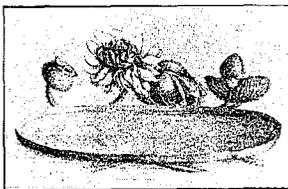


THE BOTANICAL SOCIETY AND EXCHANGE CLUB OF THE BRITISH ISLES.

(VOL. X. PART III.).

Victoria Regina.



Floreat flora.

REPORT FOR 1933

BY THE
SECRETARY,

WILLIAM HARRISON PEARSALL,
GREEN GABLE, MATFIELD, KENT.

The Ordinary Member's Subscription of 10/- per annum (or Exchange Member's 20/-) should be paid on or soon after January 1, 1934, to the Assistant Secretary, Mr JOHN F. G. CHAPPLE, Yardley Lodge, 9 Crick Road, Oxford.

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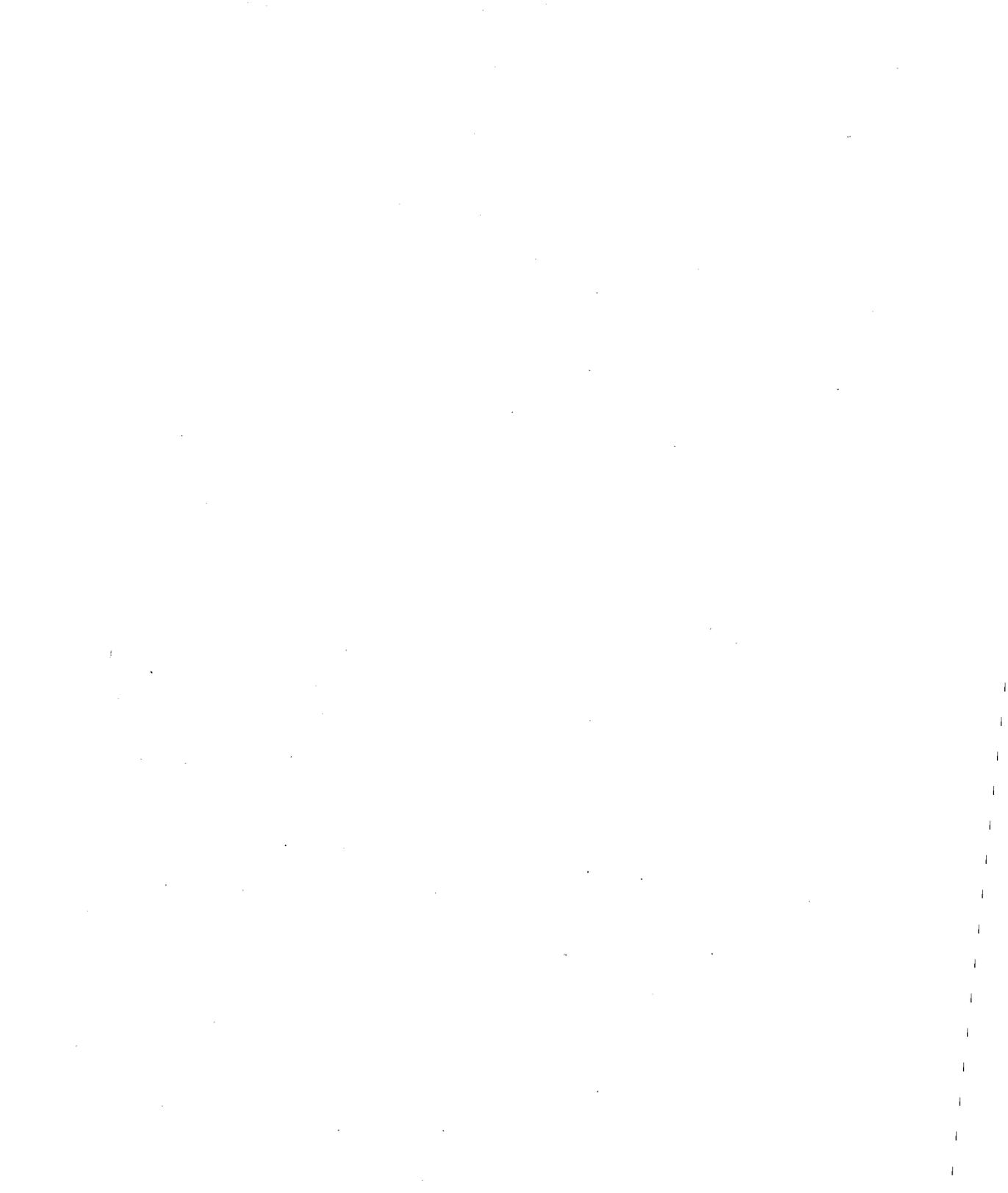
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THE
BOTANICAL SOCIETY & EXCHANGE CLUB
OF THE BRITISH ISLES.

BALANCE-SHEET FOR 1933.

Balance from Balance-Sheet for 1932, - - £305 8 8 Less Subscriptions paid in advance in 1932, - - 48 16 6 <hr style="width: 100%;"/> Subscriptions for 1933, - 241 8 0 " paid in advance, 68 4 0 Sales of Reports, Reprints, and Advertisements, - 8 8 9 Deposit Interest, - - - 0 9 7 <hr style="width: 100%;"/> <p style="text-align: right;"><u>£575 2 6</u></p>	Printing Reports (and cartriages, &c., connected), £249 8 10 Expenses of Distribution, - 1 13 0 Critics, &c., - £4 18 3 Less Donation from H. Phillips, Esq., 3 0 0 <hr style="width: 100%;"/> Postages, Stationery, and Petty Expenditure generally (Secy., & Ass. Secy.), 25 3 10 One Year's Allowance to Secretary, - - - 50 0 0 Honorarium to Ass. Secy., 40 0 0 Insurance (1932 & 1933), - 0 12 0 Cheque Stamps, - - - 0 4 4 Balance, - - - - 206 2 3 <hr style="width: 100%;"/> <p style="text-align: right;"><u>£575 2 6</u></p>
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PUBLICATIONS ACCOUNT.

Balance from Balance Sheet for 1932, - £57 19 7 Sales of Comital Flora, - 25 5 6 Sales of Flora Northants, 2 1 7 Sales of British Plant Lists, 7 8 7 <hr style="width: 100%;"/> <p style="text-align: right;"><u>£92 15 3</u></p>	Binding, - - - - £0 17 9 Balance, - - - - 91 17 6 <hr style="width: 100%;"/> <p style="text-align: right;"><u>£92 15 3</u></p>
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BALANCES OF FUNDS.

Balance from General A/c., £206 2 3 Balance from Publications Account, - - - 91 17 6 Balance from Life Members' Fund, £109 1 0 One New Life Member, - - 7 7 0 <hr style="width: 100%;"/> Balance from Miss Trower's Fund, - - - 16 7 11 Balance from Benevolent Fund, 41 3 6 <hr style="width: 100%;"/> <p style="text-align: right;"><u>£471 19 2</u></p>	National Savings Certificates, at cost, - £256 16 0 National Savings Certificates, at cost, - 143 4 0 Balance in Bank, 18th Dec., 1933, - - - 62 12 3 Cash in hand, - - - 9 6 11 <hr style="width: 100%;"/> <p style="text-align: right;"><u>£471 19 2</u></p>
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(Signed) THOMAS J. FOGGITT, } *Honorary Treasurers.*
 ,, GERTRUDE FOGGITT, }
 ,, JOHN CHAPPLE, *Assistant Secretary.*

15th January 1934. — Examined and found correct.

(Signed) F. A. BELLAMY, M.A., F.R.A.S.

SECRETARY'S REPORT.

The previous Report was very cordially received and I must at the outset express my gratitude to all those who so willingly contributed to make it so generally appreciated. As the first number of a new volume issued under changed conditions it was necessary that it should include a wide range of subjects indicating directions in which future work is desirable and interest is already aroused. It was also imperative that it should again emphasise the need for accuracy and completeness in all records of the distribution of British plants, otherwise they are valueless as the basis of further generalisations. Further, our membership includes such different types of individual scientific attainment, that our Reports must include both highly critical articles and others that are elementary and educative. In addition they must afford the most valuable and authentic records of the present distribution of British plants available and must afford space for necessary corrections of errors or omissions in the past records of the same.

As the result of keeping all the foregoing aims in view the Report became unduly bulky and expensive but achieved the objects intended by its publication. Among the papers contributed pathetic interest attaches to those by the late Dr Eric Drabble and W. F. Miller as being the last those able botanists were able to write.

The present Report follows much the same lines as the last and we trust that every member will find in its pages something of personal interest and stimulus. During the past year we have made some progress toward securing Local Secretaries for given areas and a list of those already appointed will be found herein. The Annual Conversazione on November 15, 1933, was a great success in every way. The members of the two societies got to know each other more intimately and were afforded opportunities of obtaining information or advice and of discussing matters of common botanical interest with others. We are again very greatly indebted to Mrs Gertrude Foggitt for her untiring efforts to make the occasion so thoroughly enjoyable. The date of the next Conversazione has been fixed for Wednesday, 14th of November 1934.

It may not be generally known that this Society takes the greatest interest in plant preservation and is represented on the Wild Plant Conservation Board. During the past year the Board has given much time to the consideration of such matters as the undue trimming of roadside herbage, county bye-laws for the protection of wild plants—and legislation for the same—and the danger to the flora of particular districts through road alterations, golf-courses or building. There may be some members who find it difficult to reconcile our zeal for plant

protection with our annual distribution of plants for exchange. In regard to the latter the rule "No specimens of any rare plant should be gathered if its existence in that habitat might thereby be endangered" is most honourably observed by our collecting members. Further, it is not generally known that the first charge on the plants sent in for distribution is the supply of specimens of each species to the great national herbaria at the British Museum and Kew. There are so many questions which can only be answered by the study of extensive systematic collections of plants that we are bound to collect all the evidence possible.

With a view to affording further opportunities for field-work, a series of excursions to places of botanical interest has been arranged—a list of which has already been sent out—and it is hoped that these will be well attended. We are much indebted to all those who have worked so hard to make the necessary arrangements to ensure the success of these gatherings.

Our financial position continues to be extremely satisfactory and members will be glad to know that 35 new members have joined the Society since the issue of the last Report. A list of their names and addresses is appended.

For many years it has been felt that our Reports should be published earlier in the year so as to be of use in the same year's field-work. Many attempts were made by Dr Druce to achieve this desirable result but inevitably many articles, records, and other contributions were received while the Report was going through the press and publication was thereby delayed. It seems to us that the whole difficulty lies in the fact that nobody has ever known the last date upon which MS. will be received. We propose, therefore, to suggest that all Records should be in by December 31st. As each record has to be card-indexed it would save much time and labour if members would use cards 12.5×7.5 cm., and on each write (1) The number according to the Oxford List, (2) the name of the plant, (3) the locality, giving the vice-county, (4) any additional note of scientific interest, (5) collector's name. As no record can be published without the name or number of the vice-county in which the plant was found, failure to give this information in the case of some obscure locality has frequently caused much arduous and unnecessary research.

As regards MS. *the latest date upon which any can be received is March 31st* in each year. As a general rule it is well to send in articles, papers or other lengthy contributions before the preceding December 31st. We trust members will co-operate in all such efforts to ensure earlier publication of the Report.

Altogether apart from the value of the Society's publications is that of its correspondence. Members are invited to submit any of their botanical difficulties to the Secretary, who assures them that he is always delighted to render any assistance in his power. Although the bulk of this correspondence is with members working at a distance from adequate library or herbarium facilities and yields little or no material

for publication, its educational and social value is very considerable and should be taken into account in estimating the value of the Society's work. In this connection we are deeply grateful for the very willing and invaluable co-operation of all those who have rendered assistance in the critical examination of British plants. Among foreign botanists we are indebted to Prof. O. E. Schulz, Dr K. Ronniger, Dr Almquist, Dr P. Aellen, Prof. B. H. Danser, Dr H. Dahlstedt, Dr F. Jaquet, Dr R. Probst, Dr K. H. Zahn, Dr H. Schinz, Prof. J. Holmboe and Dr G. Kükenthal. To the authorities of the Royal Botanic Gardens at Kew and of the British Museum at Cromwell Road we tender our sincerest thanks for much kindly advice and ready assistance in many instances. Among British botanists we are deeply appreciative of kindness shown by Mr A. J. Wilmott, Mr J. S. L. Gilmour, Dr W. B. Turrill, Dr T. A. Sprague, Mr A. B. Jackson, Mr George Taylor, Mr A. D. Cotton, Mr Noel Sandwith, Lt.-Col. A. H. Wolley-Dod, Rev. H. J. Riddelsdell, Mr W. C. Barton, Mr E. B. Bishop, Mr H. W. Pugsley, Mr W. O. Howarth, Mr P. M. Hall, Dr W. A. Sledge, Mr J. Fraser, Mr C. E. Britton, Mr A. E. Wade, Dr R. W. Butcher, Dr F. W. Stansfield, Mrs H. Drabble and Miss G. Wigglesworth.

NEW MEMBERS.

- Mr A. W. Anderson, Curator, Gardens and Parks, Timaru, New Zealand.
- Mr F. T. Baker, Assistant Curator, City and County Museum, Lincoln.
- Mr W. H. Blyth Martin, Taymouth, Dundee.
- Mr J. P. M. Brennan, Cape Cottage, Tonbridge, Kent.
- The Hon. Guy Charteris, 24 Oxford Square, London, W.2.
- The Rev. G. H. Chilman, Dalton Parsonage, Thirsk, Yorkshire (1934).
- Mrs Philippa German, Newlands, The Plantation, Darrington, Worthing, Sussex (1934).
- The Viscountess Gladstone, 27 Chester Terrace, London, S.W.1 (1934).
- Miss B. Gullick, B.Sc., Crane Bridge Road, Salisbury.
- Miss May Heron, Erclands, Ercall Lane, Wellington, Salop (1934).
- Mr S. Ashton Hill, Hillfields, Bewdley, Worcestershire.
Department of Botany, University College, Hull.
- Mr Francis Jekyll, Munstead House, Godalming, Surrey (1934).
- Mr Rex Knowling, Hertford College, Oxford (1934).
- Mr E. D. Morgan, South View, School Lane, Crowborough, Sussex.
- Mr E. Nelmes, The Herbarium, Royal Botanic Gardens, Kew, Surrey (1934).
- Mrs J. Vandeleur Phelps, Woodbury, East Avenue, Bournemouth (1934).
- The Rev. G. C. Pownall, "Norman Dene," Charlton Kings, Cheltenham (1934).
- Mr Cecil T. Prime, B.A., Whitgift School, Haling Park, Croydon, Surrey (1934).
- Mrs L. Samuels, Quarry Bank House, Styal, via Manchester.

- Mr A. L. Still, B.A., Roslyn, Dower Avenue, Wallington, Surrey (1934).
 Mr G. Taylor, B.Sc., British Museum (Nat. Hist.), Cromwell Road,
 S.W.7.
 Mr H. Stuart Thompson, A.L.S., 11 Buckingham Place, Clifton,
 Bristol.
 Mrs R. M. Tristram, F.L.S., Cox's Mill, Dallington, Sussex (1934).
 Mr A. J. Wilmott, M.A., F.L.S., British Museum (Nat. Hist.), Crom-
 well Road, S.W.7.
 Miss Lucy Burton, Stott Park, Lake Side, Ulverston, Lancs.
 Mr Ronald Burn, Whatfield Rectory, Ipswich.
 Miss A. M. Cory, Fullerton Manor, Andover, Hants (1934).
 Mrs R. S. K. Eyre, Woodside, Crowborough, Sussex.
 Miss G. Wotherspoon, Mount Ephraim Mansion, Tunbridge Wells, Kent.
 Rev. A. J. Young, Seamark, Lloyd Road, Hove, Sussex.
 Mrs Hugh Willan, Ladies' Empire Club, 69 Grosvenor Street, Lon-
 don, W.1.
 Miss Ruth Yeoman, The Green, Brompton, Northallerton.
 Mr W. E. Warren, "Selborne," Horsell Rise, Horsell, Surrey.
 Godalming Nat. Hist. Society. E. B. Bishop, Lindfield, Marshall Road.

 LOCAL SECRETARIES.

- Carnarvonshire. Norman Woodhead, Esq., M.Sc., University College
 of N. Wales, Bangor.
 Yorkshire, N. Riding. Miss C. M. Rob, Catton Hall, Thirsk, Yorks.
 Lincolnshire. F. T. Baker, Esq., City and County Museum, Lincoln.
 Essex. Miss M. S. Campbell, Layer Marney Hall, Kelvedon, Essex.
 Glamorgan. Miss Eleanor Vachell, 8 Cathedral Road, Cardiff.
 South Wilts. Miss Barbara Gullick, B.Sc., Crane Bridge Road, Salis-
 bury.
 Hants. P. M. Hall, Esq., F.L.S., 12 High Street, Fareham, Hants.
 Cornwall. Edgar Thurston, Esq., C.I.E., Queen's Hotel, Penzance.

PLANT NOTES FOR 1933.

†95/6. ✕*SAPONARIA CALABRICA* Guss. Pl. Rar., 164, t. 31. Ital., Graec. Waste heap, Welwyn, Herts, v.-c. 20, H. PHILLIPS. Det. SCHINZ.

†122(2)/1. ✕*GOSSYPIUM PUNCTATUM* Schum. et Thonn. Avonmouth Docks, W. Gloster, 1933, SANDWITH and GIBBONS.

†132/13. ✕*OXALIS SEMILOBA* Sond. A South African alien not given in the Oxford List. Polzeath, East Cornwall, v.-c. 2, J. DONALD GROSE. Det. Kew. The bruised leaves of this plant are used by the Zulus to rub over the mouths of infants suffering from thrush and similar ailments (ED.).

†178/1. *LATHYRUS LATIFOLIUS* L. Found in 1913 growing on the face of the cutting near the railway station at Hitchin, Herts. Specimens were sent for drawing purposes to E. W. Hunnybun. It has persisted in this station up to 1932. There were also formerly several plants in more accessible places round the lime kilns, but these have now disappeared. It was in all probability originally an outcast from the garden of A. Ransom, which extended to the edge of the cutting.

The figure of *E.B.*, tab. 1108, drawn from specimens sent by the Rev. Dr Abbot from Hawnes and Bromham, Beds, represents *L. sylvestris* L. (fide R. A. Pryor, *Journ. Bot.*, 1881) and not *L. latifolius*, to which it is credited. See Notes by F. A. N. Garry, on the Drawings for "English Botany" (*Journ. Bot.*, 1903).—J. E. LITTLE.

178/2. *L. SYLVESTRIS* L. In North Herts this plant is very rare. A specimen is in Pollard's Herbarium, dated 1868, but during forty years of field work I had never seen a living specimen from Herts until 1933, when flowering pieces from Little Wymondley were brought to me by A. Bygrave, who had known it there for a number of years.—J. E. LITTLE.

194/14j. ✕A new variety of *ROSA MICRANTHA* Sm. Early in July 1932, whilst my sister and I were collecting Roses on a favourite bushy hillside near Haslemere, Surrey, I found what seemed to be a fine bush of *Rosa micrantha*, var. *typica*, with glorious deep rose flowers, and with immature fruit of a rich vinous tint (very suggestive of that of good Burgundy or claret). Its prickles also seemed flushed with the juice of the vine, but more restrainedly so than the fruit, being pale and translucent, akin to the glow of a very old and delicate port. Further, the young leaflets had a rosy suffusion as though they had

been dipped in wine. Altogether, the effect was most pleasing, and I took a specimen, without any further study at the time. Next day at home, the usual careful examination revealed—to my great surprise—that the styles were densely hispid, indeed they might well be called woolly. Naturally, for a minute or two, I was inclined to suspect that it might be *R. rubiginosa*, but the stem armature, exserted styles, shape of leaflets and general appearance together soon convinced me that it must be *R. micrantha*. A further gathering in greater quantity, a fortnight or so later, showed spreading sepals, and I sent specimens to Col. Wolley-Dod for his opinion. He then thought it might be var. *Sagorskii* Chr., or near it. (Probably that was before he saw Keller's *Synopsis Rosarum Spontanearum Europae Mediae*, or before he had time to digest it.) Circumstances prevented me from getting any later material (with riper fruit) in 1932, but I made a special journey to get such in September 1933. Meanwhile, Col. Wolley-Dod had kindly lent me Keller's bulky *Synopsis*, from a careful study of which I came to the conclusion that this Rose is a new variety of *R. micrantha*, somewhere near var. *drinensis* Rob. Keller. Again I submitted a good supply of material to Col. Wolley-Dod, with evidence in support of such view. I quote from his reply its essential sentences, which are not impaired by the context. "This certainly seems to be a *micrantha* form Although in the youngest gathering the sepals are reflexed, the later ones rise definitely enough. The shape of the fruit definitely excludes *drinensis*, so we must make a new var. of it." This confirmation of my opinion by Col. Wolley-Dod is very gratifying to me, seeing that almost all my knowledge of the genus *Rosa* is derived from his publications, his correspondence with me, and his very numerous diagnoses of my specimens. But he is far too busily engaged on the compilation of his new *Flora of Sussex* to spare time, during the next year or so, to describe this Rose and get it published. In view of the uncertainty of life, I do not care to wait so long, and have appealed to Mr W. H. Pearsall for help. With his usual kindness he has agreed to have my commonplace English translated into the good Latin, which appears toward the end of this note, and so fulfil the conditions requisite for the publication of a new variety.

At this stage it seems desirable to trace down, from Keller, the steps which have led me to my destination. The descriptions of *R. micrantha*, and the 75 varieties and forms thereof recorded from Middle Europe, occupy no less than 16 pages of the *Synopsis*. I must add that the pages are about 12 inches by 9, and are closely printed. *R. micrantha* is here divided, and again and again sub-divided, into 25 little (shall we say ?) "groups." The following are my steps.

- A. Roseiflorae: *Flores ± intense rosei*.
- I. Hispidae: *Pedunculi glandulis stipitatis hispidi*.
 - b. Glabrescentes: *Foliola glabra vel subtus tantum ad costam ±, plerumque disperse pilosa*.
- 2. Eriostylae: *Styli pilosi*.

The respective alternatives to above would be:—

B. Albiflorae: *Flores albi*.

II. Nudae: *Pedunculi nudi vel tantum singulis glandulis stipitatis obsiti*.

a. Pubescentes: *Foliola utrinque vel tantum subtus ± dense pilosa; petioli pubescentes usque tomentosi*.

1. Liostylae: *Styli glabri*.

In succession, each of these obviously is ruled out.

Here, it may be fitting to point out that var. *Sagorskii* Chr. comes under A. I. a, with petioles “*albo-tomentosi*,” and with leaflets “*subtomentosa*.”

To return to my first four steps above. The one and only var. or f. which appears in *Synopsis* under A. I. b. 2 is var. *drinensis* Rob. Keller, and is thus described:—*Rami aculeis curvatis muniti; ramuli floriferi inermes; petioli laxi et disperse pilosi usque subglabri, crebre glandulosi; foliola subparva, ± 20 : 11 mm., elliptica, versus basin in acutum cacumen fastigiata, subtus ad costam laxi pilosa, crebre glandulosa; pedunculi disperse glanduloso-hispidi; sepala in dorso et margine glandulosa, post anthesin reflexa; receptacula fructifera globosa, disco lato; styli elongati, ± dense pilosi*.

My own decided opinion, with which Col. Wolley-Dod virtually agrees, is that the Haslemere Rose differs considerably from var. *drinensis*, and must be regarded as a distinct variety. Here are the chief differences. In the Haslemere Rose—1. Flowering branches are *not* unarmed. 2. Sepals are not permanently reflexed after flowering, but at least spreading, and often tending to be suberect. 3. Fruit certainly not globose, but almost elongate. 4. Styles hardly elongate.

Recognising the almost infinite variation so characteristic of the genus, 1 and 4 might pass, but 2 and 3, perhaps more especially the latter, seem vital.

I am not aware of any previous record in Britain of the occurrence of either *Sagorskii* Chr., *drinensis* Rob. Keller, or any other *R. micrantha* form with *densely* hispid styles. The only British Rose even distantly approaching the variety which is the subject of these notes (as regards styles), is a very thinly hispid-styled form from Hayling Island. This has been passed (not without reluctance) by Col. Wolley-Dod as f. *trichostyla* Rob. Keller, “but not typical.” The indeterminate Hayling Rose is quite different from that now under consideration.

I must conclude these notes by naming and describing my new Rose, expressing deep indebtedness to Mr W. C. Barton for his translation of such description.

Rosa micrantha Sm., var. *Burgessi* var nov.

Frutex robustus erectus decem pedes altus turionibus multis robustis arcuatis densus formosus; turiones aculeis subaequalibus falcatis vel saepe aduncis modice armati; rami floriferi longitudinis mediocris aculeis turionum aculeis similibus armati; flores saturate rosei; petioli modice glandulosi, paene vel omnino glabri; foliola mediocria vel parva,

in nervis parce pubescentia, cetera glabra, nonnulla ad basin cuneata; pedunculi modice, interdum parce glandulosi, vulgo 1-flori, nonnunquam 2-3-flori; fructus ovatus, saepe sat elongatus; styli valde hispidi vel etiam lanati, modice exstantes; sepala patula, saepe aliquantum suberecta.

Bush compact and shapely, 10 feet high, strong and erect, with many stout arching stems; stems moderately armed, with prickles subequal, falcate, often hooked; flowering branches of medium length, with prickles as on stems; flowers deep rose; petioles glabrous, or almost so, moderately glandular; leaflets medium to small, glabrous except on midribs, which are very feebly pubescent, some leaflets cuneate-based; peduncles moderately glandular, occasionally weakly so, usually solitary, but sometimes 2 or 3-flowered; fruit ovoid, often rather elongate; styles strongly hispid to woolly, moderately exerted; sepals spreading, often tending to be suberect.

When young, the immature fruit is of a rich deep vinous colour, and prickles of much paler vinous, but both fade in drying, especially the latter. Also, the young leaflets often have similar vinous suffusion.

It has affinity with var. *drinensis* Rob. Keller, differing chiefly in shape of fruit and direction of sepals.

I have great pleasure in naming, as above, this interesting variety as a slight tribute to our very good friend, Mr Charles Burgess, the esteemed Honorary Life President of the Godalming Natural History Society, so well known and respected by all inhabitants of the Borough of which he has been six times Mayor.—EDMUND B. BISHOP.

†197/7. ✕COTONEASTER RACEMIFLORA K. Koch. Goblin Combe, near Bristol, N. Somerset, 1933. No doubt planted. J. GIBBONS. Det. MARQUAND.

†210/4. ✕COTYLEDON OPPOSITIFOLIA Ledeb. ex Nordm. Stony ground near a garden at Matlock, per Mrs A. E. EASTES. Det. Kew.

282/2c. ✕DAUCUS GUMMIFER All., var. VILLOSA (Thellung). Durlston Head, Dorset, v.-c. 9, H. PHILLIPS. Det. SCHINZ.

†362/3. ✕TAGETES PATULA L. Waste heap, Welwyn, Herts, v.-c. 20, H. PHILLIPS.

†365/11(2). ✕ACHILLEA SIBIRICA Ledeb., var. TYPICA Regel. Railway wharf, Bristol, 1933, J. GIBBONS.

†404(2). ✕ZOEGERA L. Mant. i, 15 (1767). Benth. & Hook. f., ii, 477.

†404(2)/1. Z. LEPTAUREA L. Mant. i, 117. Syria, Mesopotamia. Haven Street, Ryde, Isle of Wight, 1932, J. W. LONG. Det. SCHINZ.

†532/25(2). ✕LINARIA SIEBERI Reichb. Tip, Bristol, v.-c. 34, 1933. First British record, N. Y. SANDWITH. Mediterranean region.

HIERACIUM—CORRECTIONS.

419/69(2). *HIERACIUM SAXIFRAGUM* Fries. With reference to *Hieracium saxifragum* Fries, modification, in H. H. Johnston's "Additions to the Flora of Orkney," Sixteenth Paper, p. 3 (4th March 1933), Dr Hugo Dahlstedt, in a note, dated 25th October 1933, on specimens of Reference No. 4731, from Enegars, near the Kame, Hoy, 8th July 1933, informs Col. Johnston that the specimens of James Sinclair's Reference Nos. 760 and 770 from Berriedale and Enegars, respectively, which he formerly determined as *Hieracium saxifragum* Fries, modification, on 3rd January 1933, belong to a good species, namely, *Hieracium pseudomicrodon* Dahlstedt, n. sp., in H. H. Johnston's "Additions to the Flora of Orkney," Thirteenth Paper, pp. 5-6 (1st December 1929), which belongs to Zahn's capital or group-species *Hieracium saxifragum* Fries.

[Delete 419/69(3) in *Rep. B.E.C.*, 1932, 23. See *Rep.*, 1929, 24.]

419/157. *H. SAGITTATICEPS* Dahlstedt. With reference to *Hieracium sagittaticeps* Dahlstedt, n. sp., in H. H. Johnston's "Additions to the Flora of Orkney," Fifteenth Paper, pp. 4-5 (8th March 1932), Dr Hugo Dahlstedt, in a note, dated 23rd October 1933, to Col. Johnston, says that this species is the same as *Hieracium bifidum* Kitaibel, subspecies *subtenue* W. R. Linton, and that as Linton's name is the oldest it should be used in preference to *Hieracium sagittaticeps* Dahlstedt, which is therefore a synonym of it.

[Delete 419/110(2). See *Rep. B.E.C.*, 1931, 729.]

419/242. *H. INULOIDES* Tausch, subspecies *STRICTUM* Fries, form *ANGUSTIFOLIA* Dahlstedt. With reference to this plant in H. H. Johnston's "Additions to the Flora of Orkney," Twelfth Paper, p. 8 (1st May 1929), James Sinclair's two specimens of his Reference No. 596 from the north-east side of Aith Hope, South Walls, Hoy, Orkney, 9th August 1928, were determined under the above-mentioned name by Dr Hugo Dahlstedt, on 20th February 1929; and my forty-one specimens of my Reference No. 4258, from the same station, 20th August 1929, were also determined under the same name by Dr Hugo Dahlstedt, on 18th October 1929.

On 22nd August 1931 Mr John F. G. Chapple, in my company, collected specimens at the same station, identical in character with the specimens collected by James Sinclair and me in 1928, and 1929, respectively, which the late Dr George Claridge Druce sent to Professor Karl Hermann Zahn, who determined them as *Hieracium umbellatum* Linnaeus, subspecies *maritimum* (F. J. Hanbury) Zahn, in 1931.

