersey, DRUCE. Var. *NIGRA* Marq. Keltney Burn, M. Perth, DRUCE.
- †2720. *A. SATIVA* L., sub-sp. *VERNA* Marq. Swaythling, S. Hants, RAYNER; Princes Risborough, Bucks, DRUCE. Sub-sp. *AUTUMNALE* Marq. Cardiff, Miss VACHELL; Hanslope, Bucks, DRUCE.

2722. *A. PUBESCENS* Huds. and 2723. *A. PRATENSIS* L. Cor-tachy, Forfar, DRUCE.

2724. *ARRHENATHERUM ELATIUS* M. & K., var. *BIARISTATUM* (Peterm.) Druce. Par Harbour, Cornwall, L. T. MEDLIN.

†2727. *CAPRIOLA DACTYLON* OK. On the quay by the Deben, Woodbridge, E. Suffolk, H. K. A. SHAW.

2732. *SIEGLINGIA DECUMBENS* Beauv., var. *LONGIGLUMA* Hack. Cheese Wring, Cornwall, L. T. MEDLIN.

2733. *PHRAGMITES VULGARIS* Druce, var. *FLAVESCENS* (Cust.). Near Lumsden, N. Aberdeen, W. WILSON.

†2737. *CYNOSURUS ECHINATUS* L. Southwick, Sussex, Lady DAVY; between Kingwood and Boxhill, Surrey, REDGROVE; Bristol, N. SANDWITH; Welbeck, Notts, GOULDING; Kirkby Lonsdale, Westmorland, TRAPNELL; Bromeswell, E. Suffolk, H. K. A. SHAW.

*2742. *KOELERIA ALBESCENS* DC. Sands of Barry, Forfar, Lady DAVY. New to Scotland.

†2744 (3). *K. PANICEA* Domin. Coatbridge, Lanark, GRIERSON. Det. THELLUNG.

†2747. *ERAGROSTIS CILLIANENSIS* V-L. Cardiff, Glamorgan, Miss VACHELL. Det. THELLUNG.

†2748 (7). *E. CURVULA* Nees. Bradford, CRYER, det. KEW, is det. by THELLUNG as *E. CHLOROMELAS* Steudel.

†2755. *BRIZA MAXIMA* L. Exeter, Devon, Miss TODD.

2757. *B. MINOR* L. Abundant in the Scillies, H. DOWNES.

*2759. *POA IRRIGATA* Lindm. Braemar, S. Aberdeen, DRUCE.

†2760. *P. PALUSTRIS* L. Bristol, N. SANDWITH.

2769. *P. ANNUA* L., a large form near var. *AQUATICA*. Near Woodbridge, E. Suffolk, H. K. A. SHAW.

2772. GLYCERIA FLUITANS Br., var. PEDICELLATA (TOWNS).
Martlesham, E. Suffolk, H. K. A. SHAW.

2778. G. PROCUMBENS Dub. Near the river by a granary at
Woodbridge, E. Suffolk, H. K. A. SHAW; near Stafford, with *G.
DISTANS and *G. MARITIMA, READER in *Journ. Bot.* 279, 1923; Folke-
stone Harbour, Kent, Miss M. COBBE. Perhaps a hybrid of this
with MARITIMA at Hopsham Marsh, S. Devon, Miss TODD.

2782. FESTUCA ADSCENDENS Retz. Hawes, Yorks, Miss M.
COBBE.

2783. F. SYLVATICA Vill. Melmerby, Cumberland, abundant,
Rev. W. W. MASON; Cortachy, Forfar, DRUCE.

2788. F. MEMBRANACEA Druce. On tips at Hirwain, in both
Brecon and Glamorgan, WEBB.

†2794. BROMUS RIGENS L. Naturalised in the Scillies, H.
DOWNES.

†2798. B. MADRITENSIS L. Christchurch, S. Hants, RAYNER.

*2801. B. ERECTUS Huds. Wren's Nest, Staffs, DRUCE and Sir
R. CURTIS; Llwycoed, Brecon, WEBB.

†2803. B. UNIOLOIDES H. B. K. Naturalised in the Scillies, H.
DOWNES; Christchurch, S. Hants, RAYNER; Woodbridge, Suffolk,
H. K. A. SHAW.

2807. B. PRATENSIS Ehrh., var. MULTIFLORUS (Sm.) Druce.
Radnage, Bucks and Oxon, DRUCE.

2811. B. HORDEACEUS L., var. LEPTOSTACHYS (Pers.) Beck. Be-
tween Truro and Malpas, Cornwall, Miss TODD; near Abbey Wood,
W. Kent, St. J. MARRIOTT; Glasgow, GRIERSON; a ramosa form at
Granton, Midlothian, FRASER. Var. PSEUDORACEMOSUS A. & G.
Killin, Perth, FRASER. Det. THELLUNG.

†2815. B. MACROSTACHYS Desf. Airdrie, Lanark, GRIERSON.

†2817. *B. JAPONICUS* Thunb. Par, Cornwall, L. T. MEDLIN, ex THURSTON.

†2821. *LOLIUM TEMULENTUM* L. Forfar, DRUCE and Lady DAVY; Exeter, Miss TODD; Pembrey, Carmarthen, HAMER.

PK 2824. *L. PERENNE* L., var. *SPHAEROSTACHYUM* Mast. Wye, Kent, Miss M. COBBE. Var. *VIVIPARUM*. St Blazey, Cornwall, L. T. MEDLIN.

2830. *AGROPYRON REPENS* Beauv., var. *LASIORACHIS* Hack. Glandyfi, Cardigan, BARTON.

*2846. *LEPTURUS INCURVUS* (L.) Druce. Shingle, Snettingham, W. Norfolk, LITTLE. If this is true *incurvus* it is an important discovery, since its previous stations have been adventive only.

†2851. *HORDEUM JUBATUM* L. Quay side by the Deben, near Woodbridge, E. Suffolk, H. K. A. SHAW.

2855. *ELYMUS ARENARIUS* L. Hayling Isle, S. Hants, Miss HILLARD.

2874. *EQUISETUM VARIEGATUM* L., between the var. *WILSONI* and *E. TRACHYODON*. Glen Cahir, Co. Clare, DRUCE.

2877. *ADIANTUM CAPILLUS-VENERIS* L. Found at Meathop, Westmorland, in 1902 by Rev. W. W. MASON.

†2895. *ONOCLEA SENSIBILIS* L. Came up with ferns sent from Dawlish, Devon, ex Miss POMEROY.

2897. *DRYOPTERIS CRISTATA* A. Gray. Hickling, E. Norfolk, ^{Mark} Lady G. CHURCHILL.

*2906. *CYSTOPTERIS FRAGILIS* Bernh. Bitterne, S. Hants, R. H. C. PACK, ex RAYNER. ^{Mark}

*2908. *PHEGOPTERIS POLYPODIODES* Fée. Bruce Hill, Cavan, G. G. BLACKWOOD in *Irish Nat.* 107. 1923.

2920. *OPHIOGLOSSUM VULGATUM* L. The type from Bigbreck, Birsay, Orkney, 1923, JOHNSTON.

2924. *ISOETES LACUSTRIS* L. There is a line of wrack half a mile long at Killin Pier, M. Perth, 3 inches broad and about 1 inch thick, composed of *Isoetes*, all the work of ducks, who are very fond of it. They gobble up the plant, and then make for other lakes and tarns. D. HAGGART.

2933. *NITELLA FLEXILIS* Ag. Carmarthen, HAMER.

2934. *N. OPACA* Ag. Presteigne, Radnor, Mrs DEBENHAM.

2950. *CHARA CONTRARIA* Kuetz and *var. *HISPIDULA* Braun. The Loons, Birsay, Orkney, JOHNSTON. *l.c.*

CONTRIBUTIONS TO THE KNOWLEDGE OF THE GENUS
THYMUS.

THE BRITISH SPECIES AND FORMS.

By K. RONNIGER, Vienna.

The kindness of Dr G. Claridge Druce, of Oxford, has made it possible for me to study the abundant material of this interesting genus which his British herbarium contains, a genus at which I have been working for several years.

The British Thymes have been dealt with in recent times by K. Domin and A. B. Jackson (*Journ. Bot.* vol. 46, 1908, p. 33), and by E. F. Linton (*l.c.* vol. 47, 1909, p. 346). As I have arrived at somewhat divergent results, as regards both system and arrangement, I avail myself of an opportunity to state them.

Domin and Jackson give the following species as occurring in England:—1. *T. ovatus* Miller; 2. *T. Serpyllum* L.; 3. *T. praecox* Opiz; 4. *T. glaber* Miller (= *T. Chamaedrys* Fries). To these Linton adds 5. *T. Lövyanus* Opiz, and 6. *T. spathulatus* Opiz.

Domin and Jackson adopt the method proposed by Velenovsky (*Sitzber d. böhm. Akad. d. Wiss. Prag*, 1903), which is based upon the innovation-character. According to this the large section *Serpyllum* Benth. is divisible into three groups: Suberecti, Pseudorepentes, and Repentes:—Suberecti—without creeping sterile offsets; Pseudorepentes—creeping offsets springing from the leaf-axils of the offsets of the previous year, terminated in the following year by an inflorescence; Repentes—the sterile creeping offsets of the previous year grow on as such in the following year.

But this sub-division arbitrarily separates forms that are closely allied; for instance, the species *T. ovatus* Miller and *T. glaber* Miller of the above list, the certain distinction of which is not always easy. Many other instances of the placing in different groups of allied forms by this method could be given. This appears to me to prove that although this mode of classification is certainly of practical use for the purposes of determination and for distinguishing the species, it does not lead to a natural grouping. The property of producing sterile creeping stolons seems, from the

phytological point of view, to have been a relatively late acquisition of the genus *Thymus*, for we note that in the most diverse groups of the genus some species develop runners whilst their nearest relatives do not do so.

Domin and Jackson place *T. ovatus* in the Suberecti, *T. Serpyllum*, *T. praecox* and *T. glaber* in the Repentes. The English *T. glaber* Mill., which is identical with *T. Chamaedrys* Fries, cannot, however, by any means be included in the Repentes, for all the specimens that I have seen showed the innovation-character of the Pseudorepentes. Moreover, Briquet (in Schinz & Keller *Flora der Schweiz*, 3rd ed., vol. 2, 1914) has pointed out that *T. Chamaedrys* Velenovsky (which Domin and Jackson have accepted) is not identical with *T. Chamaedrys* Fries. According to the synonymy which Velenovsky himself gives, *T. Chamaedrys* Vel. is a mixture of *T. alpestris* Tausch and *T. Trachselianus* Opiz. The former is most closely related to *T. Chamaedrys* Fries; it is a creeping plant of the Sudetic Mountains and Carpathians, and does not occur in Sweden; the latter is related to *T. praecox* and inhabits the Alps. Furthermore, Velenovsky seems to have included in his "*T. Chamaedrys*" certain forms of *T. Serpyllum*, the inflorescence-axes of which have two rows of hairs, which occur in Scandinavia and in England.

The name *T. ovatus* Mill. should be replaced by the name *T. pulegioides* Linné (*Sp. Pl.*, ed. 1, p. 592). The specimen preserved in the Linnean Herbarium, which came from Montpellier in France, as well as Linnaeus' diagnosis, leave no doubt that the two names are synonymous. Linnaeus' plant, of which I have obtained a photograph by the kind help of Mr C. C. Lacaita, shows a malformation in that the axis of the inflorescence bears a tuft of leaves at its apex; but this is only a proliferation destitute of any systematic significance. Apparently misled by this proliferation, Linnaeus erroneously transferred his species to the genus *Cunila* in the 2nd edition of the *Species Plantarum*.

For photographs of the original specimens of *T. ovatus* Miller and *T. glaber* Miller, I am indebted to the kindness of Dr A. B. Rendle and Mr A. J. Wilmott, whom I now cordially thank.

The species *T. praecox* Opiz and *T. spathulatus* Opiz which are given as growing in England, are characteristic plants of the Austrian flora, with which I am familiar. I have seen the original

specimens from the Opiz Herbarium. On this precise knowledge I am of opinion that the two species do not occur in England: at any rate I have not seen any specimen that could be assigned to either of them. A fairly certain character is afforded by the upper teeth of the calyx. In the English forms of *T. Serpyllum* these teeth are always very short, not longer, or only slightly longer, than they are broad at their base; in *T. praecox*, including *T. spathulatus*, they are considerably longer than they are broad. *T. praecox* also has, as a rule, larger leaves, in the sense that the smallest leaves of this species are as large as those of the largest-leaved English forms of *T. Serpyllum* which have been taken for *T. praecox*.

On phyto-geographical grounds, I regard the occurrence in England of *T. Lövyanus* Opiz as quite out of the question: for this species is a typical member of the Pannonic flora, of which I have seen original specimens and which grows in the neighbourhood of Vienna, my place of residence. I have not seen any form from England which would even remotely recall it. *T. Lövyanus* Opiz has the innovation of the Pseudorepentes, thin glabrous leaves about 10-12 mm. long and 4 mm. broad, its flowering shoot is hairy on all sides, the hairs on the upper part being patent and villous, the calyx is 3.5-4 mm. long, covered with long outstanding villous hairs.

With these introductory remarks, I turn to the arrangement of the English forms. It is my conviction that in England only two groups of forms are met with. Each of these can, however, be subdivided into races. They are:—

- I. Species collectiva, THYMUS PULEGIOIDES L.
- II. Species collectiva, THYMUS SERPYLLUM L.

These are characterised as follows:—

I. *T. PULEGIOIDES* L., sens. lat. Plant having 'sub-erect' or 'pseudo-repent' branching. (I have not seen a 'repent' form from England, but there are such on the Continent). Flowering-shoots sharply quadrangular below the inflorescence, goniotrichous (that is hairy only on the angles or alternately in two rows), hairs reflexed.*

*The hairiness should always be estimated from the second internode below the inflorescence, for the uppermost internode has always a tendency to more marked development of hairs.

Leaves of delicate consistence, always glabrous in the English forms. the nervature does not project on the under-side. To this belong the races *T. pulegioides* L. and *T. glaber* Mill.

II. *T. SERPYLLUM* L., sens. lat. Plant having always the 'repent' mode of branching. Flowering shoots relatively short, as a rule only 4-7 cm. high, borne in rows on the runners of the previous year. only very rarely terminated by an inflorescence, ending in a sterile tuft of leaves as a rule; they are either hairy all over or goniotrichous (internodes bearing hairs in 4 rows or alternately in 2) but in the goniotrichous forms this distribution of the hairs is not so fully manifested as it is in the group *T. pulegioides* L.; a few downy hairs occur also on the glabrous surfaces of the shoot. Leaves small, usually only 5-7 mm. long, rarely longer, rather thick, rigid, rounded above, with the nervature projecting on the under surface, glabrous or hairy. Inflorescence usually capitate. Here belong the races *T. Serpyllum* L., *T. pycnotrichus* (Uechtr.), *T. lanuginosus* Mill., *T. Drucei* Ronn., *T. neglectus* Ronn., and *T. britannicus* Ronn.

KEY TO THE BRITISH FORMS OF THYMUS.

- 1a. Leaves of delicate consistence, always glabrous, nervature not projecting on the lower surface; the plant never with 'repent' branching; the flowering shoot always goniotrichous (2 or 4 rows of hairs), *T. pulegioides* L., sens. lat.
- 2a. Plant 'sub-erect'; stem fairly high, often 20-25 cm.; leaves relatively large, averaging 9 mm. in length and 5 mm. in breadth; inflorescence elongated as a rule, interrupted, the lower verticils remote,
T. pulegioides L., sens. stric. (= *T. ovatus* Mill).
- 2b. Plant 'pseudo-repent': stem shorter and thinner, often only $\frac{1}{2}$ mm. thick; leaves small, averaging 6-8 mm. in length and 3-4 mm. in breadth; inflorescence often capitate at the time of flowering, but also frequently elongated, with the lower verticils remote, especially at the fruiting stage, *T. glaber* Mill (= *T. Chamaedrys* Fries).
- 1b. Leaves of firm consistence, rigid, small, the nervature projecting on the under surface, glabrous or hirsute; plant always with 'repent' branching; inflorescence almost always capitate, *T. Serpyllum* L., sens. lat.
- 3a. Flowering-shoot hirsute on all sides.
 - 4a. Leaves glabrous or bearing only a few scattered hairs on the surface.
T. Serpyllum L.
 - 5a. Leaves elongate-elliptical, 2-2.5 mm. broad. Type-form.....
var. *Linnaeanus* Gren. et Godr.
the internodes very short,
var. *ericoides* Wimm. et Grab., non Borbas.
upper part of flowering-shoot villose, var. *rigidus* Wimm. et Grab.
 - 5b. Leaves obovate or elliptical, 3-4 mm. broad,
var. *silvicola* Wimm. et Grab.

- 4b. Leaves hairy on the upper surface.
- 6a. Leaves moderately hirsute; flowering-shoot with short, reflexed hairs, those of the uppermost internodes being rather longer, ...
T. pycnotrichus (Uechtr.).
- 6b. Entire plant densely villose with grey hairs which, at least on the uppermost internode, are equal in length to the diameter of the stem, *T. lanuginosus* Mill.
- 3b. Flowering-shoot goniotrichous (two surfaces hairy and two glabrous).
- 7a. Inflorescence capitate and remarkably large, when hermaphrodite having a diameter of $1\frac{1}{2}$ -2 cm.; leaves obovate-elliptical, relatively large, averaging 5-8 mm. long and 3-3 $\frac{1}{2}$ broad, usually scantily hirsute on the surface, less often almost glabrous, *T. Drucei* Ronn.
- 7b. Inflorescence capitate and of medium size, when hermaphrodite at most $1\frac{1}{2}$ cm. in breadth; leaves smaller and narrower, mostly only $1\frac{1}{2}$ -3 mm. in breadth.
- 8a. Leaves glabrous or with only scattered hairs on the surface,
T. neglectus Ronn.
- 8b. Leaves hirsute on the surface, *T. britannicus* Ronn.

DESCRIPTION OF THE SPECIES AND FORMS.

I. Species collectiva, *T. PULEGIOIDES* L., sens. lat.

1. *T. PULEGIOIDES* L. Sp. Pl., ed. 1, p. 592 (1753). Syn.: *T. ovatus* Miller Gard. Dict., ed. 7, No. 7 (1759). Plant 20-30 cm. high, sterile shoots erect, no creeping sterile stolons. Stems nearly 1 mm. thick, erect or ascending, springing many together from a robust woody root; hairs variously distributed or confined to the angles; hairs retrorse. Leaves ovate-elliptical, broadest in their lowest third, obtuse or rounded; margins convex or very convex; narrowed at the base; glabrous on both surfaces, ciliated at the base; rather thin; nervature not projecting; 7-10 mm. long, 4-6 mm. broad. Inflorescence \pm spicate, the upper verticils close together, the lower remote. Calyx 3-4 mm. long, densely hairy, but less so on the dorsal side, which may be almost glabrous; the upper as well as the lower calyx-teeth always bear long cilia; the upper calyx-teeth longer than broad.

A form of *T. pulegioides* L. having short inflorescences and more ovate leaves, is var. *vulgaris* Wimm. et Grab. Fl. Siles, II, i, 163 (1829). By its sub-erect habit, thick stems, and larger leaves, this form is distinguishable from *T. glaber* Mill.

Westward Ho, N. Devon; Dover, Kent; Harefield, Middlesex; S. Hinksey, Berks (1889); Beckley, Oxon; Hyde Heath, Bucks;

Andoversford, Gloster; Harlestone, Northants. 1873; Mocktree, Stafford.

2. *T. GLABER* Mill. Gard. Dict., ed. 7, No. 6 (1759). Syn.: *T. Chamaedrys* Fries Nov. Fl. Suec., ed. I (1814) p. 35; ed. II (1828) p. 197. Plant 10-15 cm. high, often smaller, of 'pseudo-repent' habit, the creeping runners mostly short. Stems thinner than in *T. pulegioides* L. mostly about $\frac{1}{2}$ mm. thick, numerous, branched, prostrate at the base; hairs in 2 or 4 rows on the sharply quadrangular stems. Leaves thin, broadly lanceolate, rounded above, rather abruptly narrowed at the base, which is ciliate, whilst both surfaces are glabrous; venation not projecting on the under surface; 6-8 mm. long, 3-4 mm. broad. Inflorescence spherical or spicate (f. *capitatus* and f. *verticillatus* Lge. Haandb. i.d. Danske Flora, ed. I, 1851, 357). Calyx 3 mm. long, densely hirsute, but less so on the dorsal side, which may be almost glabrous; the upper calyx-teeth bearing cilia as long as those of the lower; the upper calyx-teeth usually short, not longer than broad. Here belongs the var. *gracilicaulis* Ronn., with very delicate stems, and small leaves only 4-6 mm. long and 2-3 mm. broad.

Widely distributed in Britain. Twickenham Hill, N. Somerset (I. M. Roper, as *subcitratus*); Apesdown, Isle of Wight, (C. E. Palmer, 1888); Cranbourne Chase, Dorset; Hook Common, N. Hants (C. E. Palmer, 1886); Highnam, Canterbury (C. E. Palmer, 1894); Cuckfield, Sussex, 1908; Englefield Green, Pyrford, Surrey; Walden chalk-pit, N. Essex; Galleywood, S. Essex [2012-2013], (G. C. Brown); Langley, Welwyn (Blake, 1820), Hitchin, Ware, Herts; Harefield, Stanmore Heath, Middlesex; Tubney, Brimpton Common, Wytham Wood, Berks; Seer Green, Chenies, Fawley, Whaddon, Hyde Heath, Bucks; Peppard Common, on chalk rubble at Oxford, Oxon; Cosgrove, Northants; Somersham, E. Suffolk [1620], (Brown); Great Doward, Hereford; Billesdon, Coplow, Leicester (Horwood, referred to *ovatus*, var. *subciliatus*, by Jackson in *B.E.C.* 363, 1915); Lerwick, Shetland.

Forma *verticillatus* (Lange). Stow Wood, Oxon.

Fl. albis. Galleywood, S. Essex (Brown).

Forma *gracilicaulis* Ronn. Welwyn, Herts; Apesdown, Isle of Wight; Stanmore, Middlesex.

II. Species collectiva, *T. SERPYLLUM* L., sens lat.

a. Flowering shoots hairy on all sides.

3. *T. SERPYLLUM* L. Sp. Pl. II (1753), p. 590; Fl. Suec., ed. II, (1755) p. 208; Fries Nov. Flor. Suec. ed. II (1828), p. 195. Root-stock elongated, creeping, from which spring the long creeping main axes; each main axis terminated by a sterile prostrate shoot, and bearing sterile lateral shoots. Flowering shoots low, only 4-7 cm. high, springing in rows from the stolons of the previous year, hairy all over. Leaves small, rather thick, stiff, with seven nerves (midrib with three nerves on each side) which project on the under surface, narrowly elliptical or elliptical-ovate, rounded above, cuneate below, 4-6 mm. long, 2-4 mm. broad, glabrous on both surfaces, ciliate at the base. Inflorescence capitate, rarely somewhat elongated, at most $1\frac{1}{2}$ cm. in diameter (in hermaphrodite specimens). Calyx coarsely hairy, $3\frac{1}{2}$ -4 mm. long, the upper teeth short, as broad as long, with long cilia.

Here belong:—var. *ericoides* Wimm. et Grab. Fl. Siles II. i. 165 (1829) non Borbas Symb. ad Thym. Europ. Internodes very short, leaves very small; Little Culrannoch, Forfar, 1916.

Var. *rigidus* Wimm. et Grab., *l.c.*, p. 166. Stems villose above, with patent hairs; leaves remote, 2-2 $\frac{1}{2}$ mm. broad; St Cyrus Cliffs, Kincardine.

Var. *silvicola* Wimm. et Grab, *l.c.*, p. 166. Leaves obovate or elliptical, remote, 3-4 mm. broad.

Albecq, Guernsey (Barton [126]); St. Brelade's (Piquet, 1851), St Aubin's, Jersey, 1906; Polruan, Cornwall (C. E. Palmer, 1887); Wychwood, Oxon; Westbury, Bucks; Colley, Weston, Northants; Balsall Common, Warwick; Clifden, Roundstone, Galway. The MS. states—The glabrous-leaved typical *T. Serpyllum* is not common in Britain.

4. *T. PYCNOTRICHUS* Uechtritz pro var. *T. Serpylli* apud Ph. Schube Fl. v. Schlesien (1904) p. 331. Allied to *T. Serpyllum* L. Main axes long, creeping, terminated by a sterile prostrate shoot, and bearing sterile prostrate lateral shoots. Flowering shoots low, only 4-7 cm. high, springing in rows from the stolons of the previous year, covered all over with short retrorse hairs, those on the uppermost internodes being somewhat longer. Leaves small, rather thick, stiff, 7 nerved, the nerves projecting on the under surface, narrowly

elliptical or elliptical-ovate, cuneate at the base, hairy on the surface, 4-6 mm. long, 2-3 mm. broad. Inflorescence spherical, rarely somewhat elongate, at most $1\frac{1}{2}$ cm. in diameter (in hermaphrodite specimens). Calyx with coarse villous hairs, 3-4 mm. long, the upper calyx-teeth short, about as long as broad, with long cilia.

St. Aubin's, Jersey; Polruan, Cornwall; Abbotsbury, Chesil Beach, Dorset; Uphill, N. Somerset, 1904; Freshwater, Isle of Wight; Saffron Walden, N. Essex (Bullock, 1891); Englefield Green, Surrey, 1897; Langley, Herts (Little, 1912); Harefield, Middlesex; Tubney, Wytham, Berks; Peppard, Oxon; Chenies, Chalfont, Whaddon, Bucks; Barry Isle, Glamorgan (Wade); Harleston, Northants; Balmullo, St. Andrews, Fife; Duns, Berwick; Elibank, Selkirk; Thornielee, Peebles; Struan, Perth; Aviemore, Easternness; Glen Spean, Westernness; Braemore, Elphin, W. Ross; Cnochan, W. Sutherland; Lerwick, Shetland; Cavehill, Belfast.

Two specimens of *T. pycnotrichus* (Selkirk) are remarkable in possessing elongated upper calyx-teeth and at the same time very narrow leaves. Since all the other British specimens that I have seen belonging to the form-group of *T. Serpyllum* have short upper calyx-teeth, I can only regard this case as one of individual deviation, and as not of systematic importance. The occurrence may perhaps be regarded as atavistic, which would indicate that all the British races of *T. Serpyllum* are descended from a primitive form of the more southern *T. praecox*.

5. *T. LANUGINOSUS* Miller Gard. Dict., ed. 7, No. 8 (1759) Allied to *T. Serpyllum* L. Main axes creeping, terminated by a sterile prostrate shoot, more rarely by an inflorescence, and bearing sterile prostrate lateral shoots. Flowering shoots low, only 4-7 mm. high, springing from all sides of the stolons of the previous year, villous, the hairs on, at any rate, the highest internodes being as long as the diameter of the stem. Leaves small, rather thick, stiff, 7-nerved, narrowly elliptical or elliptical-ovate, cuneate at base, densely covered with grey villosity like the rest of the plant, 4-5 mm. long, 2-3 $\frac{1}{2}$ mm. broad. Inflorescence spherical or somewhat elongated, at most $1\frac{1}{2}$ cm. in diameter (in hermaphrodite specimens). Calyx densely villous, about 4 mm. long, the upper calyx-teeth short, about as long as broad.

Sapperton, Gloster, 1911; Snowdon, Carnarvon, 1917.

Mr A. J. Wilmott has recommended that the name *T. lanuginosus* should be entirely discarded (*Journ. Bot.* vol. 61, 1923, p. 136). The reason he alleges is that in Miller's herbarium in the British Museum there is a plant which absolutely does not correspond to the diagnosis. According to Wilmott there is only the form common on the Continent, *T. Serpyllum*, v. *angustifolius* (Billot No. 828, Schultz No. 1844, determined by Wilmott, of which I could not get a photograph). Since Miller mostly based his diagnoses on specimens cultivated in his garden, it may be assumed that he had in his garden a plant corresponding to the description. Miller definitely assigns the Forest of Fontainebleau near Paris as the locality for his plant. It appears to me that the question to be settled is whether or not there exists in Central France a plant that agrees with Miller's description. From the abundant material from France that I have seen, I find that only two form-groups are represented in the northern half of that country (including Paris and Fontainebleau), as also in England, namely the form-group of *T. Serpyllum* and that of *T. pulegioides* L. It is only in southern France and in the Alps that other form-groups are to be found. Each of these two groups includes extremely hirsute forms. Miller's description makes it quite clear that the plant in question belongs to the group *T. Serpyllum*, as is shown by the following quotations:—"Thyme with creeping stalks"; "stiff leaves"; "flowers growing in heads"; "has trailing slender stalks"; "the leaves are stiffer than those of the other sorts." The repeated mention of the creeping habit and of the stiff leaves is sufficient proof that the reference is to a grey hoary plant related to *T. Serpyllum* which actually grows in northern France and has also been found in England. Though it be admitted that the name *T. lanuginosus* of Borbas, H. Braun, Velonovsky and other authors has been applied to highly hirsute forms of *Thymus* belonging to quite other groups, yet I do not see that that is any reason for discarding the name. Were that the case it would be necessary to replace a large number of the *Thymus* names by new ones, without any apparent advantage.

b. Flowering shoots glabrous alternately on two sides.

6. *T. DRUCEI* Ronniger. Allied to *T. Serpyllum*. Main axis long, creeping, terminated by a sterile prostrate shoot and bearing

sterile prostrate lateral branches. Flowering shoots low, 4-7 cm. high, springing in rows from the stolons of the previous year. goniotrichous (that is alternately glabrous or nearly so on two sides), the uppermost internode usually more densely hirsute. Leaves small, rather thick, stiff, 7-nerved, the nerves projecting on the under surface, broadly lanceolate, broadly elliptical to obovate, cuneate at base, the surface glabrous or scantily hirsute, the larger 5-8 mm. long and 3-3½ mm. broad. Inflorescence spherical, rarely somewhat elongated, with large flowers, diameter 2 cm. or more (in hermaphrodite specimens). Calyx 4 mm. long, densely villous, but glabrous on the dorsal surface. Upper calyx-teeth short, 1 mm., about as long as broad, with long cilia.

Sapperton, Gloster; Snowdon, Carnarvon, 1919; Port William, Wigton; North Berwick, Haddington; Ben Lawers (Bishop Mitchinson); Killiechonan, Rannoch; Ben Laiogh, M. Perth; West Corrie, Clova, Forfar; Ben Laiogh, Argyll; Ballater, S. Aberdeen; Sligachan [2763], Glen Brittle, Skye [in this place it verged toward *neglectus*, G.C.D.]. [To this G.C.D. refers a specimen from W. Malvern, Hereford, V. Murray, 1922].

I have seen a specimen of *T. Drucei* from Tromsø, Norway, in the Herbarium of the State Museum in Vienna.

T. Drucei always gives the impression of an alpine plant and looks very much like many forms of the Alps, such, for instance, as *T. Trachselianus* Opiz, but the latter is always distinguishable by its long upper calyx-teeth.

7. *T. NEGLECTUS* Ronniger. Allied to *T. Serpyllum*. Main axis long, creeping, terminated by a sterile prostrate shoot and bearing sterile prostrate lateral branches. Flowering shoots 3-9 cm. high, springing in rows from the stolons of the previous year, goniotrichous, that is alternately glabrous or nearly so on two sides, the lower internodes often quite glabrous. Leaves small, rather thick, stiff, 7-nerved, nerves projecting on the under surface, narrowly elliptical or elliptical-ovate, rounded above, cuneate at base, 3-5 mm. long, 1½-2½ mm. broad, glabrous on both surfaces, ciliate at the base. Inflorescence spherical, rarely somewhat elongated, at most 1½ cm. in diameter (in hermaphrodite specimens). Calyx coarsely hairy, 3½-4 mm. long, upper calyx-teeth short, about as long as broad, with long cilia.

Shepherds (with *Euphrasia Vigursii*), Cornwall; Chesil Beach, Dorset; Uphill, N. Somerset; between Odiham and Upton Grey, N. Hants (C. E. Palmer); Bretch, Gibraltar Rocks, Oxon; Halford, Devon (Townsend); Lighthorne, Warwick (C. E. Palmer, 1851); Caerphilly, Glamorgan (Wade [n. 33]); Castle Kennedy, Wigton, 1883; Corrie, Dumfries; Gourock, Renfrew (Matheson, 1846); Tummel, M. Perth; Boat of Garten, Easternness; Tomintoul, Banff (this is Marshall's var. *prostratus* [n. 2894]); Sligachan, Skye ([n. 2894], Druce, 1915); Bealach nam Bo, W. Perth; Tain, E. Ross; Golspie, E. Sutherland; Derrynane, Co. Kerry, 1906.

It is a very interesting observation that the form-group of *T. Serpyllum* L. in England shows a tendency to the development of forms having goniotrichous (hairs in two rows) flowering shoots. This has proceeded so far that even the specimens in the Druce Herbarium which I have designated as *T. Serpyllum* L., sens. strict., are not so completely holotrichous (uniformly hirsute) as is the case in, for instance, specimens from Germany. I have never seen a specimen of *T. Serpyllum* from Germany which was not completely holotrichous. The distinction of *T. pulegioides (ovatus)* as well as of *T. glaber (Chamaedrys)* from *T. Serpyllum* can therefore be very easily made in German plants on the simple character of the distribution of the hairs on the shoots, but it is more difficult to make in the case of English plants. The consequence is that many English specimens of goniotrichous forms of *T. Serpyllum* have been wrongly determined as *T. Chamaedrys*, and the erroneous conception of *T. Chamaedrys* by Velenovsky (as also by Domin and Jackson) is probably attributable in part to this cause.

Goniotrichous races (mostly mountain plants) of *T. praecox* have long been known. I may mention *T. Trachselianus* Opiz (not Briquet) and *T. polytrichus* Kerner. The oceanic climate of England evidently produces effects like those of the climate of the Alps. Inasmuch as the goniotrichous races of *T. Serpyllum* have not hitherto been noticed, I find it necessary to establish three new systematic units—*T. Drucei*, *neglectus*, and *britannicus*.

Many specimens from England which show the characters of *T. Serpyllum* but are also goniotrichous have been regarded by collectors as hybrids, either *T. Serpyllum* × *Chamaedrys* or *T. Serpyllum* × *ovatus*, which is quite conceivable. But since these plants differ

from *T. Serpyllum* and its forms only in the distribution of the hairs on the shoots, and show, moreover, no relation to the group of *T. pulegioides*, there is no question of their being hybrids. Furthermore these forms are very widely distributed in England, a fact that is inconsistent with their being hybrids.

8. *T. BRITANNICUS* Ronniger. Allied to *T. Serpyllum*. Main axis long, creeping, terminated by a sterile prostrate shoot and bearing sterile prostrate lateral branches. Flowering shoots 2-7 cm. high, springing in rows from the stolons of the previous year, gonio-trichous, that is alternately glabrous or nearly glabrous on two sides, \pm densely villose on the other two sides. Leaves small, rather thick, stiff, 7-nerved, nerves projecting on the under surface, lanceolate, narrowly elliptical or elliptical, rounded above, base cuneate, 4-6 mm. long, $1\frac{1}{2}$ -3 mm. broad, hirsute on both surfaces. Inflorescence spherical, rarely somewhat elongated, at most $1\frac{1}{2}$ cm. in diameter (in hermaphrodite specimens). Calyx coarsely hairy, $3\frac{1}{2}$ -4 mm. long, upper calyx-teeth short, about as broad as long, with long cilia.

Vazon, Guernsey (Barton [125]); Torbryan, Devon (Lightfoot 1837); Swanage, Weymouth, Dorset; Telscombe, Rottingdean, E. Sussex; S. Margaret's, Kent; Hinksey, Berks; Oxford, on chalk-rubble, Bullingdon, Oxon; Plain Wood, Northants, 1873; Cold Knap, Barry, Glam. ([n. 31] Wade); Crickieth, Carnarvon (Bailey); Harlech golf links ([132, 135, 136, 137, 141], Fairbairn Sands [132] Barton); Merioneth; Buxton, Derby; Newton Stewart, Mull of Galloway, Wigton; Selkirk, Ferrygate Links, E. Lothian; Ben y Vrackie, E. Perth; Ballater, S. Aberdeen; Bealach nam Bo, W. Perth; Loch Luichart, W. Ross; Melvich (as *prostratus*, Marshall); Ben Hope, W. Sutherland; Thurso, Caithness; Hoo Hill, Balta, Shetland; Blackhead, Co. Clare; Clifden, Galway; Ben Bulben, Sligo; Portrush, Antrim.

T. britannicus is often cultivated in gardens on the Continent. I have seen specimens from Holland, from the botanical garden at Innsbruck, and from that at Brünn.

T. arcticus Durand (*T. Serpyllum*, var. *arcticus* Durand apud Kane Arch. Explor. 1853-55, app. xviii, 459, 1856) = *T. Serpyllum*, var. *prostratus* Hornemann (Grah's Reise, 1832, p. 192, nomen solum) apud Lange Consp. Florae Groenlandicae I, 80 (1880); III,

688 (1892). A circumpolar race of *T. Serpyllum* standing very near to *T. britannicus*. It differs, however, in its always very small, elliptical to broadly elliptical leaves, which have only 5 nerves. The flowering shoot of *T. arcticus* is goniotrichous as a rule, but specimens occur which are only imperfectly so.

HYBRIDS.

9. *T. PULEGIOIDES* × *SERPYPHYLLUM* (*T. CELAKOVSKYANUS* M. Schulze Mitteil. Bot. Ver. Jena viii., 1890, p. 39). This plant differs from *T. pulegioides* in that the hairs on its shoot are indistinctly two-rowed and by its small leaves with thicker nerves; from *T. Serpyllum* by its usually elongated inflorescence, by the higher growth of the flowering shoot, and by the exclusively lateral short sterile stolons. The leaves are glabrous, but the marginal ciliation is usually more marked than in *T. pulegioides*.

Kew, Surrey; Swaffham, Norfolk; Killiechonan, Loch Rannoch, M. Perth.

10. *T. PULEGIOIDES* × *PYCNOTRICHUS* (*T. HENRYI* Ronniger). This plant differs from *T. pulegioides* in that the hairs on the shoot are indistinctly two-rowed, and by the small, scantily hirsute leaves with rather thicker nerves; from *T. pycnotrichus* by the elongated inflorescence, the higher growth of the flowering shoot, and by the exclusively lateral sterile stolons.

Telscombe, E. Sussex; Arthog, Merioneth (Barton [n. 134] see *Rep. B.E.C.* 363, 1915); Newton Stewart, Port William, Wigton.

11. *T. PULEGIOIDES* × *VULGARIS* (a cultivated plant). In the Druce Herbarium there is a specimen of this frequently cultivated hybrid from the Hills and Hollows (once a quarry), Northampton, 1873, but it must either have come from a garden, or it is a garden escape. This plant differs from *T. pulegioides* in that the shoots are downy even on the more glabrous sides, and in that the more deltoid leaves, which narrow from the lower third towards the apex, are not quite glabrous but are covered with minute papillae, and in the downy calyx with a ciliate upper lip. It differs from *T. vulgaris* by the ciliate leaf-bases, the almost glabrous leaves, the somewhat uneven hairiness of the shoot, and by the longer and more acute upper calyx-teeth.

On the evidence of a photograph of the original specimen in the Persoon Herbarium, for which I am indebted to Dr Kloos, Jr., of Dordrecht, I have come to the conclusion that the oldest name for this hybrid is *T. citriodorus* Pers. Syn. ii., 130 (1807) pro var. *lanuginosi*. All the later authors (Schreber 1811, Link 1822, Wimmer 1829) intended to describe the same plant under the name *T. citriodorus*, even though it is mostly impossible to gather from their diagnoses what exactly was meant.

PERIODICAL APPEARANCE OF PLANTS.

By E. ALMQUIST.

From my childhood I have always looked at the burnt spots in our woods to find the beautiful *Geranium bohemicum*. I had occasionally observed that the plant appeared where the spot had happened to be burnt and disappeared after flowering. I never forgot this marvellous plant.

The species is widely spread in Sweden. It is supposed to be rare, but in many districts it is rather common. In order to find it one must examine all the places where it may appear. Formerly it grew on burnt woodlands and in other burnt woods. Now-a-days it appears chiefly on small spots where brushwood is burnt, but sometimes also on new tilled lands and on naked ground where the turf has been taken off. The unexpected appearance and sudden disappearance is always very striking.

Not until the year 1897 was I able to solve the riddle. I found out that the seeds do not germinate without heat. They will rest unchanged in water a whole summer, but after heating the water, say to 50 degs. C., the seeds quickly swell to double their size, and then they germinate freely everywhere. The sunbeams can produce warmth enough on naked ground.

It is stated by experiments that the dry seeds live at least 50 years. Thus they rest in the ground, covered by grass, turf, or moss until they are heated by fire. When the cover is removed, the sun also works upon them. In the ashes the plant grows luxuriantly and produces seeds abundantly. By next year the growth is usually over, and the seeds rest until the next burning.

Jordan discovered new sub-species even among very rare plants. Really *G. bohemicum* grows sometimes on the same burnt spot together with *G. deprehensum*, a new constant species, very similar to the old form, but well discernible by its smaller seeds, cotyledons without incision, narrower lobes of the leaf and red stigma. Thus it is easy to recognise in all periods. Moreover it is very sensitive to the winter season and other influences. I have found the new form rather abundantly in two districts at the Baltic Sea.

As far as I know, such periodical appearances are not sufficiently studied in, for instance, *Sinapis*. Formerly it happened very often that *Sinapis* and *Raphanus* appeared copiously in the cornfields. The peasants believed in a generatio spontanea or in a transmutation or degeneration of the sowed corn. I suppose the seeds of these plants will remain a long time in the ground, but when brought to the surface they germinate through the higher temperature or through the plentiful access of oxygen. Probably many plants follow the same development as *G. bohemicum*. Of course, the circulation to new places is the main point for the periodicity of many plants.

NOTES ON BRITISH MINTS.

By J. FRASER.

My earliest recollection of Mints was *Mentha aquatica* on the banks of streams, *Mentha arvensis* in the cornfields in the sixties of last century and the universally cultivated *M. rotundifolia* and *M. piperita* in gardens during the same period. Later, in the same decade, I found *M. spicata* on the banks of a stream down which it may have come from a distant garden when the stream was in flood. Its scent to me was acrid, and this indicated a new find for me. Down stream in 1874 I found it as an outcast from the local manor garden.

M. rotundifolia varies chiefly in hairiness. It is often an evident escape from gardens in Surrey and Kent. On a hill in Kincardineshire I have seen it surrounded by heather and pine trees, where a habitation had been, but not a stone of the building remained. On the banks of the River Towy, Carmarthen, and at

Pennar, near the Pembroke Docks, it was far less shaggy than usual, but seemed quite native. In gardens it is sometimes sub-glabrous, without other difference. At Kings Newton, Derbyshire, by a dry roadside, it was grey and tomentose. This species hybridises freely with *M. spicata*, but *M. crispa* L. (*M. rotundifolia* × *spicata*) I have only seen in gardens. It is a monstrous form with broad, sub-glabrous leaves, with the venation radiating mostly from the base, and having a very stout inflorescence. It is quite distinct from *M. viridis* L., var. *crispa* Benth., with narrow crisped leaves and slender inflorescence. I have another *M. rotundifolia* × *spicata* from waste ground, Swanage, and a third from The Dour, New Aberdour. Both these have broad, rugose, sub-glabrous leaves with a cordate base. The latter has slightly less cordate leaves, and darker flowers, sufficient to show they are different seedlings, and evidently are of British origin. I have seen the same hybrid from the banks of the River Tay and from Switzerland. The specimen from the Tay was labelled *M. hercynica* Roehl. by J. G. Baker. A fourth hybrid is fairly frequent in Surrey gardens, where it does duty for Spearmint. It differs from the latter in having shorter, less acuminate leaves, and more hairy bracts. The leaves are distinctly rugose.

M. longifolia Huds. is very uncommon in Surrey but I have an outcast from Ranmore Common which is quite like the sheet of Linnaeus, labelled *M. sylvestris*. From Nutfield Marsh, Surrey, I have a sheet which is remarkable for the depth of the acute or acuminate serrations of the leaves; but under cultivation the serrations are not so long, and more nearly approach those of specimens I have from Leybourne; the Potteries; Aylesford and Smerth, in Kent; and from Wargrave, Berks. All these forms I consider *M. longifolia* Huds., var. *nemorosa* (Willd.), which is generally regarded as the most common form of the species. I have seen Dr G. C. Druce's specimens of *M. longifolia* × *rotundifolia* × (*longifolia* × *spicata*) = × *M. villosa* Huds. from two localities in Forfarshire, and one from E. Gloucestershire. I have it only from a garden at Ealing. An unflowered specimen I have growing in the garden seems a form or relative of this but has much larger and more rounded leaves. It came from a Nursery at Milton, Stoke-on-Trent, under the name of Duke Michael Mint.

The typical *M. spicata* L. I have found only in one spot near Leatherhead, Surrey, and by the roadside, and in the field, foot of the Boxley Hills, Kent, in a quasi-wild state.

M. piperita, collected at Tigh na Circe Fraoich, near Glenogle Head; Dochart Bridge, Killin, Perthshire; New Aberdour Beach, Aberdeenshire; between Pennenden Heath and Boxley, Maidstone; and at Emscote, near Warwick, is remarkably constant and typical for a supposed hybrid (*M. aquatica* × *spicata*). At the first named station it was spread over about an acre of marshy, mountain meadow alongside a stream. I had a root of a Mint sent me by a correspondent from Earthcott, Alveston, W. Gloucestershire, in the Valley of the Severn, and this proved to be *M. piperita* L., var. *vulgaris* (Sole), which is evidently fairly common in the west of England, and was spread over a wide area there. I have *M. piperita* L., var. *citrata* (Ehrh.) Briquet, from Northaw, Herts, by way of Mr C. E. Salmon's garden. Specimens I have seen from other places are remarkably uniform.

M. aquatica L. in the form *hirsuta* Huds. is one of the most widely distributed of British Mints, and is one of the most variable species both in the form of its leaves and amount of hairiness making it difficult sometimes to draw a line between the type and the var. *subglabra* Baker. The inflorescence also varies with one to five verticillasters, the lowest one or two pedunculate. I have long and short leaved forms; cordate leaved forms, densely and sharply serrate or nearly orbicular forms; small and lanceolate to oblong forms; large oblong and lanceolate forms; and sometimes brown or violet coloured forms from deep stagnant mud. The var. *subglabra* is sometimes red when growing out of water, to which this variety is partial. Names have been given to some of the above forms, such as *M. aquatica minor* and *M. aquatica major* by Sole, but the height of his plants seems to be his chief distinction and, as I have not cultivated this group, I am dubious about the permanency of stature. *M. capitata* Opiz and *M. pedunculata* Pers. seem more definite appellations.

× *M. verticillata* Huds. (*sativa* L.) is one, if not the most variable, of hybrid British Mints, and more of them have been named than I have collected. The var. *paludosa* (Sole) has sometimes scattered verticillasters on the lateral branches. This, the type, and

the var. *subglabra* all have broad leaves, rounded or subtruncate at the base. *M. verticillata* Huds., var. *subspicata* Becker, is similar, but has a sub-spicate inflorescence, with short bracts. All these forms take after the *M. aquatica* parent in the form of the leaves; but *M. verticillata*, var. *acutifolia* (Sm.) H. Braun has the leaves tapered to both ends as in *M. arvensis*, and in this respect is so distinct that it should have more recognition in British floras and other literature relating to Mints. I have wild and cultivated specimens from seven colonies in the Valley of the River Medway, Kent, close to the River. Three of them are albinos, and one has the short hairs on the pedicels sharply deflexed, though they should be spreading according to Smith's description of his species. He had seen only two sheets from which to make his description—one from Miller's herbarium, and another in Buddle's collection, so that, at most, he could have seen only two individuals. He had no doubt as to the affinity of his species with *M. sativa* L. I have seen a sheet of *M. verticillata*, var. *acutifolia*, in Dr G. C. Druce's collection with glabrous pedicels, and some that were much more hairy than Smith's type. I have three of these hairy forms from Surrey, and it is doubtful whether Smith's description could be made to include them or not. One of these is extremely hairy and, as it has only a few congested verticillasters whether wild or cultivated, it seems worthy of being considered a distinct variety or forma. It is not confined to Surrey.

Of the forms coming under \times *M. pubescens* Willd. I have collected only one form in a colony of *M. piperita*, on the banks of The Dour, New Aberdour, and the similarity of the two is so great that I have looked upon the hybrid as *M. aquatica* \times *piperita*. In the wild state the leaves are narrow, but broader than in both in the cultivated state. The hybrid differs in having hirsute or shaggy stems, hairy leaves, and very hirsute pedicels. This seems very different from *M. hircina* Hull, which has the leaves green and subglabrous above, and hairy beneath. *M. longifolia* is not recorded from Aberdeenshire in "Topographical Botany," and I have never seen it in gardens there. *M. palustris* Sole is a very different looking plant. However, the matter is still *sub judice*.

I have only cultivated specimens of \times *M. gentilis*, *M. gentilis*, var. *Wirtgeniana*, and *M. gentilis*, var. *variegata*. *M. cardiaca*

Baker I gathered in a quasi-wild state near Ripley, Surrey, in 1901, and have seen it on Limpsfield Common, Surrey, but think both had been old garden escapes. × *M. rubra* Sm. is plentiful in Surrey, but particularly to the south of the North Downs. Usually it is a very glabrous Mint and one of the most vigorous, growing to the height of 2-4 ft. At Westend, in clay soil, it assumed a stunted condition, with yellow-red leaves, and sub-spicate inflorescence. An unusually hairy form, with sub-spicate inflorescence, and ovate (not round), more acuminate bracts, is widely spread on Holmwood Common. The sub-spicate inflorescence may be due to situation. When growing in water, and afterwards dried, this species is difficult to distinguish from *M. gentilis*, but its long, tubular calyx usually separates it from *M. gentilis* with its short campanulate calyx.

Surrey forms of *M. arvensis* are the type and the varieties *agrestis*, *praecox*, and *ovalifolia*. On the Middlesex side of the Thames the varieties *nummularia* and what I think will prove to be *parietariaefolia* occur. *M. arvensis* L., var. *praecox*, is sub-glabrous, with glabrous pedicels, and is more nearly identical with Sole's type from the banks of the Medway, Kent, than those from the Thames banks, Surrey or Middlesex, where the plants are more decidedly hairy. Female and hermaphrodite plants occur, and some have glabrous pedicels. I have a very narrow-leaved form of this from the banks of the Thames, Old Windsor, Berks, and it has glabrous pedicels. I regard these forms and *M. arvensis parietariaefolia* as derivatives of *M. verticillata*, or that crossed again with *M. arvensis*. *M. arvensis*, var. *Allionii* (Bor.) I have from the Medway above Tonbridge, and what seems the same from the Thames banks, Middlesex, opposite Kingston, with broader leaves. Both are sub-glabrous with glabrous pedicels, and very short calyx teeth.

M. Pulegium occurs in various parts of Surrey, and plants from Black Brook, Dorking, remained prostrate after eight years' cultivation. *M. Pulegium*, var. *erecta* Wirtgen, or what I considered to be this from Limpsfield Common, grew to a height of eighteen inches under cultivation. A plant from Stonebridge, Dorking, prostrate by the side of a pool, grew perfectly upright to a height of twelve inches when cultivated, with prostrate stolons.

EXCURSION TO JERSEY.

By Miss VACHELL.

The sixteen members of the Society who met together in Jersey from May 24th-29th under the expert leadership of Dr Druce will long remember the five busy happy days spent in visiting the numerous rare species for which the Island is famous under ideal conditions and amongst the most delightful scenery.

Physically, Jersey is a part of France, but botanically it is included in the British Isles. Several of the plants that occur on the Island are therefore of unique interest, for they are South European forms which do not extend as far north as Great Britain, and the keen field-botanist who would see all the British species growing under natural conditions must of necessity, sooner or later, visit the Channel Islands.

The first afternoon (Thursday) was spent in examining the many plants of interest that grow on West Mount and on the waste ground lying to the west of St Aubin's Bay. Hardly had the party left the grounds of the Grand Hotel before the first specimens of *Bromus rigens* were secured, to be quickly followed by others of *Silene anglica*, *S. quinquevulnera*, *Brassica Cheiranthos*, *Lepidium heterophyllum*, var. *canescens*, *Polycarpon tetraphyllum*, the pretty alien, *Gnaphalium undulatum*, and several of the small leguminous plants so abundant in the Island, including *Medicago arabica*, *Trifolium scabrum*, *T. glomeratum*, and *T. suffocatum*. *Romulea Columnae* was plentiful on grassy slopes, but unfortunately all the flowers were over. Following the course of the railway that skirts the bay, low hedges of *Atriplex Halimus* were specially noticeable and a few fine plants of *Lavatera arborea* and *Plantago lanceolata*, var. *Timbali*, were passed before Bel Royal, the well known station for *Allium sphaerocephalum*, was reached. Here many plants of interest were pointed out. *Statice plantaginea* was, as yet, only just in bud, but magnificent tufts of *Alyssum maritimum* and masses of the sweet scented evening primrose *Oenothera odorata* made a fine display of white and yellow.

The following morning an early start was made by charabanc for St Ouen's Bay, which is, botanically speaking, the most interesting part of the Island. Halting at the top of the steep hill leading to the Bay, members were able to see several spikes of *Orobanche purpurea*, parasitic upon yarrow, and *Valerianella carinata* growing abundantly by the side of the road. Here the differences between the flora of Jersey and that of the mainland were exceedingly apparent. *Geranium Robertianum*, var. *purpureum*, and *Vicia angustifolia*, var. *Garlandii*, an exceedingly pretty variety named by Dr Druce after Mr Lester-Garland, the author of the "Flora of Jersey," take the place of the more ordinary forms, while the rocks were covered with *Hedera Helix*, var. *sarniensis*, which is common all over the Island. A heavy shower swept over the bay as the sandhills were being searched for *Tunica prolifera*, *Silene conica*, *Centaurea aspera*, *Medicago minima*, *Senecio vulgaris*, var. *radiatus*, *Weingaertneria canescens*, *Mibora minima*, *Koeleria albescens*, the diminutive *Viola Kitaibeliana*, var. *nana*, *Lagurus ovatus* (only an introduced plant in Jersey), and the pretty rose-coloured form of *Rosa spinosissima*, but it only damped the clothes and not the ardour of the flower-hunters, who cheerfully lunched under the partial cover of the charabanc, and then under more favourable weather conditions continued their search for rarities round St Ouen's Pond. Here *Orchis laxiflora* was seen in excellent condition, and a specimen of the allied form, *O. elata*, was secured by one of the members. After *Orobanche Ritro*, var. *hypochaeroides* and *Diotis maritima* had been visited near the shingle, *Bupleurum aristatum* remained the only serious quest. A combined search was therefore made for it on sandy ground near the square fort which resulted in the discovery of a tiny piece about one inch high. A dozen people forming an admiring circle round such a diminutive plant with their heads almost on a level with the ground would have made an amusing snapshot had a camera been available! On the way back to St. Helier the well-known station for *Brassica incana* was passed, and a very well satisfied party returned to tea at the Grand Hotel. On Saturday Corbière was reached by train about 11.30 o'clock. The extreme grandeur of the granite cliffs, the intense blue of sea and sky, the distant lighthouse approached from the mainland at low tide by a cemented causeway, and the glorious white and yellow of

ox-eye daisies and kidney vetch that clothed the grassy slopes, made a picture never to be forgotten. Flowers were everywhere. *Helianthemum guttatum* was dotted about the short springy turf. *Cytisus scoparius*, var. *prostratus*, braved the wind-swept ledges on the cliffs. *Ruscus aculeatus*, bright with scarlet berries, grew in sheltered positions, and *Asplenium lanceolatum* nestled between crevices in the rocks. *Carex punctata* alone remained unfound, so in order not to be disappointed of their prize a few enthusiasts led by Dr Druce pursued the troublesome sedge round inlet after inlet till, hungry and tired of their quest, they sought the luncheon basket at the station where it had been left. The food had, however, proved irresistible to the rest of the party, and basket and botanists had all disappeared, and were only eventually tracked by a tell-tale vasculum that had been left outside the hotel. *Echium plantagineum* and *Tillaea muscosa* were then visited near the mines, and following a road that skirted the coast the members wandered to La Moye station and caught the train home to St. Helier. Jersey trains are luckily in no hurry, and fine specimens of *Briza maxima* were secured by one of the party during the wait at one of the stations. On Sunday the motor charabanc was again requisitioned to take the party to the North of the Island. Halting at La Marais the members were enabled to see *Lythrum Hyssopifolia* growing in damp places by the road and an inviting-looking piece of boggy ground was searched for carices and marsh orchises. The next stop was at Grosnez Point. Here the colouring was superb. The massive cliffs surmounted by the ruined castle, the sea birds wheeling overhead, the rock-slopes carpeted with pink thrift, white ox-eye daisies and the lemon and orange coloured forms of *Anthyllis Vulneraria* and again the deep blue of the sky and sea. Magnificent specimens of *Hypochaeris maculata* were seen in this, its only station on the Island, and also many fine roots of *Hieracium Peleterianum*, both in excellent condition. After lunching at Plémont the party clambered down steep slopes to the shore, where in an almost inaccessible spot above a deep chasm *Limonium lychnidifolium* was pointed out by Mr Attenborough. Here, as elsewhere, the slopes of the cliffs were carpeted with flowers. Hundreds of spikes of *Orobanche amethystea*, parasitic on *Daucus*, appeared above the short turf, and *Frankenia laevis* was growing on rocks near the sea. After a fruitless search at Crabbé

Bay for wild medlar, said to be more native here than at Rozel, where it is abundant in the hedges, the party drove through the waterworks valley to St. Helier, passing *Orobanche Rapum-genistae* and *Allium triquetrum* by the side of the road.

On Monday another long day was spent in St. Ouen's Bay. Specimens of *Scirpus americanus*, which had before eluded the searchers owing to its extremely immature condition, were safely secured, and *Dianthus gallicus* was visited in its only station. Two of the flower features of the Bay were undoubtedly the bright yellow of *Raphanus maritimus*; abundant on the sand hills, and a large expanse of sandy ground near the shore literally carpeted with the pretty purple flowers of *Matthiola sinuata*. After a picnic lunch at La Pulente, *Trifolium strictum* was seen in abundance on high ground and the drive was continued over the Quenvais, past St. Brelade's Bay to Portelet Bay, where a delicious tea was provided outside a large farmhouse. The station for *Trifolium Molinerii* on Janvrin's tomb being inaccessible owing to the state of the tide, the members were tempted to wander to a point overlooking the bay, where amid tiny plants, *Mibora minima* and other treasures, a restful half hour was spent enjoying the rich colouring of the heather clad slopes, the sombre shades of the cliffs near Noirmont Point and the distant view of Janvrin's Tower on the tiny island, with its pathetic history. *Ranunculus flabellatus* and the Jersey fern, *Gymnogramme leptophylla*, still remained unseen, and to the delight of the members both were pointed out before this, the last expedition, came to an end.

The following day the party began to disperse. A few stayed on for a short while loth to leave a place of such exceptional interest. Expeditions to Mont Orgueil, Grouville, St. Catherine's Harbour, Rozel, etc. resulted in the acquisition of *Juncus capitatus*, *Spergularia atheniensis*, *Poa bulbosa*, *Phalaris minor*, *Cynosurus echinatus*, *Arum italicum*, *Thesium humifusum*, *Tragopogon porrifolius*, *Matthiola incana* (naturalised at Fort Regent), *Hypericum linariifolium*, *Ophrys sphegodes* and *Orchis militaris*, a new record for the Island.

Seldom does a week's hard flower-hunting come to an end amid such universal feelings of regret, and those who were privileged to join the expedition realised to the full the expert knowledge and

astonishing memory of our leader and the wonderful patience with which he answered question after question. As nothing happened to mar the pleasure of the party or the success of the expedition it is hoped that before long the members of the Society will be given another chance of carrying on combined work in the field.

SOME SCOTTISH RARITIES VISITED, 1923.

By W. D. MILLER.

The following notes are of slight interest to the critical botanist, but they record a visit to Scotland memorable for the large number of rare plants observed *in situ*.

The last half of July and the first few days of August were spent at various centres, and generally it would be impossible to choose a better date. *Saxifraga oppositifolia*, *Trollius europaeus*, *Rubus Chamaemorus*, *Loiseleuria procumbens* and a few other plants were practically over flowering, and some of the lowland Carices were in advanced seed. On the other hand *Lactuca alpina*, *Saussurea alpina* and a few others were hardly opening, but the great mass of plants were in their full glory.

Aided by several motors, unbounded enthusiasm and experienced guidance the party visited Barry sandhills, Glen Clova, Ben-y-Vrackie, Dalnaspidal, Loch Tummel, Glen Lyon, Ben Lawers and the adjoining hills, Ben Nevis, the Cuchullin Hills and the Firth of Forth at Longniddry.

The opening meet was at Forfar, where a short evening walk beside the Loch produced *Cicuta virosa*, *Viola lutea*, var. *amoena* (far the commonest form in the parts of Scotland with which the writer is acquainted), *Trifolium agrarium*, *Lolium temulentum* (on the wall of a house) and *Festuca pseudololiacea*. Next day, in heavy rain, the party drove to Carnoustie, and as there was no firing at the ranges, walked over the sandhills in the direction of the lighthouse. Among a host of flowers were noticed *Thalictrum minus*, var. *dunense*, *Astragalus danicus*, *Juncus balticus*, *Corallorrhiza innata*, *Parnassia palustris*, *Salix pentandra*, and a very pale form of

Koeleria cristata (unidentified, and in the present state of the classification of *Koeleria*, unnameable). The weather cleared at mid-day and, driving back, a local enthusiast, aged 12 years, shewed the party a narrow strip of wood beside the road carpeted for 50 yards or more with mingled *Pyrola minor* and *Goodyera repens*.

The next two days were given to Glen Dole and its subsidiary corries. (Incidentally *Meum athamanticum* is abundant in Glen Clova, but was not noticed elsewhere.) The extraordinary flora of Glen Dole is well known. The following is a mere list of the less common plants seen on this occasion:—*Oxytropis campestris*, *Listera cordata*, *Lacuta alpina*, *Linnaea borealis*, *Erigeron alpinus*, *Veronica fruticans*, *V. alpina*, *Carex alpina*, *C. atrata*, *C. capillaris*, *C. rariflora*, *Pyrola media*, *Salix reticulata*, *Alopecurus alpinus*, *Phleum alpinum* and *Woodsia hyperborea*. *Habenaria viridis* was seen growing with *Carex alpina* and *Juncus trifidus* on almost bare disintegrated rocks at 3000 ft. The rocks, scree and bogs were, of course, covered in profusion with less distinguished but often more beautiful plants.

The same evening Pitlochry was reached, and the following day a visit was paid to Loch Tummel to see *Schoenus ferrugineus* in its only known British station. *Drosera anglica* is abundant and very fine along this beach. In the afternoon a climb on Ben-y-Vrackie was rewarded with *Oxytropis uvalensis*, *Astragalus alpinus* and *Carex rupestris*. The following day a journey was made by road to Dalnaspidal to see *Menziesia caerulea*. The plant is very scarce and appears to be getting scarcer. It is to be hoped that collectors will be more than ever considerate. On the Sow of Atholl *Lycopodium annotinum* is the commonest form of club moss. Along the crest *Loiseleuria procumbens* carpets the ground over a large area. A dozen sedges may be gathered in the bog below, among them *Carex limosa*.

Passing on at once to various quarters on the north shore of Loch Tay, expeditions were taken thence to the top of Ben Lawers and Ben Tarmachan, to Killin and Glen Lyon. The Lawers Saxifrages were all met with, and among other rare species seen were *Gentiana nivalis* (in considerable quantity though very local), *Arenaria sedoides*, *Myosotis alpestris*, *Carex atrofusca* and the new sedge *C. microglochis*, *Juncus bigumis*, *J. castaneus*, *Pyrola secunda*,

Polygonatum verticillatum, *Kobresia caricina*, *Hymenophyllum unilaterale* and a number of other species almost equally uncommon. The commoner forms of *Orchis* in the pastures beside Lawers Hotel were in amazing profusion, the *conopsea* hybrids being of considerable interest. A long time was spent in a howling gale on the north side of King's Seat, Tarmachan, gathering Poas of the alpine type, as *P. laxa* is reported from that locality. However the descriptions and nomenclature of this group are discouraging to a degree and no conclusion was reached as to the identity of the plants obtained.

On the way to Fort William a stop was made to visit the classic station for *Scheuchzeria palustris*. A fair quantity was seen growing with *Carex limosa*, *C. filiformis*, *Oxycoccus quadripetala*, etc. As the plant—in wet years at least—is exceedingly unapproachable and as it is now reported from more than one bog in the vicinity, its threatened extinction may be indefinitely postponed.

Ben Nevis itself is somewhat disappointing botanically, but it provided *Cerastium trigynum* and *Luzula arcuata*, the latter very sparse, and a hard day out of Glen Spean, thanks to the help of the owner, produced *Saxifraga caespitosa*. Other plants noted were *Pinguicula lusitanica*, *Carum verticillatum* and *C. Carvi*, looking thoroughly native.

Thence a strenuous visit was paid to the Cuchullin Hills in Skye, where the party were rewarded by *Arabis alpina*, *A. petraea*, *Eriocaulon septangulare* and *Deschampsia setacea*.

Scirpis rufus and *Senecio viscosus* were the most distinguished plants seen beside the Forth.

It should be stated that only three of the party were collectors and, as they used the utmost discretion, little if any damage was done to the rare plants visited. It is impossible in so short a note to touch on the great mass of plants observed, several hundred in number, or to mention the scenic effects constantly offered and the noble setting which displays to such advantage the rare alpinists met with. While of course no pretence is made that such an excursion is of serious botanical importance, the labours of the study and the herbarium cannot but be invigorated by so lively an interlude, and the addition of a new species to the British Flora may be regarded as some justification for the expedition.

NORFOLK PLANTS.

By BERNARD REYNOLDS.

The list records mostly additions to Nicholson's *Flora of Norfolk*, 1914, and a few new stations for the rarer plants.

Thalictrum minus, var. *dunense*, is still at Caistor, but in very small quantity. A freak form of *Geranium pusillum* was noticed there with abnormal flowers, the calyx being greatly enlarged, and the petals abortive. *Geranium rotundifolium*, reported from one station only in the west of the county, I found at West Caistor in amazing abundance, one lane for 50 yards on both sides being practically monopolised by this plant. *Trifolium repens*, var. *rubescens*, was gathered by a friend last year, but though I was taken to the spot no trace could be seen of it this year. *Bupleurum tenuissimum* I got on the east bank of the Bure, one, and also three miles above Yarmouth. The Yarmouth plant was semi-prostrate, measuring 14 inches in length, with many branches and leaves 3 inches long. It was a quite abnormal specimen. A monstrous form of *Cicuta virosa* was noticed at Ormesby with duplicate umbels, the secondary umbels arising from the base of flowerless involucreal bracts. It was a large plant showing the same characters throughout. Also a freak of *Pedicularis palustris* was noticed near Runham with a prostrate, duplicated, flattened stem over 6 inches across at base and over 6 feet in length. *Carex diandra*, var. *Ehrhartiana* (Hoppe) was in plenty at Runham, but I did not see the type plant anywhere during my stay. *Carex Oederi*, var. *elatior*, was frequent, and one plant had female flowers at the top of the male spike, a curiosity I had not seen previously in the *Heterostachyae* group. *Ammophila bal-tica* was very abundant at Caistor, and also close to Yarmouth and at Winterton. The bright orange anthers mark it definitely from *arenaria* when they are visible. A branched or lobate form of *Ammophila arenaria* was noticed at Yarmouth, and this has been sent to Dr Druce, who will, I except, report on it later [See *Rep. B.E.C.* 634, 1922, where I have named it var. or forma *ramosa*. G. C. D.]. The marsh form of *Habenaria conopsea* was frequent at Fleggburgh and, as it is facially so different from the plant of the chalk hills, I wonder they have not been separated. *Glyceria pro-*

cumbens, which has not been recorded recently for the Yarmouth district, I saw close to the town, but it was growing in the crevices of paving stones, and seemed in danger of extermination. I searched in vain for *Carex trinervis*, but only found *C. gracilis* with the deeply three-nerved fruit and erect spikes that I think has been called (possibly in error) var. *tricornata* of Fries. The fruits were curiously light green with rather short glumes, so perhaps the plant should come under var. *viridis* of Hartman [Yes, G. C. D.]. My specimens do not compare well with the robust *tricornata* of the continent. *Potamogeton mucronatus*, reported from Yarmouth and Stalham in the *Flora*, was very abundant, and a most unusual form of *P. crispus* was noticed at Stalham with stiff branches and spatulate leaves. Mr A. Bennett has kindly informed me that a similar plant may be seen in the Linnean Herbarium.

THE VEGETATION OF THE CULBIN SANDS.

By E. J. A. STEWART, M.A., B.Sc., and
DONALD PATTON, M.A., B.Sc., Ph.D.

From time to time there appears in the daily or weekly periodicals an article on the Culbin Sands. Therein attention is usually directed to their history, or it may be, their mythology. Investigation, however, first in 1913, and again in 1923, has shown the authors that the Culbins are as interesting vegetationally as they are historically.

From the left bank and the mouth of the River Findhorn the Culbin Sands extend westward along the shores of the Moray Firth for more than six miles. They thus lie in the Watsonian vice-county 96. Bain, writing in "The River Findhorn," describes how in 1694 the Culbin Estate—"the Garden and Granary of Moray"—was overwhelmed by great accumulations of sand inblown before fierce westerly hurricanes. In the following year the proprietor of the devastated area appealed successfully to the Scots Parliament for the remission of certain taxes. The catastrophe was the cause of the passing of an Act prohibiting under severe penalties "the pulling

or cutting of bent, juniper, or broom at Culbin, or elsewhere along any sandy sea-shore round the country."

The sands are the haunt of the antiquary, who is occasionally rewarded by finding not only relics of the days when the Stuarts ruled, but also bronze ornaments, beads and fragments of pottery of much earlier periods. He is patiently waiting until one of the high white dunes passes eastward and lays bare the ruins of the ancient mansion-house and the apple tree which, it is said, reappeared once, bore leaves and produced flowers and fruit! As these massive accumulations of sand slowly progress, wind-driven before the storms, the furrows of former fields are exposed and the scattered fragments of rusted iron objects proclaim an industrious past. Indeed, one area is known locally as "The Smiddy" (smithy). In the museums of Nairn, Forres, and Edinburgh (The Antiquarian Museum) there are many relics of the Stone Age, which were collected among the sands.

The area covered by the dunes was not all above sea level prior to the great devastation. A dotted line on one map shows the limit of the land at one time. This shore line is at a considerable distance from the present sea margin. The dunes of Culbin and other dunes westward along the same coast rest upon the 25-feet raised beach which stretches between the Findhorn and Fort George. The recently published "Memoir of the Geological Survey, Scotland," on the district remarks:—"Fragments of beaches at higher levels are to be found along the inland limit of this terrace"—the lowest from 15 ft. to 30 ft. in height—"thus suggesting that the latter may have been formed in part from the destruction of older sea-margins." Amid the shifting Culbin dunes one may see extensive storm beaches of a past age, as well as possible indications, in other gravel expanses, of former channels of the Findhorn which at one time flowed westward into the sea through the present dune area.

On the shifting dunes, when the weather is dry, the sand seems ever in motion, and the gradual alteration in the configuration is no doubt greatly aided by the climatic conditions. The rainfall here is about 20 ins. annually. The topography of the surrounding district—a lowland coastal belt backed on the south and west by the mass of the Highlands and the prevailing winds, westerly and south-

westerly—account for the low rainfall. Sir Robert Gordon of Straloch, in the seventeenth century, writing of Moray, says:—"In salubrity of climate Moray is not inferior to any, and in richness and fertility of soil it much exceeds any of our Northern provinces. The air is so temperate that when all around is bound up with the rigour of winter there are neither lasting snows nor such frosts as damage fruit trees." A recent report gives the average maximum temperature as 53 degs., and the minimum 39 degs. Were the rainfall heavier the vegetation might succeed more surely in fixing the sand, but, while the adjoining cultivated lands maintain their long reputation for fertility, among the dunes the growth of plants is severely handicapped. Although the wind be high a very slight precipitation damps the sand and prevents it from shifting. On the other hand, on a clear windy day, the Culbin Sands, viewed from the mountains away to the south, present a remarkable spectacle. The sand appears to rise in dense clouds to a great height, driving eastwards towards Findhorn Bay, east of which again the country stands out clear. The dunes themselves tend to move eastward. Mr Bain records that certain of those on the western border of the area had travelled "nearly a mile during a generation." There is, indeed, a continuous cycle of movement. Sand is blown into Findhorn River and Bay and, with other material brought down by the river, is carried out to sea. The sea, aided by currents, gives sand up again in increased quantity on the coast to westward whence it is again blown inland.

The exceptional flooding of the summer of 1923 gave opportunity to appreciate something of the effect of previous yet greater floods, and in particular the amount of solid matter which can be brought down by the rivers flowing northwards into the Moray Firth. The waters of the Findhorn had so much in suspension that thousands of salmon were choked during one rapid rise of the river. The material thus conveyed has two main sources:—first, the boulder clay corroded and eroded by the river; second, the detritus formed by the weathering of the rocks *in situ* within the river basin. The centre of distribution of ice during the Ice Age was in the neighbourhood of Ben Attow to the west, where the geological formation is gneissic, similar to that in the Findhorn basin (in which also occur granite outcrops). Accordingly, by the theory above mentioned of

the mode of deposition of the Culbin Sands, the material of which they are composed may be traced to those sources. This is in agreement with the microscopic researches of Dr Mackie of Elgin ("The Sands and Sandstones of Eastern Moray"). As may be imagined from the large area of the sands, the constituent minerals and their proportions vary locally; generally, quartz and felspar preponderate.

In the central area of the Culbin Sands occur the shifting or white dunes which sometimes attain an altitude of 120 feet. Interspersed among these are the more fixed, grey dunes, generally of lower elevation, bearing a vegetation dominantly *Ammophila arenaria* Link. Scattered among all these dunes are also relatively flat expanses. Some of these have surfaces of continuous shingle, others of sand, and there are intermediate stages. On the outer parts of the Culbin area are more or less fixed dunes. Lying between the more central and the border dunes are several large level tracts which vary from "lochs" to dry basins according to the seasonal rainfall. Immediately to the south of the Culbins the land is agricultural and, as indicated, still merits the name, "The Granary of Moray." To the east is the estuary of the Findhorn, and to the north and north-west the shore of the Moray Firth. Woods, mainly Pine and Birch, have been planted extensively on the margins of the Culbins. At present the sands themselves are being planted by the Forestry Commission.

Vegetationally, the area under consideration may be classified thus:—

A. Littoral Areas.

1. Strand.
2. Salt Marshes.

B. Sandhills Proper.

1. Shifting Dunes.
2. Fixed Dunes.
3. Dune Hollows.
 - a. Shingles.
 - b. Marshes.
 - c. Grasslands.
 - d. Wooded Areas.

A. Littoral Areas.

1. Strand.

This area stretches for about two miles west of the mouth of the Findhorn. It is only a very narrow belt, and is delimited on the landward side by an almost continuous line of low dunes. In fact, at places the high tide reaches the dunes. The vegetation is very sparse on account of the conjoint action of wind and tides. Occasional plants, such as *Cakile maritima* Scop. and *Erodium cicutarium* L'Herit., occur, with invading *Ammophila arenaria* Link from the dunes.

2. Salt Marshes.

These are found in two localities. One is on the north-western seaboard of the Culbin Sands, the other occupies a portion of the western shore of the Findhorn estuary.

i. The North-West Salt Marsh.

This extends south-eastwards in the direction of the fresh-water dune marshes, discussed below, with a corresponding gradual transition in the character of the vegetation. Uprising from the marsh are frequent knolls of various altitudes bearing plants of a heath association, as *Empetrum nigrum* L., *Gentiana campestris* L., *Gnaphalium sylvaticum* L., *Lycopodium Selago* L., and *L. clavatum* L.

The vegetation of the salt-marsh proper is very varied, the following plants being locally dominant:—*Glyceria maritima* Mert. & Koch, *Glaux maritima* L., *Statice maritima* Mill., *Triglochin maritimum* L., and *Atriplex glabriuscula* Edm.

The inblown sand from seaward, the outflow of fresh water from the dune marshes, and occasional inundations of the sea prevent the establishment of a salt marsh association within any definite area. These factors account for the growth here of such plants as:—*Ranunculus sceleratus* L., *Cakile maritima* Scop., *Raphanus Raphanistrum* L., *Spergularia rubra* Pers., *Montia fontana* L., *Arenaria peploides* L., *Matricaria inodora* L., *Suaeda maritima* Dum., *Sal-sola Kali* L., *Festuca rubra* L., *Scirpus Tabernaemontani* Gmel., *Eleocharis palustris* R. & S., *Juncus bufonius* L. *Senecio sylvaticus*

L., abundant inland on the wooded areas of the Culbins, and *Sonchus arvensis* L. also occur here as casuals.

ii. The Findhorn Salt Marsh.

The flora here is more established. The high tides cover the vegetation regularly for some distance from the muddy channel proper, and frequently make more extensive inroads upon the low flats which lie between the dunes and the estuary. These flats are much cut up by narrow, sinuous, often inter-connected channels, and small runnels traverse the area from the neighbourhood of the dunes. The salt marsh proper is a relatively narrow belt. The dominant plants are:—*Statice maritima* agg. (especially), *Plantago maritima* L., *P. Coronopus* L., *Littorella uniflora* Asch., *Glaux maritima* L., *Cochlearia officinalis* L., *Triglochin maritimum* L., *Aster Tripolium* L., *Juncus squarrosus* L., and *Carex Goodenowii* Gay.