On 14th September 1933 I resubmitted specimens of James Sinclair's Reference No. 596 and my 4258 to Dr Hugo Dahlstedt, who, in a note dated 31st October 1933, wrote as follows:—"I have determined this species as *Hieracium strictum* Fries, form *angustifolia*, but I see that it is more allied to *Hieracium umbellatum* Linnaeus, from which it differs through the hairy heads, but which it resembles through the numer-

ous narrow leaves. It seems to be a species connecting *Hieracium umbellatum* Linnaeus with *Hieracium strictum* Fries. As the name that Hanbury has given it is the oldest it may retain this name *Hieracium maritimum* (Hanbury) Zahn, under " [Zahn's capital or group-species] *Hieracium umbellatum* Linnaeus.

The only other station for this species is Melvich, in Sutherland, Scotland.

[See *Rep. B.E.C.*, 1929, 26.]

HIERACIUM—ADDITIONS.

419/15(2). ✱*H. PATENS* Dahlstedt, n. sp. *Caulis* mediocriter altus ubique dense mollipilosus supra folium caulinum etiam parce glanduliferus, effoccosus. *Folia* rosularia plurima supra obscure subtus pallidius glaucescenti—viridia exteriora ovalia—ovata ± obtusa sparse acute et breve denticulata interiora ± late ovato-lanceolata basi praesertim sparse dentata ± acuta supra glabrescentia vel rare pilosa, subtus dentiuscule in nervo dorsali dense et molliter et sat longe pilosa, petiolis pilis longis dilutis crebre vestitis; *folium caulinum* parum anguste ovato-lanceolatum ad basin acute denticulatum sessile et ± amplexans, acutum supra fere glabrum subtus ± pilosum. *Inflorescentia* furcata expansa 2-3-cephala saepe ramo longo ex axillo folii caulini acuta, ramis accladium 30-40 mm. longum ± et saepe sat longe superantibus ± canofloccosis pilis sparsis vel nullis et glandulis obtectis. *Involucrum* mediocre obscure canoviride. *Squamae* lineares exteriores breves obtusiusculae longae acutiusculae pilis densis basi nigra apice albidis et glandulis sparsis vel parvis parum conspicuis vestitae exteriores praesertim in margine ± floccosae. *Calathium* circa 40 mm. diametro. *Ligulae* obscure luteae. *Atherae* polline carentes. *Stylus cum stigmatibus* obscurus siccus ater.

This species belongs to Cerinthoidea. It is especially characterised by the numerous rosular broad sparsely dentate leaves, the long and densely pilose stem somewhat glandular upwards, and the furcate inflorescence, with sparsely pilose more richly glandular peduncles and densely pilose sparsely glandular heads. I think it may be placed under *Hieracium olivaceum* Grenier et Godron, near *Hieracium flocculosum* Backhouse, or *Hieracium jaculifolium* F. J. Hanbury. *Hieracium patens* Dahlstedt belongs to Zahn's capital or group-species *Hieracium olivaceum* Grenier et Godron, and in "The London Catalogue of British Plants," Eleventh Edition (1925), it should be inserted between Nos. 1025 and 1026.

I am indebted to Dr Hugo Dahlstedt, Skärsåtra, Lidingö, Sweden, for the above description and remarks on this new species, described by him, on 30th October 1933, from my two specimens of Reference No. 4741, which have been seen by him, as well as my one specimen of Reference No. 4742.

Locality.—(1) Reference No. 4741, small, heathery, freestone, rocky ravine on hillside, 450 feet above mean sea-level, west side of Nowt Bield, Ward Hill, Hoy, Orkney, 10th July 1933, H. H. Johnston.

obscure viride (atro-viride). *Squamae* exteriores \pm ovato-lanceolatae in apicem acutiusculum \pm purpurascensensim acutatae ecorniculatae, anguste marginatae, initio \pm adpressae deinde \pm patentis, interiores lineari-lanceolatae, ecorniculatae. *Calathium* parvum. *Ligulae* angustae sat obscure luteae marginales extus stria \pm purpurascensensa notatae. *Antherae* polline carentes. *Stylus cum stigmatibus* luteus. *Achenium* pallide vitellinum apice acute spinulosum, caeterum \pm tuberculatum vel inferne laeve circa 3.5 mm. longum, 1 mm. latum in pyramiden 0.5 mm. longum conicum abiens.

This species belongs to *Spectabilia*, and it seems to be related to *Taraxacum unguilobum* Dahlstedt, but it differs from it through stouter growth, darker green leaves with longer curved or frequently hamate lobes, ordinarily with more and longer teeth, and pale yellowish-red achenes. The cusps of the lobes are often more elongated, narrower and turned upwards, especially on the inner leaves. The outer phyllaries of the heads are loosely adpressed or ordinarily spreading.

I am indebted to Dr Hugo Dahlstedt for the above description and remarks on this new species, described by him, on 18th October 1933, from my three specimens of my Reference No. 4638, all of which have been seen by him.

Locality.—Reference No. 4638, grassy, rocky sea-cliffs, 10 feet above mean sea-level, south-east side of Holm of Houton, near Orphir in Mainland, Orkney, 5th June 1933, H. H. Johnston. Native. Common. Plants in unripe and ripe fruit mostly shed, and sparingly in flower. Outer phyllaries spreading both in flower-bud and flower; inner phyllaries simple (not gibbous or appendaged) at the dark purple apex. Corolla yellow, striped purplish beneath in the outer florets. Style and its two recoiled branches yellow. Achenes pale yellowish-red. Fruit-receptacle flattish-convex. This new species grows at the same station as *Taraxacum unguilobum* Dahlstedt (fide Hugo Dahlstedt, who saw my three specimens of my Reference No. 3638A on 6th October 1933).—H. H. JOHNSTON.

423/79(3). ✱*T. Plicatum* Dahlstedt, n. sp. *Folia* obscure viridia supra maculis atropurpureis parvis-mediocribus sparsis praedita parce pilifera-subglabra, subtus pallidiora et pilis articulatis brevibus \pm dense vestita, exteriora et intermedia \pm lineari-lanceolata—anguste lanceolata—anguste lanceolata crebre lobata lobis mediocribus basi lata-latissima in apicem obtusiusculum parum productis, in margine superiore saepe convexis superioribus \pm integris inferioribus \pm denticulatis \pm retroversis vel \pm patentibus, in angulis loborum saepius \pm plicata, lobo terminali mediocri \pm sagittato, obtusiusculo, lobulis lateralibus brevibus \pm retroversis, interiora anguste obovato-lanceolata, lobo terminali mediocri-magno sagittato integro marginibus convexis obtuso-obtusiusculo, lobis caeteris \pm recurvatis subhamatis magis acutis saepe paullum distantibus; petiolis pallidis. *Scapi* folia plerumque aequantes \pm colorati. *Involucrum* sat magnum crassum \pm obscure viride. *Squamae* exteriores in alabastro \pm adpressae—erecto-patentes, deinde \pm recurvae

± lanceolatae—ovato-lanceolatae subtus obscure virides, supra pallidiores et saepe ± purpureo-violascentes, interiores sat latae lanceolatae, apice obscure purpurascens, omnes ecorniculatae. *Calathium* circa 30-35 mm. diametro. *Ligulae* subobscurae luteae marginales extus stria badio-violacea notatae. *Antherae* polline carentes. *Stylus cum stigmatibus* luteus. *Achenium* badio-stramineum circa 3 mm. longum ad 1 mm. latum apice breve spinulosum, caeterum ± tuberculatum vel fere laeve in pyramiden brevem 0.5 mm. longum sat abrupte abiens.

This species belongs to *Vulgaria*, and it is allied to such Scandinavian species as *Taraxacum pallescens* Dahlstedt, *Taraxacum expallidum* Dahlstedt, and related species. It is characterised by dense lobed leaves with broad somewhat obtuse slightly recurved lobes, sagittate more or less prolonged end lobes in the outer leaves, more acute lobes and more or less broad sagittate-ovate end lobes with convex margins on the inner leaves, but especially by the dense short articulated hairs on the under surface of the leaves.

I am indebted to Dr Hugo Dahlstedt for the above description and remarks on this new species, described by him, on 14th October 1933, from my two specimens of my Reference No. 4639 and three specimens of my Reference No. 4644, all of which have been seen by him.

Locality.—Grassy, rocky sea-cliffs, 15 feet above mean sea-level, north-east side of Holm of Houton, near Orphir in Mainland, Orkney. (1) Reference No. 4639, 5th June 1933, and (2) Reference No. 4644, 10th June 1933, H. H. Johnston. Native. Common. Plants in flower and unripe fruit, and also sparingly in ripe fruit in Reference No. 4644. Leaves dark green and spotted dark purplish above, paler green beneath. Outer phyllaries recurved both in flower-bud and flower; inner phyllaries simple (not gibbous or appendaged) at the dark purple apex. Corolla yellow, striped brownish-purple beneath in the outer florets. Style and its two recoiled branches yellow.—H. H. JOHNSTON.

446/7. *ERICA VAGANS* L. Mr R. Kempthorne sent in specimens of some very interesting new forms of this, gathered on the Lizard Downs. Dr Turrill will deal with these in a subsequent paper, but herewith are given preliminary notes by Mr Kempthorne.

Forma campanulata. The lobes of the corolla are everted, and not parallel to the stamens or turned in towards them as in the type. The corolla is therefore truly bell-shaped. Lizard Downs, 1930, 1, 2.

Forma tubulosa. The corolla is long, narrow and tubular, roughly square in cross section and not inflated. Lizard Downs, 1930, 1, 2, 3.

Forma reflexa. The distal half of the corolla is turned back on the proximal half and so the corolla appears only half the size of that of the type and less than a third of the length of the stamens. Lizard Downs, 1933.

Flore pleno. Two plants. The corolla in each is replaced by a rosette of bracts and the peduncle covered with scattered bracts. Lizard Downs, 1932, 3. R. KEMPTHORNE.

457/4. *LIMONIUM RETICULATUM* Mill. With reference to the note on this species in our last year's *Report* (1932, p. 27), Mr P. G. Beak has sent in a fine vouching specimen gathered by Mr T. R. Peace on the gravelly edge of the salt-marsh, Holme-next-the-Sea, near Hunstanton, W. Norfolk, v.-c. 28, in July 1933. We are greatly obliged for this definite proof that the plant is not extinct in v.-c. 28, and have added the specimen to the Society's herbarium.

543/17(2). ✕ *VERONICA PRÆCOX* All. As already recorded in a short note in the *Journal of Botany* (A. J. Wilmott, *Journ. Bot.*, lxxi, p. 159 (1933)), this plant was discovered in the Breckland area of Suffolk on April 16th, 1933, and is an interesting addition to the British Flora. *Veronica præcox* is a good species of the "Bentham" standard, and at once attracted attention as something plainly distinct from the known British species of that genus, and good photographs of the plant *in situ* were obtained by A. W. Graveson. Partially pressed specimens sent to Mr Wilmott at the British Museum (South Kensington) were immediately identified.

Veronica præcox is most closely allied to *V. triphyllos*, from which it may be known by the smaller and much less deeply cut stalked leaves, the stiffer spicate inflorescence, the brighter colour of the corollas, the capsule being longer than broad (instead of about as broad as long), and by the calyx being shorter than the corolla. As in *triphyllos* the seeds are greatly hollowed out on one side (pelviform), but they differ from those of that species in being smooth instead of finely rugose.

From *arvensis* it is distinguished by the deeper serrations of the leaf, the much larger brighter coloured corolla which exceeds the sepals, and the fruiting peduncles exceeding the bracts.

From *verna* it is easily known by the less cut leaves, less crowded racemes of larger flowers, fruiting peduncles exceeding the bracts, and longer capsules. Both *verna* and *arvensis* have seeds plane or convex on both surfaces.

The habitat was a typical Breckland fallow where *V. præcox* was associated with *Erophila verna*, *Silene conica*, *Silene Otites* (round edge of field), *Cerastium semidecandrum* and *viscosum*, *Stellaria Borœana*, *Arenaria tenuifolia*, *Medicago minima*, *Vicia lathyroides*, *Potentilla argentea*, *Saxifraga tridactylites*, *Anthemis arvensis*, *Veronica arvensis*, *Myosotis collina*, *Phleum arenarium*, *Festuca ambigua*, *Apera interrupta*, etc. (some of these were listed on the June visit) Such a flora is characteristic of the fields in which *V. triphyllos* occurs, and indeed these two rare Veronicas grew together at a locality discovered by Mr N. Y. Sandwith and friends about two miles distant. This second locality greatly strengthens the claim for the inclusion of *V. præcox* in the British Flora. The continental distribution is in favour of it being native here as it occurs in Germany associated with a very similar "Steppe" type of flora (see Salisbury "The East Anglian Flora," *Trans. Norfolk and Norwich Naturalists' Society*, Vol. xiii, Part 3 (1931-2), pp. 233-240). The species also occurs in Belgium, and through-

out most of France, being frequent in the district round Paris (Cosson and Germain, *Fl. des Environs de Paris*, p. 350, 1861), and certainly extending as near to Britain as the Departements of Eure and Seine-Inférieure (Brébisson, *Fl. de la Normandie*, 1879). The fact that, whereas *V. triphyllus* was known in Britain from East Anglia as long ago as 1670 (Ray *Cat.*), *præcox* has eluded discovery until 1933, may well be explained by the very early flowering of the latter. By April 16th it was well in flower and bore numerous capsules containing immature seeds. On June 6th the plants were completely dried up, leaves were unrecognisable, and only rattling seed capsules with the characteristic seeds remained. The discovery of a second locality three weeks after the first was known indicates the likelihood of further stations being found in the near future by careful search early in the Spring.

A formal description of *Veronica præcox* is appended:—

VERONICA PRÆCOX Allioni, Auct. Fl. Pedem., 5, t. 1, f. 1; *V. romana* Scop., Fl. Carn., 1, p. 18; *V. ocymifolia* Thuill., Fl. Paris, ed. 2, p. 10; *V. segetalis* Pers. *V. viscida* W. & K. *V. viscosa* Kit.

Icones.—Reichenbach, mdccxxi. Hegi, G., Fl. von Mittel-Europa, Vol. vi/i, p. 50, fig. 30 (h—1). Coste, H., Fl. France, Vol. iii, t. 2732. Cosson & Germain, "Atlas," t. xvi (fig. 6 and 7), 1845.

Plant annual. Stem erect, 5-15 cm., glandular-pubescent, simple or with somewhat spreading branches. Leaves rather fleshy in texture, often a purplish-red below. Leaves of the mid-stem shortly stalked, opposite, deeply toothed, lowest leaves less deeply cut. Bracts oblong, slightly toothed, the uppermost often almost entire. Flowers in loose bracteolate terminal racemes. Corolla bright blue (about 6 mm. in diameter), equalling or exceeding the calyx. Calyx of four oblong unequal lobes, clothed in long white hairs. Fruiting peduncles ascending, equalling or exceeding the bracts. Capsule oblong-suborbicular, slightly longer than broad (about 5 × 4 mm.), notched, glandular-ciliate. Style about 2 mm. long, considerably exceeding the notch in the capsule. Seeds smooth, bright brownish-yellow, pelviform (convex on one face and deeply hollowed out on the other).

Distribution.—Central and Southern Europe (France, Spain, Belgium, Holland, Germany, Switzerland, Italy, Austria, Czecho-Slovakia, Balkans, South Russia), Asia-Minor, Caucasus, Northern Africa.

Habitat.—Sandy fallow field near Barton Mills, West Suffolk, J. E. LOUSLEY, April 16th, 1933, and June 6th (fruit), 1933; also from a similar field about two miles distant, Mrs SANDWICH and friends, May 7th, 1933. J. E. LOUSLEY.

558/3. × *MENTHA NILIACA* Jacq., var. *WEBBERI* Fraser, var. nov. (*M. LONGIFOLIA* × *ROTUNDIFOLIA*). Stem stout, erect, 2-3½ feet high, each face of the square measuring 5-7 mm. wide, glabrous below and polished, brown, ± densely pubescent above with short recurving hairs, much branched above the middle, with a dense inflorescence on strong plants; branches slender, sharply ascending, flexuous, 3-9 in. long. Leaves oblong, obtuse, the upper ones becoming acute, sessile, cordate or sub-

cordate at the base, 7-9.5 cm. long, by 2-3.5 cm. wide, gradually shortening towards the apex of the stem, irregularly and sharply serrate, puberulous above, softly pubescent beneath on the lower leaves, the uppermost tomentose with short hairs beneath, and dull, glaucous green, rugose, and netted with sunk veins when dry; serratures mostly incurved at the tips, 0.5-1.5 mm. deep. Leaves of the branches small, oblong, and otherwise like those on the stem. Hairs on all parts of the plant simple, 5-9 jointed on the leaves. Inflorescence on the stem and branches once or twice trifurcate, with slender spikes 2-5 cm. long; bracts linear, plumose, hidden by the corolla during anthesis. Calyx tube thinly puberulous with 1-3 jointed hairs; calyx teeth ciliate with 1-4 jointed hairs; pedicels with 1-2 jointed, recurved hairs, sometimes subglabrous. Corolla thinly hairy externally, pale pink, with a purple spot on each lobe, sometimes fading to white. Stamens included; flowers functionally ♀. August and September.

The above is a strong-growing Mint, notable for the length of its *oblong very rugose leaves* both fresh and dried, and the *much branched and dense inflorescence*, when in good form. Allied to var. *nemorosa*, but without the broad base to the leaves. Canal bank, Slateford, and waste ground near Temple, both in Midlothian, 1933, D. H. WEBBER; bank of Ben Lester Burn, Arran, v.-c. 100, 1929, E. M'ARTHUR.

†577/7. *STACHYS ANNUA* L. In "The Naturalist" for 1st January 1932, Mr R. J. Flintoff has an interesting note on the discovery of this species at Dalby Nut Wood Tops on the 5th October 1931, by Mr James Green of Thornton-le-Dale—a new record for the North Riding of Yorkshire, v.-c. 62. On 26th July 1933 the plant was again gathered by Mr James Green on the limestone near Pickering, and was sent to me by Mr Flintoff for confirmation of the name. As there is only one short description of this species (*Bab. Man.*, 1922, 335) in our British Floras—and many erroneous references—it seems advisable to give here with a more extended description and to amplify or rectify some published details.

It is generally described as a "south European annual" (*Benth. & Hook.*, 1924, 367) or "Native of Europe (not northern portion)"—*Fl. Surrey*, 1931, 530—but Coste (*Fl. Fr.*, iii, 117) gives it as annual or perennial and there seems little doubt that in Britain it is not invariably an annual species. Its distribution is not confined to southern Europe but extends to Belgium, Germany, and even to the middle and south of Sweden as a rare plant. (*Lindman Svensk Fanerogamflora*, 1918, 473).

As an alien species it is not included in Druce's *Comital Flora* but both Beeby and Salmon suggested that it was possibly native in Kent, where it has been known for at least a century. It was first found near Gad's Hill in 1830, later plentifully in cornfields above Strood (1855) and abundantly on the open downs at Trottescliffe (1875) and at various places between Gad's Hill and Sevenoaks (1883). It occurred plentifully by the canal near Aintree, West Lancs., for many years prior to

1892 and many of the plants were at least a foot in height, but it subsequently disappeared from this station. In 1895 it was reported from Gomshall in Surrey and since that date has been recorded from Cornwall, North Somerset, West Gloucester, S. Hants, Surrey, Sussex, Oxfordshire, Hertfordshire, Buckinghamshire, Northamptonshire, Notts., Glamorgan, E. Suffolk, S.W. Yorks. (63), Mid-West Yorks. (64), N.E. Yorks. (62).

These are all the records known to me, but they suggest that the plant is much more generally distributed than is usually imagined and is extending its range. To facilitate its identification in other stations the following description may be helpful.

Stachys annua L. Plant annual or perennial (?), from 4 in.-16 in. in height, erect, branched, stem finely pubescent. The leaves are not "glabrous" (as usually stated) but minutely pubescent on both surfaces, especially the lower; cauline leaves oval-oblong or oblong-lanceolate, blunt, crenate-serrate, narrowed into the petiole. Floral leaves lanceolate, acute, entire or nearly so. The flowers vary in colour but the terms "yellow" and "cream-white" are misleading. The yellow is always very pale (but distinct) and is usually confined to the lower lip, the upper lip being most often white. The flowers are in whorls of 3-6. The calyx is very distinctive; narrowly campanulate, densely hairy with fine spreading glandular and eglandular hairs—the latter the longer. The teeth are *arcuate*, lanceolate-acuminate, with a short ciliate point. As a rule the teeth are shorter than the tube. Both on the Continent and in this country the plant appears to have a preference for calcareous soils. W.H.P.

†600/34(6). ✕*CHENOPodium* *ROSTRATUM* Aellen (sp. nov. ined.). (In Medd. Goteb. Bot. Traedg., viii (1933), p. 176). First found in Sweden. Viewfield Road, Arbroath, Angus, 1912, R. & M. CORSTORPHINE. Det. AELLEN.

†615/7g. ✕*Polygonum* *PERSICARIA* L., subsp. *HIRTICAULE* Danser. Cf. Bull. Jard. Bot. Buitenzorg, ser. 3, viii, p. 184 (1927). Probably from S. Eastern Asia. Selby, v.-c. 61, W. A. SLEDGE. Det. DANSER.

†615/35. ✕*P.* *BUNGEANUM* Turcz. Cf. Contr. Gray Herb. Harv. Univ., 88 (1930), p. 87. Olympia Sidings, Selby, v.-c. 61, W. A. SLEDGE. Det. DANSER.

†615/36. ✕*P.* *PENNSYLVANICUM* L. Cf. e.g. Britton & Brown Illust. Fr. North U.S., 2, p. 557. Olympia sidings, Selby, v.-c. 61, W. A. SLEDGE. Det. DANSER.

†628/25. ✕*Euphorbia* *PEPLOIDES* Gouan Fl. Monsp., 174. Europe, Afr. bor. Hitchin, Herts, v.-c. 20, H. PHILLIPS. Appeared in the garden after some spring plants from Meran (Italy) had been planted. Det. SCHINZ.

633/2(2). ✱*ULMUS ELEGANTISSIMA* Horwood, in Flora of Leics. and Rutland, 1933, 482. The Midland Elm. "A. *U. carpiniifolia* differt habitu diffusiore; ramulis minoribus; foliis minoribus angustioribus sub-cordatis et subaequalibus ad basin subglabris, margine crenato; fructibus minoribus, lobis sinus samarae incurvatis falcatis. Floribus et fructibus serotinis. Maio."

650/10. *SALIX CINEREA* L. Mr J. E. LITTLE writes: "I notice that in consequence of the opinion of Floderus, Mr J. Fraser now says that *S. cinerea* is not native in Britain (*Rep. B.E.C.*, 1932, pp. 450, 369 and 29). I enclose some evidence that this statement may need qualification. In 1921 I distributed sheets of this species from Sootfield Green, Herts (*Rep. B.E.C.*, 1921, 578), which were passed as being correctly named by Pearsall and Fraser. A sheet from the same bush was sent to Dr Rudolf Görz of Brandenburg. On this he commented that whereas he had previously been inclined to deny the existence of typical *S. cinerea* in England, this sheet (to which I afterwards added the Ref. No. 739 in my herbarium—now at Cambridge—of the same bush), altered his opinion. He writes: "From the sheet which you have sent me, there appears to be no doubt that the true *S. cinerea* is native in England."

†651/10. ✱*POPULUS REGENERATA* Schneid., ♀. Near Keynsham, N. Somerset, 1932, N. Y. SANDWITH.

658/1. *HYDRILLA VERTICILLATA*. Twenty years having elapsed since we discovered this species in Esthwaite Water, N. Lancs, and as we are often asked to account for the presence of this sub-tropical species in Britain, it may be of interest to briefly review its origin and progress. It was discovered by us in July 1914 and specimens were included in the distribution of that year. After a sufficiently lengthy interval Dr W. A. Sledge is again distributing the plant this year, and for that reason also this note is compiled.

Hydrilla is a native of Asia (E. Indies); Central Africa, Madagascar and Mauritius; and Australia. It is also found in Pomerania (N.E. Prussia) and some of the Western provinces of Russia, but how far indigenous in Europe it is difficult to say. These stations are, however, by far the nearest to Britain and it is, therefore, from them that the species could have been most easily transported. We have known the local conditions at Esthwaite intimately for 25 years and have visited it monthly for many of these. We have, therefore, ample grounds for the following suggested explanation of the plant's introduction there. The lake is about 3 miles long, a private water on the Graythwaite Estate, very secluded and quiet, with abundant reed-swamps and fens at its northern and southern extremities. These covers are the haunts of great numbers of aquatic birds of many species and in winter you can put up large flocks of wild duck at any time.

In Europe the farther you go East, the colder the winters, those of Pomerania (the nearest continental station and 700 miles due East of Esthwaite) being much more intense than ours and waters freezing

much earlier. We may readily imagine wild duck—diving and feeding among *Hydrilla* there—being ultimately driven off by the formation of ice. With unerring instinct they fly West to a milder climate; passing over the English Lake District the quietude, seclusion, and abundant cover of Esthwaite attract them and they alight. Some of them may have slender threads of the aquatic plants among which they had been feeding still hanging round their necks, or sticking to their plumage. Much more certain is it that in the mud or clay on their webbed feet are embedded seeds or winter-buds of *Hydrilla* and other delicate linear-leaved species. The ducks swim about, the mud or clay softens and falls off, carrying with it winter-buds of *Hydrilla*, which, finding a congenial habitat of the richest silt, establish themselves and grow. The reader who knows little of Nature may call this a fanciful picture; but its main details are beyond dispute and have been authoritatively established by many competent observers. It may be contended that 700 miles is too great a distance for such suggested transport, but wild duck have been caught and ringed on the shores of the Caspian Sea and during the same winter shot on Lough Neagh in Ireland—a distance twice as great as that tentatively here advanced, and along the same E. to W. line of flight.

The only alternative hypothesis, that *Hydrilla* is in its European stations vestigial, presents far too many difficulties to be seriously entertained, we consider.

It is gratifying to know that *Hydrilla* in 1933 is as flourishing as in 1914 and shows no signs of decrease. Having promised Mr A. J. Wil-mott the first flowers we found, diligent search has been made for these for very many years, but so far none have been discovered. On the contrary the plants produce abundant winter-buds and these are probably the only means of propagation in this country. W. H. P.

†719/9. LUZULA ALBIDA DC. *L. nemorosa* (Poll.) Mey. This European species of Woodrush has already been reported from the following vice-counties:—3, 8, 17, 22, 38, 40, 60, 70, 76, 80, 83, 90, 97. It is most often found in damp places by streams, or in woods, preferably on siliceous soils. The plant is loosely caespitose, 16 in. to 32 in. in height, hairy. Leaves long, linear-lanceolate, erect, ± hairy, the basal up to 3.5 mm. wide. Inflorescence diffusely corymbiform, lax, slightly shorter than the floral leaves, spreading, with divaricate branches, the ultimate branchlets terminated by 3-8 flowered glomerules. Flowers ashy white or occasionally rose-pink, 3-4 mm. diam., subsessile: perianth-segments lanceolate-acute, three of them distinctly shorter than the other three. Anthers yellowish, slightly longer than the filaments. Capsule trigonous-ovoid, dark, apiculate-beaked. Seeds terminated on one shoulder by a small tubercle. June-July. (See New County Records.)

737/5. POTAMOGETON ALPINUS Balb., f. LONGIFOLIUS Laestadius ap. Berl. Syn. in Bot. Not., 1853, 88. (= *longifolius* Tiselius, Pot. Suec.

Exsicc., I, 1894, n. 15). This interesting form was collected by Mr Geo. Taylor at Arne, near Wareham, Dorset, v.-c. 9, on September 16, 1933, and is now in Herb. Mus. Brit. It is the first British example of its kind which I have seen. The leaves are all submerged, of delicate texture, translucent, very long and narrow—up to 150 mm. \times 10-15 mm.—tapering above and below. The apex is blunt, the margins entire and the midrib strongly reticulate, as is always the case in this species. The British examples possess an unusual character in their inordinately long and gradually tapering bases which in some cases become obvious petioles $1\frac{1}{2}$ in. or more in length. The plants were sterile but it is hoped that fruiting examples may eventually be procured.

Similar specimens in Swedish exsiccata are frequently labelled *longifolius* Tis.—a synonymous but later and invalid name. It was, however, adopted by Graebner in Engler's *Pflanzenreich*, iv, 2, 73, and is twice used on the same page in hopeless confusion—as a sub-var. of var. *angustifolius* A. & G. and as a var. (for sub-var.) of var. *obscurus* (DC.). The same reference to Exsicc. n. 15 is given in each case, with identical descriptions. In the former the date is (1886) and in the latter (1894). The late Mr Arth. Bennett called attention to the unreliability of some of the nomenclature in this volume (Heft 31), and a further example on the same page may be instanced. The same Exsicc.—Tisel. n. 136 (1896)—is cited on p. 73 for *brevifolia* Tis., a sub-var. of var. *angustifolius*, and on p. 74 for *brevifolius* Tis., a sub-var. of var. *obscurus*. Two names (one mis-spelt) for the same form.

737/18. *P. ZOSTERIFOLIUS* Schum. In attempting to separate this species from the rather similar *P. acutifolius* it is still the practice to attach too much importance to the leaf-apex as a diagnostic character. If the inset figure of the leaf-apex of *P. zosterifolius*—Butcher, 387D, or Fryer, Plate 50—be compared with that of *P. acutifolius*—Fitch, 966, or Fryer, Plate 51—it will be seen that they are very dissimilar and suggest that the two species could be readily distinguished by the leaf-apex alone. Unquestionably this has often been assumed and frequently with disastrous results. *P. acutifolius* occasionally occurs in Britain (and more commonly abroad) with leaves possessing a leaf-apex exactly like that of *P. zosterifolius* as figured by Butcher, *l.c.* It is necessary, therefore, always to examine the epidermal cells of the stem before making a decision in such cases. As the stem of *P. acutifolius* is more flattened than that of any other species of the genus it is not difficult to do this under the high power of the microscope. The cells of *P. zosterifolius* are always short, $1\frac{1}{2}$ -3 times as long as broad. Those of *P. acutifolius* are constantly long, 4-6 (or more) times as long as broad. I recently collected from a pool near the R. Ouse between Barcombe Mills and Lewes, Sussex, plants which I put in my vasculum as *P. zosterifolius*. There were no fruits or winter-buds present, but microscopic examination showed them to be certainly *P. acutifolius*. The older leaves were up to 5 mm. wide, blunt and abruptly cuspidate, but the

younger leaves were more acute. In view of the difficulty in separating this form of *P. acutifolius* from the similar *P. zosterifolius*, I shall be pleased to examine any such doubtful forms as may be sent to me. W.H.P.