Casuals found in this area are:—*Fumaria capreolata* L., *Brassica oleracea* L., *Trifolium dubium* Sibth., *Leontodon autumnale* L., and *Anchusa sempervirens* L. These may have been brought down by the river.

B. Sandhills Proper.

1. Shifting Dunes.

The highest dunes, the most exposed to the winds, do not afford an opportunity for plant growth. The sand is in continual motion and the configuration is always varying. At present an attempt is being made by the Forestry Commissioners to fix these dunes by the planting of *Ammophila arenaria* and *Pinus*. Sufficient time has not elapsed to allow any observation of the effect of this latest artificial introduction of vegetation. *Ammophila*, however, also occurs naturally as the dominant and even the sole successful—usually temporarily successful—coloniser of the shifting dunes. It is found chiefly on the windward and lateral (north and south) lower slopes and bases of the dunes. All stages of *Ammophila* colonisation are presented, between absolute barrenness and a dense growth of the plant. In the latter case the Marram Grass is occasionally accompanied by other vegetation. On the windward side the older dunes are undergoing denudation; the Marram is being undermined, blow-outs occur, but continued corrosion may be im-

peded or even prevented by accumulated plant remains. These may even aid in rebuilding a dune. Any other plants found where *Ammophila* is more abundant are usually of the current year, the seeds having been inblown or carried by birds. Such are:—*Viola Riviniana* Reichb., *V. canina* L., *Veronica officinalis* L., *V. Chamædrydrys* L., *Cirsium arvense* Scop., *Senecio Jacobaea* L., and *Filago minima* Pers. Except the last-named, these we occasionally found as perennials, but of no great age.

2. Fixed Dunes.

The slopes of these dunes facing the prevailing winds are usually undergoing denudation and accordingly are mostly barren except for persisting and re-established plants of *Ammophila arenaria*. To leeward of the crest the Marram is gradually replaced by other species. In order of downward succession the typical plants are:—**Ammophila arenaria* Link. *Elymus arenarius* L., *Senecio Jacobaea* L., **Cirsium arvense* Scop., *Filago minima* Pers., *Teesdalea nudicaulis* Br., *Viola canina* L., *Erophila verna* E. Meyer, *Galium verum* L., **Carex arenaria* L., **Juncus squarrosus* L., **Calluna vulgaris* Hull, **Salix repens* L., *Taraxacum officinale* Weber, *Lotus corniculatus* L., *Rumex Acetosella* L., *Hypochaeris radicata* L., *Leontodon autumnale* L. These plants finally give way to the Dune Grassland (described below).

The plants marked * play a great part in the fixation of the sand.

3. Dune Hollows.

Among the dunes, as already indicated, occur extensive areas of shingle, the relics of former sea beaches and river channels, and occasional tracts of a former arable land, the furrows laid bare, still persisting. There are also well defined basins, the dune marshes, which in places merge into the drier and more stabilised dune grasslands. Here and there, chiefly near the margins, east, west, and south of the Culbin Sands, are woods of Pine and Birch, some no doubt, planted, others self-sown. In all these relatively flat areas occur diminutive dunes or mounds of both shifting and fixed sand whereon, again, *Ammophila arenaria* is dominant, if there be vegetation at all.

a. Shingles.

These are practically barren except for *Rumex Acetosella*, L., *Cerastium semidecandrum* L. and occasional tufts of *Ammophila arenaria* Link.

b. Marshes.

Ecologically these afford exceptional scope for study. Four areas in particular were carefully investigated, lying respectively towards the north, north-west, south and east borders of the Culbins. In the winter and spring months these are fresh-water lochs, during summer they are more or less dry. The vegetation varies accordingly.

North or Buckie Loch shows the largest continuous area of standing water and also contains the greatest number of species of plants. Commencing from the deepest water and working towards the surrounding dunes, one may observe the following sequence, typical associations of plants being arranged in order of wetness of habitat:—

(i.) *Phragmites communis* Trin., *Equisetum limosum* L., *Typha latifolia* L., *Potamogeton polygonifolius* Pourr., *Apium inundatum* Reichb. fil., *Ranunculus Lingua* L., *Menyanthes trifoliata* L., *Potentilla palustris* Scop. and *Lycopus europæus* L.

(ii.) *Caltha palustris* L., *Eleocharis palustris*, R. & S., *Eriophorum angustifolium* Roth, *E. vaginatum* L., *Stellaria uliginosa* Murr., *Radicula Nasturtium* aq. Druce, *Myosotis caespitosa* Schultz, *Pedicularis palustris* L., *Epilobium palustre* L. and *Carex inflata* Huds.

(iii.) *Peplis Portula* L., *Hydrocotyle vulgaris* L., *Juncus articulatus* L., *J. bulbosus* L., *Carex Oederi* Retz., *Galium palustre*, var. *Witheringii* Sm., *Ranunculus Flammula* L., *Juncus conglomeratus* L. and *Narthecium ossifragum* Huds.

(iv.) *Littorella uniflora* Asch., *Radiola linoides* Roth, *Lychnis Floscuculi* L., *Lycopodium inundatum* L., *Orchis mascula*, L., *O. latifolia* L., *Sagina nodosa* Fenzl, *Juncus squarrosus*, L., *Erica Tetralix* L., *Carex echinata* Murr., *Cirsium palustre* Scop., *Listera ovata* Br. and *Sagina procumbens* L.

(v.) *Salix aurita* L., *Calluna vulgaris* Hult., *Drosera rotundifolia* L., *Prunella vulgaris* L., *Corallorrhiza trifida* Châtel, *Dryop-*

teris montana OK., *Betula tomentosa* Reith. & Abel, *Goodyera repens* Br., *Salix repens* L., and *Listera cordata* Br.

These plants are not limited to the associations described. The above are the usual successions, but variations occur at different points, especially in relation to the water-content of the soil. On the south, where the drifting sand is encroaching upon the Buckie Loch area, marsh plants continue to grow up through the covering of sand. For example, *Iris Pseudacorus* L. appears to be flourishing on the otherwise barren sand in places as far as ten yards from the margin of the sand. The Moss flora plays a very significant part in the vegetation of the area.

North-West Loch contains several basins in which water appears to persist through all seasons. The flora resembles that of Buckie Loch, but a larger area is here occupied by *Betula tomentosa* Reith. *Juniperus communis* L. occurs in isolated patches. This plant we did not find in any other part of the Culbins although it is abundant in the pine woods of the district. The feature of this marsh is the way in which low fixed dunes densely clothed with vegetation are distributed among the wetter areas. This vegetation consists in some places of *Ammophila arenaria* and its associates and, in others, *Empetrum nigrum* is dominant, accompanied by *Lycopodium clavatum* L., *Achillea Ptarmica* L., *Campanula rotundifolia* L. and *Polypodium vulgare* L.

East and South Lochs show striking comparisons and contrasts with the others. In 1923 the vegetation of the former in its dominant species resembled that of the latter as the authors found it in 1913. Ten years had made a remarkable change in South Loch, and this was due to the fact that inblown sand had made the area much drier. In 1923, although the bed of East Loch was damp, there was no surface water. The zonation of the vegetation here is interesting, forming concentric belts. In the central and wetter parts the dominant plant is (1923) *Peplis Portula* L., appearing a purple patch from a distance. Among the Purslane occur tufts of *Carex Oederi* Retz. Around this area is a belt characterised by *Littorella uniflora* Asch., broader on the west, and with it are associated *Carex Goodenowii* Gay, *Sagina procumbens* L., *Sagina maritima* Presl, and *Carex inflata* Huds. In the next concentric belt *Ranunculus Flammula* L. and *Hydrocotyle vulgaris* L. are dominant, with

Juncus bulbosus L., *J. articulatus* L., *Myosotis caespitosa* Schultz. and *Elocharis palustris* R. & S. Outside this zone *Radiola linoides* Roth, is abundant, and has, as accompanying plants, *Gnaphalium sylvaticum* L., *Juncus conglomeratus* L., and *Potentilla Anserina* L. The zones of this portion of the basin may be distinguished at a distance by their respective colours. From the centre these are:—purple, green, yellow, and green.

The south-west part of the basin is characterised by a ground vegetation of mosses and by low Birches. Here occur in abundance *Lycopodium inundatum* L., *Lycopus europæus* L., *Eriophorum angustifolium* Roth, *E. vaginatum*, L. *Prunella vulgaris* L., *Pyrola minor* L., *Drosera rotundifolia* L., *Viola* spp., *Erica Tetralix* L., *Juncus squarrosus* L., and *Corallorrhiza trifida* Chât. Here are interspersed dry sandy mounds on which *Calluna vulgaris*, var. *pubescens* Hull, is dominant, accompanied by *Trifolium repens* L. and others.

By the persistent blowing in of sand from the dunes on the west separate colonies are being formed in this Birch community as well as in the more open marsh to the north of *Salix repens* and also of *Carex arenaria* L., associated with *Senecio Jacobaea* L., *Cerastium vulgatum* L., *Holcus lanatus* L., *Rumex Acetosella* L., and *Filago minima* Pers.

The considerable area of South Loch, which in 1913 was purple with *Peplis Portula* L., is now (1923) green with *Littorella uniflora* Asch., sand having blown in and made the area drier. Around the pure mat of *Littorella* are slightly elevated little mounds bearing a different and rarer vegetation, namely *Agrostis alba* L., *Aira praecox* L., *Deschampsia flexuosa* Trin., *Sagina procumbens* L., *S. apetala* Ard., *S. subulata* Presl, *Rumex Acetosella* L., *Bellis perennis* L. *Senecio Jacobaea* L., *Poa annua* L., *Alopecurus geniculatus* L., *Galium palustre*, var. *Witheringii* (Sm.), and *Holcus lanatus* L.. Ramifying from these tufts by means of stolons are plants of:—*Poa annua* L., *Rumex Acetosella* L., *Ranunculus repens* L., and *Elocharis palustris* Br. This last simulates in its habit *Carex arenaria* L., of the sandy levels, and also presents a unique feature in the behaviour of its growing point. An arch, bearing numerous shoots is raised above the sand.

Around the *Littorella* area occurs a zone of *Cerastium semide-*

candrum L. To the west of these is a wetter tract, as in East Loch, except that *Salix aurita* L. is here more abundant.

An interesting find was obtained in July 1923 in a small basin bordering a wood on the east of the sands, namely *Hottonia palustris* L., in flower and fruit, a new record for Scotland. With it were growing:—*Typha latifolia* L., *Potamogeton polygonifolius* Pourr., *Glyceria fluitans* Br., *Lemna minor* L., *Littorella lacustris* Asch., *Alisma Plantago-aquatica* L., and *Juncus subnodulosus* Schrank.

c. Dune Grasslands.

These grasslands are found towards the northern and the southern limits of the Culbin Sands.

The Northern Area flanks Buckie Loch and extends on the east for about 500 yards, while on the west it merges into the Salt Marshes already described. The portion towards the east is well established. Here the most notable grasses are:—*Holcus mollis* L., *H. lanatus* L., *Festuca rubra* L., *F. ovina* L., *Agrostis tenuis* Sibth., *A. canina* L., *Deschampsia flexuosa* Trin. and *Nardus stricta* L. With these are *Luzula multiflora* DC., *L. campestris* DC. and also *Thymus Serpyllum* L. and *Lotus corniculatus* L., locally abundant. The following species are also frequent:—*Gentiana campestris* L., *Plantago lanceolata* L., *Polygala vulgaris* L., *Myosotis versicolor* Sm., *Veronica officinalis* L., and *Trifolium repens* L., to mention a few.

The fishermen's track along the southern shore of Buckie Loch connects the east and the west grasslands by a similar flora. The grassland towards the west passes soon into marsh, and heath associates also occur in the vicinity—*Calluna vulgaris* Hull, *Lycopodium clavatum* L., and others.

The Southern Area extends between South Loch and the Findhorn Bay marshes. Here the vegetation is close and the grassland is interrupted by Birch and Elder. It resembles the Northern Grassland.

d. Wooded Areas.

These have been planted at various times and consist of Pine or Birch or a mixture of both. Where they occur, which is chiefly towards the landward side of the Culbins, they are undergoing all

stages of denudation. Self-planted Birches occur also here and there throughout the dune hollows. At present, too, Pines are being planted both on the shifting dunes and in the dune hollows by the Forestry Commissioners.

The ground vegetation of the first mentioned areas is that generally characteristic of the Pine woods of the district, *Goodyera repens* Br. being abundant, together with *Pyrola minor* L. and other Ericaceous plants. Where the sand has encroached upon the wood, typical pioneers of fixation are found, such as *Salix repens* L., *Carex arenaria* L., and *Rumex Acetosella* L.

The woodlands, as already indicated, may in future occupy a larger area of the Culbin Sands. So far man has only in a relatively slight degree interfered with the natural variations of the vegetation, for the past has been largely a record of his failures in the attempt to fix the sands. Once more and under auspices which give promise of more sustained effort, he is trying to restore this waste to its former usefulness. If he succeed in overcoming the conditions which have produced and maintained the mostly barren dunes and the local floras, rich by contrast, of the dune-hollows, then the Culbin Sands will have lost much of their attraction ecologically.

LIST OF PLANTS FOUND ON THE CULBIN SANDS.

<i>Ranunculus sceleratus</i> L.	<i>Capsella Bursa-pastoris</i> Medic.
<i>R. Flammula</i> L.	<i>Thlaspi arvense</i> L.
<i>R. Flammula</i> L., var. <i>tenuifolius</i> Wallr.	<i>Teesdalea nudicaulis</i> Br.
<i>R. Lingua</i> L.	<i>Cakile maritima</i> Scop.
<i>R. repens</i> L.	<i>Raphanus Raphanistrum</i> L.
<i>Caltha palustris</i> L.	<i>Viola palustris</i> L.
	<i>V. Riviniana</i> Reichb.
<i>Papaver dubium</i> L.	<i>V. canina</i> L.
	<i>V. tricolor</i> L.
<i>Fumaria capreolata</i> L.	<i>V. arvensis</i> Murr.
<i>Radicula Nasturtium</i> Druce.	<i>Polygala vulgaris</i> L.
<i>Cardamine pratensis</i> L.	<i>Lychnis alba</i> Mill.
<i>C. hirsuta</i> L.	<i>L. dioica</i> L.
<i>Erophila verna</i> E. Meyer.	<i>L. Flos-cuculi</i> L.
<i>Cochlearia officinalis</i> L.	<i>Cerastium tetrandrum</i> Curt.
<i>Sisymbrium Sophia</i> L.	<i>C. semidecandrum</i> L.
<i>Brassica oleracea</i> L.	<i>C. viscosum</i> L.
<i>B. arvensis</i> Scheele.	

- O. vulgatum* L.
Stellaria media Vill.
S. uliginosa Murr.
Arenaria peplodes L.
Sagina maritima Don.
S. apetala Ard.
S. procumbens L.
S. subulata Presl.
S. nodosa Fenzl.
Spergula arvensis L.
Spergularia rubra Pers.
S. salina, var. *media* Presl.

Montia fontana L.

Radiola linoides Roth.
Linum catharticum L.

Erodium cicutarium L'Herit.

Ulex europaeus L.
Cytisus scoparius Link.
Trifolium pratense L.
T. medium L.
T. repens L.
T. dubium Sibth.
Lotus corniculatus L.
L. uliginosus Schkuhr.
Vicia Cracca L.
V. angustifolia Reichb.

Spiraea Ulmaria L.
Potentilla erecta Hampe.
P. Anserina L.
P. palustris Scop.
Alchemilla arvensis Scop.
A. vulgaris L.
Rosa canina L.
Pyrus Aucuparia Ehrh.

Drosera rotundifolia L.

Hippuris vulgaris L.
Myriophyllum spicatum L.
Callitriche palustris L.

Peplis Portula L.
- Epilobium parviflorum* Schreb.
E. montanum L.
E. palustre L.

Hydrocotyle vulgaris L.
Apium inundatum Reichb. fil.
Anthriscus sylvestris Hoffm.
Angelica sylvestris L.

Sambucus nigra L.

Galium verum L.
G. saxatile L.
G. palustre L., var. *Witheringii* (Sm.).

Valeriana officinalis L.
V. sambucifolia Mikan.

Scabiosa Succisa L.

Bellis perennis L.
Aster Tripolium L.
Filago minima Pers.
Antennaria dioica Gaertn.
Gnaphalium sylvaticum L.
Achillea Millefolium L.
A. Ptarmica L.
Chrysanthemum segetum L.
C. Leucanthemum L.
Matricaria inodora L.
Senecio vulgaris L.
S. sylvaticus L.
S. Jacobaea L.
S. aquaticus Hill.
Carduus crispus L.
Cirsium lanceolatum Scop.
C. palustre Scop.
C. arvense Scop.
Crepis capillaris Wallr.
Hieracium Pilosella L.
H. corymbosum Fr.
Hypochoeris radicata L.
Leontodon autumnale L.
Taraxacum officinale Weber.
T. palustre DC.
Sonchus asper Hill.

- S. arvensis* L.
Campanula rotundifolia L.

Vaccinium Vitis-Idaea L.
Calluna vulgaris Hull and var.
 pubescens Hull.
Erica Tetralix L.
E. cinerea L.
Pyrola minor L.

Statice maritima Mill.

Hottonia palustris L.
Trientalis europaea L.
Glaux maritima L.

Centaurium umbellatum Gilib.
C. vulgare Rafn.
Gentiana campestris L.
Menyanthes trifoliata L.

Lycopsis arvensis L.
Myosotis caespitosa Schultz.
M. palustris Hill.
M. versicolor Sm.

Solanum Dulcamara L.

Mimulus guttatus DC.
Veronica arvensis L.
V. serpyllifolia L.
V. officinalis L.
V. Chamaedrys L.
V. montana L.
V. scutellata L.
V. Beccabunga L.
Euphrasia officinalis L.
Pedicularis palustris L.
P. sylvatica L.
Rhinanthus Crista-galli L.

Pinguicula vulgaris L.

Lycopus europaeus L.
- Thymus Serpyllum* L.
Prunella vulgaris L.
Teucrium Scorodonia L.

Plantago major L.
P. lanceolata L.
P. maritima L.
P. Coronopus L.
Littorella uniflora Asch.

Atriplex patula L.
A. hastata L.
A. glabriuscula Edm.
Suaeda maritima Dum.
Salsola Kali L.

Polygonum Convolvulus L.
P. aviculare L.
P. Persicaria L.
Rumex obtusifolius L.
R. crispus L.
R. Acetosa L.
R. Acetosella L.

Urtica dioica L.
U. urens L.

Myrica Gale L.

Betula tomentosa Reith. & Abel.
Alnus glutinosa Gaert.
Quercus Robur L.
Fagus sylvatica L.

Salix aurita L.
S. purpurea L.
S. repens L.

Empetrum nigrum L.

Juniperus communis L.
Pinus sylvestris L.

Corallorrhiza trifida Châtel.
Listera cordata Br.
L. ovata Br.

- Goodyera repens* Br.
Orchis mascula L.
O. incarnata L.
O. latifolia L.
O. maculata L.
Habenaria virescens Druce.
- Iris Pseudacorus* L.
- Narthecium ossifragum* Huds.
- Juncus bufonius* L.
J. squarrosus L.
J. compressus Jacq.
J. Gerardi Lois.
J. effusus L.
J. conglomeratus L.
J. bulbosus L.
J. subnodulosus Schrank.
J. articulatus L.
J. sylvaticus Reichb.
Luzula pilosa Willd.
L. sylvatica Gaud.
L. campestris DC.
L. multiflora DC. & var. *congesta* (Lej.).
- Typha latifolia* L.
- Lemna minor* L.
- Alisma Plantago-aquatica* L.
- Triglochin maritimum* L.
Potamogeton polygonifolius Pourr.
- Eleocharis palustris* Br.
E. multicaulis Sm.
Scirpus setaceus L.
S. Tabernaemontani Gmel.
Eriophorum vaginatum L.
E. angustifolium Roth.
- Carex arenaria* L.
C. echinata Murr.
C. leporina L.
C. Goodenowii Gay.
C. flacca Schreb.
C. Oederi Retz.
C. inflata Huds.
- Anthoxanthum odoratum* L.
Alopecurus geniculatus L.
Agrostis canina L.
A. alba L., and var. *maritima* Meyer.
A. tenuis Sibth.
Ammophila arenaria Link.
Aira caryophyllea L.
A. praecox L.
Deschampsia caespitosa Beauv.
D. flexuosa Trin.
Holcus mollis L.
H. lanatus L.
Phragmites communis Trin.
Poa annua L.
Glyceria fluitans Br.
G. maritima Mert. & Koch.
Festuca ovina L.
F. rubra L., var. *duriuscula* (Syme).
Nardus stricta L.
Elymus arenarius L.
- Blechnum Spicant* With.
Dryopteris montana OK.
Polypodium vulgare L.
- Equisetum arvense* L.
E. palustre L.
E. limosum L.
- Lycopodium Selago* L.
L. inundatum L.
L. clavatum L.
Selaginella selaginoides Link.

THE VEGETATION OF BEINN LAOIGH.

By DONALD PATTON, M.A., B.Sc., Ph.D.

BEINN LAOIGH, or, as it is sometimes written, Ben Lui, is situated on the borders of Argyllshire and Perthshire (lat. 56 degs. 24 N.; long. 4 degs. 48 W.), the actual summit being in the latter county. According to H. C. Watson's subdivision of Scotland the area under consideration lies partly in vice-county 98 (Argyll) and partly in 88 (Mid Perth). Beinn Laoigh is the highest of a group of four mountains at the western extremity of the Breadalbanes, and the 26th highest in Scotland. From west to east these summits are:—

Beinn a'Chliebh,	3008 ft.
Beinn Laoigh,	3708 ft.
Beinn Oss,	3347 ft.
Beinn Dubh Chraige,	3204 ft.

The Summit of Beinn Laoigh is five miles distant from Tyndrum, six miles from Dalmally and eight from Crianlarich or Ardlui. It is easiest of access from Tyndrum either by way of the Conenish Valley or by the Tyndrum-Dalmally road.

So much have the natural and ancient conditions of the vegetation of the British Isles been interfered with at the hand of man as well as by his flocks and herds, that the idea of making an ecological study of any area in these islands has oft been ridiculed. However, if there be a district where one would expect to be far from the influence of man it is to be found in the recesses of the Highlands of Scotland and such an area as that indicated affords an example. True it is that since 1741 the lead veins in this neighbourhood have, though somewhat intermittently, been exploited. But it is a long time since these mines were worked, though even to-day there are signs of renewed activity hard by. Meantime the Sphagnum and its peat have already healed up many of the old scars and the old mine road is slowly becoming part of the moor. Perhaps it is otherwise with regard to the deer and the sheep, although to some extent these animals, especially the latter, may be regarded as belonging to the area. This, of course, applies to their manner of feeding as well as to their agency in dispersing seed and in fertilising the soil. Where

sheep have not access to the high lands occupied by the deer, as obtains in the Island of Jura, the vegetation is coarse and rank; but the sheep pastures, although occupying a similar situation and growing on like soil, are of a lusher green, a more tender herbage, and contain species not found in the deer forest. On Beinn Laoigh sheep and deer are not artificially kept apart. Again in the range of which Beinn Laoigh is the chief peak, there is no cultivation. The mountain sides are very steep; the drainage is natural. Only in the lower reaches of the main valleys has there been any attempt at artificial drainage. Thus 'mong the crags and corries of these mountain fastnesses,

“ Pleasant were many scenes, but most to me
 The solitude of vast extent, untouched
 By hand of art, where Nature sowed, herself,
 And reaped her crops; whose garments were the clouds;
 Whose minstrels, brooks;
 Whose banquets, morning dews; whose heroes, storms;
 Whose warriors, mighty winds; whose lovers, flowers;
 Whose orators, the thunderbolt of God.”

If we may judge from the literature extant, Beinn Laoigh was discovered botanically only within the last 50 years. In his “ Flora of Perthshire ” Buchanan White lays claim to the glory conjointly with Col. Drummond Hay. But there are living to-day not a few who recall the controversies to which that claim gave rise. Light-foot, in his “ Flora Scotica,” makes no mention of Beinn Laoigh, though some of the plants submitted to him may have come from that mountain. Mr Peter Ewing submitted an extensive list of the plants of the district in No. 223 of *Science Gossip* in 1883, and in *Journ. Bot.* 9, 1888, Dr Druce gives a graphic description of the vegetation of Beinn Laoigh.

My own acquaintance dates from June 1911, when I was introduced to the mountain by Professor Bower. But from the end of the Great War until now I have visited the Ben at all seasons and have seen it in all its vicissitudes. I desire to acknowledge substantial assistance given by the Carnegie Trustees, whereby I was enabled to make an extensive survey of Beinn Laoigh and the neighbouring mountains of the Breadalbanes.

CONFIGURATION OF BEINN LAOIGH.

Beinn Laoigh owes its existence to the fact that the Glacial

Period terminated when it did. We see from the configuration of the mountain that the agencies of ice had a grip upon it. Vast, well-defined corries are gouged out from the very summit, and the base is overwhelmed in morainic detritus and boulder clay. Truncated spurs are a common feature, whilst the mountain-top detritus indicates the denuding power of the successive freezing and thawing which continued round the summit while yet the valleys were occupied by glaciers. With regard to the corries, the largest, Fionn Choirein, between Beinn a'Chleibh and Beinn Laoigh, faces the N.W., and Corrie Laoigh, between Beinn Laoigh and Beinn Oss, faces N.E. At a greater altitude and between these two, the grandest, the Perthshire Corrie or Coire Gaothach, also lies to the N.E., and to it the spurs of Stob Garbh and Stob an Tighe Airde give the striking sphinx-like appearance. Higher up still, between the Perthshire and the Argyllshire corries, Coire an Lochain faces due north. It is under snow for the greater part of the year. To the east is Coire ant Sneachda overlooking Allt Coire Laoigh. This stream with its tributary, Allt an Lund, which drains the northern crags of Laoigh, forms the headwaters of the River Tay. The N.W. slopes are drained by Allt Eas Daimh, a tributary of the Lochy, which flows into Loch Awe, while the southern hogback of Laoigh lies in the Clyde drainage area.

GEOLOGY.

Members of the Geological Survey of Scotland are at present working out the interrelation of the various rock formations in the metamorphic structure of the Highlands of Scotland. But the historic position of the various schists, grits and limestones does not materially alter the manner in which an approach may be made to the study of the rocks on Laoigh in connection with the vegetation. The sequence may differ in Laoigh and Lawers and other members of the Breadalbanes, but what remains is that we have the rocks *in situ* and their derivatives to go upon irrespective of their position in geological time.

Starting with the summit of the Beinn—the mountain-top detritus already referred to rests upon its parent, the Garnetiferous Mica Schist, which in this area covers a wide range. It descends only to 3200 ft. in Coire an Lochan, but in its extent to the west it

descends to 1700 ft. in Beinn a'Chlieb, which it likewise tops. On the east it descends in Coire Gaothach to 2400 ft., and in Allt Coire Laoigh to about 1300 ft. On the flank of Beinn Oss across Allt Coire Laoigh it is faulted down to an altitude of 1200 ft.

Underlying the Garnetiferous Mica Schists are the more or less Calcareous Mica Schists which extend down to the base of the mountain and the valley of the Conenish. In Allt an Lund they are seen overlying the Black Schist. The escarpment of Stob Garbh presents a fine section. With regard to these schists, the upper escarpments on the northern buttress of Laoigh, and underlying the Garnetiferous Mica Schists, are of the nature of Calc-Sericites. To the N.W., and especially in Allt Coire Laoigh, there are a series of faultings which present exposures of Quartz Mica Schists. Still on the northern escarpment of Laoigh there is, at an altitude of from 1400 ft. on the east in Fionn Choirein extending to 2600 ft. in Stob Garbh an exposure of Hornblende Schist. This schist also appears in two out-crops in the western stream which issues from the Coire Gaothach, the lower at about 1500 ft., the other about 100 ft. higher. It is found, too, for a considerable distance in Coire an Sneachda at 1800 ft. Black Schist occupies the floor of the valleys from Conenish Farm via Ciochan Beinn Laoigh towards Dalmally.

In addition the area is traversed by an E. and W. Basalt dyke which outcrops on the northern escarpment of Laoigh at the county boundary at a height of 2200 ft., and continues westward to a height of 1600 ft. in the Allt Coire Ghaothaich which exposes a fine section. The dyke disappears under the soil on the west side of this stream, but can be picked up again further east in Beinn Oss, and it can also be traced to the west down the valley of the Allt Eas Daimh. Again, to the east of the Allt Coire an Lochain a Felsite Dyke running N.E. and S.W. forms a feature in the Ben. An exposure of Epidiorite appears between Coire an Lochain and Coire Gaothach outcropping from the Sericite; another large exposure forms a prominence in the valley of the Conenish just west of the junction of Allt an Lund and Allt Coire Laoigh.

Boulder Clay occupies the valleys, and moraines are frequent, in most cases topped by peat. Scree and the downcreep of the disintegrating rock form the link between mountain and boulder clay.

It is the calcareous rocks underlying the Garnetiferous Mica

Schist which bear the richest of the alpine flora. The crags here contain the western extension of the famous "Lawers-Caenlochan Schist" which has made Lawers and Clova each the Mecca of British Alpine Botanists. Such names as Cam Craig, Beinn Heasgarnich, The Ptarmigans near Killin, The Craig an Lochain Cliffs at Lochan a Larige, to mention only a few, are themselves inspiring. Ben Vrackie, too, at Pitlochry, is a link in the grand chain. These mountains, together with those of Clova, are among the many visited in connection with the Botanical Survey of Beinn Laoigh.

THE CLIMATE.

Many botanists have been disappointed on arriving at Tyndrum Station to find a thin mist driving down the glen, and not a ben visible. Repeated visits have shown that this is the rule rather than the exception. (The hot dry summers of 1901, 1911, 1921—strange sequence—gave the botanist a favourable opportunity of visiting the recesses of the mountain tops though they did not reveal the usual conditions under which the plants live.) In these mountains, snow lies all the winter, and even by May it has hardly receded above the 2000 ft. contour. The Upper Corrie has been known to retain its snow until August. Here, too, miniature glaciers are often seen. Specially severe are the conditions of those ledge and crag plants (Comophytes) which do not become covered with snow during the winter, but which are exposed to the biting winds at temperatures below freezing point as well as to a very considerable range of temperature according to the measure of insolation as day succeeds night. The season of the mountain flora is brief, and it is shortened as we ascend. The snow fills the springs, the rocks disintegrate to form a porous soil rich in mineral content, and, although low temperatures produce a quasi-physiological drought, the vegetation is lush. Moreover, mist clings to the mountains, and the valleys are drenched with a drizzling rain. The plants rear themselves within a continued precipitation and their roots gravitate into a sodden soil or into brimming crevices, whilst a continuous film of water seeks the streamlets through the lower leaves. Even when no rain falls the wind plays its part, for, gathering the water from the upland tarns, it hurls it against the overhanging cliffs, or, as the runnels discharge over the precipices, the wind converts the water

into spray. Although this area is not a "land of brown heath and shaggy wood," it is essentially a "land of the mountain and the flood."

According to *The Journal of the Scottish Meteorological Society*, vol. x. (3rd series), the average annual rainfall for this district during 25 years (1866-90), is over 100 inches, and for Beinn Laoigh it may even exceed 130. The return for Glencroe is 128 ins., and for the Bridge of Orchy 118 ins., and Beinn Laoigh, lying between these stations, invites a heavier rainfall.

The relation between mists and insolation has also to be reckoned with in connection with the growth of the vegetation.

The following records have been taken from the *Journ. Scot. Meteor. Soc.*, vol. xi. (1895-96):—

Tyndrum, 56 deg. 26 min. N., 4 deg. 43 min. W.
792 ft. above sea level.

Mean monthly and annual records.

	Barometer. 9 a.m. and 9 p.m. during 1857-95.	Temperature.
	INCHES.	DEGREES.
Jan.,	29.794	35.6 F.
Feb.,	29.858	36.4
Mar.,	29.824	37.5
Apr.,	29.889	42.1
May,	29.936	47.2
June,	29.939	53.0
July,	29.870	55.4
Aug.,	29.851	54.2
Sept.,	29.856	51.5
Oct.,	29.803	44.4
Nov.,	29.820	39.0
Dec.,	29.808	36.6
Annual,	29.854	44.4

In this region snow occasionally falls late in the year. On 4th May 1921 snow fell at Tyndrum.

THE FACTORS AT WORK.

As already mentioned, Beinn Laoigh is not on the regular beaten track of the excursionist. It is rather inaccessible. Even agriculture does not reach its slopes, although the influence of sheep has to be considered. There exists, too, on the approach to the Ben at Tyndrum, a remnant of the ancient Caledonian Forest which has afforded some interesting botanising in the past, chiefly to the bryologist and to the fungoloist.

In discussing the Vegetation of Beinn Laoigh, it is proposed to subdivide the area into the following localities, and to treat them seriatim:—

I. Conenish.

Around the confluence of the Conenish River and Allt Eas Anie, and westward to the confluence of Allt an Lund and Allt Coire Laoigh.

II. The Head Valleys.

Allt an Lund.

Allt Coire Laoigh.

Allt Eas Daimh.

III. Stob Garbh and the Northern Scarps.

IV. The Corries.

The Perthshire Corrie (Coire Gaothach).

The Argyllshire Corrie (Fionn Choirein).

The N.W. (Upper) Corrie (Coire an Lochan).

V. The Grasslands of the Upper Slopes.

VI. The Mountain Top.

I. Around Conenish.

Conenish Farm, with its adjacent shepherd's house from which most of the excursions to the area were made, stands at the confluence of the R. Conenish and Allt Eas Anie. It is essentially a sheep farm. All the tillage that is done is confined to a very small walled-in area which is given up to the cultivation of natural hay, a few turnips, and potatoes. The farm buildings are considerably sheltered by high morainic accumulations. Here the Boulder Clay deeply overlies the Quartz Mica Schist which is being eroded and corroded by the rivers. In spite of the presence of the

sheep farm and in spite of the previous occupation of a small area in the near vicinity by a small lead working community (the miners resided at Tyndrum, then called Clifton) there is very little evidence of introduced plants. Typical weeds of the farm are found only within the retaining wall already mentioned. The common Daisy, abundant on Lawers up to an altitude of 2800 ft., is here a rarity. The writer knows only one locality for it (the roadside at Conenish) within the past twelve years, and he has never seen it grow on Beinn Laoigh. The margins of the path leading from the farm to the shepherd's house produce:—

Polygonum aviculare,
Rumex crispus,
R. Acetosa,
R. Acetosella

The last two Rumices are, of course, very abundant around the sheep fanks, where they are only, and only at times, subdominant to *Urtica dioica*, which on Beinn Laoigh grows unaccompanied by *Pteris*.

Allt Eas Anie and the Conenish River join below the farm. The vegetation of the one valley stands out in striking contrast with that of the other. At the close of the Ice Age these two valleys were left with a somewhat similar floor, for it may not be considered that the Boulder Clay deposited therein came from the slopes that the streams now drain. However that may be, the accumulation of Boulder Clay and morainic material in these valleys afforded an excellent substratum for the development of moorland. An investigation of the peat which now rests upon the Boulder Clay would doubtless show interesting divergent series of succession until the present vegetation is reached. So that to-day the valley of the Allt Eas Anie fed by water from the Quartz Mica Schist of Beinn Chuirn and the Quartzites of Meall Odhar, both exceedingly poor in mineral salts, is a Calluna-Vaccinium Moor. On the other hand, the valley of the Conenish, watered by the head-springs of the River Tay, which well from the calcareous flanks of Beinn Laoigh, rich in minerals, luxuriates as a Grass Moor. (For the flora of this valley see the subjoined table.) Lower down the Conenish Valley, where it bends round towards Crianlarich, the Ancient Caledonian Forest persists

and at no very remote period it existed at the upper reaches. To-day the roots of the pines are being dug out of the peat for firewood at Conenish. In the forest mentioned above and on the knolls arising from its swampy floor are to be found such plants as *Trientalis europaea*, *Pyrola media*, and *Listera cordata*; while in the sphagnum marshes of the wood (Coille Coire Chuile), there is great abundance of *Oxycoccus quadripetalus*, *Carex pauciflora*, and *Rhynchospora alba*. At Conenish, however, the forest has gone, and the broken peaty moorland is not relieved by any trees save an occasional rowan or birch by the side of the river, and only where the stream has corroded deeply. Just above the confluence of the streams, in the sphagnum marshes of Allt Eas Anie, there is a wealth of *Drosera rotundifolia* interspersed with *D. anglica*, and here the hybrid, *D. obovata*, grows.

Above Conenish the Boulder Clay has been deeply corroded by the Conenish River, and the great erosion of past years has resulted in extensive stretches of alluvium. At places the channel has for the time reached its base level of denudation, so that during floods the wide alluvial tracts are silted, and fresh young grass and sedges render them a fertile pasturage in the summer months, simulating in this respect, though in miniature, the grassy holms of the Upper Clyde Valley. Species, of course, differ. Here are found, in the drier areas, *Agrostis canina*, *A. tenuis*, *Anthoxanthum odoratum*, *Festuca ovina*, *Cynosurus cristatus*, with *Prunella vulgaris*, *Lotus corniculatus*, *Potentilla erecta*, *Euphrasia officinalis*. In the wetter places the grasses are more or less replaced by *Junci* and members of the *Cyperaceae*. These also predominate where the alluvium is dissected by tributary streams.

On the old river terraces and on the higher slopes of the boulder clay by the stream sides, all stages in the formation of peat are found. The Vegetation is similar to that described under "The Head Valleys" save that in the wetter localities there is a greater abundance of *Erica Tetralix* and *Scirpus caespitosus*. *Myrica Gale* is locally abundant here, but it is exceedingly rare above the confluence of Allt an Lund and Allt Coire Laoigh.

The gravel stretches of the river, at altitudes around 900 ft., support, in addition to the general vegetation, such plants of the Ben as:—

Saxifraga oppositifolia.
S. aizoides.
Oxyria digyna.

Silene acaulis.
Alchemilla alpina.

Seeds of these—more probably whole plants—have been brought down from the upper reaches and the higher altitudes, and growth has been maintained at this lower level on account of the continuance of their former ecological conditions. These plants can be traced farther down the Conenish and into Strath Fillan (below 600 ft.) in similar localities. There is, too, in this Upper Conenish Valley, a waterfall which has carved out a sheltered gorge. Here arctic-alpines from the Ben luxuriate, flower and fruit often a month earlier than they do on the upland crags, viz. :—

Trollius europaeus.
Solidago Virgaurea.
Rubus saxatilis.
Sedum roseum.
Thalictrum alpinum.
Lycopodium Selago.

Geranium sylvaticum.
Galium boreale.
Thymus Serpyllum.
Saxifraga aizoides.
S. oppositifolia.
S. stellaris, etc.

Mention must be made of the straggling, storm-buffeted larch which rears itself within the precincts of Conenish Farm.