753/19. CAREX FULVA Host. *C. Hostiana* DC. This species continues to be confused with *C. binervis*, especially when the latter is immature. A most useful diagnostic character is the female glume. In *C. fulva* this has broad silvery-white hyaline margins. The midrib does not reach the apex, which is therefore *not* mucronate, *entire* and *smooth*. On the contrary, the glume of *C. binervis* has narrower scarious margins, the midrib is exserted (making the glume mucronate), and the apex is eroded, denticulate, and often ciliate. In dealing with doubtful plants it is, therefore, well worth the trouble to detach one or two uninjured glumes and to examine them under a microscope. *C. fulva* also has the male spikelets smaller and more acute; the female spikelets shorter and more remote than those of *C. binervis*.

†763/3. ✕SORGHUM CERNUUM Host. Avonmouth Docks in W. Gloucester, 1933, J. GIBBONS. The "White Durra" of trade. Not in the Oxford List.

Extracted from *The Journal of Botany*, 1933.

185/8(2). ✕RUBUS NOBILISSIMUS W. Wats., described as subspecies of *R. opacus* Focke in *J.B.*, xxxi, 132, 1933.

185/40(2). ✕RUBUS RHODANTHUS W. Wats. in *J.B.*, xxxi, 223 seq., 1933.

396/9. ✕CIRSIIUM PALUSTRE (L.) Scop. × TUBROSUM (L.) All. = *C. SEMIDECURRENS* Richter, Nash Point, Glamorgan, v.-c. 41, J. L. Bruce, vide Gilmour, *J.B.*, xxxi, 17, 1933.

416/9. ✕CREPIS FOETIDA L., var. a. VULGARIS Bisch., vide Drabble in *J.B.*, xxxi, 63, 1933.

✕Var. b. HISPIDA Bisch., vide Drabble in *J.B.*, xxxi, 63, 1933.

543/17(2). ✕VERONICA PRÆCOX All. First record for Britain, near Barton Mills, W. Suffolk, v.-c. 26, 16th April 1933, J. E. Lousley, vide A. J. Wilmott in *J.B.*, xxxi, 159, 1933.

545/12. ✕EUPHRASIA FRIGIDA Pugsl., *J.B.*, xxxi, 86, 1933. This name was proposed in substitution of the invalid *E. latifolia* Pursh in *Revision of the British Euphrasias*, *Journal Linn. Soc.*, xlviii (1930), 490, footnote.

✕Var. b. LAXA Pugsl., *J.B.*, xxxi, 307, 1933.

545/15. ✕EUPHRASIA MICRANTHA Reichb., var. b. JOHNSTONII Pugsl., *J.B.*, xxxi, 85, 1933.

545/19(4). ✱EUPHRASIA ANGLICA Pugsf. × PSEUDO-KERNERI Pugsf., Friday Street, Surrey, September 1899, in Herb. C. E. Salmon, Pugsley in *J.B.*, xxxi, 89, 1933.

573/1. ✱PRUNELLA VULGARIS L., var. e. PALLIDA Gilmour, *J.B.*, xxxi, 321, 1933. A low-growing form from Kenfig Burrows, Glamorgan, v.-c. 41, with small flowers of a pale bluish-mauve colour and no purple coloration in the calyx and bracts.

615/. POLYGONUM. In a paper entitled "British Polygons, Section *Persicaria*," *J.B.*, xxxi, 90-98, 1933, Mr C. E. Britton revises the British forms of this section of the genus. The following forms, varieties and hybrids are additions to the British Plant List.

615/5. ✱POLYGONUM AMPHIBIUM L., var. d. NATANS Moench, vide Britton in *J.B.*, xxxi, 91, 1933.

✱Var. e. DECUMBENS Klett. & Richt., vide Britton in *J.B.*, xxxi, 91, 1933.

615/6. ✱POLYGONUM LAPATHIFOLIUM L. (SCABRUM Moench), var. a. GENUINUM Gren. & Godr., vide Britton, *loc. cit.*, 93.

✱Var. d. ANGUSTIFOLIUM Peterm., vide Britton, *loc. cit.*, 93.

✱Var. e. RUDERALE Schuster, vide Britton, *loc. cit.*, 93.

✱Var. f. TOMENTOSUM Beck, vide Britton, *loc. cit.*, 93.

(? = var. b. *incanum* Lej. & Court.).

615/6. ✱POLYGONUM LAPATHIFOLIUM L. × PERSICARIA L., Britton, *loc. cit.*, 96.

615/7. ✱POLYGONUM PERSICARIA L., var. g. PROSTRATUM Bréb., vide Britton, *loc. cit.*, 92.

615/8. ✱POLYGONUM NODOSUM Pers. (PETECTICALE Dr.), var. b. [INGRASSATUM Rouy], forma STENOPHYLLUM C. E. Britton, *loc. cit.*, 94.

✱Var. c. OVATUM A. Braun, vide Britton, *loc. cit.*, 95.

✱Var. d. ERECTUM Rouy, vide Britton, *loc. cit.*, 95.

✱Var. e. INUNDATUM C. E. Britton, *loc. cit.*, 95.

✱Var. f. BRITTINGERI (Opiz) C. E. Britton, *loc. cit.*, 95.

615/9. ✱POLYGONUM HYDROPIPER L. × MITE Schrank, Britton, *loc. cit.*, 97.

615/11. ✱POLYGONUM MINUS Huds., var. a. COMMUNE A. Br., Britton, *loc. cit.*, 98.

✱Var. b. LATIFOLIUM A. Br. (1824), replacing ELATUM Moss (1914), Britton, *loc. cit.*, 98.

737/2. POTAMOGETON POLYGONIFOLIUS POUFF. × PRAELONGUS Wulfen = P. MAOVICARII Ar. Benn., this name to be deleted from the List, W. H. Pearsall in *J.B.*, xxxi, 45, 1933.

Extracted from Col. Godfery's *Monograph of the British Orchidaceae*.

668/1. ✕EPIPACTIS PALUSTRIS Crantz, var. c. OCHROLEUCA Barla, Godfery, *Monograph and Iconograph of Native British Orchidaceae*, 61. Flowers yellowish-white, lip pure white; Freshfield, Lancs, and Kenfig, Glamorgan.

668/2. ✕EPIPACTIS LATIFOLIA All., var. e. PURPUREA Celak., Godfery, *loc. cit.*, 65. "Flowers dirty red-purple."

668/2. ✕EPIPACTIS LATIFOLIA All. × LEPTOCHILA Godf. = × *E. Stephensonii* Godf., in *Monograph*, *loc. cit.*, 76.

668/4. ✕EPIPACTIS VIOLACEA Dur. Duq., var. PURPURATA (Sm.) Godf., in *Monograph*, *loc. cit.*, 68. Godfery applies the name *violacea* Durand Duquesnay to the species, reducing Smith's *purpurata* to varietal rank. *Purpurata* is said to be based on a single specimen "glowing with a beautiful red-lilac colour." Godfery suggests that this brighter colouring is due to saprophytism.

668/7c. ✕ORCHIS INCARNATA L., var. PULCHELLA Dr. × LATIFOLIA L., *loc. cit.*, 189.

668/7c. ✕ORCHIS INCARNATA L., var. PULCHELLA Dr. × PRAETERMISSA Dr., *loc. cit.*, 191.

668/7d. ORCHIS INCARNATA L., var. DUNENSIS Dr. × PRAETERMISSA Dr., *loc. cit.*, 192.

669/3. ✕[ORCHIS SIMIA Lam.], var. b. MACRA (Lindl.) Godf., *loc. cit.*, 166. Godfery differentiates between the English and Continental plants, placing the former as a variety and using Lindley's specific name. It differs from the type by its darker, more grey-green leaves, more cylindrical spike, bluer lip-segments, broader mid-lobe with smaller spots, and whiter spur.

669/6. ✕ORCHIS LATIFOLIA L. × PRAETERMISSA Dr., *loc. cit.*, 202.

669/6. ✕ORCHIS LATIFOLIA L. × MACULATA L. (FUCHSII Dr.) = × *O. Braunii* Halacsy, *loc. cit.*, 201.

669/6. ✕ORCHIS LATIFOLIA L., var. b. EBORENSIS Godf., *loc. cit.*, 219. A dwarf form from Yorkshire and Durham.

669/6b. ✕ORCHIS LATIFOLIA L., var. EBORENSIS Godf. × MACULATA L., *loc. cit.*, 220.

669/7. ✕ORCHIS INCARNATA L., × LATIFOLIA L. = × *O. Ascheroniana* Hausskn., *loc. cit.*, 188.

672/3. ✕OPHRYS APIFERA L., var. ALBIDA Garnier & Poulter, *loc. cit.*, 238. Labellum normally coloured, sepals white. This name was proposed by P. M. Hall in *Rep. B.E.C.*, 451, 1930.

NOTES ON PUBLICATIONS, NEW BOOKS, ETC., 1933.

PLANTS AND HUMAN ECONOMICS, by Ronald Good, M.A. (Cantab.), Head of the Department of Botany, University College, Hull. With 8 maps, xii + 202, price 5/-. Cambridge University Press, 1933. This is an outstanding book in many ways—it meets a pressing and long-standing need; is packed with most reliable information unavailable in similar form elsewhere; is written in an admirable and readable manner, and is printed in excellent type. Considering its manifold attractions I am surprised at its cheapness. I strongly advise any person who reads these lines to procure a copy without delay. As I have been vainly looking for a book of this character for many years my personal reaction to it was one of delighted welcome.—W.H.P.

From the Preface we learn that "It is remarkable that the aspect of botany most intimately concerning human affairs and activities, economic botany, is the aspect least taught. The fact remains that in the educational circumstances of to-day there is often a tendency for botany to be regarded merely as a constituent of certain scholastic fences which have to be surmounted before what is popularly supposed to be open country is reached. The student's view of the science tends to be bounded by a syllabus, and of its implications he learns little. My object has therefore been to combine in small compass not only the botanical facts but also the frequently more important historical and economic facts required to give to those who begin the scientific study of botany an adequate humanistic background of reality to their subject. I have tried to give them the evidence that the science of plants is something more than a mere mental discipline. Although this book is intended primarily for those in the senior classes of schools and the junior classes of universities, I have been at some pains to make it also of potential value to those who do not happen to be students of biology."

TRANSACTIONS OF THE BOSE RESEARCH INSTITUTE, CALCUTTA. Vol. vii, 1931-32. Edited by Sir J. C. Bose, F.R.S. Longmans, Green & Co., 1933. 25/- net. 343 pp., with 161 illustrations. Whilst the majority of the papers comprised in this volume relate to further investigations of the motile and conducting mechanisms of plants, in continuation of the work described in previous volumes, there are also chemical, zoological and anthropological papers. This volume will therefore appeal to a wider public than did its predecessors, and can be most highly commended. Of the 17 chapters 13 are botanical and many of these are of absorbing interest to British readers. Of the remainder the chapter on The Fish-eating Spiders in Bengal is a fascinating study. To the writer of this review the second chapter made an immediate appeal: it is entitled Capture of Fish by Drugging a Stream and describes how large quantities of fish used to be captured in the hill-

streams of Darjeeling by the Lepcha fishermen applying to a stream extracts from the stems, roots, and fruits of various plants. The fish, though regarded as poisoned, prove, nevertheless, to be safe as human food. "Clearly the plant-extract works not as a diffuse protoplasmic poison, but acts locally on some definite organ and function. The present investigation was undertaken to ascertain what this organ might be, and how it is rendered inactive." It was found that the main effect of the introduction of extracts was a local paralysis of the respiratory activity: the fish can be revived by artificial respiration.

The experiments were extended to the various gases and solutions which have a fatal effect on fish. The results of exact and lengthy experiments with Coal Gas, Sulphuretted Hydrogen, Carbon Disulphide, Copper Sulphate Solution and Potassium Cyanide are given in detail, and are of great value. Chapter eight, on the Modifying Effect of Change of Environment on the Irritability of *Neptunia oleracea* will be read with great interest by all botanists of discernment. The volume is excellently produced and should be widely appreciated.

THE FLORA OF THE CLYDE AREA: A HANDBOOK OF THE FLOWERING PLANTS AND FERNS OCCURRING WILD OR ESTABLISHED WITHIN THE DRAINAGE AREA OF THE RIVER AND FIRTH OF CLYDE, by John R. Lee. Fcap. 8vo., pp. xvi + 391. Glasgow: John Smith & Son (Glasgow), Ltd., 1933; 7/6 net. It is now more than 40 years since the late Prof. King's revision of Henedy's *Clydesdale Flora* was published and this has been long out of print. A modern guide giving the results of local field-work and the general advance of botanical knowledge is therefore extremely welcome. The area included in the Flora is practically that of the *Handbook* issued in 1901 on the occasion of the meetings of the British Association at Glasgow, and is thus described by the author:

This embraces the whole of the land surface draining to the river and firth of Clyde, and comprising the political counties of Lanark, Renfrew, Dumbarton, and Bute, together with large parts of Ayrshire, Stirlingshire, and Argyll, a portion of western Perthshire, and small fragments of West Lothian, Peeblesshire, Kirkcudbrightshire, and Wigtonshire. The area as thus defined, is characterised by great variety and scenery, well marked geological zones, a considerable range of altitude and much diversity of surface features, with a corresponding wealth and variety of plant species. The line of the great fault, which divides Scotland naturally into its two historic regions of Highland and Lowland, passes through the middle of the Clyde area, crossing the Isle of Bute, the eastern extremity of the Cowal district of Argyll and the southern end of the Rosneath peninsula, and extending across Loch Lomond from below Luss to the Conic Hill behind Balmaha.

North and west of this line the flora differs considerably from that of the southern and eastern portion of the area. In the high ground included within this northern part many of the "alpine" plants characteristic of the richer mountains of central and northern Scotland occur, and the flora generally is of a distinctly boreal and sub-arctic type. Ex-

tensive stretches of peat-moor and of heath and hill-pasture are found; and the natural woodlands are mostly of Oak and Birch, with their usual associates. In the lowland area a large proportion of the ground is under cultivation; but a considerable part consists of grass-moor, heath, and peat-moor also. Great tracts of country of this nature are found on the uplands of Lanarkshire and Ayrshire, where stretches of boggy ground dominated by grasses, sedges, and similar plants extend for long distances. Woodlands of considerable extent, however, occur in the lower-lying parts, and along the banks of the Clyde and its numerous tributaries; and here a rich variety of sylvan vegetation is to be found. The maritime flora is of a varied character and many of the most interesting plants typical of the western sea-board of Britain are found along the shores of the Firth and on the island.

The book contains brief and admirable descriptions of Orders and Genera. Where a genus contains more than one local species a Key to enable these to be easily distinguished is provided. The descriptions of the various species are quite good, admirably worded, and fairly complete. An exhaustive Glossary of Botanical Terms at the end of the book enables the student to understand the text without reference to another volume. At the end of each specific description are short but valuable notes on habitats and distribution. Two features of especial interest to the writer are noted: the inclusion of many established species and the suppression of actual localities in the case of the rarer species. There is a growing demand for the full description of the commoner alien plants in our native floras. They are so frequently met with and cause so much trouble in identification to the amateur botanist that we welcome any attempt to help in this direction. The general presentation of the *Flora* is excellent and the price very reasonable. In view of the prohibitive additional cost of providing an adequate coloured map we consider its omission a wise choice. My own experience of such maps is that they very soon become a liability rather than an asset and, if folded, often indeed a nuisance. W. H. P.

THE FLORA OF THE LIVERPOOL DISTRICT, edited by C. Theodore Green, M.R.C.S., L.R.C.P., D.P.H. Arbroath, T. Buncle & Co., 1933. Price, 20/-. xi + 163; illustrated by drawings and photographs. The plan of this volume differs materially from that of the usual district or county Flora, its most conspicuous feature being a series of 791 illustrations of species. These are, on the whole, most carefully drawn and will appeal to botanists in general as they represent the majority of the commoner British species. The letterpress is reduced to a minimum, few localities being given, and no collectors' names. The nature of the habitat and the local frequency receive brief notice. Special chapters on Geology, Meteorology, The Sand Dunes, The Mosses, Heaths, and Estuaries of the district are added, and there is an excellent series of photographs of typical plant associations or other noteworthy scenes. The printing and general presentation are both extremely good and the Flora forms a handsome volume.

PLANT PHYSIOLOGY: With Reference to the Green Plant, by Edwin C. Miller, Professor of Plant Physiology, Kansas State Agricultural College, and Plant Physiologist, Kansas Agricultural Experiment Station. 900 pages, 6 × 9, 38 illustrations. McGraw-Hill Publications. 42/- net. This book gives a complete survey of the field of plant physiology in a comprehensive and minutely detailed treatment that makes it suitable both as a text for advanced college students and as a reference work for investigators. The work is confined entirely to the physiology of the green plant; the findings of the leading American, English and Continental investigators are summarised. Review questions and unusually complete bibliographies follow each chapter.

PLANT SOCIOLOGY, by J. Braun-Blanquet. Translated, revised and edited by G. D. Fuller and H. S. Conrad. McGraw-Hill Publications. 27/- net. Essentially an ecological study of plant communities in which there is an attempt made not only to analyse the climatic, chemical and physical factors which control vegetation, but also to evaluate the vegetation itself in a quantitative manner. Emphasis is placed on the intimate relationship of different species as members of the plant community. These social relationships are shown to have a decided influence in determining the composition and succession of plant associations.

PLANT ECOLOGY, by John E. Weaver, Professor of Plant Ecology, University of Nebraska and Research Associate in Ecology, Carnegie Institution of Washington, and Frederic E. Clements, Associate in Ecology, Carnegie Institution of Washington. 520 pages, 6 × 9, 262 illustrations. McGraw-Hill Publications. 30/- net. A comprehensive textbook for students of plant ecology and a guide for workers in related fields, written from the standpoint of development, instrumentation, and experiment. The book discusses the intimate relations between plants or groups of plants and their environment—the relations of plant to habitat, whether the latter be natural or modified by cultivation. Experiments and exercises for greenhouse and laboratory are outlined in detail and field studies are suggested.

PRINCIPLES OF GENETICS: An Elementary Text, with Problems, by Edmund W. Sinnott, Professor of Botany and Genetics, Connecticut Agricultural College, and L. C. Dunn, Geneticist, Connecticut (Storrs) Agricultural Experiment Station. 431 pages, 6 × 9, 138 illustrations. McGraw-Hill Publications. 21/- net. The object of this book is to set forth the essential principles of genetics in as clear and concise a manner as possible. The fact that one of the authors is a botanist and the other a zoologist makes for a well-balanced, well-rounded treatment. Distinctive features of the book are its Questions for Thought and Discussion, its Problems, and its Reference Assignments, all aimed to induce the student to think independently and apply for himself the principles discussed in the text.

CYTOLOGICAL TECHNIQUE, by John R. Baker, M.A., D.Ph. 1933; Methuen & Co., Ltd. F'cap 8vo. 3/6 net. This small but excellent manual is written primarily for advanced students in Zoology and Comparative Anatomy and meets a pressing need in thoroughly explaining to the student exactly what he is doing and why the various fixatives and other fluids he uses are to be preferred to others or even to different proportions of the same. Instead of working mainly or altogether in the dark he should possess a full knowledge of the substances used, of the possibility of reactions between them and of the results of choosing particular substances and mixing them in certain proportions. The number of methods recommended is reduced to a minimum but each is one of the best of its kind and is described in the fullest detail. Fortunate indeed will be the student who has thoroughly made himself master of those here included. He should certainly then be able to appreciate other existing methods and possibly to improve on them by one of his own. The book can be unreservedly recommended.

RESPIRATION IN PLANTS, by Walter Stiles, M.A., Sc.D., F.R.S., and William Leach, M.Sc., Ph.D. Methuen & Co., Ltd. F'cap 8vo. 3/6 net. This is by far the best presentation of the subject I have seen, and I read it through with sustained interest before even glancing at the Preface—an inversion of the usual order. However, I subsequently discovered that the opening page contained a remarkably accurate description of the impression produced by my reading—set out as the *object* of the authors. It is seldom that the authors' avowed aim strikes the reader so exactly as intended. No words of mine would more clearly summarise the nature of the impressions produced—"In the present book we have aimed at giving an account of the nature of plant respiration which is readable and understandable by the elementary student of botany and which at the same time contains sufficient information to render it of value to the advanced student. We have throughout endeavoured to indicate the principles of plant respiration rather than to catalogue a mass of detailed observations from researches often of very dubious value." From the reader's point of view these objects are splendidly achieved and the authors are to be heartily congratulated on so excellent a summary of modern knowledge on this important subject.

PLANT ECOLOGY, by Dr William Leach. Methuen & Co., Ltd. 1933. F'cap. 8vo. 3/6 net. This is another of Methuen's Monographs on Biological Subjects—a series worthy of the highest praise. As Ecology is, for the greater part, an outdoor study, a modern development on more exact scientific lines of "field botany," and one of its future main lines of advance, this volume will be warmly welcomed. Again and again we are asked "What is Ecology?" and there is an obvious and increasing desire for information as to its methods and aims. In this small and admirable book will be found as concise, clear and comprehensive a treatment of the modern aims of the ecologist as could

possibly be desired. Having read it with the greatest interest and enjoyment I can unreservedly recommend it to our members. If I may be permitted a suggestion, it is that the last chapter on "British Vegetation" should be expanded to form an additional volume to this excellent series.

THE FLORA OF LEICESTERSHIRE AND RUTLAND, by Arthur Reginald Horwood, F.L.S., and the late Charles William Francis Noel, third Earl of Gainsborough. Crown 8vo., pp. cxcvii, 687, 32 pls., 2 folding maps. Oxford University Press, Milford: London, 1933. Price 35/-. A great achievement. Mr Horwood must be heartily congratulated upon the completion of this large and comprehensive volume by September 1933, the date of the meeting of the British Association at Leicester. Even with unlimited leisure such an undertaking would have been great but it became doubly difficult in restricted time. Its successful accomplishment under the latter conditions is, therefore, a striking tribute to Mr Horwood's ability, industry and determination.

One is impressed at the outset by the enormous amount of information the work contains. The Introduction includes chapters on Soils, The Relation of Agriculture to Natural Vegetation, Altitude and Vegetation, Geology, Rivers, Botanical Districts—Charnwood Forest and the Woodlands of outstanding botanical interest—Climate and Meteorology, Natural Types of Vegetation, the History of Botanical Research, and Biographies. Each county is separately treated. Then follow a Plan of the Flora, notes on the Libraries and Herbaria consulted, and a lengthy Bibliography. The treatment of the Botanical Districts is exceptionally good—upon modern lines—but after reading through the 297 pp. of the Introduction the conclusion was inevitable that the enforced omission—from lack of space—of the "ecological details of some 160 species" (referred to in the Preface) might have been avoided by curtailment of the space given to Botanical Research and Biographies. As the ecological treatment throughout is one of the most valuable features of the volume we should have been greatly pleased to have seen it thus extended.

The second part of the book is occupied by the Flora (pp. 1-633) which is admirably arranged. The details of distribution are very fully given; and the notes on habitat and the frequent comparative descriptions of similar plants are both excellent. The names given to some of the genera are unfortunate—*Cervicina*, *Cammarum*, and *Capnoides* rather than *Wahlenbergia*, *Eranthis* and *Corydalis* respectively. The latter names are certainly given as synonyms but we note that the author says that the generic names are "as far as possible cited in accordance with the law of priority." The last three names, however, are included in the "Nomina Conservanda" and should take precedence over the earlier synonyms adopted. Incidentally, in this connection we noted that not one of the generic names—*Cammarum*, *Eranthis*, *Helleborus*, *Aquilegia* and *Nigella*—given on p. 21 is included in the Index.

The volume is well illustrated by maps, diagrams of regional surveys, and admirable photographs of typical aspects of vegetation. The printing and presentation are alike excellent—even the smallest type sometimes necessarily employed being singularly clear. We have seldom seen a volume in which the use of so many different kinds of type has been more happily justified. The Flora has certainly set a high scientific standard and has our warmest commendation.

RECENT DISCOVERIES IN THE NEWFOUNDLAND FLORA, by Prof. M. L. Fernald. Reprinted from *Rhodora*, Vol. xxxv, Nos. 409-420, January-December 1933. Pp. 403, with 43 full-page photographic plates and several maps of distribution. This is an exceptionally fine volume whose general presentation reaches an extremely high standard and leaves us a little envious. In a brief review it is impossible to do more than indicate some points of great interest to British botanists which the volume contains. Noteworthy additions to the flora of North America are *Cardamine flexuosa* With., and our familiar Barren Strawberry, *Potentilla sterilis*, discovered in Newfoundland. Here also many unglaciated tablelands were explored and their flora of endemic relic-species studied and recorded. *Ruppia maritima* is treated in accordance with the revision of this species by Fernald and Wiegand—*Rhodora* xvi, 119-127, t. 110 (1914), and a Key to the eastern American forms of *Festuca rubra* is given. On pp. 168-185 is a detailed account of *Agropyron* in the same area. The American variations of the ubiquitous *A. repens* (L.) Beauv. are fully described and splendidly figured (Pl. 245). *Juncus conglomeratus* L. appears as a var. of *J. effusus* on p. 233, and the author finds himself "unable to follow the extreme segregations of *J. alpinus* recently proposed in Europe," and gives reasons why the name *J. alpinus* should be preferred to that of *J. alpino-articulatus* Chaix (pp. 234-5). A new hybrid $\times J. alpiniiformis$ (*J. articulatus* \times *alpinus*) growing with typical and fertile *J. alpinus* Vill. and *J. articulatus* L. is given on p. 235, but this hybrid has been recorded as British and already has a name $\times J. Buchenaui$ Dorfl., see *Rep. B.E.C.*, 1930, 373.

We note that Fernald retains the name *Habenaria* for all the divisions of this genus. *H. straminea* being closely related to *albida* would be placed with *Gymnadenia* by Godfrey. An interesting account of the American species of *Euphrasia* is found on pp. 298-307. The author deals with the names *E. arctica* Lange and *E. latifolia* Pursh at considerable length and concludes "Surely if there is any doubt whatever (which I am unable to discover) regarding the exact identity of *Euphrasia arctica* Lange, there is hopeless doubt regarding the exact identity of *E. frigida* Pugsley—as a substitute without any type designated for *E. latifolia* Pursh ex Wettstein." He also shows that *E. americana* Wettst. is quite distinct from *E. brevipila* Burnat & Gremli. On pp. 369-386 is a long and interesting article on the species of *Taraxacum* in Eastern America. This is illustrated by fine photographic plates and an elaborate Key. "If we could see with the eyes of some Scandinavian

and English botanists we should recognise in *Taraxacum palustre* many scores of species. Every slight divergence in the cutting of the leaves or the color of the corollas or the shade of the achenes would become a 'species'. Personally I can match the specimens on the lawn outside my window with authentic sheets of ten of Dahlstedt's 'specific' propositions. Genetically they are not species nor anything but trivial variations which, under normal sexual reproduction, would quickly be lost in a common blend. Unless the *Taraxaca* have very real and deep-seated differences of involucre, flower and fruit, and definite geographic segregation, it seems like stultification of science to treat them as species. We must not ignore the facts that all plastic and modern species consist of innumerable minor trends, but that these slight tendencies are utterly different from the true ('Linnean') species which, through millions of years, have stood the long test of competition and physiographic change."

We have given this quotation at some length, but must take exception to its first sentence. No English botanist of repute would to-day "see" as Prof. Fernald imagines, but most of them would rather endorse the main argument here advanced. The article contains valuable information as to the most important characters of these plants. "The most fundamental character in *Taraxacum*, it seems to me, is in the mature achene, whether tuberculate its entire length or only at the summit, whether with a slender or thick pyramid, and, lastly, rufescent or drab. The color is less satisfactory than the other characters, since it often changes as the fruit matures. The length of the filiform beak is, also, a very satisfactory character. Consequently, for really satisfactory study, *ripe fruit* is essential. Much immature or merely flowering material can be placed only approximately. The characters of the involucre are next in importance, whether with many or with few or no bracts corniculate." As regards nomenclature *T. palustre* (Lyons) Lam. & DC. replaces *paludosum* Schlecht., and *T. palustre*, var. *vulgare* (Lam.) Fern. apparently = *officinale* Web. *T. lapponicum* Kihlman replaces *T. croceum* Dahlst.

Under *Carex*, *C. incurva* Lightf. is renamed *C. maritima* Gunner and *C. alpina* Swartz gives way to *VahlIIi* Schkuhr. *C. alpina* Swartz (1798) is invalidated by the earlier *C. alpina* Schrank (1789) and *C. alpina* Honck. (1792). *C. Halleri* Gunnerus, *Fl. Norv.*, ii, 106 (1772), clearly antedates the name of Swartz, but Gunnerus obviously had no material himself; his species was based on Haller's 1356 and his brief diagnostic phrases were taken directly from Haller's description of it. Chief weight should therefore be given to Haller's very full description and from this it is abundantly clear that it has nothing to do with *C. alpina* Swartz. This is a further instance—if one were necessary—of the folly of making a fetish of priority. Paradoxical as it may appear, priority is of secondary importance, to validity. When you have made a list of all legitimate names to be considered then priority functions. *C. Halleri*—a *nomen confusum*—would not appear on such a list.

Exigencies of space prevent a fuller reference to the many subjects dealt with in this most interesting volume. It marks a high standard of scientific achievement and is a valuable contribution to the best botanical literature.

W. H. P.

WILD FLOWER MAGAZINE. We have the greatest admiration for the high ideals and self-sacrificing labours of Mrs Dent and her talented colleagues and wish them still further success in their efforts to help others to appreciate the beauties of the countryside. It is a great pleasure to read through the reports of the various branches of the W.F. Society and to note the fine spirit of kindly service which pervades them and to estimate the substantial addition to human happiness which they suggest. Who can over-assess the amount of real joy the compilation of those individual diaries must have yielded? We were impressed also with the extent and value of the contribution to our present knowledge of the distribution of British plants which is here revealed and we gladly acknowledge the help which the Wild Flower Society is making toward the completeness and accuracy of existing records.