For a complete list of the plants of this area (and of the succeeding areas) see appendix.

II. The Head Valleys.

The Conenish River is formed by the junction of Allt Coire Laoigh and Allt an Lund. The old mine workings can be traced out along the banks of the latter near the confluence and at the base of the mountain proper. In the valley below these remains the peat hags reveal an abundance of the bleached roots of an ancient forest. Water lies long here, and the vegetation is scanty, consisting chiefly of tussocks of grass and sedge. Large boulders appear half-buried in the peat and, on sheep horns which are found lying in the shelter of these, *Onygena* occurs frequently.

(a) Allt an Lund.

The valley of this stream is more or less terraced, presenting two outstanding series of terraces, a wet series nearer the stream and, higher, a dry series which is being encroached upon by the screes.

and by the general downcreep of soil from the Ben. Characteristic of the former area are the following plants:—

<i>Eriophorum vaginatum.</i>	<i>Linum catharticum.</i>
<i>E. angustifolium.</i>	* <i>Lysimachia nemorum.</i>
<i>Scirpus caespitosus.</i>	<i>Trifolium repens.</i>
<i>Juncus squarrosus,</i>	<i>Pinguicula vulgaris.</i>
<i>Molinia caerulea.</i>	* <i>Pedicularis palustris.</i>
<i>Juncus conglomeratus.</i>	<i>Crepis paludosa.</i>
<i>J. sylvaticus.</i>	<i>Taraxacum officinale.</i>
<i>J. articulatus,</i>	* <i>Erica Tetralix,</i> sparingly.
<i>Luzula congesta.</i>	* <i>Calluna vulgaris,</i> sparingly.
<i>Anthoxanthum odoratum.</i>	* <i>Triglochin palustre.</i>
<i>Festuca ovina.</i>	<i>Drosera rotundifolia.</i>
<i>Carex echinata,</i>	<i>Parnassia palustris.</i>
<i>C. flava.</i>	<i>Equisetum palustre.</i>
<i>C. pulicaris.</i>	<i>E. sylvaticum.</i>
<i>Ranunculus Flammula.</i>	<i>Narthecium ossifragum.</i>
<i>Viola palustris.</i>	* <i>Malaxis paludosa.</i>

In addition to the above (omitting those marked with an asterisk which either are absent at the higher altitude or are not so frequent) and occupying the drier areas up to 1300 ft., the following plants are to be found:—

<i>Festuca ovina, f. vivipara.</i>	<i>Vaccinium Myrtillus.</i>
<i>Nardus stricta.</i>	<i>Euphrasia officinalis.</i>
<i>Cynosurus cristatus.</i>	<i>Polygonum viviparum.</i>
<i>Sieglingia decumbens,</i>	<i>Tofieldia palustris.</i>
<i>Agrostis tenuis.</i>	<i>Prunella vulgaris.</i>
<i>A. canina.</i>	<i>Erica cinerea.</i>
<i>Alchemilla alpina.</i>	<i>Anemone nemorosa</i>
<i>A. vulgaris.</i>	<i>Tussilago Farfara.</i>
<i>Thymus Serpyllum.</i>	<i>Hypochoeris radicata.</i>
<i>Galium saxatile.</i>	<i>Angelica sylvestris.</i>
<i>G. boreale.</i>	<i>Saxifraga hypnoides.</i>
<i>Geum rivale.</i>	<i>Primula vulgaris.</i>
<i>Rhinanthus Crista-galli.</i>	<i>Polypodium vulgare.</i>
<i>Thalictrum alpinum.</i>	<i>Blechnum Spicant.</i>
<i>Viola canina.</i>	<i>Cystopteris fragilis.</i>
<i>V. sylvatica.</i>	<i>Phegopteris Polypodioides.</i>
<i>Cardamine hirsuta.</i>	<i>P. Dryopteris.</i>
<i>Pedicularis sylvaticum.</i>	<i>Dryopteris montana.</i>
<i>Oxalis Acetosella.</i>	<i>Deschampsia flexuosa.</i>
<i>Potentilla erecta.</i>	<i>D. caespitosa.</i>

As the valley of the Conenish is ascended beyond the confluence it rapidly narrows. The slopes towards the stream are dissected by numerous natural tributaries. Thus the drainage is not impeded to any great extent by the moss and peat, and an abundant rainfall flushes the bogland. Add to this the fact that the waters from the Ben have traversed the region of the calcareous schists. Hence a grassy moorland type of vegetation occupies the valley. *Myrica Gale*, frequent below the confluence, now disappears. Sphagnum is very abundant on the lower terraces, especially where these are broad and level, and here *Malaxis paludosa* grows. Here, too, occasional bare patches of peat are exposed, which for the greater part of the year lie under water.

(b). Allt Eas Daimh.

The vegetation of this valley is similar to that of Allt an Lund. The calcareous schist escarpments extend beyond the col right down to the point where the stream traverses the lower slopes of the Argyllshire Corrie. In the lower reaches, before it flows under the railway to join the River Lochy, there is a series of kames where, on account of the nature of the deposits, the soil is more acid. Here are to be found a few clumps of *Pteris*, but they are local, the main character of the vegetation being that of a grassland, closely resembling that of the Upper Conenish. Boggy in places, this area is rich in mosses. ledges and bosses of *Polytrichum commune* and *Sphagnum* spp.—chiefly *S. cymbifolium* and *S. acutifolium*. These are conspicuous, especially in the late autumn, when the surrounding vegetation has died down. Here, too, are a few scattered birches, but they are lichen and moss clad and are slowly succumbing to the attack of fungi.

(c). Allt Coire Laoigh.

The head-waters of this valley drain an area poorer in calcareous schists, the rocks being more quartzose. However, the rocks are steeper and more deeply dissected by tributary streams. They are much drier and the lush vegetation is more confined to the margins of the numerous runnels. Away from these a rich vegetation is also maintained, which is due, no doubt, to the gravitating water in the subsoil. Further, and owing to the nature of the weathering of the

schists, the debris of the mountain, brought down and scattered over the lower ground, though tending locally to be stiff, is well aerated and contains an abundant salt supply. The dominant vegetation is again of the grassy type. *Calluna vulgaris* is very scarce and, where found, is associated but sparingly with *Erica Tetralix* in the wetter places, and rarely with *E. cinerea* in the drier areas; but there is no attempt at a Calluna-Moor Association such as obtains in Allt Eas Anie.

These head-valleys are strewn with boulders and rock-masses from the overhanging crags. Such rocks, as well as the debris on the screes where it has come to the angle of repose, are gradually colonised by species of algae, lichens and bryophytes, the vegetation depending upon the time during which these rocks have been exposed to the working of the various ecological factors. An outstanding feature here, as with the rocks *in situ*, is to be found in the nature of the weathering of the different schistose rocks. Boulders of quartz-mica-schist may be practically barren, but where the quartz predominates the chief colonists are lichens, e.g. *Rhizocarpon geographicum* DC. Others of note here are *Platysma Fahlunense* Nyl., *Gyrophora cylindrica* Ach., *Lecanora sulphurea* Ach., etc., whilst around the base of the boulders *Rhacomitrium lanuginosum* is the most frequent moss. The garnetiferous-mica-schist affords a better surface for bryophytes and the boulders are usually mottled with lichens and mosses, species of *Rhacomitrium* (*R. aciculare*, *R. heterostichum*, *R. fasciculare*,) and species of *Andreaea*. The Calcareous Schists weather more readily than the above. They crumble away and leave a porous, friable surface which in wetter parts is the habitat of angiosperms as well as bryophytes, algae and lichens. Of the last mentioned these are of note:—*Lecanora tartarea* Ach., *L. parella* Ach., *Aspicilia poriniformis* A.L.Sm., *Rhizocarpon calcareum* T.F., *R. petraeum* Mass., and *Arthopyrenia allogena* A.L. Sm.

Further, plants have been brought down from the heights by the tributary streams, so that along the main streams in each of the three head-valleys, the following species are to be found growing on the escarpments overhanging the water:—

<i>Selaginella selaginoides</i> ,	<i>S. aizoides</i> ,
<i>Saxifraga oppositifolia</i> .	<i>S. stellaris</i> .

<i>Silene acaulis.</i>	<i>Pyrus Aucuparia.</i>
<i>Spiraea Ulmaria.</i>	<i>Geranium sylvaticum.</i>
<i>Solidago Virgaurea.</i>	<i>Trollius europaeus.</i>
<i>Galium boreale.</i>	<i>Lycopodium Selago.</i>
<i>Oxyria digyna.</i>	<i>Angelica sylvestris.</i>
<i>Plantago maritima.</i>	<i>Heracleum Sphondylium.</i>
<i>P. lanceolata.</i>	<i>Avena alpina.</i>

III. Stob Garbh and the Northern Scarps.

Before dealing with the vegetation of the escarpments, which is the scope of this section, mention must be made of the grassy slopes which descend to the levels already described. Most noteworthy are those leading from Coire Gaothach which are watered, drained and soil-besprinkled by the two large streams issuing therefrom. The north-eastern exposure and the gradient of the slopes contribute towards a strong insolation during the greater part of the summer day. In the morning, however, the shadows of Ben Oss limit the range, as, in the evening, do the shadows of the Ben itself. The position of the corrie-lip causes the water-table to contribute to the slopes—reducing its head by percolating through the rocks underlying the slopes and causing moist hollows to appear, which are lush and rich in many of the characteristic flowers of the mountain. The soil is rich in lime content. A notable addition to the flora is found in *Kobresia bipartita*, and here too, *Juncus triglumis*, *J. castaneus* and *Carex saxatilis* are frequent. In the pockets of the sides of the cataracts, and at various altitudes, plants of the Stob Garbh escarpment are found, notably *Vaccinium uliginosum*, *Sedum roseum*, *Saxifraga oppositifolia* and even *Bartsia alpina*.

Stob Garbh rears itself to an altitude of about 2600 ft. from which height, to the north, east and west, there descend steep precipices and gullies. These continue from the Stob as bluffs and cliffs overhanging the Allt Eas Daimh, where they present a pseudo-terraced aspect. Mainly an outcrop of the Calcareous Schists, except where interrupted as previously described, by dykes, etc., it is, throughout its entire height, where soil accumulates, practically masked by the debris from the disintegrating calcareous schists. This specially refers to the small exposure of felsite. Where the felsite outcrops extensively, as it does on the summit of Ben Oss, it gives rise, on weathering, to angular fragments of a slabby nature

and forms unstable, barren screes. (*Cf.* The Tinto Hills). Its vegetation simulates that of the quartzite. Where the Hornblende Schist outcrops, the vegetation is very much richer.

Stob Garbh is for the most part shunned by the sun's rays for the greater part of the year. The night frosts of the early summer hold throughout the day even although the sun may shine through an unclouded sky, and the icicles, pendulous from rock and vegetation alike, may only be thawed by circulating atmospheric currents. Many places in the escarpment never receive the direct rays of the sun. On the other hand, where the more prominent ledges outcrop, the vegetation of the pockets, crags and crevices experience an intense, if somewhat limited insolation; the atmosphere is warmed but the subsoil may be icebound. Alpine conditions obtain. The outcrop has its maximum vertical extent on the northern escarpment of Stob Garbh and gradually disappears E. and W. under morainic material and peat. Successive freezing and thawing cause many falls of rock in the spring. Hence the exposures present all stages of plant invasion from the newly formed, barren rock-faces over which the oozing water soon accounts for the presence of *Nostoc*, *Trentepohlia*, etc. to the densely clad bosses with well established arctic-alpines. The nature of the escarpment—the lie of the fold—lends itself to the formation of pockets; for the outcrop here has a dip downwards into the mountain, and ledges are formed which unfortunately aid the unscrupulous collector. The reverse is obvious on Lawers where, on that account, pockets are not so well developed, and cases are extant where rare plants have at times disappeared from ledges simply by falling away with the soil that bears them. Nevertheless the comophytes of Lawers, though more frequently seen than those of Laoigh, gladden the heart—afar off! Mention has already been made of the mode of weathering of the schistose rocks. The sericite itself not only offers a resting place for a luxuriant vegetation but it gives to the pockets and ledges a rich soil not merely with regard to its chemical elements but also from the fact that it disintegrates to a porous soil with a suitable water-holding capacity and adequate aeration. The secret of its fertility may be due largely to these facts together with the influence of the biotic factor active in the accumulating humus. Since the less fertile rocks are besprinkled with the debris from the overlying decomposing

calcareous outcrops, the general tendency is for the vegetation to become more uniformly distributed, the water supply being the chief differentiating factor. One point must not be lost sight of regarding the colonisation of these scarps and gullies, and that is, that members of diverse plant communities vary not only on account of the climatic, edaphic, topographic and biotic factors, nor even on account of competition, but also because of the chances that a grain of any seed has of falling to the ground.

Typical cushions of *Silene acaulis* and *Arenaria sedoides*, straggling outgrowths of *Sedum roseum*, *Saxifraga oppositifolia*, *Alchemilla alpina* and *Dryas octopetala* and, where the rock ledges are more extensive and cushions more compact and intergrown, *Bartsia alpina*, *Trollius europaea*, *Pyrola rotundifolia*, *P. secunda*, *Geranium sylvaticum*, *Botrychium Lunaria* are common. Other plants are:—

<i>Arabis petraea</i> , var. <i>grandifolia</i> .	<i>Campanula rotundifolia</i> .
<i>Draba incana</i> ,	<i>Asplenium viride</i> .
<i>Potentilla Crantzii</i> .	<i>Hypericum pulchrum</i> .
<i>Saussurea alpina</i> .	<i>Cochlearia alpina</i> .
<i>Saxifraga aizoides</i> ,	<i>Cerastium alpinum</i> .
<i>S. nivalis</i> ,	<i>C. vulgatum</i> , var. <i>alpinum</i> .
<i>Lycopodium Selago</i> ,	<i>Carex flava</i> .
<i>Geum rivale</i> ,	<i>Statice planifolia</i> .
<i>Solidago Virgaurea</i> ,	

Where the vegetation is more established owing to the soil being more stable, as on the more extensive ledges, these plants are to be found:—

<i>Vaccinium Myrtillus</i> .	<i>Heracleum Sphondylium</i> .
<i>V. Vitis-Idaea</i> .	<i>Rhinanthus Crista-galli</i> .
<i>V. uliginosum</i> .	<i>R. Drummond-Hayi</i> .
<i>Arctostaphalos Uva-Ursi</i> .	<i>Polygonum viviparum</i> .
<i>Cerastium vulgatum</i> .	<i>Geum rivale</i> .
<i>Salix Arbuscula</i> .	<i>Plantago maritima</i> .
<i>S. Myrsinites</i> .	<i>Hieracium anglicum</i> .
<i>Carex atrata</i> ,	<i>Deschampsia alpina</i> .
<i>C. flava</i> , var. <i>oedocarpa</i> .	<i>Festuca rubra</i> .
<i>C. binervis</i> .	<i>Empetrum nigrum</i> .
<i>Galium sylvestre</i> , var. <i>glabrum</i> .	<i>Avena alpina</i> .
<i>Angelica sylvestris</i> .	

And growing in some of the broader, moss-covered crevices in the crags:—*Cystopteris montana*, *C. fragilis*, *Polystichum Lonchitis* and *Blechnum Spicant*. The first mentioned is still to be found in great abundance along the scarps of the northern face.

On the more established screes at the base of Stob Garbh there is a wealth of *Saxifraga hypnoides*, (and associated with it, *S. quinquefida*), also *Cirsium heterophyllum*, *Euphrasia* spp., *Rhinanthus* spp., *Sagina saginoides* and *Potentilla erecta*, the whole merging down into the vegetation of the valley. The lichen, *Cerania vermicularis* S. F. Gray, is common here, and a rarity, the moss, *Orthothecium rufescens*, fruits here.

In sheltered crannies throughout these cliffs the following are met with:—

<i>Adoxa Moschatellina.</i>	<i>Anemone nemorosa.</i>
<i>Cardamine hirsuta.</i>	<i>Oxalis Acetosella.</i>
<i>Chrysosplenium oppositifolium.</i>	<i>Saxifraga stellaris.</i>

and among the mosses and liverworts, overtopping them and tending to oust them, the lichen, *Solorina saccata* Ach. is common

The habit of the vegetation of the more favoured gullies is most characteristic. Thanks to the shelter afforded them, the plants, in a kindly soil, develop a luxuriant foliage. *Alchemilla vulgaris* assumes a larger leaf and a more profuse inflorescence than it does by the streamsides in the lower valleys. A similar contrast is seen in plants at the same altitude, (a) in sheltered gullies, (b) on exposed ledges, e.g. :—

<i>Solidago Virgaurea.</i>	<i>Geranium sylvaticum.</i>
<i>Sedum roseum.</i>	<i>Vaccinium uliginosum.</i>
<i>Saussurea alpina.</i>	<i>Habenaria viridis.</i>
<i>Cochlearia micacea.</i>	<i>Heracleum Sphondylium.</i>

The glory of *Dryas* and *Pyrola*, blooming on the ledges of Stob Garbh, is never to be forgotten, nor are the magnificent festoons of *Saxifraga oppositifolia* nor the blooms of this Saxifrage peeping through the snow.

“ Upon the mountain ledges green
The Saxifrage’s purple sheen
In many a splendid patch is seen
Salix herbacea floreat !”

In 1921, at an altitude of 2000 ft., twenty-seven plants of *Saussurea alpina* were seen growing in one narrow pocket, all in full bloom. What beauty! What fragrance!

Plants of the sea-side are to be found here:—

Cochlearia officinalis (f. *alpina*). *Plantago maritima*.
Sedum roseum. *Statice maritima*.

No doubt, on the retreat of the ice at the close of the glacial period, because they had adapted themselves to experience a condition of physiological drought, they had a choice of undergoing it either at the sea-side in a halophyte habitat or in the vicinity of snow and ice. The manner in which these plants of the mountain overcome the difficulties attending this physiological drought, be it due to cold or to colloidal substances in the soil, is seen markedly in the development of the root system, not only in the crevices where the comophytes develop long roots, often branching repeatedly and invested with great felts of rootlets, but also in the pockets where the plants may penetrate through the frozen zone or extend widely in a soil which the biotic factors render habitable. Birds, as seed dispersing agents, may aid in the distribution.

The type of vegetation found on the northern exposures of Stob Garbh resembles very closely that which is so notable a feature of the escarpments of biotite-mica schist in the vicinity of Finse, which overlook the Hardanger Glacier in Norway (described in a paper read to the Botanical Society of Edinburgh—*Proc. Bot. Soc. Edin*, Feb. 1915) much more than it does that on the limestone crags of the Swiss Alps.

IV. The Corries.

- A. Coire Gaothach—The Perthshire Corrie.
- B. Fionn Choirein—The Argyllshire Corrie.
- C. Coire an Lochain—The N.W. (Upper) Corrie.

A. Coire Gaothach.

Here there is great variety. From the edge of the corrie extending halfway back between the outstretched limbs of the "Sphinx" of B. Laoigh lies a very hummocky area consisting of morainic material, debris from the cliffs, and rocks outcropping

in situ. This area is very fertile and is drained by streams which go to feed the two large burns that issue from the corrie. The vegetation of the tops of the knolls is stunted and consists chiefly of:—

<i>Festuca ovina</i> , f. <i>vivipara</i> .	<i>Antennaria dioica</i> .
<i>Luzula spicata</i> .	<i>Salix herbacea</i> .
<i>Lycopodium alpinum</i> .	<i>Gnaphalium supinum</i> .
<i>Cochlearia micacea</i> .	<i>Alchemilla alpina</i> .
<i>Potentilla Sibbaldi</i> .	

Cetraria islandica is one of the commonest lichens here. On the slopes are found:—

<i>Vaccinium Myrtillus</i> .	<i>Viola palustris</i> .
<i>V. uliginosum</i> .	<i>Carex flava</i> , var. <i>oedocarpa</i> .
<i>Euphrasia</i> spp.	<i>Rumex Acetosa</i> .
<i>Veronica serpyllifolium</i> , var.	<i>Festuca rubra</i> .
<i>humifusum</i> .	<i>Rumex Acetosella</i> .
<i>Epilobium alpinum</i> .	<i>Nardus stricta</i> .

Well up within the corrie the period of the vegetation is more limited still. The season is shortened on account of the lingering mantle of snow. Amongst the looser and larger rocks at the base of the screes *Alchemilla alpina* and *Galium saxatile* form a dense intergrowth, and there is local abundance of *Phegopteris Dryopteris*, *P. Polypodioides*, *Cystopteris fragilis*, *Lycopodium Selago*, *L. clavatum* and *Cryptogramme crispa*. But it is on the screes themselves that the Parsley Fern luxuriates. It dominates the lower screes, and its extent can easily be traced from a distance, *e.g.*, from Conenish its characteristic yellow-green can be seen contrasting strongly with the colour of the surrounding vegetation and scree. The lower flushes, where the water wells out from the screes into the fresh green of the subjacent slopes, are characterised by a wealth of *Juncus castaneus*. The cliffs uprising from the screes are not so rich as those of Stob Garbh already described—the Garnetiferous Mica Schist here appearing on top. The walls of the corrie, because of its north-eastern exposure, shut out the direct rays of the sun from more than half of the corrie for the greater part of the day and at all seasons. Hence it is that, apart from the edaphic factor, the shadowed area of the south-eastern scarps of the corrie are com-

paratively barren and limited in species, whilst the southern and south-eastern slopes and crags of Stob Garbh are luxuriant and the vegetation is more varied. The most striking of the arctic-alpines upon these more or less bare escarpments is *Arabis petraea*, var. *grandifolia* Druce.

The composition of the rock, its mode of weathering, the short period of insolation made shorter by the prevalence of mists, and above all, the exposure to an atmosphere in spring when the temperature is, oftener than not, below freezing point, though about mid-day it may be very considerably higher (the dormant vegetation of the corrie-floor lying buried under snow)—all these account for the barrenness of the rocky walls of the corrie from an altitude of 2600 ft. to one of 3700 ft. Add to these the fact that, higher up in the corrie, the screes are ever on the move, and that storms are very frequent. Ledges there are in the Garnetiferous Mica Schist where, in the height of summer, some species; e.g., *Alchemilla alpina*, *Gnaphalium supinum*, *Salix herbacea*, *Luzula spicata*, *Festuca ovina*, f. *vivipara*, and curiously enough, *Cardamine hirsuta* and *C. pratense* manage to subsist; but they lack the floristic wealth of the sericite crags of Lawers at a similar altitude.

B. Fionn Choirein.

The Argyllshire Corrie is disappointing after working the Perthshire Corrie. Its exposure is more to the north-west. Larger and less corrie-like it descends to a lower altitude. Boggy at its exit into Allt Eas Daimh it produces several items of interest, e.g., *Carex pauciflora* and *Malaxis paludosa*. The lower flanks of this corrie are associated with the rich calcareous schists, and the vegetation varies accordingly. Higher up its western side Beinn a' Chliebh is precipitous, and bears the richest flora, simulating that of the corresponding walls of Coire Gaothach. Its eastern slopes are more rounded, grassy slopes giving place to extensive screes as the ascent is made to the summit. These expanses are of unstable barren blocks and slabs down-slipping from the mountain-top detritus. The lower reaches of the corrie floor are a grass moor where the following grasses are locally dominant and often closely associated, interspersed with cushions of *Polytrichum commune* in the drier and *Sphagnum* spp. in the wetter areas.

Deschampsia flexuosa.
Festuca rubra.
Festuca ovina.

Agrostis canina.
Agrostis vulgaris.

and also *Juncus squarrosus*, *Carex flava*, and var. *oedocarpa*. The Corrie vegetation at its lower altitudes gradually merges into that of the lower reaches of Allt Eas Daimh already described.

C. Coire an Lochain.

In this upper corrie the vegetative season is shorter than in any other area. At the end of May, 1921, it was still almost completely filled with snow and ice. Miniature glaciers descended to the snow-covered lochan, while round the margin, where the soil had been laid bare, the black remains of decomposing vegetation suggested by their smell, cast up seaweed. Does the process of decay contribute in any way towards raising the temperature of the surrounding soil? There, were cushions of *Silene acaulis* of last year, and trailing branches of *Alchemilla alpina*, last season's stems of *Luzula spicata*, *Poa alpina* and of *Festuca ovina*. "Solvitur acris hiems grata vice veris et Favoni." The belated spring brought on a wealth of blooms, notably *Saxifraga nivalis*, in the more sheltered gullies; and on the more stable screes plant growth was abundant; by August the snow had disappeared and in vegetation this area simulated, though not so richly, the Perthshire corrie.

Although there is a sequence in time of flowering on the lower scarps, in the corrie the limited time demands almost an arctic condition—simultaneous flowering.

NOTE.—Coire Aonaich due south of the summit, and Coire ant Sneachda due east have not been discussed under the above heading since they are not in the same category as corries; but their vegetation is considered along with the other areas as, according to altitude, it conforms to that of the Mountain Top, The Upper Grassland and The Head Valleys.

V. The Grassland of the Upper Slopes.

The transition from the vegetation of the Head Valleys to that of the upper slopes is, in most areas around the Ben, very gradual. Though it may be expected that the more or less abrupt change in inclination where these areas abut should, because of the corres-

ponding change in the drainage, bring about a corresponding change in the vegetation, still the flushing of the upper limits of the valley slopes by the water draining from off the mountain during periods of heavy rainfall scatters fine deposits of the weathered calcareous schists on the lower slopes. As already pointed out, these are also well drained. Hence the vegetation of the Upper Grasslands merges gradually into that of the valley. The altitudes at which this grassland actually commences vary not only with the configuration of the mountain but also with the direction of the exposure. To the north-west and north-east it descends almost to the moorlands already described (c. 2000 ft.) but to the south it has a higher range. There the heath and moor formations of the upper Loch Lomond Drainage Area, which extends to Laoigh from Glen Falloch by way of Gleann nan Caorrann, give place to the Eriophorum and Grass Moor Associations which extend to an altitude of about 2500 ft.

Owing to the configuration of Beinn Laoigh and to the weathering of its outcrops, the area under grass is greatly restricted. Nevertheless, because of the fertility of the soil, the grassland is rich where the weathering detritus has come to the angle of repose. This is utilised for the grazing of sheep, and the hill is much frequented by deer. To the west the mountain-top detritus graduates down into a more or less barren scree extending all along the upper eastern slopes of the Argyllshire Corrie to a considerable and varying depth. Below this, however, the grassland becomes more and more established and is soon dense and luxuriant. The most representative species are:—*Festuca ovina*, *Agrostis canina*, *A. tenuis*, *Deschampsia flexuosa*, and *Anthoxanthum odoratum*, locally abundant being *Juncus squarrosus* which shows its characteristic habit in its spreading leaves. The grassland extends round to the northern flank of Laoigh and carpets the broad shelves which top the successive precipices. Where the ground is more broken owing to corrosion and erosion attending the flushing brought about by heavy rainfall, the ledges show large bright green tufts of *Polytrichum commune* associated with other bryophytes; and where the water is more or less held up, cushions of Sphagnum with Junci are common. *Alchemilla alpina* is universal in this zone,

“Tha trusgan faoiliah air cruitan aonich.”

Where the *Alchemilla* is replaced by *Potentilla Sibbaldi*, the contrast is most striking. This is well marked on the drier and more barren stretches where the pale green leaves of the former tend to become yellow whilst the latter, usually bluish-green in colour, is very often purple or deep crimson. Associated here with the grasses are:—

<i>Ranunculus acris.</i>	<i>Taraxacum officinale.</i>
<i>Viola Riviniana.</i>	<i>Thymus Serpyllum.</i>
<i>Potentilla erecta.</i>	<i>Prunella vulgaris.</i>
<i>Alchemilla alpina.</i>	<i>Euphrasia officinalis.</i>
<i>Lotus corniculatus.</i>	<i>Plantago lanceolata.</i>
<i>Linum catharticum.</i>	<i>Rumex Acetosa.</i>
<i>Galium saxatile.</i>	<i>Luzula spicata.</i>
<i>Narthecium ossifragum.</i>	

to mention the chief.

To the north the escarpments are too frequent, denudation is ever altering the surface conditions. The broad ledges, however, bear a similar carpet to that already described save that, in addition, plants of the scarps have become established therein, notably:—*Solidago Virgaurea*, *Saxifraga hypnoides*, *S. quinquefida*, *Sagina saginoides*, *S. procumbens*, and *Cirsium heterophyllum*.

In Allt Coire Laoigh and on the southern flanks conditions are more favourable and there are well established grassy slopes,—alpine grasslands. *Festuca ovina*, f. *vivipara* is dominant, with *Anthoxanthum odoratum*, *Agrostis canina*, *A. vulgaris*, *Deschampsia flexuosa*, and, locally, *Deschampsia alpina*, *Sieglingia decumbens*, *Molinia caerulea* and *Nardus stricta*. Other plants most common to this area are:

<i>Ranunculus repens.</i>	<i>Campanula rotundifolia.</i>
<i>Cerastium vulgatum.</i>	<i>Vaccinium Myrtillus.</i>
<i>C. alpinum.</i>	<i>Plantago lanceolata.</i>
<i>Potentilla erecta.</i>	<i>Thymus Serpyllum.</i>
<i>Alchemilla vulgaris.</i>	<i>Luzula spicata.</i>
<i>Galium saxatile.</i>	<i>Juncus squarrosus.</i>
<i>Polygala vulgaris.</i>	<i>Carex capillaris.</i>

and *Carex rigida*, and occasionally:—

<i>Thalictrum alpinum.</i>	<i>Rumex Acetosa.</i>
<i>Sagina procumbens.</i>	<i>R. Acetosella.</i>
<i>Trifolium repens.</i>	<i>Luzula multiflora.</i>
<i>Scabiosa Succisa.</i>	<i>Habenaria viridis.</i>

VI. The Mountain Top.

Higher up the dominant plant still is *Festuca ovina*, but there is a greater abundance of *Juncus trifidus*, *Luzula spicata*, and *Carex rigida*. Mosses and lichens fill in the gap, or rather exclude the phanerogams because of their greater adaptability to the conditions obtaining. As the ascent is made to the top, the pockets become emptier, and the accumulation of the mountain-top detritus assumes a honeycombed appearance, block upon block, with no soil save in the smaller nooks and crannies where wind-borne or snow-borne or formed in situ on the boulder, sufficient earth has accumulated to enable the hardiest plant to obtain a foothold. Here, lichens are dominant, *Solorina crocea* being most in evidence. *Rhacomitrium lanuginosum* is the most abundant moss and associated with it are dwarfed specimens of *Salix herbacea*, *Carex rigida*, and *Festuca ovina* ff.

Near the summit, where the soil has accumulated in larger areas it is either barren or clad with vegetation; barren, because the surface soil of a preceding autumn has with its vegetation been displaced or plucked away by the winter's superincumbent and down-creeping snow. There are many such saucers, into which, on account of the inability of most species to set seed at this altitude, neighbouring plants take long to encroach vegetatively. Where the soil is carpeted with vegetation, moss and lichen prevail; but there is also scattered throughout this another flora,—trailing growths of *Salix herbacea*, and *Galium saxatile*, dense cushions of *Silene acaulis*, deeper in colour than the flowers on the lower crags, and clumps of *Gnaphalium sspinum*. Over this assemblage of plants wave the inflorescences of *Deschampsia flexuosa*, *Festuca ovina* and *Luzula spicata*, whilst through it *Carex rigida* threads its way.

In the lists appended the species recorded for the mountain-top, (60 in all), are those found within the altitudes of 3250 ft. and 3703 ft. (the summit).

In this habitat the most important ecological factor is the water supply. Plants which exist here are only such as can withstand long periods of drought. As the summit is approached, standing water and streams become less frequent and do not often occur within 100 ft. of the top, even when there is no drought. The plants which grow in this area are dependable for their water-supply upon what rises

by capillarity from the water table, upon rain, and upon mists. In dry seasons, such as occurred in the summer of 1901, 1911 and 1921, the supply from the water table is soon cut off and even for some time afterwards any surface water that may accumulate is unable to establish continuity with the water underneath owing to the fact that the soil and rock intervening have the interspaces filled with air. The surface water soon evaporates if the drought continues and relief to the plants is only temporary. The majority of the plants of the mountain-top are therefore dependent for their existence upon rain and mists. The adaptations which these species adopt to meet such conditions are chiefly confined to the underground portions. These are relatively very much more developed than the sub-aerial parts and ramify in all directions, penetrating deeply into the sub-soil in order to tap a large mass of it, or following for comparatively great distances the joints and fissures in the rocks upon which they grow so as to be in the vicinity of the water which oozes the more readily that way. The roots and rootlets are in the latter case often densely felted and thus enable the plant to retain for a long time any excess of moisture which reaches it.

In the case of the Phanerogams and higher Cryptogams the sub-aerial portions, but especially the leaves, are more adapted to prevent excessive transpiration. (With regard to the mosses, liverworts and lichens which constitute such a large portion of the mountain-top flora their sub-aerial parts have to a very large extent also to do with water supply). The leaf formation, hairs, etc., are very varied in the arctic-alpine species. This has been fully considered in recent years, the most up-to-date publication applicable to the conditions obtaining on Beinn Laoigh appears in *The Scottish Mountaineering Club Guide*, vol. 1, Section A, by Professor F. O. Bower, on "Scottish Mountain Botany, with special Reference to the Flowering Plants," where he concludes, "These are then the salient features. . . . A low, supine, often woody or succulent, glaucous or hairy vegetation it is, stunted and apparently ill-used so far as its leafy shoot is concerned, and often avoiding the production of flowers by the side alley of vegetative reproduction, called vivipary." A striking feature as the ascent is made towards the mountain top, is that the aquatic plants decrease in number until they would appear to be ousted by the species which at lower altitudes

are found growing well away from wet conditions. These, *e.g.*, *Cochlearia* and *Cardamine*, above the 3000 ft. contour, are found by the mountain runnels.

Insolation and temperature, together with the considerable rarification of the atmosphere at these altitudes, have their effect upon the vegetation. The foliage has already been regarded in the light of transpiration but it is further modified to meet difficulties of respiration and of carbon assimilation brought about by the climate. Add to these the shortness of the open season. All these demand what has been observed under the microscope in sections cut,—a more intense green due to the increased amount of chlorophyll granules present in the cells of the mesophyll, a thicker lamina due to the deeper layer of the palisade parenchyma, a thicker cuticle and a more strongly developed parenchyma, and, area for area, (when leaves of the plants of the mountain-top are compared with leaves of the same species of the valley, even in this short range of altitudes), a greater number of stomata per unit of surface in the plants found at the highest altitudes. These go to show that carbon assimilation and respiration proceed more rapidly and in measure tend to counteract the shortness of the vegetative season. The influence of the lower ranges of temperature has already been discussed for other areas. The cold dry air and the winds have a drying effect upon the plant tissues. The power of endurance is inversely proportional to the amount of contained water within the plant cells. In spite of it all, leaves of grasses and sedges may be incased in icicles, yet when the thaw comes they are found to be carrying on their vital processes. Arctic-alpine plants on Beinn Laoigh have been seen to continue to bud and flower though repeatedly retarded by frost and snow, being sometimes ice-bound for days.

The influence of light in connection with the size, colour, and the perfume of the flowers, the red pigmentation of stem, petiole and leaf, and the shade plants, need only be mentioned again here, as also the action of the wind at these altitudes and its bearing not only upon transpiration and the general habit of the plants but also upon its distribution of soil and detached portions of vegetation from other areas. Such action as the last can easily be observed on snow which has been lying for some time on the mountain.

Edaphic factors also come into play with regard to the vegetation of the mountain-top, especially if a comparison be made with the plant life on other *e.g.*, quartzite summits, the influence being due to the physical as well as to the chemical properties of the soil. For, on Beinn Laoigh, the disintegrating garnetiferous mica schist which forms the mountain-top detritus, although not so rich in minerals as the soil from the calcareous schists of lower altitudes, affords an ample source of calcium, magnesium and potassium, but it also weathers into a soil porous and suitable, in its water-holding capacity, for arctic-alpine plants,—a soil rich also in humus and its associated bacteria and other lower forms which aid as the biotic factor in making life possible to the boreal vegetation.

The Vegetation of the Areas may be summarised as follows :—

I. Around Conenish.

(a) Allt Eas Anie.

Closed Moorland Associations, belonging to the Moor and
ii. Arctic-alpine Grassland.

Heath Formations.

Scirpus Moor Associations. Moor Formation.

Cottongrass Moor Associations. Moor Formation.

Grass Moor Association. Moor Formation.

(b) Upper Conenish.

(b) Argyllshire Corrie.

II. The Head Valleys.

Grass Moor Associations of the Moor Formation.

III. Stob Garbh and the Northern Scarps.

Comophyte Formation.

(a) Open Communities on exposed Rock Faces.

(b) Associations of Sheltered Ledges.

(c) Associations of Shade Comophytes.

(d) Association of Hydrophilous Comophytes.

IV. The Corries.

i. Comophyte Formation, as above.

(a) Perthshire and the Upper Corries.

i. Comophyte Formation.

ii. Arctic-alpine Grassland.

iii. Grass Moor Association, (Lower down).

V. The Grasslands of the Upper Slopes.

Arctic-alpine Grassland.

VI. The Mountain Top.

- i. Moss Lichen Association.
- ii. Rhacomitrium Associations.

P. Ewing, in *Trans. Nat. Hist. Soc. Glasgow*, 1902, reports on "The State of the Alpine Flora in Breadalbane during the last week of July, 1902." Here he refers to the fact that "owing to the prevalence of easterly winds and the want of sunshine during the greater part of the spring and summer months, the growth of vegetation was very greatly retarded." Similar conditions obtained in 1912 and again, strange sequence, in 1922, which again appeared to be adverse to the growth of arctic-alpines. It is noteworthy, in each of the three instances mentioned above, that the year preceding the one under review, (1901, 1911, 1921), was one of great summer heat, intense insolation on the mountain slopes, a very low summer rainfall and a comparative absence of the prevalent mists. To the writer it seems that the backward state of the vegetation in the years 1902, 1912, and 1922, although influenced by adverse weather conditions during the early parts of these years, was primarily due to the drought of the year preceding. During 1911 there was a great display of flowers on Beinn Laoigh, and again in 1921. The surrounding mountains likewise showed a wealth of blooms. On Lawers, *Saxifraga cernua* was specially abundant and flowered lavishly,—a very unusual occurrence, for it seldom flowers. During the years of drought the plants used up their reserve material in their effort to produce seed. Their perennating parts were depleted of their store, and the succeeding year found them weak. Some did not survive the drought. The important point which is brought out by the recurrence of years of drought is that the stability of the life of the vegetation of the mountain-top is interfered with and this should be borne in mind, in conjunction with the gradual amelioration of the climate, when the question of the survival of an arctic-alpine flora in Scotland falls to be discussed.

There are one or two factors which apply to the vegetation of Beinn Laoigh as a whole, and fall to be considered because of their bearing upon plant distribution. The influence of man has already

been referred to and sheep have been mentioned as being responsible for the eradication and the introduction of species.