Among the many items of excellent advice with which the pages of the Magazine abound we noticed one which so perfectly expressed our own ideas that we trust Miss Hilda Salmon will allow us to reproduce it, "Go on sending me your doubtful plants and telling me what you think they are." Here you have embodied the offer of kindly service contingent upon the applicant's own preliminary individual effort. A well-known axiom in education is "Never do for a child what that child can—with a fair effort—do for itself." This is a principle capable of wide-spread application and we are quite certain that many of our own referees will be grateful for its reproduction here. May we also indulge the hope that it may catch the eye of some of our members who can appreciate its subtle implications.

W. H. P.

ABSTRACTS OF PAPERS BEARING ON THE STUDY OF THE
BRITISH FLORA, 1933.

A. J. WILMOTT AND J. S. L. GILMOUR.

INTRODUCTORY NOTE.

The authors regret that, owing to pressure of work, it has not been possible to expand these abstracts on the lines mentioned in the last Report. It is hoped, however, that the following notes, though incomplete and somewhat compressed, will be of use to British botanists.

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1. AKERLUND, E. "En fribladig *Primula veris*." *Bot. Not.* (1933), 271-278. Description and illustrations of a plant with free sepals and petals.
2. ALM, C. G., and WEIMARCK, H. "*Typha angustifolia* L. \times *latifolia* L. funnen i Skåne." *Bot. Not.* (1933), 279-284. The hybrid is described and figured; it or similar hybrids should be sought in Britain.
3. BARNES, B. "Notes on *Lathyrus Aphaca* L." *Journ. Bot.*, lxxi, 10-15, 25-33. A full account is given of forms in which the stipule ends in or bears a small leaflet. The pods may be yellowish or brown. The testa may be purple-black or variegated with yellow; diagrams are given of two plants which bore both kinds and intermediates.
4. BRENCHELEY, W. E., and HEINTZE, S. G. "Colonisation by *Epilobium angustifolium*." *Journ. Ecology*, xxi, 101. An account is given of the differential colonisation by *Epilobium angustifolium* of experimental plots at Rothamsted which had received varying dressings of artificial nitrogen manures. The conclusion is reached that differential colonisation is due to varying degrees of competition rather than to hydrogen-ion concentration or other chemical factors.
5. BRITTON, C. E. "British *Polygona*, section *Persicaria*." *Journ. Bot.*, lxxi, 90. The British species are described with many varieties and hybrids. The following new names are given under *P. nodosum* Pers.:—*f. stenophyllum*, var. *inundatum* and var. *Brittingeri*.
6. BUTCHER, R. W. "On the Distribution of Macrophytic Vegetation in the Rivers of Britain." *Journ. Ecology*, xxi, 58. The author shows that the chief factor governing the distribution of the larger plants in running water is current. Torrential, non-silted, partly silted, and littoral communities are distinguished and correlated with the nature of the river bed. The quantity of vegetation is continuously reduced in rivers with large and sudden floods. The nature of the communities is modified by the Calcium content of the water, by excessive silting and by pollution. Observations are given on the perennation and permanency of the vegetation, and it is shown that the growth of macrophytic vegetation can considerably modify the physical condition of a river.
7. CEDERCREUTZ, C. "Die Characeen Finnlands." *Mem. Soc. pro Fauna et Flora Fenn.*, viii, füz. 5, 241. The Finnish species of this family are discussed and a key to genera and species given.
8. CHATER, E. H. "*Corynephorus canescens* Beauv. on the Moray Coast." *Journ. Bot.*, lxxi, 15 (short note). A few plants at Kings-ton-on-Spey and one west of Lossiemouth (Elgin).

9. CONWAY, V. M. "Further Observations on the Saltmarsh at Holme-next-the-Sea, Norfolk." *Journ. Ecology*, xxi, 263. Additional observations and experiments on this area since Peace published his paper (1928) are recorded. A map of the present state of the vegetation is given and several tentative suggestions on the course of the succession are put forward.
10. CORBADI, R. "Anomalie Dell' *Equisetum maximum* L.'" *Nuovo Giorn. Bot. Ital.*, xl, 127. An abnormal form of this species, with fasciated fertile spikes, is described.
11. DRABBLE, E. "Note on *Chenopodium glaucum* L." *Journ. Bot.*, lxxi, 7-9. The edge of the seed is not acutely keeled as often described, but rounded. An entirely spreading plant (I. of Wight) seems to be var. *prostratum* Beck. The leaf varies—obtuse to acute—and may be very small, narrow and acute (var. *microphyllum* Murr. I. of Wight).
12. DRABBLE, E. "The Genus *Crepis* in Great Britain, II." *Journ. Bot.*, lxxi, 57-63. A key to the species is given, followed by descriptions of the British species.
13. DYMES, T. A. "The Germination of *Euphorbia Cyparissias* L." *Journ. Bot.*, lxxi, 321/2 (short note). The seeds (ovoid—not "globose") failed to germinate until sown after removal of the elaiosome, when a small percentage germinated.
14. FEHER, J. "Kleistogamie an Papaver-Arten." *Bot. Közlemények*, xxx, 194. In June 1932 the author found *Papaver dubium*, *P. Rhoeas*, and *P. somniferum* with cleistogamous flowers. The stamens and style ripen in bud, autogamy takes place, and fruits are developed which have the petals and even the sepals adhering to them. The phenomenon is probably due to wet, cold weather.
15. GERTZ, O. "Till Kännedomen om *Cuscuta europaeas* värdväxtflora." *Bot. Not.* (1933), 505-508. A long list of host plants observed in Skåne is followed by a discussion.
16. GILMOUR, J. S. L. "Notes from Glamorgan." *Journ. Bot.*, lxxi, 16-17 (short note). *Rumex rupestris* Le Gall and *Cirsium tuberosum* All. × *C. palustre* Scop.—new to the county.
17. GILMOUR, J. S. L. "New Variety of *Prunella vulgaris*." *Journ. Bot.*, lxxi, 320/1 (short note). A small, pale flowered plant with green bracts is described as var. nov. *pallida*.
18. GODWIN, H., and TURNER, J. S. "Soil Acidity in Relation to Vegetational Succession in Calthorpe Broad, Norfolk." *Journ. Ecology*, xxi, 234. This broad is surrounded by concentric plant communities consisting of (a) reed swamp, (b) carr, and (c) woodland. These are considered to represent stages in a primary hydrarch succession which is still in progress. The ground becomes gradually higher and the Ph value decreases from the edge of the alkaline broad inland, and extensive *Sphagnum* undergrowth occurs in carr, in mown marshes and in pastures. It is suggested that the

- broads represent an intermediate stage between typical Hochmoor and deciduous forest climaxes.
19. GROSS, H. "Die Eibe in Ostpreussen." *Beih. bot. Centralb.*, 50, ii, 552-576. Full records with map of the distribution of *Taxus baccata* L. in East Prussia.
 20. GUPTA, P. S. "Reaction of Plants to the Density of Soil." *Journ. Ecology*, xxi, 453. Experiments are described showing that the mechanical properties of soil as determined by its texture have considerable effect on plant growth, especially on the growth and development of the root system. *Mercurialis perennis* was especially studied.
 21. GUSTAFSSON, A. "Zur Entstehungsgeschichte des *Rubus Bellardii* Whe. & N." *Bot. Not.* (1933), 231. The distribution (map) and cytology (figures) have been investigated. The species is highly constant and widely spread, but the chromosome number at somatic metaphase is constantly 35: it can therefore scarcely develop fertilised egg cells, and is of hybrid nature.
 22. JACKSON, A. B. & A. K. "Alderney Plants." *Journ. Bot.*, lxxi, 106 (short note). Several additions are made to the list published by Marquand in 1900.
 23. JUBY, D. V., and PHEASANT, J. H. "On Intermittent Germination as Illustrated by *Helianthemum guttatum* Miller." *Journ. Ecology*, xxi, 442. Experiments are described showing that the seeds of this species are dimorphic, types with "hard" and "soft" testas being present. The latter germinate within a few days of sowing, while the former show very varying degrees of permeability and hence exhibit a remarkably discontinuous germination, lasting for as long as 300 days.
 24. KNUDSON, L. "Non-symbiotic Development of Seedlings of *Calluna vulgaris*." *New Phytol.*, xxxii, 115-126. Seed free of fungus germinated and developed roots on various culture media.
 25. LEMBERG, B. "Über die Vegetation der Flugsandgebiete an den Küsten Finnlands." *Acta Botanica Fennica*, xii. The vegetational succession on the moving sand dunes of the Finnish coast is described, many British species being mentioned.
 26. LEVAN, A. "Über das Geschlechtschromosom in *Sedum Rhodiola* DC." *Bot. Not.* (1933), 195-197. The species has $2n = 22$ chromosomes (figured), one pair unequal in size (heterochromosomes regarded as sexual heterozygoty).
 27. MARRO, G. "Il Riconoscimento Delle Specie Italiane Del Genere '*Equisetum*,' Fondato Sui Carattari Anatomici Dell' Appurato vegetativo." *Nuovo Giorn. Bot. Ital.*, xl, 94. The anatomical characters of the vegetative parts of the Italian species of the genus are fully described and a key is given based on these characters. The great majority of the species mentioned are British.

28. MARSDEN-JONES, E. M., and TURRILL, W. B. "Second Report on the Transplant Experiments of the British Ecological Society at Potterne, Wilts." *Journ. Ecology*, xxi, 268. Meteorological data for 1930 and 1931 are given, and the detailed observations carried out on each of the five species since the last report are recorded. Several interesting general conclusions on the relation between plants and their environment are drawn from these observations.
29. MARSDEN-JONES, E. M. "Alleged Change of Colour in *Primula vulgaris*." *Journ. Bot.*, xxi, 17 (short note). Specimens planted upside down did not produce pink flowers next year, as has been alleged to happen.
30. MARSDEN-JONES, E. M., and TURRILL, W. B. "Genetics of Petal Size and other Characters in *Silene maritima*." *Kew Bull.*, 1933, 357. It is shown that the pair of characters "fully developed" and "poorly developed" petals indicates a monohybrid genetic basis and segregates in F_2 in a ratio of 3 "fully" to 1 "poorly." The genetic basis of some dozen other characters is also discussed.
31. MARSDEN-JONES, E. M., and TURRILL, W. B. "A Statistical Study of Characters in two Wild Populations of *Silene maritima*." *Kew Bull.*, 1933, 479. A statistical analysis is given of samples of two populations of *S. maritima* growing (1) on the Chesil Beach, and (2) on cliffs near Land's End. Character differences between the two populations are correlated with differences in environment. The full significance of this analysis will not be apparent till after the publication of comparable analyses on high mountain populations.
32. MARSDEN-JONES, E. M., and TURRILL, W. B. "Notes on the Taxonomy of British Material of *Anthyllis Vulneraria*." *Journ. Bot.*, lxxi, 207-213. The authors have carried out extensive breeding experiments and studies of field populations with forms of this species. The genetical results appear in the *Journal of Genetics* (this year), and the taxonomic matters arising are dealt with here. The relations of var. *rubra* L. and var. *coccinea* L. are explained, the former probably including the grassland (often inland) red-flowered variation found, e.g. on Salisbury Plain, and the latter retained for the sea coast deeply coloured Cornish plant. The var. *Allionii* DC. is not British. Some pale yellow British plants are var. *ochroleuca* Corb. and the Par Harbour "Amaranth Purple" is near but not identical with *A. tricolor* Vukot. Descriptions of var. *lutea*, var. *ochroleuca*, var. *coccinea*, and "Amaranth Purple" in terms of Ridgway's colour standards are given.
33. MEYER, F. J. "Beiträge zur vergleichende Anatomie der Typhae (Gattung Typha)." *Beih. bot. Centralbl.*, 51, i, 335-376. The study includes our British species.
34. MINIO, M. "Le Osservazioni Fitofenologiche Della Rete Italiana Nel 1932 (Annata XI)." *Nuovo Giorn. Bot. Ital.*, xl, 453. The dates of flowering of a large number of species, many of them

- British, in different Italian localities during 1932 are recorded, and the results analysed.
35. MORISON, C. G. T. "The Composition of the Soils used in the Potterne Transplant Experiments and of Portions of *Centaurea* and *Silene* grown thereon." *Journ. Ecology*, xxi, 475. This account forms an addendum to the main Report, xxi, 268-93.
36. MUNTZING, A. "Quadrivalent formation and aneuploidy in *Dactylis glomerata*." *Bot. Not.* (1933), 198-205. Of 33 plants examined 16 had $2n = 14$, 9 plants $2n = 28$, and 7 plants $2n = \pm 28$. One was trisomic, $2n = 29$, and its progeny was investigated. Various kinds of open and closed rings occur in the tetraploid, *D. glomerata*. The diploid plants ($2n = 14$) are *D. Aschersoniana*, and intermediate hybrids occur. *D. glomerata* is cytologically unbalanced.
37. MUSSACK, A. "Untersuchungen über *Cystopteris fragilis*." *Beih. bot. Centralbl.*, 51, i, 204-254. A general investigation of the habitat of the plant and its characteristics is followed by an account of the germination and the effect thereon of various nutrient solutions, light intensities, and salts.
38. NESTLER, H. "Beiträge zur systematischen Kenntnis der Gattung *Linum*." *Beih. bot. Centralbl.*, 50, ii, 497-576. The characters useful in the sub-division of the genus have been investigated and a general key to the main groups of species in the genus is given. Figures of series of petals of *L. angustifolium* Huds., *L. usitatissimum* L., and *L. perenne* L. are given on pp. 508/9, and of the stamens on pp. 524/5.
39. NILSSON, A. F. "Self and cross-fertility in *Festuca rubra* L., . . . *Poa pratensis* L., and . . . *Alopecurus pratensis* L." *Bot. Not.* (1933), 206-230, Engl. summary, 221-223. There is wide variation in this respect among different individuals of each species, and genotypical differences are considered responsible for this.
40. NILSSON, F. "Self-fertility in the Genus *Lolium*." *Bot. Not.* (1933), 563-576. *Lolium perenne* and *L. multiflorum* have a low average of self-fertility, while the annuals *L. remotum* and *L. temulentum* are highly or completely self-fertile. In the first two various gradations occur, and in *L. perenne* hereditary differences between individuals occur. "No correlation could be found between pollen development and the degree of self-fertility," but some insignificant positive correlation between pollen development and general fertility in free flowering was found. Inbreeding produced lethal and sub-lethal types, a recessive lethality being indicated by high mortality rate in certain families.
41. PAPP, C. "Contributiuni La Sistemática Si Distributia Geografica a Genului *Melica* L. în România." *Bul. Grad. Bot. Şi al Muz. Bot. Cluj.*, xii, 105. The Roumanian species, varieties and forms of the genus are enumerated, including *M. nutans* and *M. uniflora*.

42. PEARSALL, W. H. "*Potamogeton MacVicarii* Ar. Benn." *Journ. Bot.*, lxxi, 45-47. Specimens collected by G. Taylor in the loch whence this supposed hybrid originally came are identical with the poor original material in Herb. Ar. Bennett and are considered to be *P. alpinus* Balb. There is no evidence of either *P. praelongus* or of *P. polygonifolius*.
43. PETCH, C. P. "The Vegetation of St Kilda." *Journ. Ecology*, xxi, 92. An ecological survey of the vegetation of Hirta in the St Kilda group was made with particular reference to the future effect of the removal of the factors of grazing and cultivation. Special attention is paid to the areas affected by sea spray and by puffin colonies.
44. PETERSEN, H. E. "Om Behaaringen hos grønlandske og danske Individder af *Vaccinium uliginosum* L." *Bot. Tidsskr.*, xliii, 251-256. A table of percentages of five categories of hairiness in Greenland (N.E., N.W., S.E., S.W.) and Denmark is given. The percentages vary in different areas, but all categories occur in each of these five areas.
45. PETERSON, D. "*Stellaria media* L. [sic] × *Stellaria neglecta* Weihe." *Bot. Not.* (1933), 500-504. The hybrid is described, and figured analytically between the parents. It is completely sterile. Chromosome numbers given were *S. media* $2n = "36-42"$; " $n = c. 20$ "; the author's investigations give *S. media* $2n = 44$, *S. neglecta* $2n = 22$. The author notes the description by Beguinot from Italy of several fertile hybrids between different forms of these two species.
46. PETTERSSON, P. "The Action of Extreme Temperatures on Species of *Viola* and *Lamium*." *Mem. Soc. pro Fauna et Flora Fenn.*, viii, 79. Genotypes of *Viola tricolor*, *V. arvensis*, *Lamium purpureum* and *L. amplexicaule* were grown in high temperatures in a greenhouse. Alterations in the anthocyanin content, size and shape of the corollas were recorded. *V. arvensis* grown at 38°-40° C. showed anomalies in the flowers evidently produced by the action of extreme heat in the early developmental stages of the flower. The possibility is discussed of extreme temperature changes producing similar effects in nature.
47. PHILIPSON, W. R. "*Carex pauciflora* Lightf. in Lake District." *Journ. Bot.*, lxxi, 76 (short note). New record for Cumberland.
48. PUGSLEY, H. W. "A Monograph of *Narcissus*, sub-genus *Ajax*." *Journ. Roy. Hort. Soc.*, lviii, 17. A very full and elaborate monographic account, fully illustrated, of the sub-genus is given, including the native *N. Pseudo-Narcissus*, of which six new varieties and one new form are described. Var. *humilis* grows in the northern counties of England, and var. *insignis* is known from Ross (Herefordshire) and Dymock (Gloucestershire).

49. PUGSLEY, H. W. "Notes on British Euphrasias, III." *Journ. Bot.*, lxxi, 83-90. These notes result mainly from a study of the herbaria of C. E. Salmon, Arthur Bennett, and Col. H. H. Johnston. *E. caerulea* [non Tausch] Bucknall is described as *E. micrantha*, var. *Johnstonii* var. nov. *E. frigida* Pugsley is still left untypified after examination of the Labrador material in Herb. Wettstein. Some Orkney material is described as a new forma *grandiflora* of *E. confusa*. The Devon plants which had been referred to *E. salisburgensis* Funck are determined as *E. confusa* (f. *albida*).
50. PUGSLEY, H. W. Review of "Taxonomical Remarks on *Juncus alpinus* Villars and some related species," by Dr Lindquist. *Journ. Bot.*, lxxi, 167-168. The Blair Atholl plant is thought to be probably *J. Marshallii* Pugsley, not *J. alpinus* Vill.
51. RASMUSSEN, A. J. "Några iakttagelser öfver *Beta maritima* L." *Bot. Not.* (1933), 316-324. This is an account of wild *B. maritima* populations investigated by the author in 1932, mainly in Great Britain.
52. RAUNELER, C. "De danske Crataegus-Arter." *Bot. Tidskr.*, xliii, 232. Four species between *C. oxyacantha* and *C. monogyna* are described: the synopsis of them (translated) is as follows:—
- A. The lowest lateral nerves of the middle leaf of long shoots \pm incurved, \cap curved upwards at the leaf apex.
 - a. Ovaries glabrous, *C. oxyacantha*.
 - b. Ovaries \pm hairy, *C. Palmstruchii*.
 - B. The lower lateral nerves of the middle leaf of long shoots straight, or in some leaves a little inwardly or outwardly curved.
 - a. Ovaries glabrous, *C. Schumacheri*.
 - b. Ovaries \pm hairy, *C. eremitagensis*.
 - C. The lower lateral nerves of the middle leaf of long shoots curved outwards especially at the base, \cap curved away from the leaf apex.
 - a. Ovaries glabrous, *C. raavadensis*.
 - b. Ovaries \pm hairy, *C. monogyna*.
- Statistics of variation in the number of styles in each form are given (of about 100,000 flowers in all). [These characters should be investigated in this country, and flowers and fruits of the same trees collected: any such pairs of specimens will be welcomed at the Natural History Museum and Kew.]
53. RENDLE, A. B. "Pentandrous Form of *Orchis mascula* L." *Journ. Bot.*, lxxi, 352-4 (short note). Description and figure of an abnormal specimen from Suffolk (R. Burn) in which the labellum bore two pollen sacs, in addition to the normal pair and an additional lateral imperfect pair.
54. RODOLICO, A. "Appunti Sulla Cariologia E Sull' Embriologia Delle 'Muleae'." *Nuovo Giorn. Bot. Ital.*, xl, 421. The chromosome number of *Publicaria dysenterica* Bernh. is shown to be $n=10$.

55. SAINT-YVES, A. "Notes critiques sur quelques espèces du *Festuca*." *Bull. Jard. Bot. Acad. Sc. U.R.S.S.*, xxx, livr. 5-6, 711. Several new subspecies and varieties of British species are described.
56. SALISBURY, E. J. "The Influence of Man on Vegetation." *Trans. S.E. Union Sc. Soc.*, 1933, 1. The author first emphasises the importance of man, both past and present, in the distribution of seeds, and comments on the unwillingness of botanists to admit this factor in phytogeographical work. Numerous instances, such as seeds carried in trouser turn-ups, are quoted. He concludes that when human intercourse between Britain and Europe commenced, plant introduction was considerably accelerated. The second half of the paper is devoted to an historical survey of the deforestation of Britain by man and its effect on the vegetation. It is pointed out that by maintaining wooded areas in a coppiced condition many species which would be absent in the primaeval forest are allowed to develop freely through man's activities.
57. SAMUELSSON, G. "*Carices Muchlenbergianae* Tuckerman i Norden." *Svensk Bot. Tidskr.*, xxvii, 1. An historical account of the treatment of this difficult group of sedges in Scandinavia is given and three species are finally recognised—*C. contigua* Hoppe, *C. Pairaei* F. Schultz, and *C. divulsa* Good.—and its subspecies *Leersii* (F. Schultz) W. Koch. A key, figures and full distributional data are given for these forms in Scandinavia.
58. SPRAGUE, T. A., and GREEN, M. L. "*Silene Cucubalus*: the correct name of the bladder-campion." *Kew Bull.*, 1933, 151. It is shown that, owing to the rule passed at Cambridge in 1930 rejecting all later homonyms, the correct name for the bladder-campion is *Silene Cucubalus* Wibel.
59. STIRLING, J. "Studies of Flowering in Heterostyled and Allied Species: Part I. Primulaceae." *Publication of the Hartley Botanical Laboratories of the University of Liverpool, No. 8* (1932). *Primula vulgaris* and *P. veris* are part of the material in which the rates of growth of flower parts are investigated as well as genetics of heterostyles, and phylogenetic theories are deduced therefrom.
60. TJEBBES, K. "The Wild Beets of the North Sea Region." *Bot. Not.* (1933), 305-315. The author considers the distinction between *B. vulgaris* and *B. maritima* is practically untenable for nearly all the distribution of "*Beta (vulgaris × maritima)* L., a polymorphic species." "Forms with prostrate stems may be annuals and perennial types with ascending or erect stems are quite as common as perennials with prostrate stems (at least in Southern Europe and Africa). It seems as if all possible combinations of the so-called distinctive characters are somewhere realised. But in the North Sea, on the contrary, *B. maritima* shows little variation, and this extends to Devon and Cornwall, but less so in the Channel Islands and Northern France. Cultivation experiments are described and the origin of the "North Sea ecotype" is discussed. This is re-

- garded as possibly due to gene selection by the harder conditions of life [rather than what would appear more probable to us—that this *B. maritima* is one species and the Mediterranean variability and the cultivated beet strains are due to hybridisation.—A.J.W.]
61. TRAUTMANN, R. "*Mentha nemorosa* Willd. und ihr Formenkreis." *Bot. Közlemények*, xxx, füz., 1-4, 26. A full description of *M. nemorosa* Willd. (sensu lat.) is given, followed by a key to its varieties.
62. TURRILL, W. B. "A Study of Variation in *Glaucium flavum*." *Kew Bull.*, 1933, 174. From an intensive study of gross morphological characters from herbarium material it is shown that *G. flavum* (sensu lat.) is most polymorphic in E. Mediterranean regions and that, in spreading westwards, certain biotypes become "weeded out," leaving a population with longer and broader fruits, yellow flowers and adaptation to coastal conditions. To this western population the name *G. flavum* sensu stricto should be given. Eastwards from the Balkan Peninsula forms with shorter, more slender, glabrous fruits and darker flowers predominate; these should be called *G. flavum*, var. *leiocarpum* Stoy. et Steff. Various other forms are discussed, some of which are considered distinct species and some merely variations of *G. flavum* sensu lat. A scheme for comparing plants showing different characters within a polymorphic species is applied to the present plant.
63. WANSCHER, J. H. "Studies on the Chromosome Numbers of the Umbelliferae, III." *Bot. Tidskr.*, xliii, 384-399. British species mentioned are:—(*Bifora radians* $2n = 22$); *Bupleurum tenuissimum* $2n = 16$; *Trinia vulgaris* (?) DC. $2n = 18$; *Pimpinella Saxifraga* subsp. *eu-Saxifraga* Thell. $n = 18$ (in subsp. *nigra* (Willd.) $n = 9$); *Daucus Carota* L. (four varieties) $n = 9$, $2n = 18$. Numbers for *Hedera Helix* L. are:—*typica* $2n = 44-48$, *hibernica* $2n = 88-98$.
64. WATSON, WM. "Notes on Rubi. I. What is *Rubus rhombifolius* Weihe?" *Journ. Bot.*, lxxi, 223-228. The plant so named by British botanists, following Focke, is described as *R. rhodanthus*, sp. nov., "the true *R. rhombifolius* remained unrecognised until very recently" (*Rep. B.F.C.*, 1931, p. 643 infra). II. "*Rubus Colemanii* Bloxam." *Ibid.*, 228-229. Bloxam's original Pakington plant is different from some other plants which have been so named and which are described as *R. crudelis*, sp. nov.
65. WATSON, W. "*Rubus opacus*, subsp. *nobilissimus* nov." *Journ. Bot.*, lxxi, 130-134. A new plant from Surrey (Abrook Common).
66. WATSON, W. "*Rubus latifolius* Bab. and *R. laetus* Wm. Watson." *Journ. Bot.*, lxxi, 127-130. A reply to criticism by Messrs Barton and Riddelsdell, discussing the characters of the former in Perthshire and the nomenclature of the latter.

67. WILMOTT, A. J. "*Cirsium heterophyllum* × *palustre* in Inverness." *Journ. Bot.*, lxxi, 17 (short note).
68. WILMOTT, A. J. "An Addition to the Breckland Flora: *Veronica praecox* All." *Journ. Bot.*, lxxi, 159-160. An account of this species, discovered by J. E. Lousley near Barton Mills.
69. WOLLEY-DOD, A. H. "The Markwick Manuscripts." *Journ. Bot.*, lxxi, 348-351. Markwick lived at Catsfield Place, Sussex, and wrote a number of botanical books and diaries now in the Hastings Museum. They include Phenological calendars from 1768 to 1776 (Catsfield) which contain a large number of first records of plants for the county, and descriptions of plants accompanied by drawings. At the Linnean Society there is a foolscap MS. *Plantae Sussexienses*, or a Catalogue of Plants growing wild in the County of Sussex (descriptions and notes of over 550 species) and a folio MS. of 37 illustrations of Grasses and Sedges with full descriptions.

OBITUARIES.

DR ERIC DRABBLE. It is with the deepest regret that we have to record the passing of Dr Eric Drabble at Freshwater, the Isle of Wight, on August 3rd, 1933. He has rendered conspicuous service to the members of this Society for over 20 years, and his willing and self-sacrificing efforts on our behalf have been of the highest value. As a botanist he possessed the true scientific spirit, approaching each problem with an open mind free from preconceptions, painstaking to a high degree in ascertaining the facts of the case and impartially weighing the evidence they afforded. As a result of this his determinations were always of the highest value. His decease is a heavy blow to British systematic botany, and his services will be greatly missed. To the writer it is a keen personal loss, only tempered by the most pleasant recollections of his unflinching friendship and kindness of spirit.

The following authentic account of his career appeared in the "Derbyshire Times" of August 12th, and will be read with much interest by his numerous friends.

Dr Eric Drabble was born in 1877 at Herne House, near Chesterfield. He came of an old Derbyshire family, and was the son of Mr John Drabble, J.P. Being a delicate boy, he was educated privately and at Chesterfield Grammar School, where he became head boy, and in 1899 proceeded to University College, Sheffield, where he worked in the Science Department and later in the Medical Department. Becoming keenly attached to the study of biology, he proceeded to the Royal College of Science, South Kensington, and there obtained the London B.Sc. degree, 1st Class Honours in Botany, the Associateship of the College (1st Class), and later the Honours Associateship.

In 1901, on the death of A. W. Bennett, he was appointed Lecturer in Botany at St Thomas' Hospital Medical School, and in 1903, Lecturer and Senior Demonstrator at the Royal College of Science, under Professor (now Sir John) Farmer. He was awarded the London D.Sc. degree in 1903. In 1905 he was appointed Lecturer in Economic Botany at the University of Liverpool, but the commercial atmosphere was very distasteful to him, and in 1908 he returned to London as head of the Botanical Department at the Northern Polytechnic. Here the charge of the University work was most congenial to him, and he retained the post until 1924, when he retired for reasons of health, but remained hon. head of the Botanical Department at the Polytechnic, in which he took a keen interest. In 1908 he was awarded the D.Sc. degree of the University of Sheffield.

During the war he was repeatedly rejected for active service, on account of asthma and heart trouble, so he took over the botanical classes at the Birkbeck College, and combined this work with that of the Northern Polytechnic. Ill-health caused his retirement to the Isle

of Wight in 1924, and though he suffered less in subsequent years, events proved that he must have had chronic euremia all his life. This disease, though the cause of his asthma, did not reveal itself until the long illness of the past five months, and caused his death on August 3rd, 1933.

He was keenly interested in British plants, and was the chief authority on the British pansies, which he monographed and listed for England, Scotland and Ireland. He continually published papers on various genera, especially those which needed re-investigation owing to errors in identification and nomenclature having been made by previous authors, and then repeated in subsequent notes. He also contributed papers to various scientific journals, including those of the Linnean Society, the Royal Society of London, the Botanical Society, and to the *Journal of Botany*.

After his retirement, a large part of his time was occupied in identifying British plants for collectors all over the country, and he was appointed one of the three referees for the Watson Botanical Society of the British Isles. He also published various supplementary lists to the Flora of Derbyshire and the Isle of Wight. His herbarium contains authentic examples of almost every British plant, and it will finally find a home in the Natural History Museum, South Kensington. Both before and after his retirement, Dr Drabble was continually in demand as an examiner in botany and biology for the University of London, the Northern Universities and for Oxford, and he welcomed these appointments as giving him an opportunity of keeping in touch with his wide circle of scientific friends.

His interests were very varied, including, besides those associated with biology, a keen appreciation and love of English literature, especially that of the 18th century. His considerable knowledge of church history and his devotion to the presence of Christ in the Holy Eucharist, led him to be an enthusiastic Anglo-Catholic, though his natural reserve made him reticent on the personal side of this subject.

An early enthusiasm for the Gilbert and Sullivan operas was shown by his frequent attendance at the performances of these plays in London and later by his association with the well-known Northern Polytechnic Operatic Society from its start until his death. He was for some time the hon. business manager to the Society and a welcome and popular non-acting member. His sense of humour, quick wit and generous spirit made him friends with all classes and all ages. He hated cant and self-assertion, but had a great admiration for the natural courtesy and good sense of country folk, with whom he loved to chat, especially when in his own beloved native county of Derbyshire.

He was buried at Freshwater on August 5th, and a requiem was said for him by Archdeacon Clayton in Chesterfield Parish Church, for which he had such pride and love.

He married in 1906 Hilda Lake, second daughter of Thomas Henry Lake, J.P., of Moresk, Truro, Cornwall, who survives him.

WILLIAM DUPPA MILLER, who died November 7, 1933, was born on July 5, 1868, at "The Poplars," Tupsley, Hereford, the eldest of several brothers and sisters. The family later moved to Oxford, and, curiously enough, bought No. 3 Crick Road, only a few doors from the house where Dr Druce spent the latter part of his life. In those days Druce had not yet moved from his business premises in the town; but it was inevitable that the Miller children, keen nature lovers as they were, should come to know him and take him the plants to name which they found on their long country rambles. In this way was laid a friendship frequently afterwards renewed throughout life.

Miller was educated at St Edward's School, Oxford, and subsequently gained an Exhibition at Hertford College. While there he coxed his college boat so successfully that under his care it rose from the bottom of the river into the first division—a record for which, alas, he paid all his life, for his efforts to reduce his weight at the time greatly impaired his health. After leaving the University he started his career as an engineer in an uncle's shipbuilding yard at Bristol, until a horrible accident there temporarily broke his nerve and set him on new lines. For a while he took up scholastic work, later becoming Private Secretary to Lord Sandon, afterwards Lord Harrowby, at Sandon Park, Staffs. Subsequently for nearly twenty years he held a similar post to the late Hon. E. W. F. Portman (and afterwards to his widow), acting as Agent for the Hestercombe estate. Whenever possible, he travelled widely, both at home and on the Continent, always welcome and popular wherever he went, not only for his genial presence but also for his keen love of sport—shooting, deer-stalking, fishing, golf, tobogganing, skating and the like, in all of which he delighted and in several of which he excelled.

Always keen on natural history and an out-door life, Miller's botanical bent was finally settled by an accidental meeting, in Devonshire, with that magnificent botanist, the late Rev. E. S. Marshall, and his family. For years in succession he and Marshall went botanical holidays together—to the Highlands, Teesdale, Cornwall and the like, and on these trips he also met Mr F. J. Hanbury and other well-known systematists. Thus his botanical tastes were fostered and encouraged until, as an older man and with fewer ties, he was enabled to give himself heart and soul to the pursuit he best loved.

For the last years of his life field botany practically absorbed all his time and energies, and in its cause he roamed anew through all the flower haunts of England, Scotland and Ireland. He was especially keen on the flora of his own adopted county of Somerset, and personally tracked down almost every one of its recorded plants. His local knowledge was unrivalled, as witness two articles from his pen, "The Southern Distribution of *Listera cordata*" and "Extinct and Rare Species of the County of Somerset" in the last Report. He was Hon. Secretary to the Botanical Section of the Somerset Archaeological and Natural History Society for twenty years or more, and an active member of the South Western Naturalists' Union; while to the Wild Flower

Society he gave his unfailing help and support. Indeed, he was never happier than when he was aiding other field botanists (provided always they were not "exterminators," for on this point he was careful and conscientious to a fault). To lead his botanical friends to the happy hunting grounds of Shapwick Moss, Brean Down, Cheddar Gorge, the Mendips, or Steep Holme to pay their respects to the Peony, was a real delight to him, and an unforgettable pleasure and inspiration to those who accompanied him.

Only those privileged to share the hospitality of Miller and his devoted sister in their pleasant home at Burnham-on-Sea, can have any real idea of the vast amount of unselfish labour that every spring and summer brought to both. One would think that every British field botanist and every lover of wild flowers must have sought Miller's assistance at one time or another either personally or by letter. And to all alike, even to the veriest tyro, he gave of his best with a patience and care that were inexhaustible. The demands upon his strength and leisure, in fact, became overwhelming, and after a severe operation, two years ago, proved too heavy for his failing vitality, so that in very truth he may have been said to have given his life for his botany and for his friends. Perhaps this was as he would have wished it, since in no man was the instinct "to help" more keenly developed, even as no man drew keener pleasure from the fascinating pursuit that he made his own.

G. F.

DR O. STAPF, F.R.S. 1857-1933. Dr Otto Stapf, F.R.S., was born at Ischl in Upper Austria on 23rd March 1857. Much of his boyhood was spent at Hallstatt, where his father was in charge of the salt-springs. He studied under Professor Wiesner in Vienna, and took his Ph.D. degree with a thesis on crystal and crystalloid structure in plants. The manuscript of this thesis is now preserved in the library at Kew, but has apparently never been published. In 1882 he became Assistant to Professor Kerner von Marilaun and was made a Privatdozent in the University in 1887. In 1885 he travelled in Persia, making valuable collections which are now at Kew. Unfortunately, the full results of his travels were never published. During the years 1885-1889 he published several valuable papers on the flora of the Nearer East and a classic revision of the genus *Ephedra*. His interest in the flora and vegetation of the Orient lasted all his life.

In January 1891 Stapf commenced work at Kew as Assistant for India, and from that date till his death he made Kew his home. In 1899 he was appointed Principal Assistant and from 1909 to 1922 was Keeper of the Herbarium and Library. After his retirement he edited the Botanical Magazine for the Royal Horticultural Society (9 volumes) and acted as Honorary Editor of the Index Londinensis (6 volumes). He served as Botanical Secretary to the Linnean Society from 1908 to 1916.

Stapf's published work, prepared while a member of the Kew staff, included accounts of the *Sonerileae*, the flora of Kinabalu in North

Borneo, the Gramineae (part) of India, South Africa and Tropical Africa, African *Apocynaceae*, *Orobanchaceae*, *Lentibulariaceae*, *Pedaliaceae*, *Myristicaceae*, *Lauraceae*, *Proteaceae*, plants of Liberia and Uganda, the Aconites of India, and Statices of the Canaries. A select list of his works in chronological sequence is published in the Kew Bulletin, 1933, 374.

The economically most important family of the *Gramineae* occupied much of Stapf's official time. Not only did he prepare certain genera for Hooker's Flora of British India, the whole of the account of the family for the Flora Capensis, and most of the genera so far published in the Flora of Tropical Africa, but he investigated, with or without subsequent publication, grass collections from all parts of the world. The much abbreviated list of his researches given in the last paragraph shows, however, that he was no narrow specialist. Many of his later papers moreover indicate how keenly he kept in touch with research in other branches of botany than taxonomy, and he was always willing to discuss, in a constructively critical spirit, all recent work in genetics, ecology, and other wider aspects of biology.

It is somewhat difficult for one who worked intimately with Stapf for nearly 25 years to appraise him as a botanist and as a man without seeming biased. His abilities are unquestionable. None could concentrate, with apparent disregard of time and space, like he could. Every point bearing, however remotely, on the problem on hand was investigated as fully as possible with meticulous care. Perhaps this is nowhere more clearly shown than in his work for the Botanical Magazine, which periodical he raised to a point of excellence it had never before attained. His wide knowledge of languages, his considerable artistic powers, and the respect felt for him by foreign colleagues were all used in his botanical studies. His correspondence was vast and his help was never sought in vain.

Stapf had a fine figure and a good presence. Though quiet and unassuming, he invariably refused to accept or reach conclusions on any subject without either making his own investigations or giving much thought to data supplied to him. Superficially he sometimes appeared rather autocratic and he certainly felt at times the irksome and frequently unnecessary restraint imposed on some of his botanical activities. He was actually endowed with almost superhuman patience, constantly devoted hours of labour for the benefit of his friends, was at heart kindness itself, and looked on the broad aspects of the world's affairs with a humane sanity which withstood even the terrible years of war. For Stapf the war was a difficult and trying period, from his personal and from his official standpoint. Though always loyal to the country of his adoption, and a severe critic of the Central Powers, his wide knowledge prevented him from condemning all individuals of any nation but could not prevent the heart-strain of one with friends on both sides.

It is fitting that special mention should be made here of Stapf's more important contributions to British Botany. Firstly there were his

studies of single species. Of these that on *Spartina Townsendii* was most prolonged, involving, as it did, much field work. Stapf upheld the theory of hybrid origin of this species in papers published in *Gard. Chron.*, ser. 3, xliii, 33 (1908) and *Journ. Bot.*, xlv, 76 (1908); in spite of the difficulty, at that time, of explaining how a plant of hybrid origin with two distinct species for its parents could breed true. A more recent account is given by Stapf in *Bot. Mag.*, tab. 9125 (1927). Stapf's hypothesis has since been most strongly supported by cytological examination of *Spartina Townsendii* and its putative parents, *S. stricta* and *S. alterniflora*. Huskins (in *Nature*, cxxvii, 781 (1931) and *Genetica*, xii, 531 (1930)) has shown that the somatic chromosome number of *S. Townsendii* is 126, that of *S. stricta* 56, and that of *S. alterniflora* 70. It therefore seems very probable that *S. Townsendii* arose by two steps. Firstly, *S. stricta* (with $n = 28$) crossed with *S. alterniflora* (with $n = 35$) and gave a sterile hybrid with $28 + 35 = 63$ somatic chromosomes. This chromosome number was doubled in a vegetative part of the hybrid, with the formation of a flowering shoot with $2n = 126$. This shoot being fertile established the true breeding *S. Townsendii* which, on account of its hybrid-vigour, quickly spread over suitable terrain even at the expense of its parents. In technical expression *S. Townsendii* is an allopolyploid.

In the Botanical Magazine tab. 9088 (1926) Stapf described, as a new species, *Aconitum anglicum* (*A. Napellus* auct. plur. non L.). This is the wild British monkshood which is also the one most commonly cultivated in country cottage gardens. The original account should be consulted by every British botanist as an example of painstaking taxonomic research and as illustrating the need of comparing our British plants most carefully with continental species.

Stapf described several plants discovered as aliens in the British Isles or Europe as new species, e.g., *Millettia depauperata* Stapf (*Compositae*), *Koeleria advena* Stapf (*Gramineae*), and *Thellungia advena* Stapf (*Gramineae*).

His researches on the Southern Element in the British Flora published in Engler's *Bot. Jahrb.*, 509 (1914) and *Proc. Linn. Soc.*, 129th Session, 81 (1917), are of the utmost importance to students of plant-life in this country. Stapf showed that "the Atlantic and Mediterranean elements in the British flora amount to about 9 per cent. of the phanerogams and vascular cryptogams. Of these little more than two-fifths are referable to the Atlantic and almost three-fifths to the Mediterranean elements." His analysis of the ecological differentiation of the southern element is most important, as is also the very clear conclusion that examples of discontinuity of distribution must be considered in connection with the facts of distribution for the whole flora and not isolated as inexplicable miracles. It is probable that more recent research in the geological, palaeometeorological, and palaeobotanical branches of science, especially studies on the history of the Quaternary Ice Age and on the pollen content of peat beds, will modify some of Stapf's conclusions, as indeed he would seem to have thought not un-

likely (see espec. p. 83 of Proc. Linn. Soc., 129th Session), but the facts brought forward by him will always have to be taken into account in framing any history of our flora and vegetation.

In conclusion, the writer would like to place on record his deep sense of gratitude to one who was always a dear and valued friend and teacher. The sense of personal loss has increased with the fuller realisation that no more can help, inspiration, or community of interest be sought from a respected and beloved chief.

W. B. TURRILL.

Miss A. A. M. TULK, who died on Easter Sunday, 1934, was a very keen seeker of wild flowers, especially about her Surrey home. Some eighteen years ago she, with Miss Bacon, re-established *Carex tomentosa* on Chertsey Meads, which had been first recorded in the neighbourhood some years before, but seemed to have been lost sight of. Clever, popular and most unselfish, she had a host of friends, especially among the field botanists whom she was ever ready to help, and many will have happy memories of pleasant and profitable hours spent under her skilful guidance.

NEW COUNTY AND OTHER RECORDS.

†3/4. *ANEMONE APENNINA* L. Near Mitcham, Surrey, well established in two places, H. S. REDGROVE.

4/1. *ADONIS ANNUA* L. Harewood, near Andover, N. Hants, v.-c. 12, W. SIMPSON.

5/1. *MYOSURUS MINIMUS* L. Castle Farm, Southwick, S. Hants, v.-c. 11, P. M. HALL.

6/6. *RANUNCULUS LINGUA* L. Fleet Pond, N. Hants, v.-c. 12—only the second recorded habitat in this vice-county, Lt.-Col. G. WATTS.

*6/21b. *R. CIRCINATUS* Sibth., var. *SUBAQUANEUS* (Wahl.) Pears. Cauldshiels Loch, near Galashiels, v.-c. 79. A form with leaves rather nearer to those of *R. trichophyllus* in shape but in size and disposition more nearly akin to those of *R. circinatus*. The peduncles are those of the latter species and mainly terminal, N. DOUGLAS SIMPSON.

*6/22(2). *R. RADIANS* Rev., var. *GODRONII* (Gren.). Pond, Mundham, W. Sussex, v.-c. 13. A new vice-county record for this variety, Miss E. S. TODD.

*6/24. *R. HETEROPHYLLUS* Weber. Coldingham Loch, Berwickshire, v.-c. 81, G. TAYLOR.

6/24c. *R. HETEROPHYLLUS* Weber, var. *SUBMERSUS* Bab. Pond, Thirsk, v.-c. 62, T. J. FOGGITT, teste PEARSALL.

6/25. *R. PELTATUS* Schrank. With glabrous carpels, Harperrig Reservoir, Edinburgh, G. TAYLOR.

6/26. *R. PSEUDO-FLUTANS* Baker & Foggitt. Cheddar, N. Somerset, H. S. REDGROVE; Kemble, W. Glos., v.-c. 34, April 18, 1933, Lady DAVY.

6/27. *R. SPHAEROSPERMIUS* Boiss. Hunton, near Stoke Charity, Hants, Lady DAVY.

6/30. *R. LUTARIUS* Bouvet. Slapton, Devon, Miss E. S. TODD.

6/33. *R. FICARIA* L. Damp ditch, Oaksey, N. Wilts, v.-c. 7, April 19, 1933, J. D. GROSE.

†10/1. *ERANTHIS HYEMALIS* Salisb. Near Mitcham, Surrey, well established and abundant, H. S. REDGROVE.

†12/1. *NIGELLA DAMASCENA* L. Waste heap, Letchworth, Herts, v.-c. 20, H. PHILLIPS.

*†24/1. *ROEMERIA HYBRIDA* DC. Waste ground near railway sidings, Nottingham, v.-c. 56, R. BULLEY.

†30/3. *CAPNORCHIS EXIMIA* (DC.) Dr. One patch naturalised in a wood at Menabilly, E. Cornwall, v.-c. 2, J. D. GROSE, teste FRASER.

31/1. *CORYDALIS CLAVICULATA* DC. Near Tavistock, v.-c. 3, Dr H. B. WILLOUGHBY SMITH; *Glenquiech, Angus, R. and M. CORSTORPHINE.

32/10b. *FUMARIA OFFICINALIS* L., var. *ELEGANS* Pugsf. Park Farm, Hambledon, S. Hants, v.-c. 11—to be confirmed by Pugsley, P. M. HALL.

†36/5. *BARBAREA INTERMEDIA* Bor. Near West Meon Station, S. Hants, v.-c. 11, Lt.-Col. G. WATTS.

37/3. *ARABIS SCABRA* All. Somerset side of River Avon, abundant in one place; Durdham Down, Bristol, Glos., rather scarce, H. S. REDGROVE.

37/6. *A. GLABRA* Bern. Between Twyford and Loddon Bridge, Berks, H. S. REDGROVE.

*39/3. *CARDAMINE IMPATIENS* L. Fotheringham, Angus, an extension of its northern range in Scotland, R. and M. CORSTORPHINE.

†39/6. *C. TRIFOLIA* L. Found in two places a mile apart, near Casterton, Westmorland, J. B. FOGGITT.

39/7. *C. BULBIFERA* Crantz. Etchingam, E. Sussex, v.-c. 14, Miss STANLEY.

†42/9. *ALYSSUM INCANUM* L. Between Truro and Malpas, Cornwall, v.-c. 1, Miss E. S. TODD.

43/4. *DRABA MURALIS* L. Between Cheddar and Charterhouse, Somerset, H. S. REDGROVE.

44/1e. *EROPHILA VERNA* E. Meyer, var. *MAJUSCULA* (Jord.). Canal bank, Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS, teste DRABBLE.

*49/5. *SISYMBRIUM IRIO* L. Waste ground at Dover, JOHN JACOB.

†49/12. *S. ERYSIMOIDES* Desf., versus var. *XEROPHILUM* Fourn. Avonmouth Docks, W. Glos., 1933, SANDWICH.

*†54/2. *BRASSICA NAPUS* L., sensu lato (*vide* A. R. Horwood, who saw my specimen at the Royal Herbarium, Kew, on 21st November

1933).—Ref. No. 4883, grassy, gravelly, waste ground near a wooden poultry-house, 160 feet above mean sea-level, Hamar House, Stromness, Mainland, Orkney, 22nd September 1933, HENRY HALGRO JOHNSTON. Not native. Introduced with poultry food into Orkney. One plant, in flower without fruit developed, only seen by me. Petals yellow. A new record for this alien species for v.-c. 111, discovered by James Sinclair, junior, in my company, on 22nd September 1933.

†54/16. *B. JUNCEA* COSS. Waste ground, Stoke-on-Trent, new to N. Staffs, E. S. EDEES.

*†54/20. *ERUCASTRUM POLLICHI* Sch. & Spenn. A few plants on waste ground at Dover, v.-c. 15, JOHN JACOB.

54/22. *B. INCANA* L. (*B. ADPRESSA* Boiss.). Adventive at Par, E. Cornwall, v.-c. 2, Miss E. S. TODD.

†61/3. *LEPIDIUM DRABA* L. Broadstairs, I. of Thanet, E. Kent, v.-c. 15, Dr J. C. M. GIVEN.

67/1. *HUTCHINSIA PETRAEA* Br. Somerset side of the River Avon, very sparingly; Durdham Down, Bristol, Glos., very sparingly and burnt up, H. S. REDGROVE.

†70/1. *VOGELIA (NESLIA) PANICULATA* (L.) Hornem. Dunbridge Station, S. Hants, v.-c. 11, Lt.-Col. W. A. PAYN; Crookham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†74/2. *BUNIAS ORIENTALIS* L. Waste ground between Truro and Malpas, E. Cornwall, Miss E. S. TODD.

80/1b. *RAPHANUS RAPHANISTRUM* L., var. *FLAVUS* Schub. & Mart. Lower Yard Farm, Godshill, I. of Wight, v.-c. 10, P. M. HALL.

87/3. *HELIANTHEMUM POLIFOLIUM* Mill. Bleadon, N. Somerset, H. S. REDGROVE.

1932 and 1933 *VIOLA* Records seen by P. M. Hall.

88/1. *VIOLA STAGNINA* Kit. Woodwalton Fen, Hunts, v.-c. 31, J. E. LOUSLEY.

88/3. *V. SILVESTRIS* Lam. Type and f. *pallida* from Berkeley, W. Gloucester, v.-c. 34, E. NEMES; as a garden plant, Colwall, Hereford, v.-c. 36, F. M. DAY; Lane, S.W. of Capel, Surrey, J. E. LOUSLEY.

88/3. *V. SILVESTRIS* Lamarck, f. *PALLIDA* Newman. Garden weed at Brockwood, The Downs School, Colwall, Herefordshire, F. M. DAY.

88/3b. *V. SILVESTRIS* Lam., var. *PUNCTATA* Dr. East Tytherley, S. Hants, v.-c. 11, P. M. HALL; Colwall, Hereford, v.-c. 36, F. M. DAY; near Brixham, S. Devon, v.-c. 3, F. M. DAY.

88/4. *V. RIVINIANA* Reichb. Near Brixham, S. Devon, v.-c. 3, F. M. DAY; Berkeley, W. Gloucester, v.-c. 34, E. NELMES; Lane, S.W. of Capel, Surrey; Chailey, East Sussex; near Dagnall, Beds, J. E. LOUSLEY.

88/4. *V. RIVINIANA* L. × *SILVESTRIS*. Scabbacombe and near Brixham, S. Devon, v.-c. 3, F. M. DAY.

88/4b. *V. RIVINIANA* Rehb., var. *DIVERSA* Greg. Roborough Down, Plymouth, S. Devon, v.-c. 3, E. MASSON PHILLIPS; Scabbacombe, S. Devon, v.-c. 3, F. M. DAY; near Barnstaple, N. Devon, v.-c. 4, R. TAYLOR; Blagdon Hill, S. Hants, v.-c. 11, P. M. HALL; Epsom Common and Mitcham Common, Surrey; Copthorne Common, E. Sussex, J. E. LOUSLEY.

88/4c. *V. RIVINIANA* Rehb., f. *MINOR* Murb. Scabbacombe, S. Devon, v.-c. 3, F. M. DAY.

88/4e. *V. RIVINIANA* Rehb., f. *NEMOROSA* N.W. & M. Scabbacombe, S. Devon, v.-c. 3, F. M. DAY; cliffs, W. side of Plymouth Sound, E. Cornwall, v.-c. 2, E. MASSON PHILLIPS; Berkeley, W. Gloucester, v.-c. 34, E. NELMES; Colwall, Hereford, v.-c. 36, F. M. DAY; by disused canal, Tickner's Heath, Surrey, J. E. LOUSLEY.

88/6. *V. CANINA* L. × *LACTEA* Sm. Chailey Common, E. Sussex, J. E. LOUSLEY.

88/6b. *V. CANINA* L., var. *ERICETORUM* Reichb. Near Barnstaple, N. Devon, v.-c. 4, R. TAYLOR; on chalk, Itchen Stoke Down, N. Hants, v.-c. 12, P. M. HALL; Richmond Park, Surrey, v.-c. 17, C. E. HUBBARD; Mitcham Common, Surrey, J. E. LOUSLEY.

88/6b. *V. CANINA* L., var. *ERICETORUM* Reichb. × *RIVINIANA* Reichb. var. *DIVERSA* Greg. Pentridge Hill, Dorset, v.-c. 9, P. M. HALL.

88/6d. *V. CANINA* L., var. *PUSILLA* Bab. Braunton Burrows, N. Devon, v.-c. 4, Dr F. R. E. WRIGHT; Scott Island, Norfolk, ex Kew; coast of Glamorgan, v.-c. 41, Miss E. VACHELL. N.B.—The Braunton plant, and perhaps the others, may be var. *sabulosa* Reichb. At the moment I am not satisfied that these two varieties can be separated.

88/6g. *V. CANINA* L., var. *CRASSIFOLIA* (Grönv.) Dr. Woodwalton Fen, Hunts, J. E. LOUSLEY.

× *STAGNINA*. Woodwalton Fen, Hunts, J. E. LOUSLEY.

× *RIVINIANA*. Ramshorn Down, Bickington, S. Devon, v.-c. 3, Miss C. E. LARTER; Glamorganshire coast, v.-c. 41, Miss E. VACHELL; Chailey Common, E. Sussex, J. E. LOUSLEY.

88/7. *V. LACTEA* Sm. Hayton, S. Devon, v.-c. 3, Miss TEAGE; Heathfield, E. Sussex, v.-c. 14, Col. A. H. WOLLEY-DOD; Chailey Common, E. Sussex, J. E. LOUSLEY.

× *RUVINIANA*. Heathfield, E. Sussex, v.-c. 14, Col. A. H. WOLLEY-DOD, also from chalk near Eastbourne, its presence in this situation apparently to be explained by the occurrence of pockets of acid soil overlying the chalk; also Chailey Common, E. Sussex, J. E. LOUSLEY.

88/7. *V. LACTEA* Sm. Copthorne, E. Sussex, v.-c. 14, H. S. RED-GROVE.

88/8. *V. ODORATA* L. Copse below Kits Coty House, Aylesford, E. Kent, an unusual caespitose form with pubescent peduncles, but not a hybrid with *hirta*, J. E. LOUSLEY.

88/8. *V. ODORATA* L., f. *IMBERBIS* (Leight.). Bevington, near Berkeley, W. Gloucester, v.-c. 34, E. NELMES.

88/8d. *V. ODORATA* L., var. *DUMETORUM* (Jord.). Scabbacombe, S. Devon, v.-c. 3, F. M. DAY; f. *IMBERBIS* (Leight.). Bevington, near Berkeley, W. Gloucester, v.-c. 34, E. NELMES; Longdon, Worcester, v.-c. 37, F. M. DAY.

88/8h. *V. ODORATA* L., var. *SUBCARNEA* (Jord.). Bessilsleigh, Berks, v.-c. 22, Miss E. S. TODD; an allied form, not typical of this variety and possibly var. *vilacina* Beck. Longdon, Worcester, v.-c. 37, F. M. DAY. The same form as the last but f. *imberbis* (Leight.). Bevington, Berkeley, W. Gloucester, v.-c. 34, E. NELMES.

88/9. *V. HIRTA* L. Near Hill, W. Gloucester, v.-c. 34, E. NELMES; Woodwalton Fen, Hunts, J. E. LOUSLEY.

88/9. *V. HIRTA* L. × *ODORATA*. Near Brixton, E. MASSON PHILLIPS, and near Brixham, F. M. DAY. Both S. Devon, v.-c. 3. Aldbourne, N. Wilts, v.-c. 7, Miss E. S. TODD; Mickleham, Surrey, v.-c. 17, J. E. LOUSLEY; Inkpen Hill, Berks, approaching × *sepincola* Jord., J. E. LOUSLEY.

88/9b. *V. HIRTA* L., var. *FOUDRASI* Jord. Berry Head, Brixham, S. Devon, F. M. DAY.

88/9b. *V. HIRTA* L., var. *FOUDRASII* (Jord.) R. & F. Berry Head, S. Devon, v.-c. 3, F. M. DAY; Aldbourne, N. Wilts, v.-c. 7, Miss E. S. TODD; Box Hill, Surrey, v.-c. 17, J. E. LOUSLEY.

88/9d. *V. HIRTA* L., var. *INCONCINNA* J. Briq. Berry Head, S. Devon, v.-c. 3, F. M. DAY.

88/9j. *V. HIRTA* L., var. *PROPERA* (Jord.) Gillot. Scabbacombe, S. Devon, v.-c. 3, F. M. DAY; Box Hill, Surrey, v.-c. 17, J. E. LOUSLEY.

88/10. *V. CALCAREA* Greg. A few plants agreeing with the description of this species, Fleam Dyke, Cambs, J. E. LOUSLEY; Boxhill, Surrey, plentiful, H. S. REDGROVE.

88/11. *V. PALUSTRIS* L. Dartmoor, F. M. DAY, and Goodameary, E. MASSON PHILLIPS. Both S. Devon, v.-c. 3. Landford Common, S. Wilts, v.-c. 8, P. M. HALL; St Leonard's Forest, near Colgate, W. Sussex, J. E. LOUSLEY.

88/14. *V. CONTEMPTA* Jord. Near Silchester, N. Hants, v.-c. 12, Miss E. S. TODD.

88/15. *V. VARIATA* Jord. Near Sundridge, W. Kent, v.-c. 16, P. M. HALL and W. H. PEARSALL.

*88/27. *V. ANGLICA* Drabble. Waste ground, Broome, N. Wilts, v.-c. 7, J. D. GROSE.

88/28. *V. DESEGLISEI* Jord. St Martin's, Scilly Isles, W. Cornwall, v.-c. 1, Miss E. S. TODD.

88/31. *V. LEPIDA* Jord. Near Sundridge, W. Kent, v.-c. 16, P. M. HALL and W. H. PEARSALL.

*89/4. *POLYGALA DUBIA* Belynyck, var. *DUNENSE* (Dum.). Braunton Burrows, N. Devon, v.-c. 3, Dr F. R. ELLISTON WRIGHT. [First record for this variety in N. Devon—flowers pink; upper leaves ± adpressed, narrowly lanceolate or sub-linear; mature capsules oval-cuneiform, distinctly shorter than the wings and broader.—ED.]

89/5. *P. CALCAREUM* F. Schultz. Itchen Stoke Down, N. Hants, v.-c. 12, P. M. HALL.

92/1. *DIANTHUS CAESIUS* Sm. Cheddar, N. Somerset, very abundant and plenty of it in accessible places, H. S. REDGROVE.

†96/11. *SILENE ITALICA* L. Still at Greenhithe, Kent, abundant, H. S. REDGROVE.

100/7. *CERASTIUM PUMILUM* Curt. Bleadon, N. Somerset, H. S. REDGROVE.

102/8. *ARENARIA TENUIFOLIA* L. Old Basing, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

103/5. *SAGINA SCOTICA* Druce. Ben More, Am Binnin, Creag na Caillich, Cam Chreag, Mid-Perth, v.-c. 88, Glen Callater, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

*103/9. *S. REUTERI* Boiss. On granitic soil, Lundy Island, N. Devon, v.-c. 4, July 1933, Dr F. R. ELLISTON WRIGHT. This is an interesting addition to the stations in the British Channel area. The plants were excellent examples of the species as described in *Rep. B.E.C.*, 1927, 460-2, and the first I have seen from soil on granite. The *Comital Flora* should be amended to read 4, 6, 10, 37, 41, 45. All other records should be deleted, W.H.P.

105/4. *SPERGULARIA CAMPESTRIS* (Kindb.) Willk. & Lge. (*S. atheniensis* Aschers. & Schweinf.). Par, E. Cornwall, v.-c. 2, Miss E. S. TODD.