But the part played by insects is an important one, not so much in connection with pollination directly, since most of the plants of the Ben are perennial or are adapted on account of their limited season to reproduce vegetatively, but because insects, too, have to perpetuate their species. Galls are common on the vegetation (see Professor Trail, in *Ann. Scot. Nat. Hist.*, 1879-1880, on "Scottish Galls") and insect larvae are abundant in the capitula of many of the Compositae. *Saussurea alpina* (to instance one example) was observed by the writer to flower profusely on Beinn Laoigh, but the fact that the flowers seemed to wilt prematurely and to produce no seed was at first put down to the early advent of winter conditions. Closer observation, however, revealed the true cause—very few of the capitula examined during 1920, 21 and 22 were found to be free from larvae.

Perhaps the greatest enemies to the plant life of this mountain are the fungi, and perhaps there is no other area better suited for the study of the Uredineae, both hosts of each heteroecism occurring in close proximity. What is the significance of this? Are the Arctic-alpines tending towards extinction on account of these fungi? Approach another way. Is it the case that the ecological factors are in a sense adverse to these boreal plants and that there is (apart from the fungal attacks), a growing disability for them to maintain their existence, or, in other words, is this another reason for the disappearance of the rarer and more arctic of the mountain flora? If that is so, are these plants by nature less immune to fungal attack than they would be in more northern latitudes? One thing is obvious and that is, that where these species are found at home in the vicinity of the Dovre Fjeld in Norway they are comparatively free from fungi. The answer then is apparent.

So far the following have been identified by the writer:—

On *Thalictrum alpinum*.

Puccinia septentrionalis Juel.,(Aecidia).

Puccinia borealis Juel.,(Aecidia).

On *Saxifraga oppositifolia*.

Melampsora alpina Juel.,(Aecidia).

On <i>Alchemilla alpina</i> .	
<i>Uromyces alchemilla</i> ,	(Uredospores and Teleutospores).
On <i>Campanula rotundifolia</i> .	
<i>Coleosporium campanulae</i> Lev.,	(Uredospores).
On <i>Polygonum viviparum</i> .	
<i>Puccinia Polygoni-amphibii</i> Pers.,	(Teleutospores).
<i>Puccinia septentrionalis</i> Juel.,	(Teleutospores).
On <i>Salix Arbuscula</i> .	
<i>Melampsora alpina</i> Juel.,	(Uredospores).
On <i>Salix herbacea</i> .	
<i>Melampsora alpina</i> Juel.,	(Uredospores).
On <i>Anthoxanthum odoratum</i> .	
<i>Puccinia Anthoxanthi</i> Fekl.,	(Uredospores).
On <i>Anemone nemorosa</i> .	
<i>Puccinia fusca</i> Wint.,	(Teleutospores).

An interesting comparison may be made between the Arctic-Alpine Flora of Beinn Laoigh and the Arctic Flora as described by Sir Joseph Hooker in *Trans. Linn. Soc.* vol. xxiii, p. 256, and the Scottish Arctic-Alpine Flora (Professor Bower, on "Scottish Mountain Botany"). The species found on Beinn Laoigh may be classified thus:—

Arctic species.

According to Hooker's Arctic List,	302
(All these found in Arctic Europe).	
According to Hooker's Arctic List, but not found in Arctic Europe, although in other Arctic areas (see Note 1, at end at Appendix A),	2
According to Hooker's "Student's Flora of the British Islands" (Note 2),	10
	<hr/>
Total number of Arctic species,	314

Alpine species.

Of the above species over 300 are found on the Alps, Pyrenees or Caucasus.	
In addition, according to Hooker's "Student's Flora" (Note 3),	8
	<hr/>
Total Arctic-Alpine Species,	322

Non-Arctic-Alpines (Note 4),	50
Doubtful Species (Note 5),	16

Total for Beinn Laoigh, 388

Further, Hooker gives a list of the most arctic plants of general distribution that are found in all the arctic areas. Of these 36 are in the British flora, and 25 are found on Beinn Laoigh. In a second list he includes 22 species which occur in all the chief arctic areas around the pole, but usually do not attain such high latitudes as the foregoing. Of these, 17 are in the British flora, and 9 are found on Beinn Laoigh. Thus of the 83 most arctic plants, 53 are in the British flora, and 34 grow on Beinn Laoigh. (See *B.E.C. Report* for 1922—PATTON, on "Variations in the Vegetation along the out-crop of the Lawers-Caenlochan Schist").

Another interesting feature is that the following 35 species are found at all altitudes on Beinn Laoigh:—

<i>Thalictrum alpinum.</i>	<i>Polygonum viviparum.</i>
<i>Ranunculus acris.</i>	<i>Oxyria digyna</i> (1).
<i>Viola palustris</i> (2).	<i>Rumex Acetosella.</i>
<i>Silene acaulis</i> (1).	<i>R. Acetosella.</i>
<i>Sagina procumbens.</i>	<i>Juncus squarrosus.</i>
<i>Geranium sylvaticum.</i>	<i>Luzula multiflora</i> (2).
<i>Oxalis Acetosella.</i>	<i>Carex echinata.</i>
<i>Potentilla erecta.</i>	<i>Anthoxanthum odoratum.</i>
<i>Alchemilla alpina.</i>	<i>Deschampsia caespitosa</i> (1).
<i>Saxifraga stellaris</i> (1).	<i>D. flexuosa.</i>
<i>S. aizoides.</i>	<i>Molinia caerulea.</i>
<i>Sedum roseum</i> (1).	<i>Festuca ovina</i> (1).
<i>Galium saxatile.</i>	<i>Nardus stricta.</i>
<i>Taraxacum palustre</i> (1).	<i>Blechnum Spicant.</i>
<i>Vaccinium Myrtillus.</i>	<i>Lastrea Filix-mas.</i>
<i>Veronica serpyllifolia.</i>	<i>Phegopteris Polypodioides.</i>
<i>Thymus Serpyllum.</i>	<i>Lycopodium Selago.</i>
<i>Plantago lanceolata.</i>	

(1) These are in Hooker's list of 61 most arctic plants.

(2) These are in Hooker's second list of 22*.

**Draba rupestris* occurs in both of Hooker's lists.

The following table gives the number of species and varieties recorded for the various districts of Beinn Laoigh:—

(a) Bienn Laoigh, aggregate,	388
(b) Upper Conenish Valley,	185
(c) The Head Valleys,	191
(d) Argyllshire Corrie,	226
(e) Perthshire Corrie,	114
(f) North (Upper) Corrie,	68
(g) Stob Garbh Crag,	245
(h) Upper Grasslands,	86
(i) The Summit Flora,	60

Details of the above are found in Appendix A.

The Flora of Beinn Laoigh may be summed up thus :—

<i>Phanerogams</i> ,	350	<i>Equisetales</i> ,	9
<i>Filicales</i> ,	25	<i>Musci</i> ,	191
<i>Lycopodiales</i> ,	4	<i>Hepaticae</i> ,	114

The ratio of Monocotyledons to Dicotyledons is 117/233 or 1 : 2.

According to Hooker, the ratio for Arctic Europe is 1 : 2.3, and for the Arctic as a whole, 1 : 2.6.

APPENDIX A.

LIST OF PLANTS AND THEIR LOCALITIES.

I. Phanerogams, etc.

- (a) Aggregate.
- (b) Upper Conenish Valley.
- (c) Allt an Lund, Allt Coire Laoigh and Allt Eas Daimh.
- (d) Argyllshire Corrie.
- (e) Perthshire Corrie.
- (f) North (Upper) Corrie.
- (g) Stob Garbh Crag.
- (h) Upper Grasslands.
- (i) Summit Flora.

NOTE.—In a few cases plants (mostly critical species) have not been personally observed on the Ben. Numbers (as under) are used to indicate the authority :—

- | | |
|-----------------|--------------------|
| 1. A. Bennett. | 4. P. Ewing. |
| 2. C. Bucknall. | 5. F. J. Hanbury. |
| 3. G. C. Druce. | 6. E. S. Marshall. |

	a	b	c	d	e	f	g	h	i
<i>RANUNCULACEAE.</i>									
<i>Thalictrum alpinum</i> L.	x	x	x	x	x	x	x	x	x
<i>Anemone nemorosa</i> L.	x	x	x	x	x		x		
<i>Ranunculus hederaceus</i> L.	x	x							
<i>R. Flammula</i> L.	x	x	x	x			x	x	
<i>R. acris</i> L.	x	x	x	x	x	x	x	x	x
<i>R. Natorstii</i> A. Berl.	x 3								
<i>R. repens</i> L.	x	x	x	x			x	x	
<i>R. Ficaria</i> L.	x	x	x	x			x		
<i>Caltha palustris</i> L.	x	x	x	x		x	x		
var. <i>minor</i> Syme.	x			x	x	x	x		
<i>C. radicans</i> Forster.	x 3								
<i>Trollius europaeus</i> L.	x	x	x	x	x		x		
<i>CRUCIFERAE.</i>									
<i>Radicula Nasturtium-ag.</i>									
Druce.	x	x		x	x		x		
<i>Arabis petraea</i> L.	x			x	x	x	x		x
var. <i>grandifolia</i> Druce.	x			x	x		x		
<i>A. hirsuta</i> Scop.	x			x			x		
<i>Cardamine pratensis</i> L.	x	x	x	x	x		x		
var. <i>palustris</i> (Peterm.)	x				x				
<i>C. hirsuta</i> L.	x	x	x	x	x		x		
<i>C. flexuosa</i> With.	x	x	x	x	x		x		
<i>Draba incana</i> L.	x			x	x		x		
var. <i>confusa</i> (Ehrh.).	x				x	x	x		
<i>D. rupestris</i> Br.	x						x		
<i>Erophila verna</i> E. Meyer.	x			x			x		
<i>Cochlearia alpina</i> Wats.	x			x	x	x	x	x	x
<i>C. micacea</i> Marshall.	x			x	x	x	x		
<i>Sisymbrium Thalianum</i> Gay.	x						x		
<i>VIOLACEAE.</i>									
<i>Viola palustris</i> L.	x	x	x	x	x	x	x	x	x
<i>V. Riviniana</i> Reichb.	x	x	x	x			x		
<i>V. canina</i> L.	x	x	x	x			x		
<i>V. lutea</i> Huds.	x	x	x	x			x		
f. <i>amoena</i> (Symons.).	x	x	x	x	x		x	x	
<i>POLYGALACEAE.</i>									
<i>Polygala vulgaris</i> L.	x	x	x	x			x		
<i>P. serpyllacea</i> Weihe.	x			x			x		

	a	b	c	d	e	f	g	h	i
<i>CARYOPHYLLACEAE.</i>									
<i>Silene acaulis</i> L.	x	x	x	x	x	x	x	x	x
<i>Lychnis dioica</i> L.	x 4								
<i>L. Flos-cuculi</i> L.	x 4								
<i>Cerastium viscosum</i> L.	x	x	x				x		
<i>C. vulgatum</i> L.	x	x	x	x	x		x		
<i>C. alpinum</i> L.	x			x	x	x	x	x	x
var. <i>pubescens</i> Syme.	x				x	x	x	x	x
<i>Stellaria media</i> L.	x			x			x		
<i>S. Holostea</i> L.	x 4								
<i>S. graminea</i> L.	x	x	x				x		
<i>S. uliginosa</i> Murr.	x	x	x	x	x		x		
<i>Arenaria sedoides</i> Froel.	x			x	x	x	x		x
<i>Sagina procumbens</i> L.	x	x	x	x	x	x	x	x	x
<i>S. saginoides</i> D.T.	x			x	x	x	x	x	x
<i>S. scotica</i> Druce.	x 3								
<i>PORTULACAEAE.</i>									
<i>Montia fontana</i> L.	x	x	x	x			x		
<i>HYPERICACEAE.</i>									
<i>Hypericum pulchrum</i> L.	x	x	x	x			x		
<i>LINACEAE.</i>									
<i>Linum catharticum</i> L.	x	x	x	x	x		x	x	
<i>GERANIACEAE.</i>									
<i>Geranium sylvaticum</i> L.	x	x	x	x	x	x	x	x	x
<i>G. pratense</i> L.	x 4								
<i>G. Robertianum</i> L.	x	x	x						
<i>Oxalis Acetosella</i> L.	x	x	x	x	x	x	x	x	x
<i>LEGUMINOSAE.</i>									
<i>Trifolium pratense</i> L.	x	x							
<i>T. repens</i> L.	x	x	x	x	x		x	x	
<i>Lotus corniculatus</i> L.	x	x	x	x	x		x	x	
<i>ROSACEAE.</i>									
<i>Spiraea Ulmaria</i> L.	x	x	x	x			x		
<i>Rubus saxatilis</i> L.	x	x	x	x	x		x		
<i>Dryas octopetala</i> L.	x			x	x		x		
<i>Geum rivale</i> L.	x	x	x	x			x		
<i>G. urbanum</i> L.	x	x							

	a	b	c	d	e	f	g	h	i
<i>Potentilla Crantzii</i> G. Beck.	x			x	x		x		
<i>P. erecta</i> Hampe.	x	x	x	x	x	x	x	x	x
<i>P. palustris</i> Scop.	x	x	x						
<i>P. Sibbaldi</i> Hal. fil.	x			x	x	x	x	x	x
<i>Alchemilla vulgaris</i> L.	x	x	x	x	x	x	x	x	
<i>A. alpestris</i> Schmidt.	x		x	x	x	x	x	x	
<i>A. alpina</i> L.	x	x	x	x	x	x	x	x	x
<i>Pyrus Aucuparia</i> Ehrh.	x	x	x	x			x		
SAXIFRAGACEAE.									
<i>Saxifraga oppositifolia</i> L.	x	x	x	x	x		x		
<i>S. nivalis</i> L.	x			x	x	x	x		x
<i>S. stellaris</i> L.	x	x	x	x	x	x	x	x	x
<i>S. aizoides</i> L.	x	x	x	x	x	x	x	x	x
<i>S. hypnoides</i> L.	x		x	x			x	x	
<i>S. quinquefida</i> Haw.	x			x			x		
<i>Chrysosplenium oppositifolium</i> L.	x	x	x	x	x	x	x	x	
<i>C. alternifolium</i> L.	x	x					x		
<i>Parnassia palustris</i> L.	x	x	x	x			x		
CRASSULACEAE.									
<i>Sedum roseum</i> Scop.	x	x	x	x	x	x	x	x	x
<i>S. anglicum</i> Huds.	x						x		
DROSERACEAE.									
<i>Drosera rotundifolia</i> L.	x	x	x	x			x		
<i>D. anglica</i> Huds.	x	x	x						
<i>D. ang.</i> × <i>rot.</i> (<i>obovata</i> M. & K.).	x	x	x						
ONAGRACEAE.									
<i>Epilobium montanum</i> L.	x	x	x	x	x		x		
<i>E. montanum</i> × <i>E. palustre</i>	x		x				x		
<i>E. tetragonum</i> L.	x	x					x		
<i>E. palustre</i> L.	x	x	x				x		
<i>E. alsinifolium</i> Vill.	x			x	x		x		
<i>E. alpinum</i> L.	x			x	x	x	x	x	x
UMBELLIFERAE.									
<i>Hydrocotyle vulgaris</i> L.	x	x	x				x		
<i>Conopodium majus</i> Loret.	x	x	x	x			x		
<i>Angelica sylvestris</i> L.	x	x	x	x			x		

	a	b	c	d	e	f	g	h	i
<i>Heracleum Sphondylium</i> L.	x	x	x	x			x		
CORNACEAE.									
<i>Cornus suecica</i> L.	x 4								
CAPRIFOLIACEAE.									
<i>Adoxa Moschatellana</i> L.	x			x			x		
RUBIACEAE.									
<i>Galium boreale</i> L.	x	x	x	x	x		x		
<i>G. verum</i> L.	x	x							
<i>G. saxatile</i> L.	x	x	x	x	x	x	x	x	x
<i>G. asperum</i> Schreb.	x	x	x	x			x		
var. <i>nitidulum</i> (Thuill.).	x			x			x		
<i>G. palustre</i> L.	x	x	x	x			x		
var. <i>Witheringii</i> (Sm.).	x	x	x	x			x		
var. <i>glabrum</i> Koch.	x 3								
<i>Asperula odorata</i> L.	x	x							
VALERIANACEAE.									
<i>Valeriana officinalis</i> L.	x	x	x	x			x		
DIPSACEAE.									
<i>Scabiosa Succisa</i> L.	x	x	x	x			x	x	
COMPOSITAE.									
<i>Solidago Virgaurea</i> L.	x	x	x	x			x		
var. <i>cambrica</i> (Huds).	x	x	x	x			x		
<i>Bellis perennis</i> L.	x	x							
<i>Antennaria dioica</i> Gaertn.	x	x	x	x			x		
<i>Gnaphalium supinum</i> L.	x			x	x	x	x	x	x
<i>Tussilago Farfara</i> L.	x		x				x		
<i>Carduus crispus</i> L.	x	x							
<i>Cirsium palustre</i> Scop.	x	x	x						
<i>C. heterophyllum</i> Hill.	x		x				x		
<i>C. arvense</i> Scop.	x	x							
<i>Saussurea alpina</i> DC.	x			x			x		
<i>Crepis taraxifolia</i> Thuill.	x	x	x	x			x		
<i>C. capillaris</i> Wallr.	x	x	x	x			x		
<i>C. biennis</i> L.	x	x	x	x			x		
<i>C. paludosa</i> Moench	x	x	x	x			x		
<i>Hieracium Pilosella</i> L.	x	x	x	x			x		
<i>H. anglicum</i> Fr.	x			x			x		

	a	b	c	d	e	f	g	h	i
var. <i>acutifolium</i> Backh.	×			×			×		
var. <i>longibracteatum</i> F.J. Hanb.	×			×			×		
var. <i>cerinthiforme</i> Backh.	×			×			×		
<i>H. flocculosum</i> Backh.	× 5								
<i>H. iricum</i> Fr.	× 5								
<i>H. holosericeum</i> Backh.	×			×	×		×		
<i>H. curvatum</i> Elfstrand.	× 3								
<i>H. lingulatum</i> Backh.	× 5								
<i>H. senescens</i> Backh.	× 5								
<i>H. sinuans</i> F.J. Hanb.	× 5								
<i>H. nigrescens</i> Willd.	× 5								
<i>H. Oreades</i> Fr.	× 1								
<i>H. callistophyllum</i> F.J. Hanb. var. <i>glandulosum</i> F.J. Hanb.	× 6								
<i>H. varicolor</i> Dahlst.	× 6								
<i>H. ciliatum</i> Almq.	× 6								
<i>H. pictorum</i> Linton.	× 6								
<i>H. pictorum</i> Linton. var. <i>dasythrix</i> Linton.	× 3								
<i>H. crebridens</i> Dahlst.	× 6								
<i>H. rivale</i> F. J. Hanb.	× 5								
<i>H. petrocharis</i> Linton.	× 6								
<i>H. sagittatum</i> Lindeb. var. <i>lanuginosum</i> Lönhr.	× 6								
<i>H. duplicatum</i> Almq. var. <i>stenophyes</i> W. R. Linton.	× 6								
<i>Hieracium anfractiforme</i> E. S. Marshall.	× 6								
<i>H. vulgatum</i> Fr.	×			×			×		
<i>H. Dewari</i> Bosw.	× 5								
<i>H. stictophyllum</i> Dahlst.	× 6								
<i>H. sparsifolium</i> Lindeb.	× 5								
<i>Hypochoeris radicata</i> L.	×	×	×	×			×	×	
<i>Leontodon hispidum</i> L.	×	×	×	×			×		
<i>L. autumnale</i> L. var. <i>pratense</i> (Koch).	× 4	×	×	×			×		
<i>Taraxacum officinale</i> Weber.	×	×	×	×	×		×		
<i>T. palustre</i> DC.	×	×	×	×	×	×	×	×	×
CAMPANULACEAE.									
<i>Campanula rotundifolia</i> L.	×	×	×	×	×		×	×	

	a	b	c	d	e	f	g	h	i
<i>E. gracilis</i> Fr.	x				x		x	x	
<i>E. curta</i> Wettst.	x 2								
var. <i>glabrescens</i> Wettst.	x 2								
<i>E. foulaensis</i> Towns.	x 3								
<i>Bartsia alpina</i> L.	x		x	x			x		
<i>Pedicularis palustris</i> L.	x	x	x	x					
<i>P. sylvatica</i> L.	x	x	x	x			x		
<i>Rhinanthus Crista-galli</i> L.	x	x	x	x			x		
<i>R. borealis</i> Druce.	x			x	x		x		
<i>R. Drummond-Hayi</i> Druce.	x			x	x		x		
<i>Melampyrum pratense</i> L.	x	x	x	x			x		
var. <i>montanum</i> (Johnst.).	x			x			x		
LENTIBULARIACEAE.									
<i>Utricularia intermedia</i> Hayne.	x 3		x						
<i>Pinguicula vulgaris</i> L.	x	x	x	x			x		
var. <i>bicolor</i> Nordstedt.	x 6								
LABIATAE.									
<i>Thymus Serpyllium</i> L.	x	x	x	x	x	x	x	x	x
<i>T. Chamaedrys</i> Fr.	x 3								
<i>Prunella vulgaris</i> L.	x	x	x	x					
PLANTAGINACEAE.									
<i>Plantago maritima</i> L.	x	x	x	x	x	x	x	x	
<i>P. lanceolata</i> L.	x	x	x	x	x	x	x	x	x
POLYGONACEAE.									
<i>Polygonum viviparum</i> L.	x	x	x	x	x	x	x	x	x
<i>P. aviculare</i> L.	x	x							
<i>Oxyria digyna</i> Gilib.	x	x	x	x	x	x	x	x	x
<i>Rumex obtusifolius</i> L.	x	x							
<i>R. crispus</i> L.	x	x							
<i>R. Acetosa</i> L.	x	x	x	x	x	x	x	x	x
<i>R. Acetosella</i> L.	x	x	x	x	x	x	x	x	x
EUPHORBIACEAE.									
<i>Mercurialis perennis</i> L.	x	x	x	x			x		
URTICACEAE.									
<i>Urtica dioica</i> L.	x	x	x						

	a	b	c	d	e	f	g	h	i
MYRICACEAE.									
<i>Myrica Gale</i> L.	x	x	x						
CUPULIFERAE.									
<i>Betula alba</i> L.	x	x	x	x					
<i>Alnus glutinosa</i> Gaertn.	x	x							
SALICACEAE.									
<i>Salix aurita</i> L.	x	x	x						
<i>S. nigricans</i> Sm.	x		x	x			x		
<i>S. phylicifolia</i> L.	x			x	x		x		
<i>S. arbuscula</i> L.	x			x			x		
<i>S. arbuscula</i> × <i>herbacea</i> .	× 6								
<i>S. repens</i> L.	× 4								
var. <i>ascendens</i> (Sm.).	× 4								
<i>S. myrsinites</i> L.	x		x	x	x		x		
<i>S. myr.</i> × <i>nigricans</i> .	x		x	x			x		
<i>S. myr.</i> × <i>phylicifolia</i> .	× 6								
<i>S. herbacea</i> L.	x			x	x	x	x	x	x
<i>S. herb</i> × <i>reticulata</i> .	x						x		
<i>S. reticulata</i> L.	× 4								
EMPETRACEAE.									
<i>Empetrum nigrum</i> L.	x		x	x			x		
ORCHIDACEAE.									
<i>Malaxis paludosa</i> Sw.	x		x	x					
<i>Listera cordata</i> Br.	x								
<i>Orchis mascula</i> L.	x	x	x	x			x		
<i>O. maculata</i> L.	x	x	x						
<i>Habenaria conopsea</i> Benth.	x	x	x	x					
<i>H. viridis</i> Br.	x			x	x		x		
var. <i>bracteata</i> A. Gray.	x			x			x		
LILIACEAE.									
<i>Narthecium ossifragum</i> Huds.	x	x	x	x			x	x	
<i>Tofieldia palustris</i> Huds.	x			x			x	x	
JUNCACEAE.									
<i>Juncus bufonius</i> L.	x	x	x						
<i>J. trifidus</i> L.	x		x	x	x	x	x	x	x
<i>J. squarrosus</i> L.	x	x	x	x	x	x	x	x	x
<i>J. compressus</i> Jacq.	x	x	x	x			x		

	a	b	c	d	e	f	g	h	i
<i>J. effusus</i> L.	×	×	×	×			×		
<i>J. conglomeratus</i> L.	×	×	×	×			×		
<i>J. bulbosus</i> L.	×	×	×	×			×		
<i>J. articulatus</i> L.	×	×	×						
<i>J. alpinus</i> , Vill.	× 6			×					
<i>J. sylvaticus</i> Reich.	×	×	×	×			×		
<i>J. castaneus</i> Sm.	×				×		×		
<i>J. biglumis</i> L.	×				×	×	×		
<i>J. triglumis</i> L.	×		×	×	×	×	×	×	
<i>Luzula pilosa</i> Willd.	×	×	×				×		
<i>L. sylvatica</i> Gaud.	×	×	×				×		
<i>L. spicata</i> DC.	×		×	×	×	×	×	×	×
<i>L. campestris</i> DC.	×	×	×						
<i>L. multiflora</i> , DC.	×	×	×	×	×	×	×	×	×
var. <i>congesta</i> (Lej.).	×	×	×						
NAIADACEAE.									
<i>Triglochin palustre</i> L.	×	×	×	×			×		
<i>Potamogeton polygonifolius</i> Pourr.	×	×	×						
CYPERACEAE.									
<i>Eleocharis palustris</i> R. & S.	× 4								
<i>Scirpus pauciflorus</i> Lightf.	×						×		
<i>S. caespitosus</i> L.	×	×	×	×			×		
<i>S. setaceus</i> L.	×						×		
<i>Eriophorum vaginatum</i> L.	×	×	×	×					
<i>E. angustifolium</i> Roth.	×	×	×	×					
<i>Rynchospora alba</i> Vahl.	×	×	×						
<i>Schoenus nigricans</i> L.	×			×			×	×	
<i>Kobresia bipartita</i> D.T.	×		×						
<i>Carex dioica</i> L.	×		×	×			×		
<i>C. pulicaris</i> L.	×	×	×	×			×	×	
forma <i>montana</i> Pugsl.	×			×			×	×	
<i>C. pauciflora</i> Lightf.	×	×	×	×					
<i>C. echinata</i> Murr.	×	×	×	×	×	×	×	×	×
<i>C. canescens</i> L.	×		×						
<i>C. leporina</i> L.	×		×						
<i>C. atrata</i> L.	×			×			×		
<i>C. gracilis</i> Curt.	× 4								
<i>C. rigida</i> Good.	×		×	×	×	×	×	×	×
<i>C. Goodenowii</i> Gay.	×	×	×				×		
var. <i>juncella</i> (Fr.).	×			×			×		

	a	b	c	d	e	f	g	h	i
<i>C. flacca</i> Schreb.	× 4								
var. <i>stictocarpa</i> Druce.	× 4								
<i>C. limosa</i> L.	×			×	×		×		
<i>C. pitulifera</i> L.	×	×							
<i>C. pallescens</i> L.	×		×	×			×		
<i>C. panicea</i> L.	×		×	×	×		×	×	
<i>C. vaginata</i> Tausch.	×			×	×		×	×	
<i>C. capillaris</i> L.	×			×	×		×	×	
<i>C. pendula</i> Huds.	× 4								
<i>C. binervis</i> Sm.	×		×	×			×	×	
var. <i>Sadleri</i> (Linton).	× 3								
<i>C. fulva</i> Host	×			×			×	×	
<i>C. flava</i> L.	×		×	×			×	×	
var. <i>pumila</i> Anders.	× 3								
var. <i>oedocarpa</i> Anders.	×	×	×	×			×	×	
var. <i>lepidocarpa</i> (Tausch).	× 4								
var. <i>pygmaea</i> Anders.	× 3								
<i>C. flava</i> × <i>Oederi</i> .	× 3								
<i>C. flava</i> × <i>saxatilis</i> .	× 3								
<i>C. inflata</i> Huds.	× 4								
var. <i>brunnescens</i> Druce.	× 3								
<i>C. vesicaria</i> L. var. <i>alpigena</i> Fr.	× 3								
var. <i>dichroa</i> Anders.	× 3								
<i>C. saxatilis</i> L.	×			×	×		×	×	
GRAMINEAE.									
<i>Anthoxanthum odoratum</i> L.	×	×	×	×	×	×	×	×	×
<i>Alopecurus geniculatus</i> L.	×	×							
<i>Phleum pratense</i> L.	×	×							
var. <i>nodosum</i> (L.).	× 4								
<i>Agrostis canina</i> L.	×	×	×	×	×		×	×	
<i>A. tenuis</i> Sibth.	×	×	×	×	×		×	×	
<i>A. pumila</i> L.	×			×		×	×	×	
<i>Deschampsia caespitosa</i> Beauv.	×	×	×	×		×	×	×	×
var. <i>brevifolia</i> .	×			×			×	×	
var. <i>alpina</i> .	×			×			×	×	
<i>D. alpina</i> B. & S.	×			×	×		×	×	
<i>D. flexuosa</i> Trin.	×	×	×	×	×	×	×	×	×
var. <i>montana</i> Hook fil.	× 3								
<i>Holcus mollis</i> L.	×								
<i>H. lanatus</i> L.	×	×							

	a	b	c	d	e	f	g	h	i
<i>Avena pratensis</i> L.	x		x	x			x		
var. <i>alpina</i> (Sm.).	x			x			x	x	
var. <i>longifolia</i> (Parn.).	x 6								
<i>Sieglingia decumbens</i> Bernh.	x	x	x	x			x	x	
<i>Sesleria caerulea</i> Ard.	x			x			x	x	
<i>Cynosurus cristatus</i> L.	x	x	x						
<i>Koeleria gracilis</i> Pers.	x		x	x			x	x	
<i>Molinia caerulea</i> Moench.	x	x	x	x	x	x	x	x	x
<i>Poa annua</i> L.	x	x	x						
var. <i>supina</i> Gaud.	x 3								
<i>P. alpina</i> L.	x			x	x	x	x	x	x
<i>P. glauca</i> Vahl.	x 4								
<i>P. pratensis</i> L., var. <i>humilis</i> (Ehrh.).	x 4								
<i>P. Baltouri</i> Parn.	x 4								
var. <i>montana</i> (Parn).	x 6			x	x				
<i>P. nemoralis</i> L.	x			x			x	x	
var. <i>montana</i> Gaud.	x 3								
var. <i>glauantha</i> Reichb.	x 6								
<i>Glyceria fluitans</i> Br.	x	x							
<i>Festuca bromoides</i> L.	x 4								
<i>F. ovina</i> L.	x	x	x	x	x	x	x	x	x
var. <i>supina</i> Hackel.	x 4								
<i>F. rubra</i> L.	x		x	x	x	x	x	x	
var. <i>grandiflora</i> (Hackel).	x 3								
var. <i>pruinosa</i> Hackel.	x 4								
<i>Nardus stricta</i> L.	x	x	x	x	x	x	x	x	x
<i>FILICES.</i>									
<i>Hymenophyllum petitatum</i> Desv.	x			x			x		
<i>Pteris aquilina</i> L.	x		x						
<i>Criptogramme crispa</i> Br.	x			x	x				x
<i>Blechnum Spicant</i> With.	x	x	x	x	x	x	x	x	x
<i>Asplenium Adiantum-nigrum</i> L.	x	x	x				x		
<i>A. viride</i> Huds.	x	x	x	x	x		x		
<i>A. Trichomanes</i> L.	x	x	x				x		
<i>Athyrium Filix-foemina</i> Roth.	x	x	x						
<i>A. alpestre</i> Milde.	x			x	x	x	x	x	x
<i>Woodsia alpina</i> Gray.	x						x		
<i>Cystopteris fragilis</i> Bernh.	x	x	x	x	x		x		
var. <i>dentata</i> (Hook.).	x			x	x		x		x

	a	b	c	d	e	f	g	h	i
<i>C. montana</i> Desv.	x			x			x		
<i>Polystichum Lonchitis</i> Roth.	x		x	x	x	x	x	x	x
<i>P. aculeatum</i> Roth.	x	x	x				x		
<i>Dryopteris montana</i> OK.	x	x	x				x		
<i>D. Filix-mas</i> Schott.	x	x	x	x	x	x	x	x	x
var. <i>pumila</i> (T.M.).	x						x		
<i>D. spinulosa</i> OK.	x			x			x		
<i>D. aristata</i> Druce.	x			x	x	x	x	x	x
var. <i>dumetorum</i> (Sm.) Druce.	x 3								
<i>Polypodium vulgare</i> L.	x	x	x	x			x		
<i>Phegopteris Dryopteris</i> Fée	x	x	x	x	x		x		
<i>P. polypodioides</i> Fée.	x	x	x	x	x	x	x	x	x
<i>Botrychium Lunaria</i> Sw.	x			x			x		
EQUISETACEAE.									
<i>Equisetum arvense</i> L.	x	x	x	x			x		
<i>E. pratense</i> Ehrh.	x		x	x			x		
var. <i>alpestre</i> Wahl.	x 4								
<i>E. sylvaticum</i> L.	x		x	x			x		
<i>E. palustre</i> L.	x	x	x	x			x		
var. <i>polystachyon</i> Weis.	x	x							
<i>E. limosum</i> L.	x		x						
var. <i>fluviatile</i> (L.).	x 4								
<i>E. variegatum</i> Schleich.	x 4								
LYCOPODIACEAE.									
<i>Lycopodium Selago</i> L.	x	x	x	x	x	x	x	x	x
<i>L. clavatum</i> L.	x			x	x		x		
<i>L. alpinum</i> L.	x			x	x	x	x	x	x
SELAGINELLACEAE.									
<i>Selaginella selaginoides</i> Gray.	x			x	x		x	x	
	388	185	191	226	114	68	245	86	60

NOTE 1.—List of Species not included as Arctic Europe Species, but included in other of the Arctic areas by Hooker:—

<i>Galium saxatile</i> ,	in Arctic Greenland.
	in Iceland.
	in the Alps.
<i>Glyceria fluitans</i> ,	in Arctic West America.
	in Arctic East America.
	in Arctic Greenland.

NOTE 2.—List of Species not included in the List of Hooker's Arctic plants, but classified as such in his " Student's Flora of the British Islands " :—

<i>Hieracium flocculosum.</i>	<i>Arabis petraea.</i>
<i>H. holosericeum.</i>	<i>Geranium pratense.</i>
<i>H. lingulatum.</i>	<i>Crepis paludosa.</i>
<i>H. senescens.</i>	<i>Luzula sylvatica.</i>
<i>H. Dewari.</i>	<i>Carex pilulifera.</i>

NOTE 3.—Species not included as Arctic Europe or in any other of the Arctic divisions, in Hooker's lists, but classified as Alpine in the " Student's Flora."

<i>Arenaria sedoides.</i>	<i>Hieracium anglicum.</i>
<i>Carex pulicaris.</i>	var. <i>acutifolium.</i>
<i>C. glauca.</i>	var. <i>cerinthiiforme.</i>
var. <i>stictocarpa.</i>	var. <i>longibracteatum.</i>

NOTE 4.—List of Plants not included either as Arctic or as Alpine in the Lists of Hooker or in his " Student's Flora " :—

<i>Erophila verna.</i>	<i>C. biennis.</i>
<i>Stellaria Holostea.</i>	<i>C. capillaris.</i>
<i>Hypericum pulchrum.</i>	<i>Hieracium Pilosella.</i>
<i>Chrysosplenium oppositifolium.</i>	<i>Hypochoeris radicata.</i>
<i>Sedum anglicum.</i>	<i>Leontodon hispidus.</i>
<i>Hydrocotyle vulgaris.</i>	<i>Erica Tetralix.</i>
<i>Conopodium majus.</i>	<i>E. cinerea.</i>
<i>Heracleum Sphondylium.</i>	<i>Primula vulgaris.</i>
<i>Galium verum.</i>	<i>Lysimachia nemorum.</i>
<i>G. asperum.</i>	<i>Pedicularis sylvatica.</i>
var. <i>nitidulum.</i>	<i>Rumex obtusifolius.</i>
<i>Asperula odorata.</i>	<i>R. crispus.</i>
<i>Bellis perennis.</i>	<i>Mercurialis perennis.</i>
<i>Cirsium arvense.</i>	<i>Salix aurita.</i>
<i>Crepis taraxacifolia.</i>	<i>S. repens.</i>

<i>Orchis mascula.</i>	<i>Avena pratensis</i> , and var.
<i>Potamogeton polygonifolius.</i>	<i>alpina</i> and <i>longifolia.</i>
<i>Scirpus setaceus.</i>	<i>Sesleria caerulea.</i>
<i>Schoenus nigricans.</i>	<i>Cynosurus cristatus.</i>
<i>Carex pendula.</i>	<i>Koeleria gracilis.</i>
<i>C. binervis.</i>	<i>Festuca bromoides.</i>
<i>C. fulva.</i>	<i>Hymenophyllum peltatum.</i>
<i>Holcus lanatus.</i>	<i>Asplenium Adiantum-nigrum.</i>
<i>H. mollis.</i>	<i>A. Trichomanes.</i>
<i>Sieglingia decumbens.</i>	

NOTE 5.—Of the 29 *Hieracia* recorded for Beinn Laoigh, the following are not included in the calculations on p. 297, because for them, the data as to distribution are not available:—

<i>H. curvatum.</i>	<i>H. Pictorum</i> , and var. <i>dasy-</i> <i>thrix.</i>
<i>H. crebridens.</i>	
<i>H. sinuans.</i>	<i>H. rivale.</i>
<i>H. Oreades.</i>	<i>H. petrocharis.</i>
<i>H. callistophyllum</i> , and var. <i>glandulosum.</i>	<i>H. sagittatum</i> , and var. <i>lanuginosum.</i>
<i>H. variicolor.</i>	<i>H. duplicatum</i> , and var. <i>stenophyes.</i>
<i>H. ciliatum.</i>	
<i>H. anfractiforme.</i>	<i>H. stictophyllum.</i>
<i>H. sparsifolium.</i>	

APPENDIX B.

Musci.—Arranged after "The Student's Handbook of British Mosses" (H. N. Dixon and H. G. Jamieson). Those listed have been confirmed by the writer.

SPHAGNALES.	<i>A. alpina</i> Smith.
<i>Sphagnum cymbifolium</i> Ehrh.	<i>A. falcata</i> Schp.
<i>S. papillosum</i> Lindb.	<i>A. crassinervia</i> Bruch.
<i>S. rigidum</i> Schp.	
<i>S. tenellum</i> Ehrh.	BRYALES.
<i>S. subsecundum</i> Nees.	<i>Tetraphis pellucida</i> Hedw.
<i>S. squarrosum</i> Pers.	<i>T. Browniana</i> Grev.
<i>S. acutifolium</i> Ehrh.	<i>Catharina undulata</i> Web. & Mohr.
var. <i>rubellum</i> Russ.	<i>Oligotrichum hercynicum</i> Lam.
var. <i>elegans</i> Braithw.	<i>Polytrichum nanum</i> Neck.
var. <i>quinquefarium</i> Lindb.	<i>P. aloides</i> Hedw.
var. <i>deflexum</i> Schp.	<i>P. urnigerum</i> L.
	<i>P. alpinum</i> L.
ANDREÆALES.	<i>P. sexangulare</i> Ehrh.
<i>Andreaea prophylla</i> Ehrh.	