*107/1. *PORTULACA OLERACEA* L. Weed in kitchen garden, Blackmoor, Liss, Hants, Hon. W. J. L. PALMER. Plant prostrate, very smooth. Leaves fleshy, sessile or shortly stalked, opposite or upper alternate, obovate or wedge-shaped. Flowers sessile (opening only on sunny mornings); petals 4-6, oboval, yellow. Sepals 2, keeled to the summit. Many stamens. Style deeply 5-6 parted. Flower-bud flat and acute. European, also naturalised in N. America.

†108/1. *CLAYTONIA SIBIRICA* L. (*C. alsinoides* Sims). Blackmoor, N. Hants, v.-c. 12. Although the *Comital Flora* gives 12, it does not appear either in Townsend's *Flora* or in Rayner's *Supplement*, Hon. W. J. L. PALMER and P. M. HALL; *Whitehall Plain, Epping Forest, near Chingford, v.-c. 18, 1933, B. T. WARD. In the *Comital Flora* no record for this species is given for v.-c. 17, but Salmon (*Fl. Surrey*, 1931; 193) gives two localities for it in that county. Mr Ward reports that the plant is still flourishing exceedingly in the Felday locality.

†108/2. *C. PERFOLIATA* Donn. Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†112/7. *HYPERICUM MONTANUM* L. Forge Valley, near Scarborough, v.-c. 62, J. CHAPPLE.

†112/12. *H. DUBIUM* Leers. Lamlach, Arran, v.-c. 100, R. MACKECHNIE. Recorded in *Top. Bot.*, Supp. 2, but not in *Comital Flora*.

†117/4. *MALVA PUSILLA* Sm. By canal between Fleet and Alder-shot, v.-c. 12, Lt.-Col. G. WATTS, teste DRABBLE.

*†117/4. *M. BOREALIS* Wallm., forma (*MALVA PUSILLA* Smith) (*vide* A. R. Horwood, who saw four specimens of my Ref. No. 4869 at the Royal Herbarium, Kew, on 21st November 1933. Grassy, gravelly, waste ground near a wooden poultry-house, 160 feet above mean sea-level, (1) Ref. No. 4869 (plant in flower and sparingly in young unripe fruit), 6th September 1933, and (2) Ref. No. 4910 (plant in flower and unripe fruit), 30th October 1933, H. H. JOHNSTON. Not native. James Sinclair's specimen of his Ref. No. 968 was collected by him, in my

company, from the same plant, on 22nd September 1933. A new record for this alien species for v.-c. 111.

†117/7. *M. NICAENSIS* All. Tip, Bristol, v.-c. 34, 1933, SANDWICH.

†117/9. *M. PARVIFLORA* L. Phillack, Cornwall, Miss E. S. TODD.

127/7. *GERANIUM PYRENAICUM* Burm. f. Ashley, S. Hants, v.-c. 11, Rt. Hon. H. T. BAKER and P. M. HALL.

127/10. *G. MOLLE* L., var. *AEQUALE* Bab. Avonmouth Docks, W. Glos., 1933, SANDWICH.

†133/4. *IMPATIENS GLANDULIFERA* Royle. Penylan, near Ruabon, Denbigh, v.-c. 50, Miss V. G. OWLES; *Lamlach, Arran, v.-c. 100, R. MACKECHNIE; *near Coldstream by the R. Tweed, extending for a mile, v.-c. 68, E. C. WALLACE; *by canal, Higham, W. Kent, v.-c. 16, E. C. WALLACE.

153/1. *MEDICAGO FALCATA* L. Shalford Common, near Guildford, Surrey. First seen here in 1917, and under observation since. It blossoms each year but never sets seeds, F. CLARKE. The var. *tenuifoliolata* Vuyck quoted in *Fl. Surrey* (p. 230) at Pewley Hill, Guildford, is no longer in existence there, having been destroyed by too vigorous trimming.

†153/1b. *M. FALCATA* L., var. *TENUIFOLIOLATA* Vuyck. Between Dawes Green and Betchworth, Surrey, A. L. STILL.

†153/4b. *M. HISPIDA* Gaertn., var. *DENTICULATA* (Willd.). Scilly Isles, Miss E. S. TODD.

†155/19. *TRIFOLIUM AGRARIUM* L. Pondtail, Fleet, N. Hants, v.-c. 11, Lt.-Col. G. WATTS; tip, Bristol, v.-c. 6, 1933, SANDWICH.

155/20b. *T. PROCUMBENS* L., var. *MAJUS* Koch. Bramshot, N. Hants, v.-c. 11, Lt.-Col. G. WATTS.

166/1. *ASTRAGALUS GLYCYPHYLLUS* L. Taynton, Burford, Oxon, new station for district 5 (Isis) of the *Fl. Oxon*, T. H. LEE per H. W. POWELL; Chilham, E. Kent, JOHN JACOB.

†166/4. *A. CICER* L. Waste ground, Burton-on-Trent, R. C. L. BURGESS.

†170/1. *CORONILLA VARIA* L. Stone wall—not near a garden—Swindon, v.-c. 7, J. D. GROSE.

176/4. *VICIA OROBUS* DC. In one spot on the Mendips, Somerset, not very abundant, but apparently increasing, H. S. REDGROVE.

178/3. *LATHYRUS TUBEROSUS* L. Portishead Dock, N. Somerset, 1933, J. GIBBONS.

183/2. *PRUNUS PADUS* L. Foxcote, E. Gloster, v.-c. 33, Miss L. ABELL.

†184/4. *SPIRAEA TOMENTOSA* L. Quite naturalised in a copse near Crookham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

*185/26. *RUBUS SCHEUTZII* Lindeb. Roadside, Abbethune, Arbroath, Angus, 1932, R. and M. CORSTORPHINE, teste W. WATSON.

*185/35. *R. VILLICAILIS* Koehl. Between Lethnot and Edzell, Angus, 1932, R. and M. CORSTORPHINE, teste W. WATSON.

*185/36. *R. ATROCAULIS* P. J. M. (*rectangulatus* Maass.). Magdalen Green, Dundee; Westwater at Edzell, 1932, R. and M. CORSTORPHINE, teste W. WATSON.

*185/56. *R. SCHLECHTENDALII* Weihe. Edzell, Angus, 1932, R. and M. CORSTORPHINE, teste W. WATSON.

185/92. *R. ECHINATUS* Lindl., f. or hybr. (Ref. No. Z.508.) Stem stout, low arching, purple. Petals faint lilac or white, ovate, obtuse. Styles green, exceeded by the white stamens. Wood, near Chinnor, Oxon, P. G. BEAK. "*R. echinatus* Lindl., a f. or hybrid," H.J.R.

185/92. *R. ECHINATUS* Lindl. (Ref. No. Z.502.) Stems arching, rather low, but stout. Petals lilac, elliptic obtuse, not contiguous. Styles green, exceeded by the white stamens. Hillside, Chinnor, Oxon, P. G. BEAK. "*R. echinatus* Lindl., which is not the same as *R. discerptus* P. J. Muell.," H.J.R.

*185/94. *R. CENOMANENSIS* Sudre. Muirhead of Liff; Arbroath-Dundee Road, 1932, R. and M. CORSTORPHINE, teste W. WATSON. New to Scotland.

*185/110. *R. FUSCUS* W. & N. Between Tannadice and Memus; near Cononsyth, Arbroath, Angus, 1932, R. and M. CORSTORPHINE. Var. *HYPOSERICUS* Sudre. Greens of Gardyne, Angus, 1932, R. and M. CORSTORPHINE, teste W. WATSON.

185/115. *R. SCABER* W. & N. (Ref. No. Z.488.) Stems low-arching, rather weak. Sepals reflexed. Petals white, elliptic; styles green, shorter than the white stamens. Under oak-wood, Bagley Wood, Berks, P. G. BEAK. "The Boar's Hill plant which Focke taught up to put under *R. SCABER* W. & N.," H.J.R.

189/4. *POTENTILLA ARGENTEA* L. Casual, Avonmouth Docks, W. Gloster, 1933, J. GIBBONS.

*189/6. *P. VERNA* L. Chalk railway embankment, Micheldever Station, N. Hants, v.-c. 12. Its origin here unknown; it occurs in about half a dozen strong tufts quite high up the slope of the embankment. Possibly introduced by the agency of the railway from Bristol, Lt.-Col. G. WATTS; Axbridge, N. Somerset, and abundant at Durdham Down, Bristol, Gloster, H. S. REDGROVE.

†189/11. *P. NORVEGICA* L. Roadside between Fleet and Aldershot, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

*189/25. *P. PALUSTRIS* Scop. Near Chingford, Epping Forest, v.-c. 18, removes the exception as to this v.-c. (London Nat. Hist. Soc.), J. ROSS.

*190/4. *ALCHEMILLA MINOR* Huds. Near West Wellow, S. Hants, v.-c. 11, P. M. HALL.

191/2. *AGRIMONIA ODORATA* (Gouan) Mill. Bramshot and Crookham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

*†191/3. *A. AGRIMONOIDES* L. Kinnordy, Angus, R. and M. CORSTORPHINE, det. A. J. WILMOTT.

193/4. *POTERIUM OFFICINALE* (L.) A. Gray. Near Burley, S. Hants, v.-c. 11, Miss HARDCASTLE.

194/19(l). *ROSA TOMENTOSA*, var. *DIMORPHA* (Bess.) Des. Crianlarich, Mid Perth, v.-c. 88, E. C. WALLACE. Det. A.H.W.-D.

*194/21(b). *R. VILLOSA* L., var. *b. MOLLIS* Smith [= *ROSA MOLLIS* Smith, var. *a. TYPICA* Wolley-Dod] (*fide* A. H. Wolley-Dod, who saw my two herbarium specimens of my Ref. No. 376 in May 1926; and two specimens of my Ref. No. 4887, one specimen of my Ref. No. 4888, and James Sinclair's one specimen of his Ref. No. 969, on 11th November 1933).—(1) Ref. No. 376, grassy banks at burnside, 220 feet above mean sea-level, Red Glen, between Burandie and Dwarfie Hamars, Hoy, Orkney, 16th September 1914, H. H. JOHNSTON. Native. Rare. Plants in unripe fruit. (2) Ref. Nos. 4887 and 4888, heathery, grassy, rocky ravine at burnside, 410 feet above mean sea-level, west side of Nowt Bield, Ward Hill, Hoy, Orkney, 27th September 1933, H. H. JOHNSTON. Native. Rare.

194/21d. *R. MOLLIS* Sm., f. *CAERULEA* Woods. *Coldstream Bridge, Cheviotland, v.-c. 68, E. C. WALLACE. Det. A.H.W.-D.

ROSA NOTES FOR 1933, BY EDMUND B. BISHOP.

The following are a few additions to those mentioned in other communications of mine, printed elsewhere in this Report, and also to those

commented on by me in the Report of the Exchange Section. They arise out of personal submissions to me by the members named.

As in all my notes on *Rosa*, "N.C.R." means new to Col. Wolley-Dod's own records, whilst the nomenclature is that of his "Revision of the British Roses." The corresponding numbers of the "British Plant List," 2nd edition, have been inserted for convenience of reference.

Collected by Miss E. S. Todd in West Cornwall, during 1933, being N.C.R.s for v.-c. 1:—

194/7. *R. CANINA* L., var. *DUMALIS* (Bechst.) Dum. Crowles, near Penzance.

194/7b. *R. CANINA* L., var. *DUMALIS* (Bechst.), f. *CLADOLEIA* (Rip.) Devoran.

194/7e. *R. CANINA* L., var. *BISERRATA* (Mér.) Baker. Devoran.

Collected by Mr P. G. Beak in Oxfordshire, during 1933, being N.C.R.s for v.-c. 23:—

194/5h. *R. STYLOSA* Desv., var. *SYSTYLA* (Bast.) Baker, f. *LANCEOLATA* Lindl. Bampton. (Ref. No. Z.540).

194/10g. *R. DUMETORUM* Thuill., var. *CALOPHYLLA* Rouy. Bampton. (Ref. No. Z.543).

194/8f. Also collected by Mr Beak at Bampton, Oxon, v.-c. 23, is an interesting Rose submitted by him as *R. canina* L., var. *verticillantha* (Mér.) Baker, f. *Lemaitrei* (Rip.) W.-Dod ?. Mr Beak sent gatherings from three different bushes, which seem practically identical in form, all irregularly serrate only. Wolley-Dod says that *Lemaitrei* has biserrate leaflets, and it is included by Keller in his Group C. (Biserrato-Compositae). My own decided opinion (for what it is worth) is that Mr Beak's Z.310, 311, and 541 all come under var. *hirtella* Chr., which is included in Keller's Group B (Transitoriae) and has passing mention in Wolley-Dod's "Revision," p. 40 (under *Lemaitrei*). These sheets have not yet been submitted to Col. Wolley-Dod. Unless he adopts *hirtella*, of course they must remain under *Lemaitrei*.

194/20e. Amongst other Roses submitted by Mr Beak, but collected by Mr T. R. Peace, in Mid Perth, is one which I think is *R. Sherardi* Davies, var. *typica* W.-Dod, f. *pseudo-mollis* W.-Dod (= *R. tomentosa* Sm., var. *pseudo-mollis* E. G. Baker). As this would be an N.C.R. for the well-worked v.-c. 88, perhaps I had better give it as such with a ?.

Although not an N.C.R., the following note, recording a slight extension of the area of the only known station for one of our very rarest Roses, may be of interest to critical students of the genus:—

194/11g. *R. DUMETORUM* Thuill., var. *SETICAULIS* W.-Dod. On August 16th, 1933, my sister (Mrs C. L. Wilde), Mr Biddiscombe and I set out on a long-delayed attempt to find this elusive floral aristocrat

of our adopted county, guided solely by the note in *Flora of Surrey* (Salmon), p. 673.

We all know how difficult it usually is to locate a desired plant, even when furnished with elaborate instructions. Mr Biddiscombe and I, working the problem out beforehand on the 1-inch Ordnance map, were each quite certain as to the exact spot. Such spots are about a mile apart, and at neither did we find our Rose. My sister came out with no pre-conceived notions on the subject, but at a nondescript junction of lanes suddenly said "I am going down here," and went down there, ignoring our sceptical protests. A very few minutes later she climbed over a stile into a field, and then strolled along by the hedge examining Roses, we meekly following doing likewise. After proceeding thus for about 50 yards, we were quietly informed that she had a Rose with pubescent leaflets, with acicles on branches and glands on peduncles. With delight and no little surprise we hurried up to the bush, by which time subfoliar glands had also been added. The diagnosis was now fairly obvious, seemingly it must be *seticaulis*, though not an absolute fit by the book description.

But this is not the end of the story. In due course I sent specimens to Col. Wolley-Dod, accompanied by a rough sketch-plan showing the actual situation of the bush. Here are extracts from his reply:—

"Most interesting. Not exactly my *seticaulis*, nor from the same bush, but it can go under that name. The chief differences are as follows:—Your leaflets are mostly more truncate, or at least rounded at base, and are narrower in proportion to their length than mine, which have quite rounded sides. Your petioles are much more glandular and pubescent, but strikingly long stipules agree. Your fruit is subglobose, mine ovoid, quite $1\frac{1}{2}$ times as long as broad. Your styles are longer and more hispid, but I think mine are more definitely hispid than I have described them. . . . Mrs Wilde's is a new bush, hardly a new station."

We did not make any considerable gathering from this bush, but I will send specimens (as far as they can be spared) to the first three or four members, *actively* interested in the genus, who apply to me for them. If possible, I will distribute further specimens to Exchange members next year.

195/1b. *PYRUS MALUS* L., var. *PARADISIACA* L. Foxcote, E. Gloster, v.-c. 33, Miss L. ABELL.

195/2. *P. COMMUNIS* L. Foxcote, E. Gloster, v.-c. 33, Miss L. ABELL.

*195/10. *SORBUS PORRIGENS* Hedl. Castle Coch Woods, Glamorgan, v.-c. 41, 1933, A. J. WILMOTT and E. VACHELL.

*195/13. *PYRUS ARIA* (L.) Ehrh. × *AUCUPARIA* (L.) Ehrh. = *P. PINNATIFIDA* Ehrh. Ashley, S. Hants, v.-c. 11, P. M. HALL and Rt. Hon. H. T. BAKER, det. A. J. WILMOTT.

†198/1. *AMELANCHIER CANADENSIS* (L.) Med. Naturalised near West Wellow, S. Hants, v.-c. 11, G. W. PIERCE; Canal bank, near Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†198/3. *A. LAEVIS* Wieg. Holmsley, S. Hants, v.-c. 11, Dr R. W. BUTCHER and J. CHAPPLE, det. FRASER.

199/10. *SAXIFRAGA HYPNOIDES* L. Very abundant in one spot at Cheddar, to which it is restricted in the district—its most southerly station in Britain, H. S. REDGROVE.

199/17. *S. GRANULATA* L. Cheam, Surrey, a new station, v.-c. 17, A. L. STILL.

*207/5. *RIBES ALPINUM* L. Near Dunninald, Angus, R. & M. CORSTORPHINE.

*209/1. *TILLAEA MUSCOSA* L. Blackmoor, N. Hants, v.-c. 12. Occurs in several places in Woolmer Forest. It is somewhat remarkable that it should not have been recorded before from a habitat very typical for the plant, Hon. W. J. L. PALMER and P. M. HALL.

213/1. *DROSERA ANGLICA* × *ROTUNDIFOLIA*, with both parents. Lower slopes of Ben Douran above Bridge of Orchy, v.-c. 98, Argyll, R. MACKECHNIE and E. C. WALLACE.

214/1. *HIPPURIS VULGARIS* L. Bowling, Dumbarton, v.-c. 99, R. MACKECHNIE.

216/1. *MYRIOPHYLLUM SPICATUM* L. Basingstoke Canal, Odiham, N. Hants, v.-c. 12; Pevensey Levels, E. Sussex, v.-c. 14, E. C. WALLACE.

216/2. *M. ALTERNIFLORUM* DC. Frensham Little Pond, Surrey, v.-c. 17; shores of Loch Tay, Killin, Mid Perth, v.-c. 88, E. C. WALLACE.

216/3. *M. VERTICILLATUM* L. Marsh ditches near Lewes, Sussex, v.-c. 14, E. C. WALLACE.

216/3b. *M. VERTICILLATUM* L., var. *PECTINATUM* (DC.). Wicken Fen, Cambs, v.-c. 29, H. PHILLIPS.

217/2. *CALLITRICHE OBTUSANGULA* Le Gall. Near Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

*217/3. *C. PALUSTRIS* L. Farlington Marshes, S. Hants, v.-c. 11, Dr W. A. SLEDGE and P. M. HALL, det. W. H. PEARSALL. *Austwick Moss, v.-c. 64, H. W. PUGSLEY. Excellent fruiting examples.

217/5. *C. INTERMEDIA* Hoffm. Pool near Bewdley, Worcs., v.-c. 37, E. C. WALLACE.

217/5d. *C. INTERMEDIA* Hoffm., var. *HOMOIOPHYLLA* Godron. Cauldshiels Loch, near Galashiels, v.-c. 79, A. DOUGLAS SIMPSON.

217/6. *C. AUTUMNALIS* L. *Cauldshiels Loch, near Galashiels, v.-c. 79, N. DOUGLAS SIMPSON; Loch Clunie, E. Perth; Loch Ussie, near Dingwall, E. Ross; Lintrathen Reservoir, Angus, G. TAYLOR; *Eaglesham, Renfrew, v.-c. 76, R. MACKECHNIE.

*219/1. *LYTHRUM SALICARIA* L. Near Friockheim and at Forfar Loch, Angus, R. & M. CORSTORPHINE.

220/14. *EPILOBIUM PALUSTRE* L. With white flowers, Pevensey Level, E. Sussex, v.-c. 14, E. C. WALLACE.

221/1. *LUDWIGIA PALUSTRIS* (L.) Ell. This species fruited very freely this year (1933) in the station S.E. of Lyndhurst, where it is very abundant. Last year it was discovered by Mrs Tindall in a new station, extending its range several miles to the south, and it was rediscovered here this year independently by Mrs Ashby. The new station is one much frequented by botanists and it is possible that the plant may have been introduced here accidentally or otherwise by human agency, P. M. HALL.

*234/1. *CARPOBROTUS EDULIS* N. E. Br. (*Mesembryanthemum edule* L.). In quantity on cliffs of the Cornish coast near Wadebridge, v.-c. 2, R. J. FLINTOFF.

*239/1. *ERYNGIUM CAMPESTRE* L. Waste ground between the docks and the sand-dunes at Port Talbot, Glamorgan, v.-c. 41, R. L. BURGESS.

245/3. *BUPLEURUM ROTUNDIFOLIUM* L. On waste ground near Skipton, Yorks, v.-c. 63. New to the Craven district, T. H. HOLMES and J. N. FRANKLAND.

†245/6. *B. PROTRACTUM* Hoffm. et Link. (*B. subovatum* Link). Near Lewes, Sussex, Miss K. PICKARD.

246/1. *TRINIA GLAUCA* Dum. Bleadon and Uphill, N. Somerset; plentiful on Durdham Down, Bristol, Gloster, just blooming, April, H. S. REDGROVE.

251/1. *SISON AMOMUM* L. Common at Staplehurst and other places in Kent; I never saw it in the Lake District, W. H. PEARSALL.

†252/1. *FALCARIA VULGARIS* Bernh. Portishead Dock, N. Somerset, 1933, SANDWICH.

277/2b. *HERACLEUM SPHONDYLIIUM* L., var. *ANGUSTIFOLIUM* Huds. Bewdley, Worcs.; v.-c. 37, J.B.D. ex E. C. WALLACE.

†279/1. *CORIANDRUM SATIVUM* L. Waste heap, Welwyn, Herts, v.-c. 20, H. PHILLIPS.

*285/2. *CORNUS SUECICA* L. Near the top of Whitecombe, Dumfries, v.-c. 72, among heather, July 30, 1931, Miss H. M. LOGAN HOME.

*287/3. *SAMBUCUS EBULUS* L. Near Polnoon Castle, Renfrew, v.-c. 76, R. MACKECHNIE.

291/2b. *LONICERA PERICLYMENUM* L., var. *QUERCIFOLIA* Ait. Lam-lash, Arran, v.-c. 100, R. MACKECHNIE.

296/5. *GALIUM SYLVESTRE* Poll. Plentiful at Cheddar, N. Somerset, H. S. REDGROVE.

*296/5d. *G. SYLVESTRE* Poll., var. *HISPIDUM* Schrader. Heathy ground, Marlborough, v.-c. 7, J. D. GROSE.

296/7c. *G. PALUSTRE* L., var. *LANCEOLATUM* Uechtr. Woodwalton Fen, Hunts, H. PHILLIPS.

301/1. *VALERIANA OFFICINALIS* L. Cheddar, N. Somerset, apparently growing with *V. sambucifolia* Mik., but these two so-called species seem to me to run into one another, H. S. REDGROVE.

*304/4. *VALERIANELLA CARINATA* Loisel. Old Basing, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

306/1. *DIPSACUS SYLVESTRIS* Huds. (*D. FULLONUM* L.). Near Lewes, Sussex, Miss K. PICKARD.

†306/3. *D. SATIVUS* (L.). (*FULLONUM* auct.). Waste heap, Welwyn, Herts, v.-c. 20, H. PHILLIPS.

†307/2. *LEPICEPHALUS SYRIACUS* (Schrader). Newport, Isle of Wight, v.-c. 10, J. W. LONG.

†308/2. *SCABIOSA ATROPURPUREA* L. A continental species naturalised at Folkestone (see *Fl. Kent*, 187). On the Leas, Folkestone, September 1931, Miss P. M. PEARSALL.

†318/1. *ASTER SALIGNUS* L. Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS, det. KEW.

†318/4. *A. NOVI-BELGII* L. Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†318/7. *A. TRADESCANTII* L. Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS, det. BRIT. MUS.

324/5b. *FILAGO MINIMA* Pers., var. *SUPINA* Rouy & Camus. Sandy ground, Pondtail, Fleet, N. Hants, v.-c. 12. A rather remarkable form with horizontal branches, simulating *F. spathulata*, Lt.-Col. G. WATTS and P. M. HALL, det. E. DRABBLE.

328/1. *GNAPHALIUM LUTEO-ALBUM* L. Avonmouth Docks, W. Gloster, 1933, SANDWITH.

†341/3. *XANTHIUM SPINOSUM* L. In fine flower near Thirsk, Yorks, v.-c. 62, September 30, 1933, Miss C. ROB.

†356/1. *HEMIZONIA PUNGENS* Torr. & Gray. Waste ground, Stoke-on-Trent, new to N. Staffs, E. S. EDEES.

†368/1. *ANTHEMIS TINCTORIA* L. North Foreland Golf Course, Isle of Thanet, v.-c. 15, GUY CHARTERIS.

*368/4. *A. COTULA* L. Lamlash, Arran, v.-c. 100, R. MACKECHNIE.

†368/8. *A. RUTHENICA* M. Bieb. Avonmouth Docks, W. Gloster, 1933, J. GIBBONS.

371/1. *MATRICARIA INODORA* L. Lulworth Cove, Dorset, v.-c. 9, Miss P. A. LEAKE.

*†371/2. *M. CHAMOMILLA* L.—Ref. No. 4875, grassy, gravelly, waste ground near a wooden poultry-house, 160 feet above mean sea-level, Hamar House, Stromness, Mainland, Orkney, 6th September 1933, H. H. JOHNSTON. Not native. A new record for this non-native species for v.-c. 111, found on 6th September 1933. Note.—In Magnus Spence's *Flora Orcadensis*, p. 37 (1914), *Matricaria Chamomilla* L. is recorded by him from Beaquoy, Birsay, Mainland, Orkney, but the four specimens of his Ref. No. 352, collected by him at this station in 1898 and labelled under the name of this species, are, undoubtedly, *Anthemis nobilis* L. See "Bot. Exch. Club Distributor's Report for 1921," vol. vi, part iv, p. 564 (September 1922).

†378/16. *ARTEMISIA BIENNIS* L. Waste ground, Stoke-on-Trent, new station in N. Staffs, E. S. EDEES; Byfleet, Surrey, v.-c. 17, H. PHILLIPS.

†383/7. *SENECIO SQUALIDUS* L. Railway bridge, Tonbridge, W. Kent, v.-c. 16, E. D. MORGAN and G. E. SHAW; *Warrenley, near Redcar, N.E. Yorks, v.-c. 62, Miss CATHERINE ROB.

*383/8. *S. VISCOSUS* L. Shingle, Ben Lester Burn, Arran, v.-c. 100, R. MACKECHNIE.

†385/1. *CALENDULA OFFICINALIS* L. Waste heap, Welwyn, Herts, v.-c. 20, H. PHILLIPS.

†389/1. *EGHINOPS SPHAEROCEPHALUS* L. Railway bank, Uffington, v.-c. 22, J. D. GROSE.

396/1. *CNICUS ERIOPHORUS* Roth. Near Andoversford, E. Gloster, v.-c. 33, Miss L. ABELL.

396/4. *C. ACAULE* (L.) Weber × *TUBEROSUM* (L.) All. Near Avebury, North Wilts, v.-c. 7, J. E. LOUSLEY.

396/8b. *C. ARVENSE* (L.) Scop., var. *MITE* Koch. Byfleet, Surrey, H. PHILLIPS.

396/8e. *C. ARVENSIS* Hoffm., var. *SETOSUS* M. Bieb. A bed of this variety in a lane at Silsden, Yorks, v.-c. 64, T. H. HOLMES and J. N. FRANKLAND.

396/9. *C. PALUSTRE* (L.) Scop. × *PRATENSE* (Huds). DC. (= × *C. FORSTERI* Sm.). Swamp west of Hedge Court Mill-pond, Surrey, v.-c. 17. *C. pratense*, f. *pseudo-Forsteri* (Wats.) also occurred. As there is a proposal to utilise this lake for boating, this rare hybrid, which was recorded thence by Beeby many years ago, is likely to be lost, J. E. LOUSLEY.

405/11b. *CENTAUREA NEMORALIS* Jord., var. *DIVERSIFOLIA* C.E.B. Tillywhim, near Swanage, Dorset, H. PHILLIPS.

405/11c. *C. NEMORALIS* Jord, var. *SUBINTEGRA* C.E.B. Highdown, near Hitchin, Herts, v.-c. 20; Chippenham Fen, Hunts, and Wicken Fen, Cambs., v.-c. 29, H. PHILLIPS.

405/11d. *C. NEMORALIS* Jord., var. *MINIMA* C.E.B. High Down, near Hitchin, Herts, v.-c. 20, H. PHILLIPS.

405/11f. *C. NEMORALIS* Jord., var. *DEBEAUXII* C.E.B. High Down, Herts, v.-c. 20, H. PHILLIPS. All teste C. E. BRITTON.

405/11c. *C. NEMORALIS* Jord., var. *SUBINTEGRA* C.E.B. Bramble Reed Lane, Matfield, Kent, W. H. PEARSALL.

405/13g. *C. SCABIOSA* L., f. *INCISA* C.E.B. in *Rep. B.E.C.*, 1922, p. 770. Letchworth, Herts, v.-c. 20, H. PHILLIPS.

405/16. *C. ASPERA* L. Waste ground between the docks and the sand-dunes at Port Talbot, Glamorgan, v.-c. 41, R. L. BURGESS.

†405/35. *C. PALLESCENS* Delile. Newport, Isle of Wight, v.-c. 10, J. W. LONG.

†405/43. *C. DILUTA* Ait. Waste heap, Welwyn, Herts, v.-c. 20, H. PHILLIPS.

†407/3. *CARTHAMUS TINCTORIUS* L. Near Lewes, Sussex, Miss K. PICKARD.

*409/1. *CICHORIUM INTYBUS* L. Clanchlands, Arran, v.-c. 100, R. MACKECHNIE.

410/1. *ARNOSERIS MINIMA* (L.) Schw. & Koerte. Near Bramshot Links, Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; Isle of Oxholme, N. Lincoln, v.-c. 54, Dr H. B. W. SMITH.

411/1b. *LAPSANA COMMUNIS* L., var. *PUBESCENS* Koch. Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

416/3. *CREPIS BIENNIS* L. Winchfield, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†416/11. *C. SETOSA* Haller f. In fair abundance on waste ground, Splott, Cardiff, v.-c. 41, Miss E. VACHELL.

419/54. *HIERACIUM LIMA* Hanb. Cheddar, N. Somerset, specimens sent to Kew Hbm., H. S. REDGROVE.