- P. strictum* Banks.
P. commune L.
 var. *humile* Schp.
 var. *fastigiatum* Lyle.
Diphyscium foliosum Mohr.
Ditrichum homomallum Hampe.
D. flexicaule Hampe.
Swartzia montana Lindb.
S. inclinata Ehrh.
Seligeria recurvata B. & S.
Ceratodon purpureus Brid.
Rhabdoweisia fugax B. & S.
R. denticulata B. & S.
Cynodontium virens Schp.
Dicranella heteromalla Schp.
D. subulata Schp.
D. squarrosa Schp.
Dicranoweisia crispula Lindb.
Campylopus Schwartzii Schp.
C. flexuosus Brid.
 var. *paradoxus* Wils.
C. fragilis B. & S.
C. atrovirens De Not.
Dicranum fulvellum Smith.
D. falcatum Hedw.
D. Starkei W. & M.
D. schisti Lindb.
D. molle Wils.
D. Bonjeani De Not.
D. scoparium Hedw.
D. majus Turn.
D. fuscescens Turn.
Fissidens osmundioides Hedw.
F. adiantoides Hedw.
Grimmia apocarpa Hedw.
G. funalis Schp.
G. torquata Hornsch.
G. pulvinata Smith.
G. patens B. & S.
G. trichophylla Grev.
G. decipiens Lindb.
G. Doniana Sm.
Racomitrium aciculare Brid.
R. protensum Braun.
R. fasciculare Brid.
R. heterostichum Brid.
 var. *gracilescens* B. & S.
R. sudeticum B. & S.
R. lanuginosum Brid.
R. canescens Brid.
Ptychomitrium polyphyllum
 Förn.
Hedwigia ciliata Ehrh.
Tortula muralis L.
T. subulata Hedw.
Barbula fallax Hedw.
B. rigidula Mitt.
B. convoluta Hedw.
B. unguiculata Hedw.
Leptodontium flexifolium Hpe.
Weisia viridula Hedw.
W. mucronata B. & S.
W. rupestris C. M.
W. curvirostris C. M.
 var. *commutata*.
 var. *scabra*.
Trichostomum tortuosum Dixon.
T. fragile Dixon.
Encalypta ciliata Hoffm.
E. commutata N. & H., var.
 imberbis.
E. rhabdocarpa Schwgr.
Zygodon lapponicus B. & S.
Z. Mougeotii B. & S.
Ulota Bruchii Hornsch.
 var. *intermedia* Brid.
U. crispa Brid.
U. phyllantha Brid.
Orthotrichum leiocarpum B.
 & S.
O. Lyellii H. & T.
O. affine Schrad.
Edipodium Griffithianum
 Schwgr.
Splachnum sphaericum L. fl.
Tetraplodon mnioides B. & S.
Tayloria lingulata Lindb.
Funaria hygrometrica Sibth.
Amblyodon dealbatus P. Beauv.
Meesia trichoides Spruce.
Aulacomnium palustre Schwgr.
Catoscopium nigratum Brid.
Conostomum boreale Swartz.
Bartramia Ederi Sw.

- B. ithyphylla* Brid.
B. pomiformis Hedw.
B. Halleriana Hedw.
Philonotis fontana Brid.
 f. falcata Brid.
P. calcarea Schp.
Breutelia arcuata Schp.
Webera acuminata Schp.
W. polymorpha Schp.
W. elongata Schwgr.
W. cruda Schwgr.
W. nutans Hedw.
W. annotina Schwgr.
W. carnea Schp.
Plagiobryum Zierii Lindb.
Bryum filiforme Dicks.
B. pendulum Schp.
B. inclinatum Bland.
B. pallens Sw.
B. turbinatum Schwgr.
B. turbinatum Schwgr., var.
 latifolium B. & S.
B. pseudo-triquetrum Schwgr.
B. pallescens Schleich.
B. caespiticium L.
B. capillare L.
B. erythrocarpum Schwgr.
B. alpinum Huds.
B. argenteum L.
Mnium undulatum L.
M. hornum L.
M. serratum Schrad.
M. punctatum L.
Neckera crispa Hedw.
N. pumila Hedw.
N. complanata Hübner.
Homalia trichomanoides Brid.
Antitrichia curtispindula Brid.
Thuidium tamariscinum B.
 & S.
T. delicatulum Mitt.
Isotheicum myurum Brid.
- Cylindrothecium concinnum*
 Schp.
Orthothecium rufescens B. & S.
O. intricatum B. & S.
Pleuropus sericeus Dixon.
Brachythecium rutabulum B. &
 S.
B. rivulare B. & S.
B. Starkei B. & S.
B. plumosum B. & S.
B. purum Dixon.
Eurhynchium Swartzii Hob-
 kirk.
E. myosuroides Schp.
Plagiothecium pulchellum B. &
 S.
P. denticulatum B. & S.
P. undulatum B. & S.
Amblystegium Sprucei B. & S.
A. filicinum De Not.
Hypnum stellatum Schreb.
H. uncinatum Hedw.
H. revolvens Sw.
H. commutatum Hedw.
H. falcatum Brid.
H. cypressiforme L.
H. hamulosum B. & S.
H. molluscum Hedw.
H. crista-castrensis L.
H. ochraceum Turn.
H. scorpioides L.
H. trifarium W. & M.
H. cordifolium Hedw.
H. giganteum Schp.
H. sarmentosum Wahl.
H. cuspidatum L.
H. Schreberi Willd.
Hylacomium splendens B. & S.
H. loreum B. & S.
H. squarrosum B. & S.
H. triquetrum B. & S.

APPENDIX C.

Hepaticae.—Arranged after "The Student's Handbook of British Hepatics" (S. M. Macvicar).

MARCHANTIALES.

Targionia hypophylla L.
Conocephalum conicum (L.)
 Dum.
Preissia commutata Nees.
Marchantia polymorpha L.

JUNGERMANNIALES.

ANACROGYNAE.

Aneura pinguis (L.) Dum.
A. multifida (L.) Dum.
A. sinuata (Dicks.) Dum.
Metzgeria furcata (L.) Dum.
M. conjugata Lindb.
M. hamata Lindb.
M. pubescens (Schrank) Raddi.
Pallavicinia Lyellii (Hook.)
 Gray.
Moerckia Blyttii (Moerch)
 Brockm.
Pellia epiphylla (L.) Corda.
P. Neesiana (Gottsche) Limpr.
P. Fabbrioniana Raddi.
Blasia pusilla L.

ACROGYNAE.

Gymnomitrium concinnatum
 (Lightf.) Corda.
G. obtusum (Lindb.) Pears.
G. coralloides Nees.
G. crenulatum Gottsche.
G. adustum Nees.
G. varians (Lindb.) Schiffn.
G. crassifolium Carr.
G. alpinum (Gottsche) Schiffn.
Marsupella Sprucei (Limpr.)
 Bernet.
M. aquatica (Lindenb.) Schiffn.
M. emarginata (Ehrh.) Dum.
Alicularia compressa (Hook.)
 Nees.
A. scalaris (Schrad.) Corda.*
A. Geoscyphus De Not.

Eucalyx obovatus (Nees) Breidl.
E. hyalinus (Lyell) Breidl.
Aplozia crenulata (Sm.) Dum.
 var. *gracillima* (Sm.).
A. sphaerocarpa (Hook.) Dum.
A. cordifolia (Hook.) Dum.
A. riparia (Tayl.) Dum.
A. pumila (With.) Dum.
Jamesoniella Carringtoni (Balf.)
 Schiffn.
Gymnocolea inflata (Huds.) Dum.
Lophozia Muelleri (Nees) Dum.
L. ventricosa (Dicks.) Dum.
L. alpestris (Schleich.) Evans.
 var. *gelida* (Tayl.).
L. incisa (Schrad.) Dum.
L. quinquedentata (Huds.) Cogn.
L. lycopodioides (Wallr.) Cogn.
L. Hatcheri (Evans) Steph.
L. Floerkii (Web. et Mohr)
 Schiffn.
L. barbata (Schmid.) Dum.
Sphenolobus minutus (Crantz)
 Steph.
S. politus (Nees) Steph.
S. exsectus (Breidl.) Steph.
Plagiochila asplenioides (L.)
 Dum.
 var. *minor* Lindenb.
P. spinulosa (Dicks.) Dum.
Leptoscyphus Taylori (Hook.)
 Mitt.
L. anomalus (Hook.) Mitt.
Lophocolea bidentata (L.) Dum.
L. cuspidata Limpr.
L. heterophylla (Schrad.) Dum.
Chiloscyphus polyanthus (L.)
 Corda.
Harpanthus Flotowianus Nees.
Saccogyna viticulosa (Sm.) Dum.
Cephalozia bicuspidata (L.)
 Dum.
C. Lammersiana (Hüb.) Spruce.

<i>Hygrobiella laxifolia</i> (Hook.) Spruce.	<i>S. gracilis</i> (Lindb.) Kaal. var. <i>laxifolia</i> Carr.
<i>Pleuroclada albescens</i> (Hook.) Spruce.	<i>S. aspera</i> Bernet. <i>S. nemorosa</i> (L.) Dum.
<i>Odontoschisma Sphagni</i> (Dicks.) Dum.	<i>S. nimbose</i> Tayl. <i>S. ornithopodioides</i> (With.) Pears.
<i>O. denudatum</i> (Nees) Dum.	
<i>Calypogeia Trichomanis</i> (L.) Corda.	<i>S. dentata</i> Dum. <i>S. undulata</i> (L.) Dum.
<i>C. fissa</i> (L.) Raddi.	<i>S. uliginosa</i> (Swartz) Dum.
<i>Bazzania trilobata</i> (L.) Gray.	<i>S. paludosa</i> K. Müll.
<i>B. tricrenata</i> (Wahl.) Pears.	<i>S. irrigua</i> (Nees) Dum.
<i>B. triangularis</i> Pears.	<i>Radula complanata</i> (L.) Dum.
<i>Lepidosia reptans</i> (L.) Dum.	<i>R. Lindbergii</i> Gottsche. var. <i>germana</i> (Jack).
<i>L. setacea</i> (Web.) Mitt.	
<i>Blepharostoma trichophyllum</i> (L.) Dum.	<i>Pleurozia purpurea</i> (Lightf.) Lindb.
<i>Antheia julacea</i> (L.) Dum.	<i>Madotheca laevigata</i> (Schrad.) Dum.
<i>A. Juratzkana</i> (Limpr.) Trevis.	
<i>Herberta adunca</i> (Dicks.) Gray.	<i>M. platyphylla</i> (L.) Dum.
<i>Mastigophora Woodsii</i> (Hook.) Nees.	<i>M. rivularis</i> Nees. <i>Lejeunea cavifolia</i> (Ehrh.) Lindb.
<i>Ptilidium ciliare</i> (L.) Hampe.	<i>L. patens</i> Lindb.
<i>Trichocolea tomentella</i> (Ehrh.) Dum.	<i>Frullania germana</i> Tayl. <i>F. Tamarisci</i> (L.) Dum. var. <i>atrovirens</i> Carr.
<i>Diplophyllum albicans</i> (L.) Dum.	
<i>D. taxifolium</i> (Wahlenb.) Dum.	<i>F. fragilifolia</i> Tayl.
<i>Scapania compacta</i> (Roth) Dum.	<i>F. dilatata</i> Dum.
<i>S. aequiloba</i> (Schwaegr.) Dum.	

APPENDIX D.

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VIOLET NOTES FOR 1924.

By E. S. GREGORY.

V. HIRTA × *ODORATA* (× *GIGAS*). Found by me, originally in the parish of Stokeinteignhead (v.-c 3). March 1913. Flowers averaging 3 cm. in length. Examinations of this plant have been made from time to time during the last ten years, and have been principally on cultivated material. The first note on this violet reads thus:—“A plant found March 13, 1913, had stipules 8 mm. broad at base and for two-thirds of their length; the tip concave on one side and convex on the other, suddenly narrowing to a point. The flower, of an exquisite pale mauve colour, had a large white eye. The lateral petals were very much inflected, and made it useless at this date to measure the breadth of the flowers. The whole plant was of a thick texture, as in *V. odorata*, var. *floribunda*. A portion of the only plant we were able to find was removed by Miss

Peck and placed in a pot in her greenhouse at Maidencombe House. It remained there until established, and was then planted in her garden. The second examination on portions of the original plant in 1914 notes:—Leaves rounded at apex, hairs slightly depressed as in plants of *V. hirta* × *odorata*; flowers scentless, of a pale mauve colour, on long peduncles (11-12 cm.); bracts 1 cm. in length × 5 mm. in breadth at base; spur thick; flowers averaging 3 cm. in length and breadth. I suspect this new form of *V. hirta* × *odorata* to be the cross var. *dumetorum* × *hirsuta*. My notes on × *gigas* in 1915 refer to a peculiarity which occurs in the form of lobes of uncertain size and shape at the base of the laminae. I believe these to be produced only by plants in a state of cultivation, and chiefly in the summer state of development.

A giant race has cropped up in *Primula sinensis* from certain crossings. This giant race does not consist of large plants but of ordinary-sized plants with large flowers. Natural crossings may have originated a giant race in the genus *Viola*.

THE PURSUIT OF DAPHNE.

Not the least charming of the many legends in the Greek mythology is that of Daphne, the beautiful maiden who, praying for heaven's aid when pursued by Apollo, was straightway changed into a laurel, and in that shape continued for ever to be the sun-god's favourite. Even in this sceptical age I think we flower-lovers must feel grateful to Apollo for the addition thus made to the world's flora; but in one matter I venture to doubt the accuracy of the story, for I cannot believe that the metamorphosed nymph is to be found in that respectable, but not very thrilling shrub, the Bay (*Laurus nobilis*), when we have among us so entirely lovable and enchanting a flower as the Daphne of the Persian name, *Mezereum*. To us, at any rate, whatever the Greeks may have fabled, this is the true Daphne, the beloved of Apollo and of everyone who worships the beauty that is divine. For surely there are few sights more welcome to a botanist than when in the early months of the year, while the woods are still leafless, he feasts his eyes upon this slim, grace-

ful little plant with the pink flowers that outrun the foliage, alike rich in fragrance and delicate in form. I wish that Professor Henslow, and other writers on the "uses" of plants, had not told us that our Daphne is "a recognised drug," and "powerfully irritant"; for her best use is simply to be beautiful, and it is difficult to think of her at all as a "drug," or as associated with the British Pharmacopoeia. The case of her larger sister, the Spurge Laurel, is somewhat different; for though I have a great respect, and even liking, for that honest and sturdy shrub, I must admit that she is at times apt to be an irritant, even a powerful one, when she obtrudes herself on the notice of a flower-lover who is seeking vainly for the other Daphne. When one is hoping to see the Mary of the family, it is a little trying to have a succession of interviews with the Martha. According to some writers, our Daphne is "doubtfully wild" in this country. I wonder whether it would be more correct to say that she is doubtfully tame. Certainly the process that is at present going on is one not of naturalisation but of denaturalisation; she is not being let loose from the garden into the wilderness, but deported from the wilderness to the garden. She is one of those too beautiful flowers whose beauty is their undoing, inasmuch as it courts domestication. What are we to say of a man who goes into the woods with a spade, and digs up a *Daphne mezereum* as he might a turnip or a potato? Is such a pursuer of the nymph to be called an Apollo? I think, rather, an Apollyon, which means "one that exterminates," would be the fitter title.

One such Destroyer I met last season in the person of a lodge-keeper, at a park in West Sussex, a wooded district where the *Daphne mezereum* has long been regarded as a native. He was not breathing forth flames, as the original Apollyon did; he was, in fact, a very civil and obliging fellow; but when I saw him in his garden, and asked him over the hedge if he knew a wild plant called the Daphne, he pointed to a corner of the enclosure, and said triumphantly: "There is one." I learnt that his Daphne, which was then in bloom, was one of two that had been found in the woods a year or two before, and had shared the usual fate of their tribe.

When I told the good man that I had been unsuccessfully searching the woods for a flower of that species, he showed great willingness to do me a service, and promised to let me know if he again

came across the plant. "You shall have one," he said hopefully, as I wished him good day. Luckily something in this remark caused me to explain that what I wanted was a sight of the plant growing, not a specimen of it dug up. At this he looked very puzzled, and I could see that I had fallen fearfully in his estimation, as one who must be considered a wandering half-witted crank, whereas he had at first taken me for a gentleman with a garden (perhaps even a park) of my own.

Well, as Apollo failed in his pursuit of Daphne, I suppose a mortal ought not to complain; but in truth I was luckier than Apollo, for when, after spending two or three days in roaming about the woods west of Arundel, I returned home empty-handed, drenched in the rain and hail storms which are the modern substitutes for "April showers," I found on my table a letter from a friend in East Sussex, who wrote: "I can show you the *Daphne mezereum*, wild, of course, if you care to come over here. I *did* care to go over there; and so for the first time—and I hope not the last—I saw the beloved of Apollo in all her beauty.

HENRY S. SALT.

ORCHIS MACULATA L. and O. FUCHSII Druce

BY

G. CLARIDGE DRUCE.

Under this heading in *Rep. B.E.C.* 99, 1914, I argued that British botanists had been holding a wrong conception of the Linnean *O. maculata*. That is now ten years ago, and as it is evident that some botanists have not the paper at hand, some of its salient features are here reproduced, and a reply made to the objections raised by Colonel Godfery in a paper contributed to *Journ. Bot.* 306, 1923. This I answered (*l.c.* 198, 1924), but as my MS. was submitted to Colonel Godfery by the Editor, he was enabled to write an additional note in which, with some change of front, fresh points were raised. These barely touch the main issue, but I wish to reply to some of them. Mainly, he seems to agree that we are dealing with two distinct species—

an important onward step. The chief point of difference between us is that if two species of the Spotted Orchis occur which, if either, shall bear the original name.

In the paper referred to I showed that the description in the *Species Plantarum*—"Petalae 3 exteriorae erectae; 2 interiorae conniventiae. Nectarium labium trifidum, planum: lobis lateralibus majoribus crenatis; intermedio angustissimo, integerrimo" fitted the plant which Linton (*Fl. Bournemouth* 208, 1902) named sub-sp. *ericetorum* and Webster (*British Orchids* 54, 1886) described as *O. maculata praecox*. My description added little to that given by Linnaeus, but I described *O. Fuchsii* and showed in what manner it differed. For convenience, the descriptions of the flowers of the two species are reprinted.

O. maculata vera. Flowers conspicuous, broad, pale, or of different shades of lilac-purple, the markings fainter than in *Fuchsii*, and the margins less distinct, often crenulate. The lateral lobes of the labellum large, rounded, flat, much larger than the median one, which is sometimes quite small and rarely as long, or longer than the side ones.

O. Fuchsii. Labellum deeply three lobed, the lobes subequal, the centre longer and somewhat larger than the lateral, entire. The lateral lobes have their outer margin straight, or only slightly curved, or rounded, slightly crenate or entire.

Three years later, in the fifteenth edition of *Hayward's Botanist's Pocket Book* 277, I gave the contrasting features of the flowers.

O. maculata. Labellum tri-lobed, the lateral segments larger than the middle one, and as long or longer.

O. Fuchsii. Labellum tri-lobed, the middle segment as large and longer than the lateral.

As will be seen there is no reference to the three words "intermedio angustissimo, integerrimo," detached from their context, on which Colonel Godfery says my case rests. The statement, which has not the shadow of foundation, can only be explained by a misunderstanding as to the characters of the two plants. This view is borne out by the inability of Colonel Godfery to find true *maculata* on the Continent—indeed, the Messrs Stephenson in *Journ. Bot.* 126, 1921, say Colonel Godfery, in writing and conversation, frequently insisted that *ericetorum* is not found on the Continent at all—and by his inability to identify the Linnaean herbarium specimen. This assumes that some different concept of true *maculata* is held. Yet Colonel

Godfery is positive that *ericetorum* is identical with *O. elodes* Griseb., and suggests that this is the valid name, overlooking the fact that if it is identical the Linnean name *maculata* is 90 years older and must have precedence. Nor is it logical to say that *ericetorum* is not found on the Continent, since Grisebach founded his *elodes* not on a British but on a Continental specimen. Nor can I agree with the statement that the name *elodes* is in universal use in the sense of *ericetorum*. In the first place the description is poor; there is no reference, for instance, to the stem being hollow or solid. Reichenbach (*Ic. Fl. Germ.* xiii., t. 54, f. ii. and iii.) rescues it from oblivion, and figures two plants—one, Grisebach's own specimen, which has only unopened flowers, and therefore is indeterminable (the narrow, upright, unspotted leaves suggest an *incarnata* form, to which it is referred in *Index Kewensis*); the other, from Lapland, which does not represent Linton's *ericetorum*, since there is a cylindric spike of small purple, non-contiguous flowers. The figures of the details, however, suggest that, as a variant, it belongs to the *maculata* group. In Camus' *Iconographie des Orchidées d'Europe* it is represented by a white-flowered plant with unspotted leaves, the former having the mid-lobe longer than the not large side lobes. Messrs Stephenson say, as regards *elodes*—"The description of Camus does not help much . . . very few British plants would fall within such a description." Therefore it seems probable that Colonel Godfery has made a concept of true *maculata* (*ericetorum*) based on the poor description and contradictory figures of *elodes*, and there need be no surprise at his inability to match them in the European countries he has visited. I confess I cannot make the figure of *elodes* fit our British plants. Yet I have seen true *maculata* (*ericetorum*) plentifully in Belgium and in Western France. Recently M. Senay, of the Soc. Linnéenne de la Seine-Maritime, sent typical specimens which he gathered near Le Havre, and he says he has never seen *Fuchsii* there. I saw it also in Norway as far north as Trondheim, and it is plentiful about Upsala (teste Ahlberg), in Russia, and it is widely distributed in Denmark, where it is well represented in the Herbarium at Copenhagen, which, through Professor Ostenfeld's kindness, I had an opportunity of examining when I was in that city this year. There, as here, it is essentially the plant of acid soils. There are specimens from Lausanne and elsewhere from Switzerland in the National Herbaria, and it occurs in Northern Italy, Western Spain, and other parts of Europe. It was the only form found by me in Zetland. Its distribution is

influenced by soil conditions, and it will be found chiefly where primitive rocks are near the surface or where much humic acid is present in the soil. In travelling in Britain from Cornwall northwards to Sutherland, on acid soils *maculata* would in the main be met with. In journeying from Dover to Durham through Essex, Herts, Bucks, Northants, and Yorks, *O. Fuchsii* would be the prevailing plant wherever basic soils appear.

As regards the universal use of *O. elodes* in a specific sense, I can find only a solitary instance, other than the author's. In eight or nine cases it is sunk to varietal or lower grade. It is not adopted by English authors, not even in Wilmott's edition of Babington. In Beck's *Fl. Nied.-Oesterr.* 205, 1890, it is treated as "*O. maculata* × *Gymnadenia odoratissima*." The vast majority of authors, including Schinz & Keller in their recently issued *Fl. der Schweiz* and Muller in his *Orchid-Arten*, ignore it.

Colonel Godfery maintains that *O. maculata* L. equals *O. Fuchsii*, and he makes some statements in support of this view. Let us examine them. He says, that "petala 3 exteriora erecta" characterise *O. Fuchsii*, not *maculata*. Has he overlooked the character given by Linnaeus of *maculata*, 8 lines, above "petalis dorsalibus patulis?" Messrs Stephenson say the direction of the sepals is less erect than in *Fuchsii*. As a matter of fact, in the herbarium the character is valueless, and in the field I think it will be found that the direction varies with the age of the flower. The tendency in both species as the flower matures is for the sepals to spread. It is insufficient for specific distinction.

The character, "lobis lateralibus majoribus," with or without the three last words, eliminates *Fuchsii*, and I reject any plant with large side lobes as my *Fuchsii*. The figures cited by Linnaeus from Vaillant *Paris.*, t. 31, f. 9 and 10, and that from Dodoens *Pemptades* 240 do not represent *O. Fuchsii*. The habitat, "in Europae pratis succulentis," suits *O. maculata* better than *O. Fuchsii* which prefers firmer ground and often sylvan situations. The specimen labelled *O. maculata* by Linnaeus in the Linnean Herbarium is not *Fuchsii*. Dr Moss, who independently worked at the subject, carefully examined it, and emphatically stated that it was true *maculata* which he said "equals *ericetorum*, and as you say, *praecoæ* Webster, and is well described in sensu stricto, by Linnaeus." Messrs Stephenson (*l.c.* 125, 1921) identify the herbarium specimen of Linnaeus with true *maculata*, *i.e.* not *Fuchsii*, and they say "it is in full agreement with the description,"

and they go on to write: "from this point of view Webster and Linton were in error in assuming that *Fuchsii* type was the true *maculata*."

But Colonel Godfery brings forward another statement—it can scarcely be held to be an argument—that because in 1921 *Orchis Fuchsii* was gathered in a marsh at Rella, in Oeland, where Linnaeus gathered "*O. palmata maculata*," in 1741, that *O. Fuchsii* must be the Linnean *maculata*. In the first place there are no specimens known to exist of the Linnean gathering from Rella 180 years ago, so their identity is purely conjectural. Probably both species may be found there. But, even assuming that *O. Fuchsii* was seen there by Linnaeus it does not affect the case. The *maculata* of the *Species Plantarum* is not based on the Rella habitat, or on the Rella plant. He widens the place of growth to "pratis Europae succulentis." Colonel Godfery places too much stress on the Rella habitat. He gives the impression that in the second edition of the *Fl. Suecica* it is cited. That is not the case. Linnaeus says, "Habitat in pratis depressis, frequens," and true *maculata* is frequent in such situations in Sweden.

A point is made as to the meaning of the words, "intermedio angustissimo, integerrimo," which he holds Linnaeus meant "that it was very narrow in comparison with its length." This is a construction which can scarcely be maintained, nor does he make it clearer by misquoting the word "majoris," instead of "majoribus."

One may say that Linnaeus cites "It. Oeland," in *Fl. Suecica*, etc., but it is given as a reference, and he does not base his description on it. The plant before him when he drew up his description of *O. maculata* for the *Sp. Pl.* in 1753 is true *maculata* (not *Fuchsii*), the plates he cites for it are not *Fuchsii*, while his description clearly excludes *Fuchsii*. Can a clearer instance be given for the retention of a Linnean name as applied to a segregate? We may cite *Crataegus Oxyacantha* as an example bearing on this point. Linnaeus gives no named variety and alludes to no variation, yet he must have seen *monogyne* since most of his herbarium specimens belong to that species. The figures and synonyms he cites belong to *monogyne*, yet one word in the descriptive name induced most European botanists to restrict the Linnean *Oxyacantha* to the plant Thuillier called *oxyacanthoides*, the differentiating word being "subtrifidis"—the leaves being usually, but not invariably subtrifid, whereas in *monogyne* they are usually "subquinquifidis." This example bears upon the case of the restricted *maculata*, but in *maculata* the synonyms, figures cited, and herbarium specimen all agree with the description, whereas in

Crataegus the synonyms, figures and herbarium specimen contradict it, yet, according to Swedish botanists, *C. Oxyacantha* = *oxyacanthoides*, not *monogyna*. *Quercus Robur* and *Epilobium hirsutum* are other examples which I need not labour here.

One other point remains to discuss. Colonel Godfery alludes to the name *O. maculata* L. being in universal use in the sense of *Fuchsii*. I am afraid this statement is due to a failure to understand what my *Fuchsii* is. In *Rep. B.E.C.* 101, 1914, I gave many instances where *O. maculata* was used in the proper sense (*i.e.*, *ericetorum*). But he cites one of these, *i.e.*, Rouy *Fl. Fr.* xiii., 53, 1917, as representing *Fuchsii*. Let us quote the description:—"Labelle faiblement 3-lobé [in *Fuchsii* it is deeply lobed] le lobe médian plus petit que les latéraux" [in *Fuchsii* the middle lobe is as large or nearly as large and longer than the lateral lobes]. Bouvier (*Flore des Alpes* 641) says—"Labelle à 3-lobes, les latéraux crénelés, plus larges que le moyen." Archangeli (*Fl. d'Italie* 659, 1882) says—"Labello trilobo a lobo medio ovato quasi acuto, i laterali larghi il doppio di esso." Merino (*Fl. Galicia* iii., 81, 1909) writes—"Mediano menor y por veces diminuto." The Abbé Coste gives a similar description, with which his figure agrees. Krockner (*Fl. Siles.* iii., 21, 1814) gives—"Labellum profunde trifidum, planum, lobis lateralibus, majoribus, crenatis, intermedio integro." Can any critical worker assert that these descriptions represent *O. Fuchsii*, which I characterise "labium tribus lobis altius indentatum, quae lobae ut subaequales sunt, ita media longior et aliquanto major quam laterales, et omnes integrae?" In what way does Boreau's (*Flore du Centre* 1857) vivid description, "épi serre cylindrace, conique . . . label à 3 lobes, les latéraux larges et crénelés, celui du milieu plus étroit entier," disagree.

To summarise:—Even if *O. maculata* L. included *O. Fuchsii*—of which there is no clear evidence—the description excludes it. The Linnean description, synonyms, figure, habitat, and herbarium specimen agree in showing it to be identical with *praecox* Webster, *ericetorum* Linton, and, possibly as a variant, *elodes* Griseb. Inferences drawn from plants gathered in the same locality in 1922 as being the one to which Linnaeus refers in his *Iter Oeland* in 1745 have no bearing on the case. He describes nothing apart from *maculata* in the *Sp. Pl.*; he gives no such restricted habitat as Rella, either there or in the *Fl. Suecica*. Suppositions respecting what must have been in the mind of Linnaeus, or as to what he may or may not have seen, being conjectural, are valueless in the face of what he has written in

establishing the species in 1753. Even if he saw *Fuchsii* he may not have thought it worthy of specific distinction as in the cases of the Oak and Hawthorn. He must have seen both species, but he only describes one. This was the case so far as the Orchid goes in Britain up to 1866, when Syme, like Linnaeus, had only one species, but he, unlike Linnaeus, widened the description so as to cover both plants, which, he thought, were indefinable variants of one species. This is the attitude adopted by Lindman in his *Svensk Famerogam Flora* of 1918. The direction of the sepals does not afford a differentiating specific character.

As bearing upon the distinctness of the two species, we may add that Mr T. A. Dymes has been making some very careful researches into the seed-characters. He finds no difficulty in separating those of *Fuchsii* from *maculata*. Those of *Fuchsii* are more delicately built, are much more pointed and curved at the apex, the testal cells are more sculptured, and there is a constant difference of thirty per cent. in size. Messrs Stephenson assert that they have seen both species growing together in a rich loamy clay with no peat (*Journ Bot.* 124, 1921), and Mr R. F. Burton removed *maculata* from the peat to a pot of ordinary soil, and it retained its characters unchanged. These observations go far to prove the distinctness which I claim for them; but one wants to have seeds of *maculata* sown in calcareous soil and those of *Fuchsii* in peaty soil to see if under these conditions the plants come true from seed.

VARIOUS NOTES.

SOCIETY FOR THE PROMOTION OF NATURE RESERVES HANDBOOK, 1923. From this it will be observed that Meathop Moss, Westmorland, and Wood Walton Fen, Huntingdonshire, have been acquired by the Society, which also has a tenancy of Swaddiwell Field, Northamptonshire, alluded to by John Clare in his poems as "Swordiwell." At one time a home of the Spider Orchid, alas it is no longer to be found there. The Society benefits under the will of the Hon. N. C. Rothschild to the extent of £5000.

THE NATIONAL TRUST—REPORT FOR THE YEARS 1922-3. During the year this Society has had the misfortune to lose by death its very able Chairman, The Earl of Plymouth, whose memoir appears

in our *Report*. The Trust has been presented with 224 acres of downland in the Isle of Wight, known as Bornface Down, which has been most generously given by Mr Llewellyn Davis. Mr Macandrew, of Reigate, has acquired and given to the Trust Leith Hill Tower and Summit, which formed part of the estate of Mr John Evelyn of Wotton. The summit is 965 feet in altitude, the highest point in the south-east of England. The Tower was erected in 1766 by Mr Hull, and commands a view of thirteen counties, the sea itself being visible through Shoreham gap. Thirty acres of Midsummer Hill, Eastnor, have been given by the Rev. H. and Mrs Somers-Cocks, in memory of their son, a victim of the Great War. Scole Head, adjacent to Blakeney, consisting of about 1200 acres of delightful sand-dunes, has also been acquired. The area round Box Hill has been increased by the purchase by private subscription of about 250 acres. A real and permanent benefit to the nation accrues from the yearly working of this most excellent Society, and one hopes to see its membership still more largely increased in the near future. The Fell and Rock-Climbing Club of the English Lake District has presented about 3000 acres to the National Trust. It includes a large part of Scawfell and part of Great Gable, etc. Kinnoull Hill has been given by Lord Dewar to the City of Perth. Three acres on Dawes Hill Park, High Wycombe, with grottoes, waterfall, and woodland, has been given to that borough by the Marquis of Lincolnshire.

EARLY PAINTINGS OF FLOWERS. In the Cave dwellings, with their sometimes most vivid and artistic depiction of animals, there is almost an entire absence of floral paintings, nor are such to be found carved on bone as is so frequently the case with animals. Even on the B.C. Grecian coins the outline of a head may be quite realistic, whereas the Rose on the Rhodian coin is so conventional that its identity is rather guessed at than recognised. So, too, on the Vaphian Cups, while the bulls are magnificently shown, the trees, presumably olives, under which they are chased or netted, are but poorly detailed. It is therefore pleasing to gather from "The Times" that Sir Arthur Evans, in describing some of the paintings discovered at Knossos of about 1600 B.C., says that not only are the bright colours preserved, but there are excellent and natural depictions of many plants, among

which the crocus and rose are conspicuous. Among plants painted in association of rocks of variegated hues are Madonna Lilies, Briar Roses, Ivy, *Pancreatium maritimum*, Olive, Wild Pea, Vetches, and Labiate plants.

CURTIS' BOTANICAL MAGAZINE. Volume 148 has been published by the Royal Horticultural Society; 165 original drawings for this work, dating 1830-4, have been presented to Kew by Mr W. A. Bilney.

KEW GARDENS have received many rare living plants which were left by Mr H. J. Elwes.

EPIPOGON EPIPOGIUM (L.) comb. nov. in *Gard. Chron.*, August 1924. *Satyrium Epipogium* L. *Epipogon aphyllum* Sw. This very rare species was first found in Britain in a footpath at the bottom of a very steep bank, close to the Sefey [Sapoy] brook, at Tedstone Delamere, near Bromyard, Herefordshire. The banks are clothed with oaks, surrounded by ferns and briars, and are very shady. No other specimen had been found up to the tenth of August. Mr H. C. Watson named and returned the specimen to Mr W. R. Crotch (see *Phyt.* 118, 1855), who adds that Mr Lees is reported to have presented a specimen to the Linnean Society. This appears to have been lost, and I am also unable to trace the whereabouts of Mr Crotch's specimen. Babington (*Man.* 406, 1904) says it was only once found at Tedstone Delamere. In 1876 Miss Lloyd found a specimen in a wood near Ludlow in Shropshire. This was painted by Miss Lewis and the painting submitted to Prof. Babington. The specimen was carelessly thrown away by a servant. In 1878 it was again found in the same wood, and this specimen, I believe, is in Babington's herbarium at Cambridge. For some years nothing more was heard of it, but on September 2, 1892, I visited Ludlow in order to search for it, when Miss Lloyd took me to the locality in Ringwood Chase, which was a trench into which, or rather on the banks of which, leaf-débris had been put from the trench. On this humus material Miss Lloyd first found it. No trace of it was then visible. A prolonged and arduous search on that and the following day was made, when in quite a different part of the wood, and well within the Salopian Border, under the dense shade of oaks, a solitary small specimen

was found, which I have recently given to the Herbarium of the British Museum at South Kensington. Although many botanists have since repeatedly searched the wood no other example has been found, and during the war the part where the plant grew was cleared of trees. I am informed by Mr Towndrow that a specimen was found near Ross, Herefordshire, in 1910. This year, when in Jersey, Dr H. Smith kindly sent me a painting which had been made by Miss Baumgartner from one of two small specimens which had been gathered by a girl in an Oxfordshire wood last June. Mr Marcham had correctly identified it as *Epipogon*. I at once corroborated the name, and hurried back in order to visit the place. After two days' search I was rewarded by finding a specimen in flower, but going over, and what was possibly the dried remains of a second plant. I may add that the two specimens which were first found were not preserved, so that, as far as I know, there are not more than four British examples of this rare and curious British species in existence. The exact locality of this latest and most interesting addition to the Oxfordshire flora is naturally withheld, but I may say it grew in shade among dead leaves. It may be added that the plate in *English Botany* is drawn from a foreign specimen.—G. CLARIDGE DRUCE.

AJUGA REPTENS L., var. STOLONIFLORA Bogenh. Fl. Jena, 316. Described by the author as a beautiful plant with numerous stout scions all flowering. British plants to be referred to this variety have been gathered at Ockham Common, Surrey (25th May 1907; C.E.B.), and at Polohu Valley, Cornwall (4-5-1899, A. O. Hume in Herb. S. Lond. Bot. Inst.). The description of this variety by Rouy (Fl. Fr. xi., 228) very aptly characterises the British plants—the season's stolons each terminating in a spike of flowers, paler and less numerous than those of the primary stem. Other varieties of *Ajuga reptans* probably awaiting recognition as British forms are (1) var. *sylvestris* Bogenh. Fl. Jena, 315, "stem and inflorescence shaggy, the upper bracts entire, blue, twice as long as the whorls. Root-leaves very large, crenately toothed, obovate, the upper leaves with scattered hairs." Surrey plants collected by A. O. Hume near Burford Bridge are very probably this: (2) var. *typica* Beck Fl. Nied.-Oester, 1924, "lower leaves obovate. Lower bracts broad oval or roundish, the upper gradually decreasing in size, obtuse,

shorter than the flowers." (3) var. *longifrons* Beck. *ibid.* " Basal leaves often narrower, more oblong than in the preceding var. Lower bracts oblong often distinctly crenate-serrate; the upper oblong-lanceolate much narrower, many times longer than broad, often acute, as long as or exceeding the flowers."—C. E. BRITTON.

PERSONAL NOTES.

MRS ISABEL ADAMS, F.L.S., 14 Vernon Road, Edgbaston, Birmingham, is painting British Aquatic Plants. Would members assist her by sending specimens?

MRS PERRIN, 23 Holland Villas Road, London, W. 14, is continuing her beautiful paintings of British plants. Members willing to assist in collecting specimens are asked to write to the above address.

MRS O'CALLAGHAN, Hangmoor, Virginia Water, Surrey, is painting British Plants, and will be glad to receive local specimens in flower. She will gladly defray the cost of the transmission.