422/2b. *LEONTODON AUTUMNALIS* L., var. *PRATENSIS* (Koch). Ben More, Mid Perth, v.-c. 88; Ben Douran, Argyll, v.-c. 98, R. MACKECHNIE and E. C. WALLACE.

*425/6. *LACTUCA ALPINA* Benth. (*Mulgedium alpinum* Less.). In moist rocky situation above Ullswater at about 500-600 ft. elevation, between Patterdale and Pooley Bridge, Cumberland, v.-c. 70, Miss AGNES K. SWAINE.

427/3e. *SONCHUS ASPER* Hill, var. *INTEGRIFOLIUS* Wallr. Hitchin, Herts, v.-c. 20, H. PHILLIPS.

427/4f. *S. OLERACEUS* L., var. *LACERUS* Wallr. Wooton Pillinge, Beds, v.-c. 30, H. PHILLIPS.

†427/5. *S. TENERRIMUS* L. Biggleswade, Beds, v.-c. 30, H. PHILLIPS.

433/1. *WAHLENBERGIA HEDERACEA* Reichb. Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

435/2. *CAMPANULA LATIFOLIA* L. Near the R. Wey at Guildford, Surrey, in quantity, F. CLARKE.

435/5. *C. RAPUNCULOIDES* L. Near West Wellow, S. Hants, v.-c. 11, G. W. PIERCE.

439/1. *OXYCOCCUS QUADRIPETALUS* Gilib. Woolmer Forest, N. Hants, v.-c. 12, Hon. W. J. L. PALMER and P. M. HALL; still on Ockley Common in abundance, Surrey, v.-c. 17, E. C. WALLACE. [A most

interesting record. We have often been surprised to find that so many botanists fail to recognise this species unless in flower.—Ed.]

†443/1. *GAULTHERIA SHALLOX* Pursh. Well established on the south slope of Leith Hill, Surrey, district Xa, Miss FLORA RUSSELL.

*453/2. *PYROLA MEDIA* Sw. Hindon, Wilts, v.-c. 8. First seen in 1931 and again in 1932 but not until 1933 were flowers observed and the plant's identity established. It has apparently been known to the village children as "a sort of Lily of the Valley" for many years, Miss BARBARA GULLOCK.

453/3. *P. MINOR* L. Plantation on downs near Crundale, Kent. This confirms an old record for district 7 in *Fl. Kent*. There were about a dozen plants, flowers just opening, May 20, 1933, W. H. PEARSALL and H. D. STANLEY.

457/1. *LIMONIUM VULGARE* Mill. Holme, W. Norfolk, v.-c. 28, H. PHILLIPS.

457/5. *L. BINERVOSUM* C. E. Salmon. Holme, W. Norfolk, v.-c. 28, H. PHILLIPS.

467/3. *ANAGALLIS FOEMINA* Mill. In gardens at Dover, Kent, J. JACOB; in garden at The Green, Millom, Cumberland, W. H. PEARSALL.

469/1. *SAMOLUS VALERANDI* L. Lulworth Cove, Dorset, v.-c. 9, Miss P. A. LEAKE.

477/1. *BLACKSTONIA PERFOLIATA* Huds. Two new stations for district 5 (Isis) of Oxon, v.-c. 23—Stonesfield, W. D. CAMPBELL; Leaffield, Swinbrook Common, G. GORDON. Both per H. W. POWELL.

478/4. *ERYTHRAEA PULCHELLA* Fr. (*CENTAURIUM PULCHELLUM* (Sw.) Dr.) Edge of dried-up pond, Bampton, Oxon, P. G. BEAK.

478/4c. *CENTAURIUM PULCHELLUM* Sw., var. *SIMPLICISSIMUM* Schmidt. Kenfig sand dunes, Glamorgan, v.-c. 41, 1933, ELEANOR VACHELL, teste J. S. GILMOUR.

†485/9. *GILIA SQUARROSA* H. & A. Appeared on the newly-made lawn of a house at Topcliffe, 3 miles from Thirsk. The plant was kindly determined by Mr A. J. Wilmott. It is a native of California, and as the doors of the house came as planks directly from that country the plant's origin was easily traced, Miss CATHERINE M. ROB.

486/1. *POLEMONIUM CAERULEUM* L. Small marsh near Shalford Church, Surrey, probable garden escape, J. G. LAWN.

†492/2. *PLAGIOBOTHEYS STIPITATUS* (Greene) Johnston. (*Allocarya stipitata* Greene). Avonmouth Docks, W. Gloster, 1933, SANDWITH.

†493/2. *LAPPULA ECHINATA* Gilib. Bramshot, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†494/1. *ASPERUGO PROCUMBENS* L. Waste ground, Bristol, v.-c. 34, 1933, SANDWITH.

506/7. *MYOSOTIS SYLVATICA* (Ehrh.) Hoffm. Quarry near Upton Grey, N. Hants, v.-c. 12, presumably not native but well established, Lt.-Col. G. WATTS.

507/2. *LITHOSPERMUM PURPUREO-CAERULEUM* L. Abundant in two places near Cheddar, N. Somerset, H. S. REDGROVE; *rubbish tip on the outskirts of Burton, v.-c. 39, R. C. L. BURGESS.

*†509/2. *ECHIMUM PLANTAGINEUM* L. In cultivated ground near Folkestone, probably introduced with seed potatoes from the Channel Islands, JOHN JACOB.

†515/1. *CUSCUTA EPILINUM* Weihe. On *Linum* at extreme north of Northamptonshire, with the two following species, E. B. BISHOP.

515/2. *C. EUROPAEA* L. Parasitic on various herbaceous plants but not on adjacent nettles, bushy and grassy tract of land in the extreme north of Northamptonshire, v.-c. 32, E. B. BISHOP.

515/4. *C. TRIFOLII* Bab. On clover at extreme north of Northamptonshire, E. B. BISHOP.

†515/7. *C. SUAVEOLENS* Ser. On beetroot in an allotment garden, Skipton, v.-c. 63, T. H. HOLMES and J. N. FRANKLAND, confirmed by KEW.

†516/1. *LYCOPERSICUM ESCULENTUM* Hill. Braunton Burrows, N. Devon, v.-c. 4, J. D. GROSE.

*†517/2. *SOLANUM NIGRUM* L. Flower border in a garden, 90 feet above mean sea level, Holland House, Papa Westray, Orkney, (1) 7th September 1933 (plant in flower and unripe fruit), and (2) 17th September 1933 (plant in unripe fruit and sparingly in flower and ripe fruit), WILLIAM TRAILL. Not native.

†517/9. *S. TRIFLORUM* Nuttall. Holy Island sands, Northumberland, E. C. WALLACE.

†517/14. *S. SISYMBRIFOLIUM* Lam. Newport, Isle of Wight, J. W. LONG.

†522/1. *DATURA STRAMONIUM* L. In the village near the station, Braunton, N. Devon, W. H. PEARSALL and Dr F. R. E. WRIGHT.

524/1. *HYOSCYAMUS NIGER* L. Pool Bottom, district 5 (Isis), Oxon, v.-c. 23, new station for this district, H. W. POWELL; in fruiting condition, Braunton Burrows, N. Devon, in October, J. D. GROSE.

*†524/1. *H. NIGER* L. Grassy, gravelly, waste ground near a wooden poultry-house, 160 feet above mean sea level, Hamar House, Stromness, Mainland, Orkney, (1) Ref. No. 4868 (plant in unripe fruit and sparingly in flower), 6th September 1933, and (2) Ref. No. 4881 (plant in unripe and ripe fruit mostly dehisced and most of the seeds shed), 22nd September 1933, H. H. JOHNSTON. Not native. James Sinclair's specimen of his Ref. No. 962 was collected by him, in my company, from the same plant, on 22nd September 1933. A new record for this non-native species for v.-c. 111.

†527/5. *VERBASCUM BLATTARIA* L. Near West Wellow, S. Hants, v.-c. 11, G. W. PIERCE.

532/1. *LINARIA VULGARIS* Mill. Lamash shore, Arran, v.-c. 100, R. MACKECHNIE.

*532/7. *L. MINOR* Desf. Clarkston, Renfrew, v.-c. 76, R. MACKECHNIE.

532/24. *L. SPURIA* (L.) Mill. Peloriate form. E. Meon, S. Hants, v.-c. 11, F. ESCOMBE.

532/25. *L. ELATINE* (L.) Mill. Between Clanfield and Hambleton, S. Hants, v.-c. 11, P. M. HALL.

543/8b. *VERONICA ANAGALLIS-AQUATICA* L., b. *GLANDULOSA* Dr. Sands of Barry, Angus, G. TAYLOR, comm. R. H. CORSTORPHINE.

*543/9c. *V. AQUATICA* Benq., var. *LATICARPA* Krösche. Ogbourne, N. Wilts, v.-c. 7, J. D. GROSE.

†543/23. *V. SPURIA* L. Avonmouth Docks, W. Gloster, 1933, J. GIBBONS.

†543/31. *V. PEREGRINA* L. On the walled garden of Farington House, Farington, v.-c. 59, H. E. BUNKER.

543/41. *V. FILIFORMIS* Smith. Ayr, v.-c. 75, R. MACKECHNIE.

545/5. *EUPHRASIA NEMOROSA* Löhr, near var. c. *CALCAREA* Pugsl. Holmsley, S. Hants, v.-c. 11, H. PHILLIPS. Near var. d. *COLLINA* Pugsl. Chippenham Fen, Cambs, v.-c. 29, H. PHILLIPS.

545/5b. *E. NEMOROSA* Löhr, var. *CILIATA* Drabble. Sandy turf, St Helen's Spit, I. of Wight, v.-c. 10, Dr W. A. SLEDGE and P. M. HALL, det. PEARSALL.

545/10. *E. OCCIDENTALIS* Wettst. Winspit, south of Worth, Matravers, Dorset, H. PHILLIPS; Brean Down, N. Somerset, v.-c. 6, CHAS. WATERFALL.

545/12b. *E. FRIGIDA* Pugsl., var. *LAXA* Pugsl. Ben More, Am Binnein, Coire Ardtrain, Cam Chreag, Creagan Lochain, Creag na Caillich, Mid Perth, v.-c. 88; Glen Callater, S. Aberdeen, v.-c. 92; Ben Douran, Ben Dothaidh, Argyll, v.-c. 98, E. C. WALLACE and R. MACKECHNIE.

*545/15. *E. MICRANTHA* Reichb. Hatchett Pond, Beaulieu, S. Hants, v.-c. 11, H. PHILLIPS.

545/19(2). *E. ANGLICA* Pugsl. Highland Water, near Lyndhurst, S Hants, v.-c. 11, J. CHAPPLE.

546/4. *BARTSIA VISCOSA* L. In fine flower, September 10, 1933, near the bulb-farm, Braunton, N. Devon, W. H. PEARSALL.

550/2. *OROBANCHE CARYOPHYLLACEA* Sm. Near Dover, Kent, JOHN JACOB.

550/4. *O. ELATOR* Sutton. Cold Ash, Newbury, Berks, v.-c. 22, Miss A. M. NEILD.

551/1. *LATHRAEA SQUAMARIA* L. Lyminge, E. Kent, v.-c. 15, J. JACOB.

552/2. *UTRICULARIA MAJOR* Schmidel. In flower, ditches in Easton marsh, Freshwater, I. of Wight, v.-c. 10, Dr W. A. SLEDGE and P. M. HALL. Townsend, *Flora of Hants*, gives *U. vulgaris* for this station, but Rayner's *Supplement* and Drabble and Long's List (*Rep. B.E.C.*, 1931) both correctly give *U. major*. Only one species grows here and there is no other recorded station for either species in the Island. Druce, *Comital Flora*, gives v.-c. 10 for both species and this number should, therefore, be deleted in the case of *U. vulgaris*, P. M. HALL.

552/2. *U. MAJOR* Schmidel. In August 1929 Mr Francis Druce discovered a form of *Utricularia* in Oxwich Bay, Glamorgan. The plants were in abundance, but there was only one flower. With Miss E. Vachell the site was visited again in 1930, but no flowers were seen. In 1933 flowers were numerous and the species proved to be *U. major*, which has not been recorded for Glamorgan since 1907, E. VACHELL.

552/4. *U. OCHROLEUCA* Hartm. Loch Dochart, Lochan Lairig Cheile, Mid Perth, v.-c. 88, R. MACKECHNIE and E. C. WALLACE.

†554/1. *ACANTHUS MOLLIS* L. Menabilly, East Cornwall, v.-c. 2, J. D. GROSE, det. KEW.

558/1. *MENTHA ROTUNDIFOLIA* (L.) Huds. Abundant in many pastures away from houses between Tintern and Redbrook, Wye Valley, v.-c.s 34 and 35, J. E. LOUSLEY.

558/3. *M. LONGIFOLIA* (L.) Huds. Well established by River Cam, Little Chesterford, North Essex, v.-c. 19, A. W. GRAVESON and J. E. LOUSLEY.

558/3. × *M. NILIACA* Jacq., var. *ALOPECUROIDES* (Hull) Briq. Well established, Norton Heath, near Ongar, North Essex, v.-c. 19, A. W. GRAVESON and J. E. LOUSLEY.

558/3. *M. LONGIFOLIA* (L.) Hudson. Letchworth, Herts, v.-c. 20, H. PHILLIPS.

Var. b. *NEMOROSA* (Willd.). Letchworth, Herts, v.-c. 20, H. PHILLIPS.

*558/6. *M. PIPERITA* L. Clarkston, Renfrew, v.-c. 76, R. MACKECHNIE; *Crookham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS, det. FRASER.

558/7. × *M. PALUSTRIS* (Sole) Fraser. Valley near Mount, Cardiganshire, v.-c. 46, 1932, SANDWITH, det. FRASER.

558/7. *M. AQUATICA* L. [Ref. A.59]. Bampton, Oxon, August 1933, P. G. BEAK. "The dry summer has made the leaves of this smaller than usual, but by technical characters it cannot be separated from the type. The slender stems are due to their struggle with rank vegetation."—FRASER.

558/7. *M. AQUATICA* L. [Ref. Z.551]. Bampton, Oxon, August 1933, P. G. BEAK. "This simulates the variety *nicaeensis* Briq., but the upper leaves and their serratures are too acute, and the verticils or capitula are too large."—FRASER.

558/7. *M. AQUATICA* L. [Z.577]. Port Meadow, Oxford, September 1933, P. G. BEAK. "An approach to the var. *subglabra* Baker, but the upper part of the stem, the upper leaves and their petioles are too hairy. There is no exact line of demarcation between the type and the variety, for *M. aquatica* varies greatly between the very hairy *M. hirsuta* Hudson and the var. *subglabra* Baker."—FRASER.

558/7. *M. AQUATICA* L. [Z.578]. Port Meadow, Oxford, September 1933, P. G. BEAK. "An approach to the var. *subglabra* Baker, but the main stem and branches throughout, and the petioles of the leaves are too hairy."—FRASER.

558/7b. *M. AQUATICA* L., var. *SUBGLABRA* Baker. [Z.576]. Port Meadow, Oxford, September 1933, P. G. BEAK. "The leaves are large,

and that is usually the case with subglabrous mints, because they grow in watery or very wet places."—FRASER.

558/9. ×*M. VERTICILLATA* (L.). Chippenham Fen, Cambs, v.-c. 29, H. PHILLIPS.

558/10. *M. GENTILIS* L., emend. Westend Common, Esher, new station for Surrey, A. L. STILL. This plant has a rather faint smell of Spearmint. Also at Leith Hill, Surrey, with the scent of *M. citrata*, H. W. PUGSLEY and A. L. STILL.

558/10. *M. GENTILIS* L. Killin, Mid Perth, v.-c. 88, E. C. WALLACE; East Meon, S. Hants, v.-c. 11, F. ESCOMBE, det. FRASER.

558/11. ×*M. GENTILIS* (L.), var. *CARDIACA* (Baker) Briq. By farm buildings, Sharpham Moor, near Glastonbury, N. Somerset, 1933, SANDWICH, det. FRASER.

*558/12. ×*M. RUBRA* Sm. Valley near Mount, Cardiganshire, v.-c. 46, 1932, SANDWICH.

558/13. *M. ARVENSIS* L., var. *BREVIDENS* Fraser. Holmwood Common, Surrey, v.-c. 17, J. E. LOUSLEY.

558/13. *M. ARVENSIS* L., f. *HIRTIPES* Fraser. Stoborough, Dorset, v.-c. 9, H. PHILLIPS.

558/13j. *M. ARVENSIS* L., var. *DENSIFOLIATA* Briq. [Ref. Z.550]. Cornfield, Bampton, Oxon, August 1933, P. G. BEAK. "The leaves of this variety are broadest at or near the base, and in open fields or amongst corn, it makes a much-branched densely leafy plant."—FRASER.

*558/14. *M. PULEGIUM* L. Near Braunton, N. Devon, v.-c. 4, W. H. PEARSALL and Dr F. R. E. WRIGHT.

560/1b. *ORIGANUM VULGARE* L., var. *MEGASTACHYUM* (Link). Seaton, S. Devon, v.-c. 3, E. C. WALLACE.

†565/1. *MELISSA OFFICINALIS* L. Near Hook Station, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†566/11. *SALVIA BERTOLONII* Vis. Waste ground, Burton-on-Trent, R. C. L. BURGESS.

†566/17. *SALVIA VERTICILLATA* L. By Bramshot Links, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; waste ground, Stoke-on-Trent, new to N. Staffs, E. S. EDEES.

572/2. *SCUTELLARIA MINOR* Huds. Found at Keasden near Clapham, Yorks, v.-c. 64, July 1933. First record for the Craven district of this vice-county, C. A. CHEETHAM.

573/2. *PRUNELLA LACINIATA* L. Cheddar, N. Somerset, sparingly, H. S. REDGROVE.

+575/2. *SIDERITIS ROMANA* L. Waste ground, Stoke-on-Trent, new to N. Staffs, E. S. EDEES.

577/1. *STACHYS ALPINA* L. × *S. GERMANICA* L. (× *S. DIGENEA* Legué). Spontaneously in Lady Davy's garden at Byfleet from parents of British origin. It agrees well with specimens collected by Legué in Herb. Brit. Mus., and with a useful note attached to the sheet. See also Salmon in *Journ. Linn. Soc.*, xliv, p. 357 (1919). J. E. LOUSLEY.

577/4. *S. PALUSTRIS* L. × *SILVATICA* L. (*S. AMBIGUA* Sm.). Near Spitchwick, Widecombe Parish, S. Devon, F. M. DAY.

*577/7. *S. ANNUA* L. Thornton Dale, North Riding, Yorks, v.-c. 62, found by Mr James Green on limestone, R. J. FLINTOFF.

577/13. *S. OFFICINALIS* Trevis. (*S. BETONICA* Benth.). Near Weymouth, Dorset, with pure white flowers, R. MILES.

581/6. *LAMIUM AMPLEXICAULE* L. Crookham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

+583/1. *BALLOTA RUDERALIS* Sw. Par, E. Cornwall, v.-c. 2, Miss E. S. TODD.

586/2. *TEUCRIUM SCORDIUM* L. Braunton Burrows, September 1933, W. H. PEARSALL and Dr F. R. E. WRIGHT.

586/3. *T. BOTRYS* L. Near Harewood, N. Hants, v.-c. 12, an interesting extension of range westwards from the well-known Micheldever station, W. SIMPSON; in a field at Godmersham, E. Kent, where it has been growing for some years, JOHN JACOB.

587/4. *AJUGA CHAMAEPTIS* (L.) Schreb. Near Harewood, N. Hants, v.-c. 12, W. SIMPSON.

593/3. *HERNIARIA HIRSUTA* L. Milber Down, Newton Abbot, S. Devon, where it had not been seen for 15 years, Rev. W. KEBLE MARTIN.

+596/6. *AMARANTUS RETROFLEXUS* L. Lockerley, S. Hants, v.-c. 11, Lt.-Col. W. A. PAYN; Headington, Oxford, v.-c. 23, J. CHAPPLE.

600/1. *CHENOPODIUM RUBRUM* L. Near Aldershot, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

600/5. *C. URBICUM* L. Penryn, W. Cornwall, v.-c. 1, Miss E. S. TODD.

600/7. *C. OPULIFOLIUM* Schrader. Scilly Isles, v.-c. 1, Miss E. S. TODD; Hitchin, Herts, v.-c. 20, H. PHILLIPS.

600/8k. *C. VIRIDE* L. (*C. SUECICUM* Murr). Invergowrie, Angus, v.-c. 90, R. & M. CORSTORPHINE.

600/13. *C. GLAUCUM* L. Near Aldershot, N. Hants, v.-c. 12, Lt.-Col. G. WATTS. This species is recorded in *Comital Flora* from both v.-c.s 11 and 12, but neither Townsend's *Flora* nor Rayner's *Supplement* gives any records from the mainland of Hants, P. M. HALL; Ascot Place, Berks, v.-c. 22, A. H. CARTER and J. E. LOUSLEY; Byfleet, Surrey, v.-c. 17, H. PHILLIPS.

600/15. *C. POLYSPERMUM* L. Garden weed at Fishbourne Ferry, Isle of Wight, v.-c. 10, Dr W. A. SLEDGE and P. M. HALL.

*606/6. *ATRIPLEX DELTOIDEA* Bab. Above Tayock, Montrose, and North Water Bridge, Angus, R. & M. CORSTORPHINE. Var. b. *PROSTRATA* Bab. Sands, Montrose, Angus, R. & M. CORSTORPHINE.

606/8. *A. MARITIMA* Hallier (*ARENARIA* Woods). Sands, Montrose, Angus, R. & M. CORSTORPHINE.

†606/11. *A. TATARICA* L. Lurgies, Montrose, Angus, 1914, R. & M. CORSTORPHINE. Dr Aellen suggests *A. oblongifolium* W. & K. Pl. Rar. Hung., iii, 278, t. 211, as the name of this plant.

611/1. *SALICORNIA RADICANS* Sm. Newtown, I. of Wight, v.-c. 10, Dr W. A. SLEDGE and P. M. HALL.

611/2. *S. LIGNOSA* Woods. Porchester and N. Hayling, S. Hants, v.-c. 11, and Pagham, W. Sussex, v.-c. 13, Dr W. A. SLEDGE and P. M. HALL; Dawlish Warren, S. Devon, FRANCIS M. DAY.

611/3. *S. DOLICHOSTACHYA* Moss. Porchester, S. Hants, v.-c. 11; Pagham, W. Sussex, v.-c. 13, Dr W. A. SLEDGE and P. M. HALL; Prinstead, W. Sussex, v.-c. 13, and an erect form from N. Hayling, S. Hants, v.-c. 11, P. M. HALL.

611/4b. *S. EUROPAEA* L., var. *STRICTA* (Meyer). N. Hayling, S. Hants, v.-c. 11, P. M. HALL.

611/5. *S. RAMOSISSIMA* Woods. Newtown, I. of Wight, v.-c. 10; Pagham, W. Sussex, v.-c. 13, Dr W. A. SLEDGE and P. M. HALL; N. Hayling, S. Hants, v.-c. 11, with forma *simplex* and f. *brachiata* (teste Wilmott), P. M. HALL.

611/7. *S. GRACILLIMA* (Towns.) Moss. Newtown, I. of Wight, v.-c. 10, Dr W. A. SLEDGE and P. M. HALL. A very small red-coloured plant which showed stereids when sectioned by Sledge; superficially very different in appearance from the orange-brown Pagham plant determined by Wilmott as this species in 1932.

611/8. *S. APPRESSA* Dum. N. Hayling, S. Hants, v.-c. 11, P. M. HALL, det. WILMOTT.

611/9. *S. DISARTICULATA* Moss. N. Hayling, S. Hants, v.-c. 11, P. M. HALL; Newtown, I. of Wight, v.-c. 10, J. W. LONG.

615/5c. *POLYGONUM AMPHIBIUM* L., var. *GLANDULOSUM* Schönheit. Lamlash, Arran, v.-c. 100, R. MACKECHNIE.

*615/8. *P. NODOSUM* Pers. (*PETECTICALE* (Stokes) Dr.). Olympia Sidings, Selby, v.-c. 62, W. A. SLEDGE.

615/10. *P. MITE* Schrank. Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

615/11. *P. MINUS* Huds. Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

615/15. *P. AEQUALE* Lindm. Byfleet, Surrey, v.-c. 17, H. PHILLIPS.

+615/31. *P. POLYSTACHYUM* Wallich. Between Fleet and Crookham, N. Hants, v.-c. 12, plentiful and quite naturalised, Lt.-Col. G. WATTS.

+615/32. *P. CUSPIDATUM* Sieb. & Zucc. By Aldershot Club, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

+628/9. *EUPHORBIA VIRGATA* W. & K. Greenhithe, Kent; Mitcham, Surrey, H. S. REDGROVE.; Forrester's Drive, S. Beddington, Surrey, A. L. STILL.

628/11. *E. CYPARISSIAS* L. Abundant at Elm's Vale near Dover, JOHN JACOB.

628/13. *E. PORTLANDICA* L. A maritime form of *E. segetalis* L. Lulworth Cove, Dorset, v.-c. 9, Miss P. A. LEAKE.

*+635/1. *CANNABIS SATIVA* L. (*vide* A. R. Horwood, who saw my three specimens of my Ref. No. 4885 and James Sinclair's specimen of his Ref. No. 968 at the Royal Herbarium, Kew, on 21st November 1933).—Ref. No. 4885, carrot plot in a vegetable garden, 160 feet above mean sea-level, Whiteglen House, Hoy, Orkney, 27th September 1933, H. H. JOHNSTON. Not native. A single ♂ plant, near the Hayling Ferry, Portsea Island, S. Hants, v.-c. 11, Hon. W. J. L. PALMER.

*646/1. *QUERCUS ROBUR* L. The common species in N. Lancs is *Q. sessiliflora*, but there is a good specimen of *Q. Robur* near the western shore of L. Windermere, N. of the Ferry Hotel, v.-c. 69b, Dr W. H. PEARSALL.

*646/4. *Q. ILEX* L. Wood near Flagstone Hill, Weston-super-Mare, North Somerset, v.-c. 6, CHAS. WATERFALL, det. A. B. JACKSON.

650/3. \times *SALIX UNDULATA* Ehrh. (*S. ALBA* \times *TRIANDRA*). Ditchlands, Berrow, N. Somerset, 1933, SANDWICH, det. FRASER.

650/3. *S. ALBA* L. \times *FRAGILIS* L., f. *MONSTROSA* Floderus. Roadside, Warwickwold, Bletchingley, Surrey, v.-c. 17, J. E. LOUSLEY.

650/3. *S. ALBA* L. \times *PENTANDRA* L. (*S. EHRHARTIANA* Sm.). Near Bordeaux Farm, Little Chesterford, North Essex, v.-c. 19, J. E. LOUSLEY and A. W. GRAVESON.

650/10. *S. ATROCINEREA* Brot. \times *AURITA* L. Hedgerow in lane between Worm's Heath and Chelsham, Surrey, v.-c. 17, J. E. LOUSLEY.

650/12. *S. NIGRICANS* Sm. \times *PHYLICIFOLIA* L. By Lawets Burn; on island at mouth of Dochart, Loch Tay; Stob Garbh, Ben Lui, Mid Perth, all v.-c. 88, J. E. LOUSLEY.

650/14. *S. ARBUSCULA* L. \times *HERBACEA* L. (\times *S. SIMULATRIX* F. B. White). Rocks at head of Allt Innischoarach, Mid Perth, v.-c. 88, J. E. LOUSLEY.

650/17. *S. MYRSINITES* L., var. *PROCUMBENS* (Forbes). Rocks at head of Allt Innischoarach, Mid Perth, v.-c. 88, J. E. LOUSLEY.

651/1. *POPULUS CANESCENS* Sm. \times *TREMULA* L. (*P. HYBRIDA* M. Bieb.). Corston, N. Somerset, 1932, SANDWICH.

651/3c. *P. NIGRA* L., var. *VIRIDIS* Lindley, ♂. Nailsea, N. Somerset, 1932, SANDWICH, det. FRASER.

*652/1(2). *EMPETRUM HERMAPHRODITUM* Hag. Glen Doll, Angus, G. TAYLOR, comm. R. H. CORSTORPHINE.

653/2. *CERATOPHYLLUM DEMERSUM* L. *In boat-house at Wray Castle, Lake Windermere, v.-c. 69b, Dr W. H. PEARSALL; in pond at Staplehurst, Kent, fruiting on 12th August 1933, H. D. STANLEY; *Balloch Pond, Crieff, Mid Perth, v.-c. 88, R. MACKECHNIE. [*C. aquaticum* is recorded for v.-c. 88 in *Top. Bot.*, Supp. 1].

*654/1. *HYDROCHARIS MORSUS-RANAE* L. Ditches of Fleet Pond, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

661/1. *CORALLORHIZA TRIFIDA* Chât. Near Auchmore, Killin, Mid Perth, v.-c. 88, E. C. WALLACE.

*665/1. *GOODYERA REPENS* (L.) R. Br. In *Rep. B.E.C.*, 110, 1932, this is recorded for Stuston Common, near Diss, E. Norfolk. Stuston Common is in E. Suffolk, v.-c. 25. According to the *Comital Flora*, this is a new vice-county for *Goodyera*, E. MILNE-REDHEAD.

*667/1. *CEPHALANTHERA RUBRA* Rich. "Near Trowbridge, Wilts, v.-c. 8, T. Gardner, June 1906," ex Herb. J. B. DUNCAN.

668/2. *EPIPACTIS LATIFOLIA* Allioni. Waterworks wood, Matfield, Kent. First fully open flowers, 18th July 1933, W. H. PEARSALL.

668/3. *E. LEPTOCHILA* Godfr. *Woods in East Sussex some miles south of Tunbridge Wells, v.-c. 14, W. H. PEARSALL and Col. A. H. WOLLEY-DOD; *Nonington, E. Kent, v.-c. 15, JOHN JACOB.

668/5. *E. RUBIGINOSA* Crantz. (= *E. ATRORUBENS* Schultes). Seen by several members on limestone scars near Settle, Yorks, v.-c. 64, in July.

*669/10. *ORCHIS ELODES* Gris. Henfield Common, W. Sussex, v.-c. 13, E. C. WALLACE.

699/11. *O. FUCHSII* Druce. North Leigh, district 5, Oxon, v.-c. 23, spike 5 in., stem 27 in. = 32 in., with several other equally fine spikes. Sent to Kew, 3rd July 1933, W. D. CAMPBELL and H. W. POWELL.