MR T. A. DYMES, F.L.S., Carthona, West Drayton, Middlesex, wants ripe capsules of British orchids.

MR F. J. HANBURY, F.L.S., Brockhurst, East Grinstead, is anxious to have seeds of rare British plants. He will defray expenses.

MR W. NORWOOD CHEESMAN, The Crescent, Selby, York, wishes to exchange specimens of *Mycetozoa*.

MR A. E. WADE, Botanical Department, University of Cardiff, is preparing a Flora of Monmouthshire, and would be glad of assistance.

MR W. H. PEARSALL has removed from Dalton to Elf Hall, Lady Hall, Broughton-in-Furness.

MR JOHN CRYER, our valued member, whose assistance to the Club as a *Hieracia* expert has been very great, is completing 50 years of educational work in Yorkshire. As long ago as 1897 he headed the poll at the School Board election by a majority of over 5000. We

wish him long life and strength to continue his very useful botanical work in Yorkshire, a county in which he is so much respected.

WANTED to purchase for an Institution, a Herbarium of British Plants containing good series of the critical genera and varieties given in the London Catalogue. Apply to the Secretary, 9 Crick Road, Oxford.

WALLACE, ALFRED RUSSELL. A memorial portrait to this distinguished naturalist was presented to the Trustees of the Natural History Museum. Sir Charles S. Sherrington, the President of the Royal Society, unveiled the portrait, which was accepted on the part of the Trustees by the Archbishop of Canterbury. It is placed near the statue of his great fellow-worker, Charles Darwin.

GODMAN, FREDERICK DU CANE, AND SLAVIN, OSBERT. A mural tablet to these great naturalists was unveiled by Lord Rothschild on July 28 at the Natural History Museum, and was accepted on the part of the Trustees by the Archbishop of Canterbury. In 1909 a fund was raised to place a memorial, and the balance was to be used as a nucleus of an Exploration Fund. To this Dame Alice and the Misses Godman generously contributed a sum of £5000. It may be recalled to mind that we owe the monumental work on the *Biologia Centrali-Americana* to the distinguished scientists whose names are on the memorial tablet. Mr Godman's enormous and valuable collection of birds and butterflies was given to the Natural History Museum, and there the tablet to his memory is placed adjacent to the Darwin statue.

CORRECTIONS AND ADDITIONS, 1920 & 1922 REPORTS.

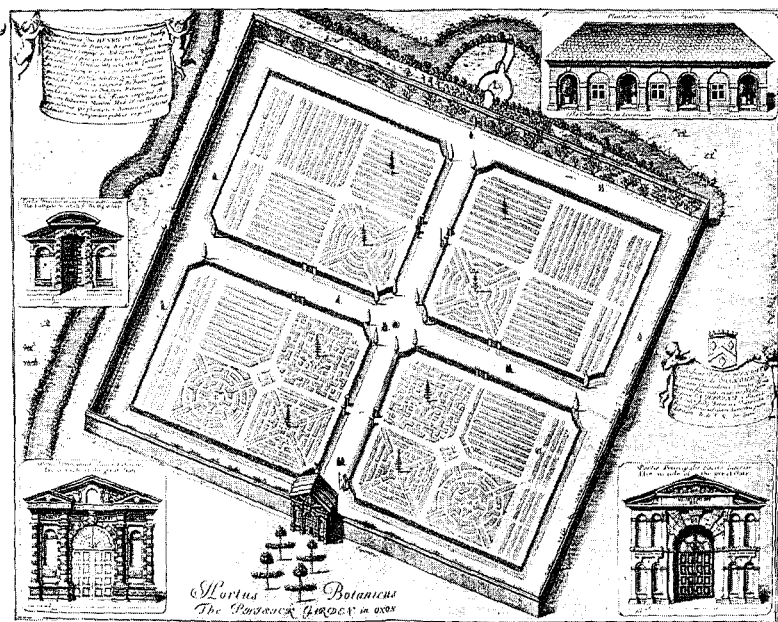
Report 1920.

- p. 237. Lines 12 and 13. For " of Pierowall discovered *Primula, foliis* " read " to Pierowall discovered a *Primula foliis*."

Report 1922.

- p. 604. Line 27. For " Mr F. J. Wall " read " Mr T. J Wall."

- p. 614. Line 1. For "Cumberland" read "Westmorland."
 Line 16. For "comb. nov." read "Fritsch."
- p. 618. Line 34. For "Discovered" read "Recorded."
- p. 621. Line 28. For "Phellack" read "Phillack."
 Line 29. For "mule" read "military."
 Line 32. Delete "mule-."
- p. 657. Lines 13 and 17. For "Thompson" read "Thomson."
- p. 698. Line 19. For "Wortling" read "Worthing."
 Line 25. For "Paharanpur" read "Saharanpur."
- p. 699. Line 6. For "examiner" read "lecturer."
- p. 716. Line 4. For "Buxton, Derby" read "Buckton, E. Yorks."
- p. 717. Line 3. For "*gracilis*" read "*elegans*."
- p. 719. Line 18. For "E. Sussex" read "Surrey."
- p. 728. Line 16. For "Devon" read "St Austell, Cornwall."
- p. 729. Line 11. For "Corbridge-on-Tyne" read "Lintley."
- p. 733. Line 24. Delete "the Hill of."
- p. 738. Line 20. For "*latifolium*" read "*pseudo-latifolium*."
- p. 739. Line 25. For "J. S. WALL" read "T. J. WALL."
- p. 740. Lines 4, 5, and 28. For "J. E. WALL" read "T. J. WALL."
- p. 747. Line 1. Mr Arthur Bennett says the locality is in East Sutherland.
 Line 28. For "fern" read "form."
- p. 749. Line 28. Insert "Boynton, E. Yorks."
- p. 755. Line 19. For "Langarnay" read "Langamay."
- p. 761. Line 2. Insert at end "or Padua."
- p. 774. Line 33. For "Durness" read "Deerness."
- p. 810. Line 36. For "300" read "800."
- p. 829. Line 25. Insert "Alien here."
- p. 850. Line 27. For "July" read "August."
- p. 851. Line 19. Insert "One may add that *Rhinanthus monticola* Sterneck was founded on a specimen from The Black Isle which G. C. Druce sent him."



LOGGAN'S PLAN OF THE OXFORD PHYSICK GARDEN IN 1675.



order of Anicia Juliana in the fifth century. The originals of these drawings exist at Vienna, and the Empress Maria Theresa in the latter part of the eighteenth century had copper plate engravings made, of which only four copies are known to exist, two at Vienna, one at Oxford, and a very incomplete example, which probably belonged to Linnaeus, at the Linnean Society's rooms in London. A facsimile copy of the drawings has been issued in colour. Old as is the history of botany, or rather medical botany, in Europe, doubtless the knowledge was derived from an older source, Egyptian in part. It is interesting to recall that 23 centuries before Christ the knowledge of weaving and the necessary cultivation of the flax plant were well known. It is not likely that the demulcent and oily quality of the seeds escaped attention. Indeed, the Flax was cultivated in Europe in Neolithic times, and as a variety which has happily been named *Linum precursor*. We know that early in Egyptian history the Lotos, Indian *Nelumbium*, was introduced by one of its rulers from the valley of the Euphrates or Tigris, and that in B.C. 17, thirty-one incense trees (*Olibanum*) were brought from Arabia, together with cassia and gum acacia. Seventeen hundred years before the Magi made their offerings Frankincense was depicted on Egyptian walls. The transplantation of the trees was deemed astonishing since the narrator says, "Never has anything been seen like it since the foundation of the world." Older still perhaps was the botanical knowledge of the Chinese. They were aware in 1200 B.C. that hemp consisted of two different kinds, male and female. The father of Chinese Botany was the Emperor, Chennung, who lived about 2700 B.C. He was not only the ruler, but a doctor, botanist, and agriculturist. An early Botanic garden was established after the capture of Yunnan, about 100 B.C., and to this one hundred Areca Palms were transplanted to afford the nuts for chewing Betel. This had been in use centuries before, as is evidenced by the references to the practice in the ancient literature of the Hindus. The Moors, whose commerce extended from Madeira to China, were well conversant with horticulture, and brought in the eleventh century, among other things, to Xatava in Spain, the knowledge of paper-making which they had extorted from prisoners they took at Samarcand in 751. At Salerno, in Italy, a Botanical garden was founded in 1317 by Matthaeus Silvaticus in connection

with the celebrated medical school, and there was another at Venice in 1333, which was due to Gualterius. The discovery of America gave an important stimulus to the study of growing plants. We know that Maize was grown in Seville about 1500, but not only was that corn, which is of almost unimaginable antiquity, brought to Europe, but also the valuable Potato, the Tobacco, the Prickly Pear, and the Tomato, these nurslings of another sky. This led to the desire to found gardens in which they might be cultivated and their properties studied. It is extraordinary how quickly these strangers found a place in cultivation. We know that Maize and Prickly Pear are in the Herbarium of Cibo gathered before the year 1533 and that Rauwolf saw the Maize growing at Birra in the Valley of the Euphrates in the year 1574.

As purely Physic Gardens, Padua and Pisa are the oldest in Europe. The former was established in 1543 (?) by Anguillaria*, while Pisa owed its origin in 1544 to Luca Ghini who was probably the first botanist to form a Herbarium. Among his many pupils five formed the oldest herbaria of which we have knowledge. Three of these exist to-day that of Cibo at Rome, of Aldrovandi at Bologna, and Cesalpini at Florence. Of Ghini's five pupils two, John Falconer and William Turner, were Englishmen, but their collections are lost. Turner was the father of English Botany and the author of "The Names of Herbes" and "The Herball." Aldrovandi founded the garden at Bologna in 1568, and bequeathed it to the city. In a splendid room in the University Library I had the pleasure of seeing his collection of plants dating from 1553, his MSS., his published works and his wood-blocks. (There is an extremely interesting biography of him by Giovanni Fantuzzi). His example was followed in Holland, that home of gardeners, by Cluyt, who founded a garden at Leyden in 1577. Leipzig had one in 1580. Koenigsberg in 1581, and Breslau in 1587. France lagged a little behind but Richier de Belleval initiated one in Montpellier, the University of Rabelais, in 1597. As yet Paris had not followed the fashion. It was reserved for an Englishman, Henry Danvers, Baron Danby, then living at Cornbury Park, Oxfordshire, to remove the

*An account of this by Jac. Antonio Cortuso appeared in 1591, giving plans of the gardens, a portrait of the author, and a list of plants in Italian. The garden was a fine example of the formal geometrical style.

reproach which might rest on England by giving to the University of Oxford in 1621, a not unworthy garden for that great and ancient University. "In Usum Acad. et Reipub." is carved upon the gateway.

HISTORY OF THE DANVERS FAMILY.

Before the Norman Conquest there was in Normandy near Coutances a village named D'Aluers, the squire of which, Roland D'Aluers, joined the banner of Lord of St Lô, who was the Bishop of Coutances, at the battle of Senlac when Harold was overthrown. Then England was piteously overrun, and although the Conqueror never reached Oxford we know how greatly that city suffered from the aftermath of the war and how the English nobles were despoiled of their possessions. As a reward for his loyalty and bravery Roland D'Aluers was granted " sundry lands and livings in the county of Bucks, Oxon and Berks whereof the greater part had been ye inheritance of Lewyn, an English Earle before ye Conquest." He was also given the honor of Wallingford, and it was at this town that Wigod, the holder of the manor received William and there the Conqueror had homage paid him by Wigod and Stigand, Archbishop of Canterbury." Wigod's daughter and heiress was married to the Conqueror's favourite noble, Robert de Oilli, a name still connected with the D'Oyley tower at Oxford. Roland had three sons who lived in Oxon, Northants and Bucks. Tetsworth came into their hands. This village is situated on the London road and is named after a Saxon invader from Jutland named Teot who, seeing good pasturage and a never failing spring called the Knapp, built his home hard by, which became the homestead of Teot and gave its name to the Manor which fell into the possession of D'Aluers, whose name in course of time became changed to De Auvers, and then to Danvers. Here, as is to be learned from the Cartulary of Thame Abbey, which is preserved in the library of the Marquis of Bath, at Longleat, they intermarried with the local families of Tollemaches, whose name survives in Stoke Talmage, with the Chevauschesuls from whom the village of Chiselhampton takes its name and with the D'Oyleys who were connected with Oxford. (The last Baronet, Sir William D'Oyly, lived about a century and a half ago in a cottage adjacent to a public house in Westcott Barton, a small village in North Oxfordshire). The eldest son, Sir Ralph,

lived at Little Marlow in Bucks and is said to have married the sister of Alexander the Magnificent, Bishop of Lincoln. The Danvers made judicious marriages and became great landowners especially near Banbury. Among these matrimonial alliances were marriages with the Fettiplaces of Swinbrook and Shefford, "the Greens and the Fettiplaces hold all the manors the parks and the chases"—(the last male Fettiplace died as the keeper of a small inn at Burford)—with the Greys of Rotherfield, with the Fiennes of Broughton Castle, the Quartermaines of Thame, the Verneys of Byfield and the Bruleys of Waterstock. Eventually Sir John Danby, who was born in 1540, a notable person owing to the zeal he displayed in the land-defence against the Spanish Armada, succeeded to the estates of Silvester Danvers at Dauntsey in Wiltshire. He made a great marriage with Elizabeth Nevill, the heiress of the last Lord Latimer, through whom he obtained the estates and Castle of Danby in Yorkshire. He had three sons and seven daughters, six of whom survived him. The three sons were all educated at Oxford. Charles, the eldest, matriculated at Christ Church when he was 16, and at 18 he was fighting in France. He then became member for Cirencester. In 1598 he was on terms of enmity with Henry Long, brother of Sir Walter Long of South Wrasall, who had grossly insulted him. His younger brother, Henry, coming into the inn at Corsham when they were quarrelling, and thinking his brother was in danger of his life drew his pistol and shot and killed Long. The brothers had to flee and they owed their escape to Henry Wriothsesley, Lord Southampton, the patron of Shakespeare. They fought in France under Henri Quatre, who was so pleased with their prowess that he wrote a letter to Elizabeth asking for their pardon. This was granted in 1598 and in the next year Charles was given a command as Colonel and fought in Ireland under the Earl of Essex with whom he was on terms of great friendship. This led him to become implicated in the Essex rebellion and he paid for his friendship by expiating his treason on the scaffold on Tower Hill on March 18, 1601. His large property was forfeited to the crown, but two years later it was handed over to his second brother Henry, who was the seventeenth in descent from Sir Roland D'Aluvers. Henry, the Founder of the Garden, was born at Dauntsey on June 28, 1573. He also matriculated at Christ church when he was 16, became page to Sir Philip

Sidney and served under Maurice Count of Nassau, afterwards Prince of Orange. Then he fought under Henri Quatre, and was knighted at Rouen when 18 by Robert Devereux, Earl of Essex. After his exile, when pardoned, he was made a captain of a vessel and proved so capable that the Lord High Admiral, the Earl of Nottingham, said he was the best captain of the Fleet then fighting on the Spanish coast. He served under Essex in Ireland where he became Lieutenant-Colonel of the Horse, and received a shot in his face at the battle of Kinsale. For his valour he was created Baron Danvers of Dauntsey by James the First in 1603. After the accession of Charles the First he was created in 1626 Earl of Danby, sworn a Privy Councillor in 1628, and made Knight of the Garter in 1633. "The ceremonial attaching to that knighthood was the grandest solemnity known in the memory of man." He was made Governor of Guernsey in 1665, Ranger of Wychwood Forest and Keeper of Cornbury Park to which place he "retired, full of honour, woundes and daies." There he kept a house of great and costly hospitality and added to the portion where Robert Dudley, Earl of Leicester, died in 1588, a fine south-western wing designed by Nicolas Stone.

Henry was the illustrious Founder of the Oxford garden. In 1620 he determined to found the Physic Garden and therefore purchased the lease of a pasture ground on the south-west side of the London road called Paris Mead, once the burial place of the Jews before their expulsion in 1290, and subsequently of the hospitallers of St. John, prior to the acquisition of that Hospital by William Waynflete for the erection of Magdalen College. "Four thousand loads of mucke and dunge had to be carted by H. Windsor, the City Scavenger, to raise the ground above flood-level." We are told that on July 25, 1621, the Vice-Chancellor, the Proctors and most of the University solemnised the laying of the first stone of the Physic Garden. Mr Dawson of Broadgates made a speech and then Dr Clayton and last of all the Vice-Chancellor. Lord Danby completed the levelling of the ground and enclosed it with stately walls which at that time cost £5000, the chief gateway being from the design of Inigo Jones but executed by Nicolas Stone, the architect for the additions to Cornbury, of St Mary's Porch, of the tomb of Sir Thomas Bedley, and the beautiful effigy of Lady Elizabeth Carey in Stow Church in Northamptonshire. It may be

added that the statue in the upper niche of the garden gateway is of Lord Danby and the statues in the lower niches of Charles the First and Second were paid for by the proceeds of a fine of one hundred pounds inflicted on Antony Wood for libelling Lord Clarendon the author of *The History of the Rebellion*. The gateway was not completed till 1632. Elizabeth, Lord Danby's mother, who had for second husband Sir Edward Carey, was a clever woman—"she has Chaucer at her fingers' ends. A great politician, great witt and spirit, but revengeful." Henry inherited her ability. Aubrey says of him that "he was a perfect master of the French; a historian; tall and spare; temperate; a great economist so that all his servants were sober and wise in their respective stations." They included Colonel Legge and his brother. This Colonel Legge was a godson of Lord Danby who sent him as a volunteer to fight for Gustavus Adolphus and afterwards to help Prince Maurice of Orange in the Low Countries. In later days he became a most devoted servant to the Stuart cause. He was captured after the battle of Worcester, where he was wounded, and was imprisoned in Coventry gaol. He would have been executed had not his wife arranged an escape by visiting him, when he went out dressed in her clothes. Of this episode there is a vivid MS. account which I have had the pleasure of seeing in the muniment room at Patshull. His son was the first Earl of Dartmouth. Lord Danby died at Cornbury Park on January 20, 1644. He was buried at Dauntsey Church in Wiltshire. On his monument are some lines written by his nephew, the saintly George Herbert. Lord Danby left Cornbury Park to his sister, the wife of Sir Richard Gargrave, who, from such a condition of affluence that he could ride on his own land from Wakefield to Doncaster, became so impoverished that he was obliged to earn his bread by travelling with pack-horses. He died in an old hostelry with his head on a pack-saddle. Danby also left for the upkeep of the Botanic Garden the parsonage inappropriate of Kirkdale in Yorkshire and also "some trees which are lying at Wilcott as Tymber to perfect such buildings as shall be ordained at Oxford for the benefit of my Physic garden." William Lenthall, the Speaker of the House of Commons, then living at Burford Priory, was left as one of the overseers of his will, but on Lenthall's being made Master of the Rolls he added a codicil substituting Sir

Edward Hide in his place. The troublous conditions of the times prevented the University benefiting by the will, which was contested by Danby's brother, Sir John Danvers, of whom a few words must be said. He, too, came as a lad of sixteen to Brasenose College Oxford. He was knighted at Royston in 1608-9, and shortly after, when about 25, married Magdalen Lady Newport, then twelve years the widow of Sir Richard Herbert, of Montgomery Castle, who had ten children living at her second marriage. Sir John became Member of Parliament for Arundel, sat for Montgomery in 1614, and for the University of Oxford in 1621-2, just after his brother had given the Physic garden. He was a man of considerable learning, and very fond of gardening. So singularly handsome was he that people on the Continent followed him about to admire his fair complexion and flaxen hair. His mansion at Chelsea was a treasure-house of marbles, and here he held a "salon," to which many were attracted by the ability and wit of his charming wife. In the Commons John Danby went over to the Parliamentary Party, was one of those who tried the King, and signed his death-warrant, his face being one of the two whom Charles recognised. On the death of his wife in 1627, he married, the next year, Elisabeth Dauntsey, by whom he became possessed of the Manor of West Lavington in Wiltshire. By her he had three sons and three daughters. His eldest son, Henry, was made the heir of the greater part of Lord Danby's estate, notwithstanding which John tried to oust his sisters from the bequests left them by Lord Danby, and succeeded so far as Cornbury Park was concerned. However, Henry, the son of Sir John, died of smallpox when only 21, before his father's decease, as did his two brothers. So far as he could, Henry left his estates to his sister, Anne, who married Sir Henry Lee, of Ditchley and Quarrendon, and her only surviving daughter married James Bertie, Baron Norreys of Rycote, the ancestor of the Earls of Abingdon. Sir John Danby lost favour with the Commonwealth, left England, and lived on the continent for some years. On his return he lived at Danby House, Chelsea. He married a third time, and by his wife, Grace Hewett, he had a son, John, who became his heir according to his will of 1654. It is said that he felt he ought to carry out the wishes of his brother to endow the Oxford Physic Garden, and that he had actually prepared a codicil for this pur-

pose, but it was never signed owing to his somewhat sudden death in April 1655. So Oxford again suffered.

JACOB BOBART.

Before the death of the Earl of Danby, Jacob Bobart, a native of Brunwick, had been appointed gardener at the Physic Garden at a salary of forty pounds a year. This deed is dated 1641, but it is probable that Bobart had been at the garden sometimes since he is spoken of as 'of Oxford.' Bobart was, says Baskerville (*Collectanea* p. 190), in his younger days. . . . sometime a soldier by which Imploy and Travail he had opportunities of Augmenting his knowledge, for to his native Dutche added the English Language and he did understand Latin pretty well. As to fabric of body he was by nature very well built (his son in respect of him but a shrimp) tall, strait and strong, with square shoulders and a head well set upon him. In his latter day he delighted to weare a long beard and once against Whitsontide had a fancy to tagg it with silver, which drew much company in the Physic Garden." He was an excellent gardener and Baskerville says "After ye walls & gates of this famous garden were built, old Jacob Bobart may be said to be ye man that first gave life and beauty to this famous place, who by his care & industry replenished the walls with all manner of good fruits our clime would ripen & bedeck the earth with great varietie of trees and plants & exoticck flowers, dayly augmented by the Botanists who bring them hither from ye remote Quarters of the world. At the entrance he set two yew trees which being formed by his skill are now grown up to gigantic bulky fellows, one holding a Bill, th'other a Club on his shoulder." These examples of topiary work formed the theme of many ballads and jests. Evelyn came to see the Garden in 1654, where Bobart showed him "the sensitive plant, canes, olive-trees, rhubarb," etc. In 1648 a Catalogue of the Plants growing in the garden was published. This affords striking testimony to Bobart's capabilities for no fewer than 1600 are enumerated. A second edition appeared in 1658. It was a joint compilation of Dr Philip Stephens, Principal of Hart Hall, now Hertford College, William Browne, afterward Senior Fellow of Magdalen College, and by the Bobarts, father and son. It has a quaint preface. The



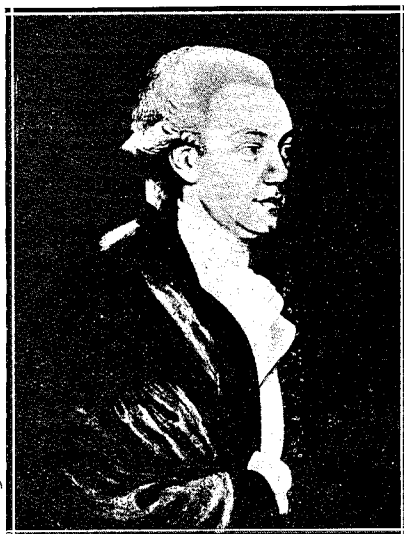
JACOB BOBART.



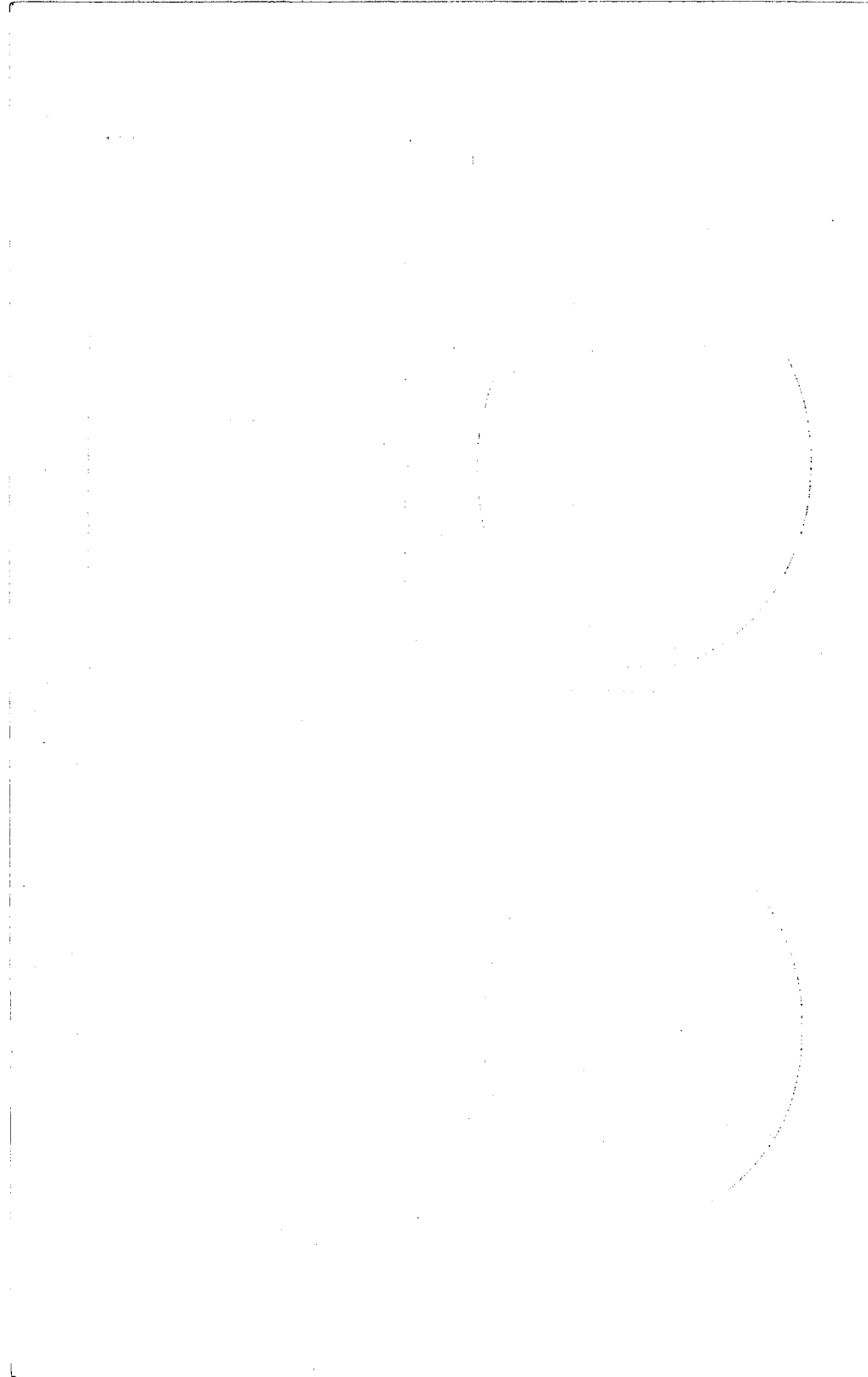
MORISON.



DILLENIIUS.



SIBTHORP.



names of the plants are accompanied by references to the pagination of the authors cited, the first time in a British Botanical work. A very few plants have the localities mentioned. Evelyn came again in 1664 (*Memoirs* I, 352) when he saw two large locust trees and many planes, and some rare plants under the culture of old Bobart. Samuel Pepys paid it a visit in 1668, and to it also came Cosmo de Medici in May 1669, when Bobart is described as an elderly man of a fine countenance and a perfect botanist. The plants of the greatest rarity were shown to the serene prince. In the same year, Elias Ashmole and Antony Wood were often in the garden with Bobart, "who showed them many choice plants, grafts, herbs, and other curiosities to Mr Ashmole's great delight." Ashmole had only recently been initiated into the art of simpling by John Watlington, an apothecary of Reading, and on one of these visits Ashmole explored the rich country round Stow Wood. In 1670 the Prince of Orange came when "Bobart received him with a Dutch compliment." (*Wood Life and Times*, II., 208). Bobart died in the garden house at Oxford on February 4, 1679, in the 81st year of his age. There is a tablet to his memory, which Dr Vines has recently restored, on the south wall of St Peter's Church.

ROBERT MORISON.

Owing to the disturbed period a Professor of Botany was not appointed until December 6, 1669, when Dr Robert Morison was elected. Next day he was made Doctor of Physic. From the MS. draft of his *Vita* (Sloane MS. 3198, ff. 17-29), which is in the hands of Archibald Pitcairne, we learn that Morison was born at Aberdeen in 1620, and entered that University at so early an age that he graduated in Latin, Greek and Philosophy, taking the degree of Master of Arts in 1638. He also studied Mathematics and turned his attention to Natural History, especially Botany, with the idea of becoming a Physician. His parents wished him to study Theology, so in order to meet their wishes he took up Hebrew with so much success as to be able to write a grammar in that tongue. But he kept to his first love. Then came on the Civil War, and under Montrose, in the battle of the Brig of Dee, 1644, against the Covenanters, he was severely wounded. He subsequently fled to France where he studied medicine and its

allied sciences in Paris, and was created Doctor at Angers in 1648. Vespasian Robin (after whom *Robinia* is named) was his Botanical teacher, and Robin recommended him to Gaston, Duke of Orleans (uncle of Charles the Second), who gave him the management of the Royal Garden at Blois. At that magnificent castle Morison evolved his system of classification which was to have been published under the ægis of the Duke of Orleans. The Duke, unfortunately, died in 1660, but he was previously in that year visited by Charles, to whom the Duke introduced Morison. The result was that after the Restoration, Morison was invited to come to England. Despite the pressure made by Fouquet, the Minister of Finance, to induce Morison to remain in France he hastened to London where he received the title of King's Physician and Professor of Botany, with a stipend of two hundred pounds a year. "Tantus Morisono amor Patriæ," remarked Pitcairne. In London he found time to prepare his *Praeludia Botanica*, issued in 1669. This publication recommended him to the University of Oxford: "whereupon, by the great testimonies and recommendations of his worth, he was elected on December 16, 1669." Charles for a time continued the salary and the title of Regius Professor, but the former, as was not unusual, fell into arrears, and there is a pathetic letter from him to Saneroft, Archbishop of Canterbury (Tanner MSS. *Bib. Bodl.* xxxvi., n. 216) asking for these arrears since he "is so much in debt yat I cannot appear in person. . . . I shall be forced . . . to dispond and give all over and goe shift for my wife and familie, and my thirty years' study all lost." The letter bears the laconic, and it is to be feared utterly inadequate, reply "Dr Morison £5." It may be added that he appears to have had only forty pounds a year from the University. At Oxford Morison was primarily engaged on the preparation of his great work, *Historia Plantarum Universalis Oxoniensis*, the first volume of which was issued in 1680, but he had, however, previously issued, in folio size, "*Plantarum Umbelliferarum Distributio Nova*, the earliest systematic monograph of a plant group. This is dedicated to James, Duke of Ormonde, the Chancellor, and to the Vice-Chancellor and others who paid for the twelve copper plates of figures, each of which bears the names and arms of the donors. The first issued volume of the *Historia* is called *Pars Secunda*. As he explains in his

preface this refers to the *Pars Prima* on Arbores, which he meant to publish, but which has never appeared. The specimens themselves on which it was to be based, are still preserved in the Oxford Herbarium, but there is no evidence of these or, indeed, of any other plants illustrating his second volume, having been collected by Morison. The handwriting accompanying them in that of Bobart, the younger. Possibly in many cases they may have been actually seen by Morison. He did not live to complete more than nine of the fifteen sections in which he arranged herbaceous plants. About 1300 figures of plants are given on 126 plates, each of which had been given by some generous and usually distinguished donor. Morison, however, was not only an able botanical writer, but he lectured in the open air "in the middle of the garden (with a table before him) on herbs and plants thrice a week." He introduced a variegated form of the greater Maple, miscalled the Sycamore, from Magdalen Grove, and also had from Blois a variegated form of the *Dulcamara*. His end was untimely and tragic. He had gone to London to procure suitable paper for the *Pars Tertia* of his *Historia* when, crossing the Strand near Charing Cross, he was knocked down by the pole of a coach. His skull was fractured and he died next day, November 10, 1683. He was buried in the Church of St Martin's-in-the-Fields. Pitcairne says "he was vigorous in body, having a mind trained to every kind of study, of ingenuous manners, calling a spade a spade, eager for true knowledge, and a hater of filthy lucre, considering the public advantage rather than his private gain."

JACOB BOBART, THE YOUNGER.

Succeeding him as acting Professor came Jacob Bobart, the younger, who for many years had been employed in the botanic garden, probably as amanuensis by Professor Morison. He was born in Oxford about 1640, and his name first appears on the title page of the second edition of the *Catalogue of the Oxford Garden*, already referred to. When quite young he prepared a collection of dried plants, which is alluded to in one of his MSS.—"ut 24 die Novembris 1666, me 2052 plantas collectas et exsiccatas habuisse numeravi," and this is still preserved in sixteen cases, although not in their original arrangement, in the

Herbarium. He succeeded his father as keeper of the Gardens in 1679, and in 1683 Dr Fell, Bishop of Oxford and Dean of Christ Church, one of the delegates of the Press, entrusted him with the great collection of seeds upon which Morison's system was based, together with 50 engraved plates (these cost about three pounds each), and as many drawn plates or figures in order that he might complete the *Historia* which Morison left unfinished. For the same purpose Dr Obadiah Walker, Master of University College, also handed over the Morison MSS. On this Bobart spent much labour, and he lived to see the third volume of the *Historia* published in 1699. His salary appears to have been forty pounds a year. He did not neglect the garden despite the effects of the great frost in the winter of 1682-3, when "oaks, ashes, walnut trees were miserably split and cleft so that they might be seen through, and this also with terrible noises like the explosion of fire-arms" (*Phil. Trans.* xiv., n. 165, Nov. 20, 766, 1684), yet Uffenbach, visiting it in 1710, found it full of plants, but with few rarities, not equal to Leyden or Amsterdam. The yews, he says, were the best he had seen on his travels. The rarer plants were all grouped in an enclosure, and behind the house where there was a small Orangery and a glass-house on either side. The whole appearance was satisfactory. He was shown *Amygdalus Nana Aegyptiaca flore pleno*, and Bobart told him that when it arrived Hermann of Leyden was with him. On seeing the plant his eyes filled with tears, and he said, "this is my plant." This was true, for a ship which had many plants he had obtained with great difficulty from India was captured by a French privateer, and a few came to Oxford. Bobart generously restored some of them to Hermann. A much more commendatory account is given of the Garden in 1714 by Dr John Ayliffe, who says it contains many thousands of plants. He speaks of the use it is "to many kinds of people and also for the service of all Medical Practitioners, supplying the Physicians, Apothecaries and who else shall have occasion for things of that nature with what is right and true, fresh and good for the service of Health and Life." Unlike Morison, Bobart was on excellent terms with John Ray to whose *Synopsis Methodica Stirpium Britannicarum* of 1690 he contributed a list of British plants, four being new to the British flora. Ray warmly acknowledges his help in the preface. His

Pars Tertia of the *Historia* is a monumental labour. It is a folio of 657 pages with an index, and is illustrated with 166 plates, representing something like 2000 species. All the copper plates are preserved in the Radcliffe Library. This volume suffices to establish his reputation as a highly skilled botanist, possessing a wide knowledge of plants. He was able to add, at least, ten species of flowering plants to the British flora. He was an acute observer and proved the dioecious character of *Lychnis dioica* (Blair *Bot. Ess.* 243, 1720). Linnaeus established the genus *Bobartia* in his honour, and he fully deserves the estimate placed on his work by John Ray (*Syn.* ed. ii., 1696) "celebris imprimis Botanicus, nec tamen minoris meriti quam famae." His later years at the Garden were full of disappointment. He himself made "an appeal to the Vice-Chancellor and delegates and curators of the Universitie, lamenting the declining state of the Physic Garden. It is but a melancholy consideration to look back and think (and indeed it is a great wonder) that this should be the only Publick Garden of Europe that hitherto maintained itself," and he goes on to ask for a grant in aid. Sherard (Richards. *Corr.* 9) in 1691, says that "Bobart is tired of Oxford, and would like to go to Chelsea, but Doody is to have that place."

Sherard (*l.c.* p. 11) says:—I am surprised the Vice-Chancellor has obliged him to resign his place [on account of his infirmities], and has chosen Dr Sandys, Botanic Professor: they ought to have let him spend the short remainder of his time in the Garden." As it happened he actually never left it, but died in the Garden house on December 28, 1719. He was buried in St Peter's-in-the-East Church, where there was a memorial to his memory placed in the north aisle. He left his library of 278 volumes to the University and a field near St Frideswide's for the poor of St Peter's-in-the-East for 500 years. It was then to revert to the descendants of Bobart. There is an attributed portrait of Bobart in the Botanic Garden Library. The plants in his (what is called the Morison herbarium) number about 6500. These have been identified recently. (See Vines and Druce, *An Account of the Morisonian Herbarium*, 1914). Dr Sandys, of Wadham, succeeded Bobart, then came Gilbert Trowe, of Merton, but we hear little or nothing of the Garden or of Botany during their occupation of the Chair. It

was reserved for William Sherard to bring back some of its old traditions and glory.

WILLIAM SHERARD.

William Sherard, whose name was originally Sherwood, was born at Bushby in Leicestershire, in February, 1658-9. He was educated at Merchant Taylor's School, and in 1677 was admitted to St John's College, taking the degree of B.C.L. and becoming a Fellow in 1683. He spent much time in foreign travel, some time as tutor of Lord Townsend, studying botany under Tournefort at Paris. It was at that eminent Botanist's suggestion that he contemplated the continuation of Bauhin's *Pinax*—the *Index Kewensis* of that day. About 1704, he went as our Consul to Smyrna. There he collected plants, continued to work at the *Pinax*, and busied himself with antiquarian research. He returned to England in 1716, having made a large fortune. He took up his residence at Barking Alley, London, living in the greatest privacy. He accumulated a very large herbarium, was in correspondence with foreign botanists on terms of great friendship with Hermann and Vaillant, and became a patron of the science. He was much esteemed by John Ray, who inserted many of his British discoveries in the *Synopsis*, and was in constant correspondence with Dr Richardson of Bierly, whose original letters have recently been acquired by the Bodleian Library. Nichol prints seventy-five of these letters in vol. i. of the *Literary Anecdotes*.

On one of his continental journeys he met with Dillenius, whom he afterwards induced to come with him to England, bringing with him "most, if not all of his Fungi painted, and all his Lichenes, Lichenastra, and Muscos, neatly designed." Dillenius lived with him at Barking Alley, where both assiduously worked at the *Pinax*. As a third edition of Ray's *Synopsis* was badly needed, Dillenius was entrusted to bring it up to date, but as it was thought that a foreign botanist's name on the title-page might be prejudicial to its sale, it was published anonymously. It was doubtless financed by Sherard, who also assisted Hermann, and probably wrote the *Schola Botanica*, which was published at Amsterdam in 1689. He determined to do something for Oxford, and in 1726 gave £500 to enlarge its conservatory, and presented many books and rare plants. He likewise made over his very large herbarium of something over

14,000 sheets. On his death in 1728, it was found that he had endowed the chair of botany with £3000, hereafter known as the Sherardian Chair, on the condition that Dillenius was made its first professor, and that the University should give yearly the sum of £100 towards the upkeep of the Garden. Sherard lies buried in a nameless grave at Eltham, in Kent, where his brother James had a noted garden.

DILLENIUS.

An engraving of the Oxford garden made by Williams (*Oxonia Depicta*, t.viii.), shortly before Dillenius took up his residence, shows it to be arranged in 16 squares, with a dwelling-house bordering the street. In order to widen the approaches to Magdalen Bridge this was removed by the Street Commissioners in 1790, and the front of the garden itself narrowed. The main street was raised so as to make the approach to the bridge easier, but this prevented a level and easy entrance to the north gateway. Dillenius took up his residence in 1734, and received the degree of D.M. in 1735. As a full account of his life and works has already been published in *An Account of the Dillenian Herbaria*, by G. C. Druce and S. H. Vines, 1907, we may briefly point out the salient features of this great botanist's career. He was an indefatigable worker, but his chief life's work, the *Pinax*, has never been published. The MS. is preserved in the Botanic Garden Library. Dillenius was, however, something more than a great Indexer. In the *Pinax* he made his identifications and reductions of species. In his earlier works he established many genera which Linnaeus took up. As regards British Botany he made a celebrated journey into Wales, of which a verbatim account is given (*l.c.* xlv.), when some new varieties and species were discovered, including *Viola Curtisii*, *Anthyllis Dillenii* and *Potamogeton nitens*, and he was the first to recognise *Koeleria vallesiana* in Somerset. This lay forgotten among the odds and ends of his collection, and had become separated from its label. About 180 years after it was gathered, the writer went to Uphill, and re-discovered it there. Some years of labour were spent in producing the large and sumptuous *Hortus Elthamensis*, with its 417 well-drawn and engraved figures of the plants growing in James Sherard's garden at Eltham. Many were new to science, and several new genera were established. His description of the

plant we know as *Solidago cambrica* is a good example of his painstaking accuracy. There is a finely coloured copy in the Oxford den Library. Sprengel and Linnaeus gave great, but not undue, praise to this work. The type-specimens are preserved in the Oxford Herbarium. As we have said Dillenius bore the cost except that James Sherard paid thirty guineas for 10 copies, and he had an extra one gratis. The loss was upwards of 200 guineas, and besides the time and labour it crippled Dillenius for life, as we shall see later on. James, the brother of Dillenius' patron, William Sherard, was a physician, and had a great garden of rare plants at Eltham, but he was a mean creature, who complained that Dillenius, in preparing it "only had for his chief care to improve and advance the knowledge of botany." This reproach throws a lurid light upon James Sherard, who intimates that Dillenius' first care should have been to adorn his garden. After taking up his residence in Oxford Dillenius became sedentary, and worked in the Library and Herbarium rather than in the field, yet he kept up his friendships with British and foreign Botanists, including the illustrious Haller. He added little to the knowledge of the flora of the Oxford district. Some years of his later life were spent in describing the plants and etching the copper plates for his important work, the *Historia Muscorum*, which was published in 1741. It has eighty-five plates and 576 quarto pages, in which about 600 "mosses" are described. This volume was issued at a guinea, but it sold slowly, and he was a considerable loser. The specimens on which the descriptions are based are at Oxford. Their names have recently been freshly revised. He commenced an abridged edition, which was to have been issued at half price, but he did not live to complete it. Regarding his edition of Ray's *Synopsis* it is necessary to say that Dillenius made most valuable additions, which are usually printed in a different type. He added about 40 Fungi, 40 Algae, more than 150 Musci, and about 200 Phanerogams and Filices. For 36 years it was the text-book of British Botanists. Among the plants of special interest it contained the first description, as a British plant, of *Nitella mucronata*, from Isleworth. In the course of the next two centuries it had been found only twice, i.e., in Sussex and Hants, until in 1892, the writer found it in great quantity at Godstow.

Unaccountably, it has died out there, and has not been seen since. In 1736, Linnaeus, who had been to London, through the generosity of Clifort, came to see Dillenius. Dillenius was rather annoyed with him, because he thought that in his *Genera Plantarum* Linnaeus had not done him justice or indeed had been unjust. When Linnaeus came to the Oxford Garden, Dillenius was talking to Dr Shaw, the great traveller in Barbary, whose plants Dillenius had identified, and not thinking Linnaeus would understand English, remarked "this is the young man who would confound the whole of Botany." Later on, it is said, Dillenius asked Linnaeus how he would classify *Linaria Cymbalaria*, which grew on the wall, and he replied so clearly, and with such evident knowledge that he received high commendation, when he remarked that he hoped that he had not brought confusion there. There are two or three versions of this tale, but they all agree in testifying to the mutual esteem which grew up between these two great men. Linnaeus stayed eight days with Dillenius, who did not leave him an hour alone during the day, and at the end of his visit offered to share his stipend with Linnaeus if he would stay and work with him. After his departure Dillenius wrote—"A new author is arose in the north, the founder of a new method. . . . I am afraid his method wont hold"—a true prediction. They continued to correspond, but so far as the Linnean letters go all appear to have perished.

The difficult task of deciphering the letters of Haller was accomplished by Dr Vines (*l.c.* xciii-cxii). Both Haller and Dillenius were opposers of the Artificial System of Linnaeus, and with much in common it was to Haller that Dillenius looked to complete the *Pinax*. The sedentary life and too close adherence to his desk led to increased stoutness, and Dillenius died suddenly on April 2, 1747, aged 63. He, too, is buried in the church of St Peter's-in-the-East, where there is a monumental tablet to his memory. The monetary loss which had been caused by James Sherard's meanness left him so poor that there was not enough money to pay for his funeral, so that his library had to be sold. Thus passed away one of the greatest botanists of his time. Linnaeus bears testimony to the departed Professor's merits, as will be seen from extracts from his letters and writings. "There is nobody in England who under-

stands or thinks about genera except Dillenius." "I have dedicated my new edition of *Fundamenta Botanica* to Dillenius, yourself [Haller], Van Royen, Gronovius, the Jussieus, Burmann and Amman, placing your names in this order, which seems the just one, you being all the most eminent botanists of your time." "Dillenius on Mosses is a most learned work." "His loss to science is unspeakable." Linnaeus founded the beautiful genus, *Dillenia*, which belongs to a family of its own, the *Dilleniaceae*, in honour of him—"it is of all plants the most distinguished for the beauty of its flower and fruit like Dillenius among botanists." There is a three-quarter length portrait of him in the Bodleian Library given by his executor, George Seidel, in 1750, of which there is a replica in the School of Botany at Oxford. He is represented as holding a drawing of *Amaryllis formosissima* in his hand. During his tenure of office the Garden was by no means neglected. The plants established with so much skill by Bobart were carefully tended and additions freely made. Pointer in the *Oxoniensis Academia* of 1749 narrates there was " (1) true African Rhubarb; (2) the Aloe Plant, with a white flower on it. The Aloe is so succulent a plant that it has been preserved 10 years above ground without either earth or water, and 'tis thought may be preserved so 20 years, as I was informed by the late excellent botanist, Mr Bobart, Master of this Garden; (3) the True Indian Tobacco Plant; (4) Guinea Pepper Tree; (5) *Pomum Amori*, and Indian Wheat [*Zea Mays*]; (6) *Sorbus Vera* (*Pyrus domestica*); (7) *Helianthemus* or Sun-flower, of a fleshy colour and five leaves; (8) *Scylla vera*, which has a six-leaved flower almost of a lead colour [*? Urginea Scilla*]; (9) *Arbor Balsami Peruviana*; (10) *Cedrus Vera*, from Mount Lebanon, with leaves like a star raised from a seed, as the aforementioned tree was; (11) *Paliurus* or Thorn with which our Saviour was crowned, as Mr Bobart told me he had great reason to believe. It grows in the corner between the gate and the house [a specimen of *Paliurus Spina-Christi* still grows near the gateway]; (12) *Pistachia Vera*, the true Pistachia Tree with leaves like a walnut; (13) the Currant Grape grafted upon the Fox-Grape; (14) the White Frontiniac Vine, grafted upon the Parsley Vine. [These grafts were due to the reverend and ingenious Robert Sharrock, LL.D., Fellow of New College]. No. 14 grew and bore well, and the earlier ripening



JACOB BOBART. INIGO JONES' GATEWAY.



ENTRANCE TO BOTANIC GARDEN.



of the Parsley Vine led to an earlier ripening of the graft. The graft of the currant upon the large, luxuriantly growing vine called Fox Grape, seemed to produce much fairer and stronger fruit than that usually upon its own stock. See Plot, *Nat. Hist.* 1677. (15) The Sensible Plant. This unaccountable plant grows in the island, Barbada, in North America." Many of these rarities dated from Bobart's time.

HUMPHREY SIBTHORP.

On the death of Dillenius, Dr Humphrey Sibthorp, a scion of an old Lincolnshire family, was elected Professor. During his long tenure of the office, Sir James E. Smith says "Botany slept at Oxford." Sibthorp is said to have given one not very successful lecture in the 37 years he held the post. However, Linnaeus connected, and not unhappily, his name with a small genus, *Sibthorpia*, whose type is a tiny plant with inconspicuous, inodorous flowers, of no economic value, which delights in frequenting shaded, sheltered, sequestered places: but if for no other reason we value him for the sake of his son, John Sibthorp, who is one of the illustrious few of Oxford's own.

JOHN SIBTHORP.

He was born in 1758, in the city, was educated at Magdalen School, entered Lincoln College, and joined University College, taking his M.A. in 1780, and his M.B. in 1783. He studied medicine in Edinburgh and ascended Ben Lomond, making a list of its plants for botanical study. He catalogued the plants he found in Lincolnshire, Surrey and Devon. He took the Oxford M.D. in 1784. Having obtained a Radcliffe Travelling Scholarship, he visited Switzerland and France, staying for some time at Montpellier. An inheritance of considerable value from his mother, who was his father's second wife, made him independent of the medical profession. To him that hath shall be given. His father, succeeding to the family estate, resigned, it could scarcely be said he relinquished, the Sherardian Chair. John succeeded, and took up the duties of his office, such as they were. It was when he was at Göttingen in 1784, that he first made up his mind to visit Greece, doubtless with the example of Sir George Wheeler before him. At Vienna he met with the celebrated botanist, Jacquin. There he saw the unique brush-drawings of Dioscorides,

and there he was introduced to a young draughtsman, Ferdinand Bauer, the son of the court painter to Prince Lichtenstein. There Jacquin gave him a copy of the copper plate engravings made from the Dioscorides figures, of which five only had been made by order of the Empress Marie Thérèse. In March, 1786, accompanied by Bauer, he started from Vienna, passing through Carniola to Trieste, Venice, Bologna, where one suspects he acquired Gregory of Reggio's herbarium, Florence, Rome and Naples. Bauer's first drawing is of the Colosseum, and there are many of Naples, Baiae, Vesuvius, Ischia, and Capri. They sailed from Naples in May, touching at Messina, of which Bauer gives a pleasing sketch, and another, not so finished, of that incomparable view of Etna from the Greek theatre at Taormina. Two or three views of Stromboli and the Lipari Islands are included. Passing Cerigo they touched at the island of Melos or Milo, where the Venus was still hidden. Bauer has made three sketches, one of which shows the unprotected roadstead. By June they reached Crete, when "Flora was in her gayest attire, and the snowy covering of the Sphakiote Mountains was withdrawing." Here they stayed, and Bauer has paintings of Canea, the monastery of the Holy Trinity with its formal Cypresses, the Sphakiote Mountains and the celebrated snow cavern, where even in the blazing heat of summer the snow lies unmelted. Many new plants were discovered, including *Veronica thymifolia*, *Asperula incana*, *A. rigida*, which he found near the monastery of St John, *A. suberosa*, *Galium junceum*, *G. incurvum*, *Onosma erecta*, *Lysimachia anagalloides*, *Rhamnus prunifolius*, *Ferula thyrsofolia*, *Linum caespitosum*, *Daphne taxifolia*, *Gypsophila dianthoides*, *Silene ramosissima*, *Rosa glutinosa*, *Teucrium alpestre*, and numerous others, making a wonderful haul. Most of these were exquisitely painted by Bauer. On leaving Crete they narrowly escaped ship wreck near the isle of Melos. They afterwards passed the harbour and town of Hydra, where *Campanula anchusiflora* was gathered. Ægina, in the Saronic Gulf, was visited, Siphnos, one of the Cyclades, with its little town perched on a conical hill was passed, and they landed at the adjacent isle of Antiparos in order to explore its celebrated grotto, where the *Capparis rupestris*, a new species in Bauer's sketch, is shown growing at its entrance. Bauer gives several views. The curious isle of Amorgos with its Roraima-like hill was

seen, and there are good views of its town and harbour. On the hill grows *Helichrysum amorginum*, with its beautifully white everlasting flowers, in its only habitat. Samos, on the Anatolian coast was touched, and Bauer supplies a striking view of the Temple of Juno, while Sibthorp collected some new species, including *Campanula drabifolia* and *Convolvulus sagittifolius*, var. *Sibthorpii*. They then reached Smyrna. There they stayed for some time. Curiously, Bauer gives us no pictures of it so, probably, despite its name, the malodorous town did not appeal to him. From it they travelled overland to Broussa, the old capital of the Turkish Empire, following in the steps of the Consul Sherard, the founder of the Sherardian School of Botany at Oxford. In the glorious scenery of that delightful and historic town the artist and the botanist must have greatly rejoiced, and the clear, sweet air must have invigorated them after the horrors of a Greek sailing boat. On the way Bauer painted Scala Nova, and a vivid sketch of a caravan bivouacking, the ring of camels, and the ring of mules enclosing their respective saddles and loads, while outside their owners are enjoying their evening meal. On their way they gathered *Cyperus rotundus*, var. *major*, *Scabiosa eburnea* and *Silene mollis*, and Bauer gives a distant view of the Bithynian Olympus and a charming scene, the approach to Broussa through the chestnut groves, showing the minarets of the beautiful city, the rival to Granada in its picturesque situation. It is said to have three hundred mosques. This view is reproduced in the third volume of the *Flora Graeca*. Sibthorp more than once climbed Mount Olympus and he made some important discoveries on this splendid hill. They found many plants new to science, and other rarities. They include *Alopecurus lanatus*, *Pedanthum timoni-folium*, *Festuca punctoria*, *Scabiosa ochroleuca*, *Asperula nitida*, *Galium coronatum*, *Plantago gentianooides*, *Myosotis nana*, *Campanula betonifolia*, *Phyteuma Sibthorpiatum*, *Viola gracilis*, *Saxifraga Sibthorpii*, *Heracleum humile*, *Seseli caespitosa*, *Euphorbia pumila*, *Lathyrus aureus*, *Xeranthemum cylindraceum*, etc. The winter was spent at Constantinople, where he noticed about 800 species, and here Bauer painted about thirty views, many of great beauty and interest,—The Golden Horn, Seraglio Point, the Prinkipos Islands, etc. They stayed on the Isle of Karki from

October 19 to December 20. Sibthorp's bill for lodgings and food came to 407 piastres and 19 paras. There he collected fish and birds which have been superbly painted by Bauer but never published. A glorious view of Constantinople (No. 53) is reproduced in Vol. IV., 1823. There are many views of the Dardanelles and the Bosphorus where "the dolphins play around us," of the Palaces which line its shores, and of Hellespont. In February they visited Belgrade and there is a splendid drawing of the aqueduct built by the Romans which supplies the city with water. There are views of the Tower of Oblivion, of Buyukdere, and of the entrance to the stormy Euxine. At Constantinople they were joined by Captain Emery and Mr Hawkins of Dallington, Northamptonshire (one of Sibthorp's Executors), and the party set out for Cyprus in a Venetian merchant ship, passing through the Dardanelles. They stayed long enough near Tenedos to allow Bauer to paint it, and hugging the Anatolian coast sailed across the Archipelago of which several sketches were made including the Islands of Lero; Cos, the birthplace of Hypocrates; and Patmos. Bauer made some very fine sketches of the Monastery of the Apocalypse. They touched at Mitylene and Rhodes of which there is a lovely view taken from the land, looking between the two harbour-towers seawards. They stayed five weeks in Cyprus, but Bauer has only three views—Monte Croce, The Monastery, and Ipsora. Here Bauer discovered the interesting *Pinguicula crystallina*. Other discoveries included *Cotula tridentata*, *Linaria Sibthorpii*, *Bupleurum nodiflorum*, *Allium Dioscoridis*, *Athamanta multiflora*, *Polygala venulosa*, *Daucus involucrata*, *D. littoralis*, *Silene discolor*, *Arenaria picta*, *Wilckia lyrata*, *Kentranthus orbiculatus*, and *Salvia crassifolia*. Returning northwards from Cyprus, they kept close to the Asian coast, and landed at Porta Finica. They skirted Cape Chelidonia securing an interesting sketch of an Asian village sheltered by Oriental Planes, under which water-buffaloes are grazing. Views of the Isle of Lero, and of Argenteria were obtained. They reached Athens on 19th June 1787. There Bauer painted thirteen views of which three are missing. The ten include three superb drawings of the Theseum. The view of Athens from Mount Anchesmus is poorly represented in Vol. V. of the *Flora*. The original is a splendid study as it shows Athens as it was in 1787 with the distant mountains about Salamis and the Gulf of Corinth

There Sibthorp gathered many novelties, including *Chondrilla ramosissima*, *Tunica ochroleuca*, *Dianthus serratifolius*, *Silene rigidula*, *S. congesta*, and *Veronica glauca*. From the classic capital the travellers visited Livadia, where Bauer gives drawings of the Fountain, the Grotto of Trophonios, the renowned Oracle, and Mount Parnassus (reproduced in Vol. I.). Many additional species were found here by Sibthorp, including *Achillea holosericea*, *Cepharlaria ambrosioides*, *Stachelin a uniflosculosa*, *Silene caesia*, *S. limifolia*, *Asperula lutea*, *Daphne jasminea*, *Biasolettia pumila* and *Jurinea glyacantha*. They made an expedition to Cape Colonna where Bauer prepared magnificent studies of the Temple of Athens, where Byron had written "Place me on Sunium's marbled steeps." Round the bold headland the travellers probably had a bad time with the fierce currents which surge by as they journeyed to Euboea, then called Negropont, the largest Greek island. Of this island five excellent drawings are given. They ascended Mount Delphus in a storm of wind and rain on 3rd August, but its rich botanical treasures rewarded them for their laborious, if not perilous, adventure. Their finds included *Silene articulata* and *Euphorbia deflexa*. Then they had a week's voyage to Mount Athos near to the Isle of Lemnos. Sibthorp thought Athos was the richest place for flowers of the many he had visited. Bauer gives four fine paintings—the Convent of St Anna (reproduced in Vol II, 1813); the Convent of Iviri; the Summit of the Mountain, and a view of Athos from the West. The new finds included *Anthemis Sibthorpii*, *A. pectinata*, *Cephalaria graeca*, *Dianthus strictus*, *D. gracilis*, *Phlomis lunaifolia*, *Digitalis leucophaea* and *Hieracium bracteolatum*. They returned to Athens, and then went on to Salonika of which there are three good views, one showing the crowded harbour and Mount Kurbach, the Gulf of Salonika, and a glowing view of Lake Petriski and the Village of Pechliger. Then they retraced their steps to Athens and proceeded to Dodeca and the Port of Megara—a city which reached its zenith in the 8th century B.C., and colonised Byzantium on the Bosphorus, Heracleia on the Euxine, and Megara-Hyblaea in Sicily. In September 1787 they came to Corinth, of which there is a view from the Gulf of Ægina, one of the Temple of Neptune and one of Corinth, which is reproduced in Vol VII, 1830, and another still better from Lepanto. They reached Patras of

which there is a telling sketch of the town and Venetian fortress, and gathered *Cyperus comosus*. They left Patras on the 24th September, passing by Gibraltar, of which Bauer gives two views. So bad was the voyage with long delays that they did not reach England till December 7th, 1787. Sibthorp on his return to England was much weakened by the privations he had endured, but some measure of strength was regained. His great merits were recognised by the University. He worked assiduously at the *Flora Oxoniensis* having a willing helper in James Benwell who was employed in the Garden. Benwell had a good knowledge of the local flora and attended Sibthorp on his floral excursions and himself discovered some rare plants. He died in 1819, at the age of 82, having earned the respect and esteem of all who knew him. In the spring of 1788 Sibthorp entertained in Oxford Sir Joseph Banks (to whom he dedicated the *Flora Oxoniensis*, and to whom he gave many of his Greek duplicates), Mr Dryander and Sir James E. Smith.

Despite his assured position, his wealth, his love for agriculture, and of England, Sibthorp was still urged by a feeling that he had not completed the task he had set himself, and determined that he would make another expedition to the East. He remained in England only long enough to issue the *Flora Oxoniensis* in 1794. It is in Latin, and enumerates about 750 species of Flowering Plants and Ferns, 90 Musci, 20 Hepaticae, and over 340 Lichenes, Algæ and Fungi. Writing to Sir J. E. Smith, who was then bringing out the first edition of Sowerby's *Botany*, he says that he has seen all the species which he enumerates in the *Flora Oxoniensis*, by no means a light task. It brought the knowledge of the County flora well up-to-date and remained without a local rival for nearly half a century. In 1794, accompanied by a Maltese, Francesco Borone, as Botanical assistant, Sibthorp, then in delicate health, set out for Constantinople, joining on the journey the suite of the Ambassador to the Ottoman Empire, Mr Liston. They travelled by way of Ostend, guarded by a convoy. He suffered much from sea-sickness. The party posted to Ghent and Brussels, the latter very gay despite the horrors of war with which it was surrounded. They passed through Lovain, Liège, Aix-la-Chapelle, Bonn, Nuremberg, and reached Ems on the 11th. On the 16th they were at Vienna, where Sibthorp met the great Austrian Botanist, Host, and Joseph Jacquin.

and was shown the Belvedere Gardens. There he found the elder Jacquin completing his monograph on *Ovalis*, and there he went over the garden at Schönbrunn which rivalled Kew in the multitude of its treasures. Leaving Vienna and travelling through the rich Hungarian plains by Rosenthurm into Wallachia, they reached Bucharest on May 5th, and passing through Bulgaria they came on May 9th to the minaretted city of Constantinople. There he met Mr Hawkins of Dallington, and they visited Belgrade, where he found an *Epimedium* which he mistook for *alpinum*. They crossed over the Sea of Marmora, once more to explore Olympus. The dolphins in the Bosphorus afforded them a pleasurable sight. In September they passed down the Hellespont, spent two days in examining the plains of Troy, and then proceeded to Imbros and Lemnos. Ten days were spent in the vicinity of Athens, as they were blockaded by pirates. Their journey led them to Skiatho, thence to the Negropont, and on the 13th passed under the five-arched bridge which connects Euboea with the mainland of Greece, reaching the Piraeus on the 15th of September. They spent four weeks at Athens where Borone met with his death by falling from a window while sleep-walking. On November 16th Sibthorp left Athens by the ancient Eleusinian way, and proceeded to Patras and Zante. In that pleasant island he spent the winter, purchasing from an apothecary a good herbarium of the island plants. In February 1795 the Morea was visited and in two months a complete circuit of the peninsula was made. The Violet and Primrose welcomed them in the plains of Arcadia, and *Narcissus Tazetta*, which Dr Sibthorp was disposed to think the true poetic Narcissus, decorated in profusion the banks of the Alphaeus. On the oaks of the Arcadian Mountains grew the Mistletoe, *Loranthus europaeus* (the English Mistletoe was said to grow in Greece only on the silver fir), and in Arcadia too they found the silvery white stars of *Ornithogalum nanum*. They visited Argos and Mycena where they saw much to interest them in the ancient ruins, and noticed heaps of shells of *Murex truncatus* which afforded the Tyrian purple dye. Then they travelled to Corinth, Patras and by way of Elis to Pyrgos. Guarded by a Turkish escort they reached Calamata by the 13th of April. By boat they travelled along the rocky shore to Cardamoula. They climbed the splendid mountain, Taygetus, in the Morea, but owing to bad weather could

not reach the summit. Among other plants they found *Euphorbia Apios*, a plant whose emetic and purgative properties were known to Dioscorides. They returned to Calamata by way of Mistra, and sailed from Corone in a Venetian vessel. Here on April 29 Hawkins went on to Greece and left Sibthorp, whom he was destined never to see again. Sibthorp left Zante, where he found *Scorzonera crocifolia* and *Crepis fuliginosa*, on May 1 for Otranto, having a most tedious journey, which instead of taking five days, actually took twenty-four. They touched at Cephalonia and Prevesa, visiting the ruins of Nicopolis where Sibthorp took a severe chill from which he never recovered. As he says the air of Prevesa is even deemed by the Greeks as infamous. He then went to Ancona and posted through the Tyrol, paying a visit to Schreber at Erlangen, who received him with great politeness. Schreber was preparing a monograph on *Carex* and had adopted Goodenough's names. Then he went to Göttingen to see Hoffman. Sibthorp reached England in the autumn of 1795 and was at Oxford on October 8th, very ill, and dieting himself on asses' milk. He was able, however, to take gentle horse exercise. But his disease made progress. The milder air of Ashburton in Devon was unavailingly tried, then, as a last resort he went to Bath. There he died in February 1796 at the early age of thirty-eight. He lies buried in the Abbey Church where there is a bas-relief monument by Flaxman to his memory. "No name has a fairer claim to botanical immortality among the martyrs of science than that of Sibthorp."

About 2300 species of plants were collected on the two journeys, many of which were new to science. Bauer had been not less industrious as his 965 beautiful and accurate drawings of plants testify. In addition there are water-colour drawings of Mammals, Birds and Fish, which are as yet unpublished. Sibthorp left to the University of Oxford, in addition to monetary bequests for publishing the *Flora Graeca* and to endow a Chair of Rural Economy, his collection of dried plants, and collection of animals, preserved or dry, to be deposited in the Library of the Professorship of Botany. The residue of his estate he left to his father, Humphrey Sibthorp. The preparation of the *Flora Graeca* was entrusted to Sir James E. Smith—the first volume appearing in 1806. There were twenty-five subscribers at £240 each and six other copies were printed for sale. The last

volume was issued in 1846. One hundred of Bauer's magnificent paintings had been most excellently etched on copper-plates by Mr J. C. Sowerby at a cost for engraving of each plate of about £14. The total cost of the book was £15,572 6s 10d. The sales of the 31 copies came to £5863 10s 1d, so that there was a deficit of £9708 16s 9d to be met by the Sibthorp estate. It may be added that Robert Brown edited Vol. vii., and Dr Lindley completed the Vols. viii., ix. and x. The writer is fortunate enough to possess the executor's, Mr Platt's, own copy as well as the correspondence and accounts relating to its publication and the minutes of the trial between the executors and the British Museum on a question of copyright, as heard before the Court of King's Bench on January 11, 1827, the Attorney-General and Solicitor-General appearing for the British Museum. Judgment was given in favour of the Executors. The case was carried to the Exchequer Court on January 29, 1828, and heard before Mr Justice Parke and Mr Justice Gazelee. The judgment was affirmed on February 11, 1828 in favour of the Executors. It was supposed that Sibthorp's correspondence was also left to the University, but it has perished.

Dr Williams of Christ Church was appointed Professor in 1795. His chief merit appears to be that he selected William Baxter in 1813 to be gardener, and under his instructions and careful management the old traditions of Bobart were revived. Botany was, however, at its lowest ebb and Dr Williams, although an elegant scholar, added nothing to botanical science and for practical instruction the undergraduates had recourse to the teachings of Mr Baxter.

WILLIAM BAXTER.

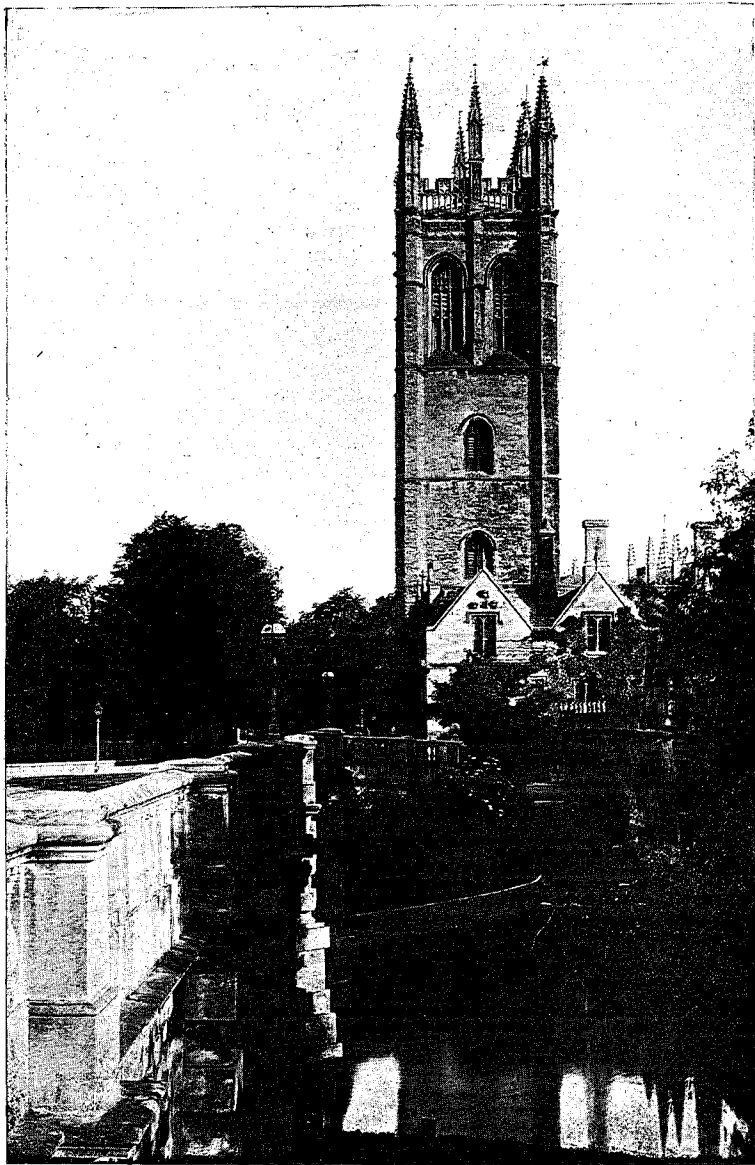
Baxter brought together a nearly complete collection of the British Willows. He was a careful and laborious investigator of leaf-fungi, and to this he was driven "partly from finding it impossible to make the garden such as he could wish. This industrious man—with the assistance of three persons, each of whom receives 2s per day—cultivates between 4000 and 5000 species of plants in the wretched houses of this garden, though in fact there is only one stove, properly so-called, and this is much too small." (Schultz, 1824), See *Bot. Misc.* i. Baxter himself produced in six volumes an excellent work, *Phaenogamous*

Botany, illustrated by well etched copperplates of each genus of British plants and these were well coloured in Oxford. He also started a Natural History Society in 1832, and he greatly helped the Rev. R. Walker in his preparation of the *Flora of Oxfordshire*.

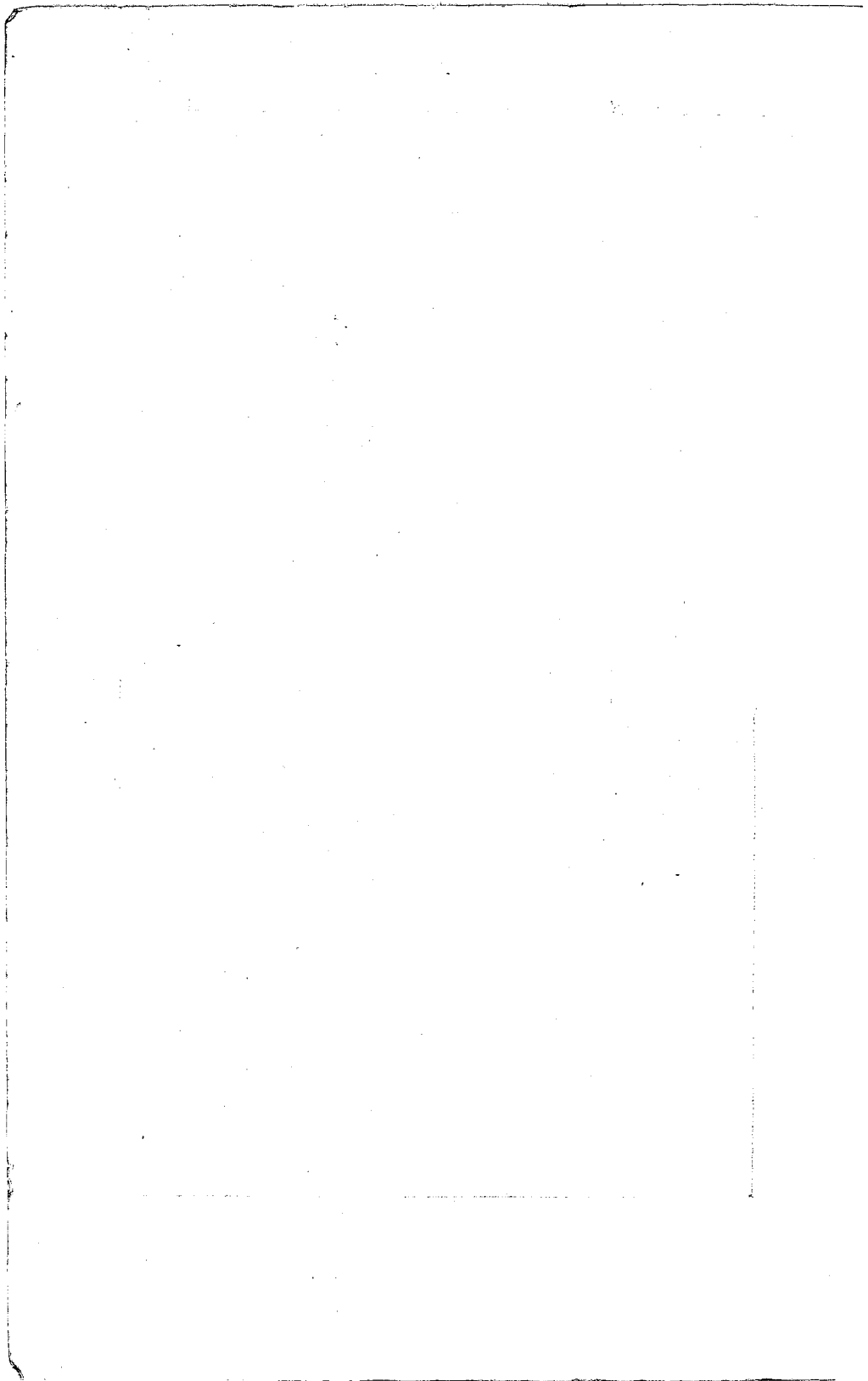
On the death of Dr Williams, Dr C. G. B. Daubeny was appointed Professor on February 8, 1834, when he was thirty-nine years old. He made extensive alterations in the gardens, and built the Victoria Lily House and the Orchid House, incidentally spoiling the appearance of Danby's stately wall. As a compensating asset there was a memorable meeting of the British Association in the Garden in 1847. Baxter's position, however, was not made much more important, and he was allowed to retire on an "wholly inadequate pension" in 1851 when he was succeeded by his son, Mr W. H. Baxter, who planted the trees and shrubs in The Parks. Professor M. A. Lawson, a native of Durham, was elected Sherardian Professor in 1868, an office which he held till 1882, during which time little change took place. He never created enthusiasm in his subject. On his retiral he went out to a Cinchona plantation in India, where he commenced a Herbarium, and was spoken of in terms of admiration by Mountstuart Grant Duff when he was governor at Madras.

PROF. I. B. BALFOUR.

Two years after his retirement from Oxford, Prof. Isaac Bayley Balfour was appointed, and in his vigorous clearance the grandson of old Mr Baxter was cashiered, the arrangement of the flower-beds was changed from its old Linnean method to the modern system, not without some losses, the Herbarium was brought from its old home to the late professor's dwelling-house, and some of the old collections were cut up and re-assorted. Professor Balfour also brought from Kew, a capable gardener, Mr W. G. Baker, and an air of industry pervaded the peaceful precincts. But he was here too short a time to let his brilliant talents bear fruit. A herbarium curator — a German, Dr Schönland, was appointed, and some attempts were made to get the Herbarium into order. One may add that in the interregnum before Balfour's appointment much had been done to overhaul the collections which were in a state of chaos. In a search for Sibthorp's English plants it was my good luck to find in an outhouse exposed to the weather, the valuable herbarium of Italian plants collected by Gregory of Reggio in 1606—the oldest



MAGDALEN COLLEGE TOWER.



collection with the names of localities appended in Britain. It had been rejected and put outside with poor Baxter's plants, Dr Ayres' collection of plants from Thame, Bloxam's Brambles and Trimmer's Mints. The two last were alive with larvæ. Professor Balfour presented us with his Herbarium which he made at Edinburgh and also with his Socotra plants. In 1888, he was appointed Regius Professor at Edinburgh.

DR S. H. VINES.

Dr S. H. Vines was chosen Sherardian Professor in 1888, and during his long tenure of office continued efforts were made to keep the garden up to its old traditions, to increase the Library and the Herbarium, developing the latter mainly to make it thoroughly representative of the European and Mediterranean area. He also rebuilt the glass-houses. Serving as I did under him for over thirty years, I know how unwearied he was in maintaining and extending the collections under his control. It has been my lot to rearrange the whole collections and to make the Herbarium consultable. We published two accounts of the Herbarium, in 1897 and 1919. The acquisitions which are noticed in the edition of 1919 speak for themselves. We also published an account of the Dillenian Herbarium and of the Morisonian Herbarium in which we gave, not only the biographies of those two distinguished botanists, but also an identification of the numerous species these herbaria contain. Dr S. H. Vines retired in 1919 when Sir Frederick W. Keeble, F.R.S., was appointed to the chair. Information upon the garden history will also be found in the pleasantly written "Oxford Gardens," 1912, by Mr R. T. Gunther.

It is well to recognise that with all their beauty and the sense of repose which they bring to one's mind that the gardens are not large enough, and that they are not a fitting home for an Arboretum. Such a desirable addition to the beauties of Oxford might surely be found along the side of the Cherwell, Mesopotamia, north of Magdalen Bridge, in Marston Fields, Christ Church, or Merton Meadows, where trees and shrubs from many climes should produce an effect not inferior to that of the Cambridge garden or the Arnold Arboretum in Massachusetts. The planting of such an Arboretum would bear witness that in the twentieth cen-

ture the rulers of the University were not less vigilant and generous than those who guarded its destinies three centuries ago, or he who gave to Oxford for the "use of the public and the University" the delightful garden of which we are all so proud.

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