674/6. *PLATANATHERA CHLORANTHA* Reichb. *Castle Coch Woods, June 1900, and Rhubina, both Glamorganshire, Miss E. VACHELL, teste P. M. HALL. N.C.R. for v.-c. 41. *Moorland near Burnley, v.-c. 59, W. MUMBERSON and A. TURNER.

674/7. *P. BIFOLIA* Reichb. Grwny Valley, Glamorganshire, v.-c. 41, June 1912, E. & C. T. VACHELL, teste P. M. HALL.

669/18. *HIMANTOGLOSSUM HIRCINUM* Koch. (= *ORCHIS HIRCINA* Crantz). Stonesfield, the Isis district, Oxon, v.-c. 23, W. D. CAMPBELL, per H. W. POWELL. Found by Winnie Gatford, taken by her to Mr Campbell, science master, Charlbury Central School, who visited the habitat. Specimen sent to Kew, 30th June 1933. First record for district 5 (Isis).

678/2. *CROCUS VERNUS* (L.) All. Holywater, N. Hants, v.-c. 12, Hon. W. J. L. PALMER and P. M. HALL; *in the middle of a meadow, blooming fully, 3rd March 1934, in an exposed situation, East Burham, Bucks, v.-c. 24, E. B. BASDEN.

686/2. *LEUCOJUM AESTIVUM* L. Between Twyford and Loddon Bridge, Berks, abundant, H. S. REDGROVE.

707/1. *ORNITHOGALUM PYRENAICUM* L. Growing as a weed—one plant only—by the side of a bed of onions in the garden of Mr Henry Ward, signalman, Railway Cottages, Goathland, N.E. Yorks, v.-c. 62, introduced, R. J. FLINTOFF.

707/2. *O. UMBELLATUM* L. *Near Lee Place by Wey and Arun Canal, near Billingshurst, W. Sussex, v.-c. 13, E. C. WALLACE; in flower,

21st May 1933, Tunbridge Wells Common, v.-c. 16, E. D. MORGAN;
Holywater, N. Hants, v.-c. 12, Hon. W. J. L. PALMER and P. M. HALL.

*708/1. *LILIUM MARTAGON* L. Stourport Woods near Worcester,
v.-c. 37, 1901, J. B. DUNCAN.

711/1. *GAGEA LUTEA* Ker. Abundant at one place between Cold
Ashton and Doddington, Gloster, H. S. REDGROVE.

*713/1. *COLCHICUM AUTUMNALE* L. Near Braunton, N. Devon, v.-c.
4, Dr F. R. E. WRIGHT.

718/2. *JUNCUS ACUTUS* L. Par, E. Cornwall, v.-c. 2, Miss E. S.
TODD.

718/7. *J. FILIFORMIS* L. Shores of Bassenthwaite Lake, a new
station for v.-c. 70. This species has been seen in recent years on the
shores of Coniston, Esthwaite, Crummock, Buttermere and Derwent-
water, Dr W. H. PEARSALL and Dr W. A. SLEDGE.

718/8. *J. SUBNODULOSUS* Schrank. Clarkston, Renfrew, v.-c. 76,
August 1933, recorded in *Top. Bot.* but not in *Com. Fl.*, R. MACKECHNIE;
Isle of Oxholme, N. Lincoln, v.-c. 54, Dr H. B. W. SMITH.

718/11. *J. ALPINUS* Villars. [Error]. Glamorgan, v.-c. 41. *T.B.*
Supp. 1. "Glamorgan," Vachell sp., recorded by Mr A. Bennett.
Rep. B.E.C., 394, 1913, corrected by Dr Druce to 2436, *J. alpinus* Vill.
Near Cromer, Norfolk, E. Vachell. "The record for Glamorgan in
Bennett's *Add. to Top. Bot.* is a mistake for Norfolk. Mr Bennett
identified the plant as *alpinus*, but I have not seen the specimen."
Rep. B.E.C., 284, 1930, line 12, "In first Suppl. to *Top. Bot.* Bennett
gives:—41. Glamorgan [error, should be 27. E. Norfolk], Vachell.
Ditto, line 5. Vol. iv, *B.E.C.*, "Near Cromer, Norfolk, E. Vachell,
named by A. Bennett who (in *Top. Bot. Add.*) erroneously put the re-
cord to Glamorgan." Mr Bennett's *Herb.* still contains this specimen.
Mr A. J. Wilmott definitely states that it should be recorded as *J.*
alpinus Vill., error. It was recorded in Riddelsdell's *Flora of Glamor-
gan* and Trow's *Flora of Glamorgan*.

718/14. *J. COMPRESSUS* Jacq. [Error.] Glamorgan, v.-c. 41, in *T.B.*,
Supp. 2. No locality given. This record is apparently based on a
specimen sent by E. Vachell to Mr A. Bennett for verification, 15th
August 1902. He remarks, "The other (rush) seems to be *J. compressus*
but that is hardly ripe enough to be positive. E. Vachell thinks it likely
that the specimen was gathered near Cromer, Norfolk, and not in
Glamorgan, but cannot remember. No other records for this species
exist, and it seems wise to consider the record an *error*."

718/14. *J. COMPRESSUS* Jacq. Hornsea Mere, S.E. Yorks, v.-c. 61,
R. BULLEY; edge of pond, Bampton, Oxon, P. G. BEAK.

718/16. J. MACER S. F. Gray. *Glasgow, Lanark, v.-c. 77; *Clanchlands, Arran, v.-c. 100, R. MACKECHNIE.

718/16. J. TENUISS Willd. Ponaanooth, Cornwall, Miss E. S. TODD.

*719/9. LIZULA ALBIDA DC. Grange-in-Borrowdale, v.-c. 70, Mrs L. C. KENNEDY.

722/2. SPARGANIUM RAMOSUM Curt. Patterton, Renfrew, v.-c. 76, R. MACKECHNIE.

735/2. TRIGLOCHIN PALUSTRE L. Sea-shore, Holy Island, v.-c. 68, E. C. WALLACE.

737/4. POTAMOGETON COLORATUS Vahl ex Hornem. In quantity at Braunton, N. Devon, v.-c. 4, W. H. PEARSALL.

737/5. P. ALPINUS Balb. Castle Howard, N.E. York, v.-c. 62, Miss C. ROB; Loch of Craigleash, Perth; burn from Loch Ussie, E. ROSS; Lintrathen Reservoir, Angus, G. TAYLOR.

737/9f. P. GRAMINEUS L., var. LACUSTRIS Fries. Loch of Lowes, New Cumnock, Ayrshire; also from Glenbuck, Ayrshire, the form known as *P. paucifolius* Opiz, G. TAYLOR.

737/11. ×P. NITENS Weber, var. SUBGRAMINEUS (Raunkiaer) Hagstr. Burn from Loch Ussie, E. ROSS, v.-c. 106. Var. SUBPERFOLIATUS, f. LACUUM Hagstr. Lochindorb, Elgin, v.-c. 95. Var. SUBINTERMEDIUS Hagstr. Marlee Loch, Perth, and Coldingham Loch, Berwickshire; *Loch Lubnaig, W. Perth, v.-c. 87, G. TAYLOR. The Oxford List should be amended as follows:—e. *subgramineus* (Raunk.) Hagstr. f. *subintermedius* Hagstr. g. *subperfoliatus* (Raunk.) Hagstr.

737/12. P. ANGUSTIFOLIUS Bercht. et Presl. Mepal, Cambridgeshire, v.-c. 29, Miss E. VACHELL; abundant and with mature fruits in Cauldshiels Loch, v.-c. 79, N. DOUGLAS SIMPSON.

737/13. P. LUCENS L., type, and var. LONGIFOLIUS DC. Plentiful in ditches at Mepal, Cambridgeshire, v.-c. 29, Miss E. VACHELL; type in Loch-na-craige, Mid Perth, v.-c. 88, G. TAYLOR.

737/14. P. DECIPIENS Nolte. Ditches at Mepal, Cambridgeshire, v.-c. 29, Miss E. VACHELL. All the records given in the *Comital Flora* for this species need revision as they include var. *salicifolius* Ar. Benn. (*L.C.*, 1925, 1954d) which is a form of *P. nitens*.

*737/14e. ×P. DECIPIENS Nolte, var. BREVIFOLIUS Hagstr. In the R. Tweed below Coldstream Bridge, Cheviotland, v.-c. 68, E. C. WALLACE; *near Coldstream, v.-c. 68, E. C. WALLACE.

737/15. *P. PRAELONGUS* Wulf. Loch-na-craige, Mid Perth, v.-c. 88; Lochindorb, Elgin, v.-c. 95, G. TAYLOR.

737/16. *P. PERFOLIATUS* L., var. *OVATIFOLIUS* Wallr. Loch Clunie, E. Perth, G. TAYLOR. Var. *ROTUNDIFOLIUS* Wallr. Marlee Loch, E. Perth, G. TAYLOR.

737/17. *P. CRISPUS* L. Loch Clunie, E. Perth; Glenbuck, Ayrshire, G. TAYLOR.

737/19. *P. ACUTIFOLIUS* Link. Pond near R. Ouse, below Barcombe Mills, E. Sussex. See under "Plant Notes" for *P. zosterifolius*, 737/18, W. H. PEARSALL.

737/20. *P. OBTUSIFOLIUS* M. & K. Loch Clunie and Marlee Loch, E. Perth; Lintrathen Reservoir, Angus; Faldonside Loch, Selkirk; Loch of Lowes, New Cumnock, Ayr, G. TAYLOR.

737/21. *P. PUSILLUS* L., subsp. *LACUSTRIS* Pears. This has been seen during the past year in Windermere, Coniston, Esthwaite, Derwentwater, Bassenthwaite and Ullswater, Dr W. H. PEARSALL.

*737/22. *P. FRIESH* Rupr. Canal at Cardiff, Glamorgan, v.-c. 41, E. VACHELL, teste PEARSALL.

737/23. *P. PUSILLUS* L. Fleet Pond, N. Hants, v.-c. 12, G. WATTS; Loch Clunie, E. Perth; burn from Loch Ussie, E. Ross; Lintrathen Reservoir, Angus; Faldonside Loch, Selkirk, G. TAYLOR.

737/23. *P. PUSILLUS* L. Ditches in Easton Marsh, Freshwater, I. of Wight, v.-c. 10, Dr W. A. SLEDGE and P. M. HALL, det. PEARSALL.

*737/25. *P. PANORMITANUS* Biv.-Bern. Small lake at Llangammarch, Brecon, Wales, v.-c. 42, Lady DAVY; Fleet Pond, N. Hants, v.-c. 12, G. WATTS; marsh ditches near Lewes, E. Sussex, v.-c. 14, E. C. WALLACE.

737/28. *P. PECTINATUS* L. Eaglesham, Renfrew, v.-c. 76, R. MACKECHNIE.

738/2. *RUPPIA ROSTELLATA* Koch. Eaststoke, Hayling, S. Hants, v.-c. 11; Printhead, W. Sussex, v.-c. 13, P. M. HALL.

739/1. *ZANNICHELLIA PALUSTRIS* L., var. *GENUINA* A. & G. Fish-boure Millpond, W. Sussex, v.-c. 13, P. M. HALL, det. PEARSALL; Faldonside Loch, Selkirk, v.-c. 79, G. TAYLOR.

*739/2. *Z. PEDICELLATA* Fries, var. *PEDUNCULATA* (Reich.) Farlington Marshes, S. Hants, v.-c. 11, Dr W. A. SLEDGE and P. M. HALL, det. PEARSALL.

740/2. *ZOSTERA NANA* Roth. Prinstead, W. Sussex, v.-c. 13, P. M. HALL, det. PEARSALL.

741/1. *CYPERUS LONGUS* L. Well established in wet field near Hever, W. Kent, v.-c. 16, E. C. WALLACE.

745/2. *ELEOCHARIS UNIGLUMIS* Schultes. Marsh by the sea, Llanmaddea, Glam., v.-c. 41, 1933, SANDWITH; marsh near S. Haven, Studland Heath, near Swanage, Dorset, A. L. STILL.

746/2e. *SCIRPUS MARITIMUS* L., var. *MONOSTACHYS* Meyer. Dawlish Warren, S. Devon, FRANCIS M. DAY.

746/4. *SCIRPUS TABERNAEMONTANI* Gmel. Near Newdigate, Surrey, v.-c. 17, A. L. STILL.

*746/8. *S. PAUCIFLORUS* Lightf. Moor above Braunton, N. Devon, v.-c. 4, removes this exception in the *Com. Fl.*, W. H. PEARSALL and Dr F. R. E. WRIGHT; Berrow, N. Somerset, v.-c. 6, H. S. REDGROVE.

746/10. *S. HOLOSCHOENUS* L. Braunton Burrows in great beauty and abundance, W. H. PEARSALL and Dr F. R. E. WRIGHT.

746/12. *S. FILIFORMIS* Savi. (*S. SAVII* Seb. & Maur.). Braunton Burrows, W. H. PEARSALL and Dr F. R. E. WRIGHT.

746/14. *S. COMPRESSUS* Pers. Holy Island, N. Northumberland, v.-c. 68, E. C. WALLACE.

746/14. *S. COMPRESSUS* Pers. (*BLYSMUS COMPRESSUS* Panz.). Near Andoversford, E. Gloucester, v.-c. 33, Miss L. ABELL.

746/14. *BLYSMUS COMPRESSUS* Panz. Burnham-on-Sea, Somerset, H. S. REDGROVE.

*750/1. *CLADIUM MARISCUS* R. Br. Near Braunton, N. Devon, v.-c. 4, W. H. PEARSALL and Dr F. R. E. WRIGHT.

*753/2. *CAREX RIPARIA* Curtis. Blyton, N. Lincoln, v.-c. 54, Dr H. B. WILLOUGHBY SMITH.

753/2b. *C. RIPARIA* Curt., var. *GRACILIS* Coss. & Germ. Canal bank, Dogmersfield, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

753/3. *C. ACUTIFORMIS* Ehrh. Blyton, N. Lincoln, v.-c. 54, Dr H. B. WILLOUGHBY SMITH; *common in Low Furness, N. Lancs, v.-c. 69b, W. H. PEARSALL; *abundant in N. Devon, v.-c. 4, W. H. PEARSALL and Dr F. R. E. WRIGHT.

*753/8. *C. LASIOCARPA* Ehrh. Near Braunton, N. Devon, v.-c. 4, W. H. PEARSALL and Dr F. R. E. WRIGHT.

753/12. *C. STRIGOSA* Huds. Wood, E. of Haslemere, Surrey, J. G. LAWN; Duke's Wood, Newdigate, Surrey, A. L. STILL.

753/12. *C. STRIGOSA* Huds. News Wood, Eastnor, Herefordshire, a new station, F. M. DAY.

753/15. *C. BINERVIS* Sm. Marshy field near Bampton, Oxon, P. G. BEAK.

753/19. *C. HOSTIANA* DC. (*C. FULVA* Host). Bog at Cothill, Berks, v.-c. 22, P. G. BEAK.

*753/22. *C. OEDERI* Retz. Braunton Burrows, N. Devon, v.-c. 4, W. H. PEARSALL and Dr F. R. E. WRIGHT.

753/24. *C. DEPAUPERATA* Curt. Plentiful at one spot near Cheddar, N. Somerset, specimens sent to Kew Hbm., H. S. REDGROVE.

753/27. *C. HUMILIS* Leysser. Pentridge Hill, Dorset; Bokerley Ditch, Dorset and S. Hants; Martin Down, Blagdon Hill, Windmill Hill Tidpit and Cran's Barrow, S. Hants; Wich Down, S. Wilts, P. M. HALL. This is a considerable extension of the plant's range in Dorset and Hants as previously recorded, and links up the known stations.

753/30. *C. MONTANA* L. Near Charterhouse, Somerset, very abundant, H. S. REDGROVE.

753/39. *C. RARIFLORA* Sm. Carnan Tuirc, Glen Callater, S. Aberdeen, v.-c. 92, very fine, 8 in.-9 in. high, 9th July 1933, R. MACKECHNIE.

753/49. *C. GOODENOWII* Gay, f. *PUMILA* Kük. Castle Morton Common, Worcestershire, FRANCIS M. DAY.

753/57. *C. AXILLARIS* Good. (*C. REMOTA* × *VULPINA*). Between Dawes Green and Betchworth, Surrey, A. L. STILL.

753/58. *C. CANESCENS* L. Blyton, N. Lincoln, v.-c. 54, Dr H. B. WILLOUGHBY SMITH.

753/63. *C. BOENNINGHAUSENIANA* Weihe. (*C. PANICULATA* × *REMOTA*). Alder swamp on Reigate Heath—probably the locality given by Salmon, *Fl. Surrey*, 1931, 628—nine clumps were observed, A. L. STILL.

753/75. *C. DIOICA* L. Colony bog, Bisley, Surrey, v.-c. 17, E. C. WALLACE.

*754/11. *PANICUM LINEARE* Krock. (*P. HUMIFUSUM* Kunth. *P. GLABRUM* Gaud. *DIGITARIA HUMIFUSA* Pers.). Seen *in situ* by W. D. Miller, W. H. Pearsall and Dr F. R. E. Wright near Braunton, N. Devon, on September 6th, 1933, and considered by them undoubtedly native.

†756/2. *SETARIA VIRIDIS* Beauv. (*Panicum viride* L.). Near Lewes, Sussex, v.-c. 14, Miss K. PICKARD.

764/1. *LEERSIA ORYZOIDES* (L.) Sw. Near Lyndhurst, S. Hants, v.-c. 11, with panicle nearly exerted on 3rd September 1933, Dr W. A. SLEDGE and P. M. HALL.

770/6. *ALOPECURUS FULVUS* Smith. Dunsfold, Surrey. Unrecorded for this district (Xb) in the *Flora of Surrey*, p. 637, Hon. Mr JUSTICE TALBOT.

†777/6. *PHELEUM GRAECUM* Boiss. et Heldr. Tip, Bristol, v.-c. 34, 1933, SANDWITH, det. HUBBARD.

†780/3f. *AGROSTIS NIGRA* With. Near Cardiff, Glamorgan, v.-c. 41, 1933, E. VACHELL.

*780/4. *A. SETACEA* Curt. Abundant on Halsinger Down above Braunton, N. Devon, at 500 ft. Not given for v.-c. 4 in *Comital Flora*, W. H. PEARSALL and Dr F. R. E. WRIGHT.

782/1. *POLYPOGON MONSPELIENSIS* Desf., also the hybrid ×*POLYPOGON LITTORALIS* Sm. Allhallows-on-Sea, West Kent, v.-c. 16. With both putative parents by a brackish ditch. Mr H. S. Redgrove, whom I directed to the station a month later, states that he has made arrangements with the owners of the estate to protect the ditch in which this beautiful grass grows, J. E. LOUSLEY.

*783/2. *CALAMAGROSTIS LANCEOLATA* Roth. Near Elstead, Surrey, v.-c. 17. This was given in the last Report without the star. A new county record for Surrey, G. M. ASH.

791/4b. *DESCHAMPSIA FLEXUOSA* Trin., var. *MONTANA* Hook. fil. Carnan Tuirc, S. Aberdeen, v.-c. 92; Ben Douran, Argyll, v.-c. 98, R. MACKECHNIE and E. C. WALLACE.

*795/2. *ARRHENATHERUM TUBEROSUM* Gilib. Lamlash, Arran, v.-c. 100, R. MACKECHNIE.

797/1. *CYNODON DACTYLON* Pers. Woodcote Avenue, Wallington, Surrey, growing in an ash-path and apparently enjoying it, A. L. STILL.

802/1d. *PHRAGMITES COMMUNIS* Trin., var. *FLAVESCENS* Custer. Kynance, Cornwall, v.-c. 1, Miss E. S. TODD.

809/3. *KOELERIA BRITANNICA* (Domin). Forge Valley, near Scarborough, v.-c. 62, J. CHAPPLE.

*814/1. *CATABROSA AQUATICA* Beauv. Occurs in N. Devon, v.-c. 4, Dr F. R. E. WRIGHT; Waggoner's Wells, Grayshott, Hants, v.-c. 12. New to district X of Townsend's *Flora*, J. E. LOUSLEY.

*824/5. *POA PALUSTRIS* L. Margin of Fleet Pond, Hants, v.-c. 12, J. E. LOUSLEY.

*824/13. *P. BULBOSA* L. Hayling Island, S. Hants, v.-c. 11, in small quantity and badly threatened by car parking, 1932, C. STALEY, and 1933, P. M. HALL.

826/4. *FESTUCA LOLIACEA* Curt. Walton Bridge, Middlesex, A. L. STILL.

827/17. *BROMUS COMMUTATUS* Schrad. Brent Knoll, Cornwall, Miss E. S. TODD.

*827/20. *BROMUS MOLLIFORMIS* Lloyd. S. Stack, Holyhead, Anglesey, v.-c. 52, J. E. LOUSLEY.

*†835/7. *HORDEUM JUBATUM* L. (*vide* C. E. Hubbard, who saw my four specimens of my Ref. No. 4882 and James Sinclair's specimen of his Ref. No. 967 at the Royal Herbarium, Kew, on 20th November 1923).—Ref. No. 4882, grassy, gravelly, waste ground near a wooden poultry-house, 160 feet above mean sea-level, Hamar House, Stromness, Orkney, 22nd September 1933, H. H. JOHNSTON. Not native. Seeds of this species introduced with poultry food into Orkney. One tuft of plants, in flower and withered flower (no fruit developed), only seen. A new record for this alien species for v.-c. 111, discovered by James Sinclair, junior, in my company, on 22nd September 1933, when he collected his specimen of his Ref. No. 967.

839/2. *JUNIPERUS SIBIRICA* Burgsd. On Moel Meirch, the boundary between Carnarvon and Merioneth, N. WOODHEAD.

854/4. *POLYSTICHUM LONCHITES* Roth. Blackshope, Moffat, Dumfries, v.-c. 72; July 1898, J. B. DUNCAN. In *Top. Bot.*, Supp. 1, but not in *Com. Flora*.

856/11. *PHEGopteris ROBERTIANA* Braun. Very abundant at Cheddar, v.-c. 6, H. S. REDGROVE.

859/1. *CETERACH OFFICINARUM* Willd. Though rare elsewhere in N. Lancs it is abundant on the walls of Wray Castle, Lake Windermere, Dr W. H. PEARSALL; Funtingdon, W. Sussex, v.-c. 13, P. M. HALL.

863/1. *HYMENOPHYLLUM TUNBRIDGENSE* Sm. Near East Grinstead, Sussex, v.-c. 14; v.s.s., W. J. L. PALMER.

866/1. *OPHIOGLOSSUM VULGATUM* L. Barry Links, Angus, v.-c. 90, 3rd July 1929, R. MACKECHNIE. Queried for v.-c. 90 in *Top. Bot.* and *Comital Flora*. In Gardiner's *Flora of Forfarshire* there is a note to the effect that Don recorded this plant from Barry, but that the record had never been confirmed. The *Flora* is dated 1848. The doubt of its

occurrence in Angus can now be removed. Mr Mackechnie has sent Mr E. C. Wallace excellent specimens.

+868/1. *AZOLLA FILICULOIDES* Lam. Mudeford, S. Hants, v.-c. 11, J. W. LONG.

876/12. *CHARA ASPERA* Willd. Cauldshiels Loch, near Galashiels, v.-c. 79, N. DOUGLAS SIMPSON.

876/16. *C. FRAGILIS* Desv. Fleet Pond, N. Hants, v.-c. 12, G. WATTS.

NEW COUNTY RECORDS EX "JOURNAL OF BOTANY," 1933.

45/2. *COCHLEARIA OFFICINALIS* L. Lundy Island, N. Devon, v.-c. 4, Dr F. R. Elliston Wright, *J.B.*, xxxi, Supp., p. 2. Add to *C.F.*, but not *N.C.R.*, vide *T.B.*, ed. ii, p. 35.

*54/6. *BRASSICA CHEIRANTHUS* Vill. Lundy Island, N. Devon, v.-c. 4, native, Dr F. R. Elliston Wright, *J.B.*, xxxi, Supp., p. 2.

*103/9. *SAGINA REUTERI* Boiss. Lundy Island, N. Devon, v.-c. 4, Dr F. R. Elliston Wright, *J.B.*, xxxi, Supp., p. 3. Confirmed by W. H. Pearsall. First record on granite.

*+110/1. *TAMARIX GALLICA* L. Lundy Island, N. Devon, v.-c. 4, planted, Dr F. R. Elliston Wright, *J.B.*, xxxi, Supp., p. 3.

*+275/1. *ARCHANGELICA OFFICINALIS* Hoffm., teste Kew. Lundy Island, N. Devon, v.-c. 4, Dr F. R. Elliston Wright, *J.B.*, xxxi, Supp., p. 5.

*+378/5. *ARTEMISIA STELLERIANA* Bess. Weston Mouth, S. Devon, v.-c. 3, a single plant, August 25th, 1932, F. Druce, *J.B.*, xxxi, 76, 1933; Hengistbury Head, S. Hants, v.-c. 11, September 1900, H. W. Pugsley, *J.B.*, xxxi, 107, 1933.

*457/5. *LEMONIUM BINERVOSUM* C. E. Salmon. Alderney, A. B. & A. K. Jackson, *J.B.*, xxxi, 107, 1933. *C.F.* does not mention S.

*618/10. *RUMEX RUPESTRIS* Le Gall. Kenfig, Glamorgan, v.-c. 41, Miss E. M. Thomas, vide Gilmour, *J.B.*, xxxi, 16, 1933.

*633/2. *ULMUS NITENS* Moench. Alderney, A. B. & A. K. Jackson, *J.B.*, xxxi, 107, 1933.

*753/72. *CAREX PAUCIFLORA* Lightf. Bog near Stonethwaite, Cumberland, v.-c. 70, July 1931, W. R. Philipson, *J.B.*, xxxi, 76, 1933.

*790/1. *WEINGARTNERIA CANESCENS* (L.) Bernh. Near Lossiemouth, Moray, v.-c. 95, E. H. Chater, *J.B.*, xxxi, 15, 1933.

*795/2. *ARRHENATHERUM TUBEROSUM* Gilib. Lundy Island, N. Devon, v.-c. 4, Dr F. R. Elliston Wright, *J.B.*, xxxi, Supp., p. 10.

FURTHER CORRECTIONS AND ADDITIONS TO PREVIOUS REPORTS.

PATRICK M. HALL.

REP. B.E.C. FOR 1927, VOL. VIII, PART III.

- p. 305. For 189/26 read 189/23(2), and for *Vilmorinciana* read *Vilmoriniana*.
- p. 319. 717(2)/1. Add var. *viridis* to *List* as var. b.

REP. B.E.C. FOR 1928, VOL. VIII, PART V.

- p. 617. For 341/5 read 341/6, and add to *List*.
- p. 618. 396/8. For *purpureocaulis* read *purpureocaulis*.
- p. 625. For 423/62(2) read 423/62(3) *T. hemipolyodon*.
For 423/62(3) read 423/62(2) *T. hamiferum*.
- Note.—It is clearly intended in the *List* that the *Taraxaca* shall be arranged, as far as possible, alphabetically.
- p. 626. 423/67. Delete all this paragraph, which is duplicated, *l.c.*, p. 629.
- p. 633. 543/19. For *Garckiana* Fourn. read *Garckiana* P. Fourn., *vide l.c.*, p. 881.
- p. 635. For 600/8(3) read 600/8.
- p. 747. For 474/2 read 474/3, and add to *List*.
- p. 880. Line 33. For 15(2) read 15(3), *vide l.c.*, p. 621.
Line 34. For 15(3) read 15(2), *vide l.c.*, p. 620.
Line 44. For 63(2) read 62(2), *vide* correction to *l.c.*, p. 625, above.
Line 45. For 62(2) read 62(3), *vide* correction to *l.c.*, p. 625, above.
Line 48. For *simulatum* read *similatum*, *vide* description, *l.c.*, p. 626.
- p. 881. Line 41. For *brasiliense* read *brasiliensis*.
- p. 883. Line 18. Delete this addition: var. *argillacea* already appears in *List* as var. b.
Line 25. For 9 read 8.
Line 45. For 138 read 137.

REP. B.E.C. FOR 1929, VOL. IX, PART I.

- p. 22. 196/1. For *gracilis* read *gracilipes*. The plant described here as var. *gracilis* is clearly the same as that referred to on p. 115 of the same *Report* as var. nov. *gracilipes*. The description on p. 115 is the more detailed and that fact and the use of the expression "var. nov." suggest that of the two names *gracilipes* is the one intended to be given to this variety.
- 274/1. Add var. *purpurascens* to *List* as var. d.

- p. 30. 446/7. Add var. *parviflora* to *List* as var. b.
For 509/7 read 509/6.
- p. 31. 515/10. For Visiani read Viviani.
- p. 38. 688/1. Add var. *trilobata* to *List* as var. b.
- p. 124. For 423/88 read 423/35.

REP. B.E.C. FOR 1930, VOL. IX, PART III.

- p. 260. 185/30(2). For Marss. read Maass.
- p. 263. For 194/7 *R. squarrosa* Rau read 194/12 *R. Afzeliana* Fr.
194/12. Var. *Bartlettiana* will be var. o. in the *List*.
Var. *berniciensis* will be var. p. in the *List*.
194/19. For *dimorpha* Dum. read *dimorpha* (Bess.) Déség.,
vide Wolley-Dod, *Revision of British Roses*,
p. 89.
- p. 271. 419/125(4). Var. *multiflorum* will be var. b. in the *List*, with
the name of the species in square brackets.
- p. 278. 545/19. Var. *minoriflora* will be var. d. in the *List*, var. c.
is *obscura* Pugsl.
- p. 371. 669/18. Delete Morestead.
For Witchchurch, S. Hants, read Witchchurch, N.
Hants.
For Owlesbury read Morestead.

REP. B.E.C. FOR 1931, VOL. IX, PART V.

- p. 572. For 735/5 read 737/5.
- p. 751. Under *G. Tetrahit* L., for var. *arvensis* Schleich. read Schlecht.

REP. B.E.C. FOR 1932, VOL. X, PART I.

- p. 21. 35/4 d. For *palustris* read *palustre*.
- p. 30. For 718/d. read 718/.
- p. 91. For 84/4 e. read 88/4 e.
- p. 92. 133/3. The asterisk should be affixed to both records.
- p. 104. 383/7. Add * N.C.R. for Stafford, v.-c. 39.
- p. 109. 611/7. For S. Hants read W. Sussex.
618/3. \times *obtusifolius* = \times *acutus*. Add * N.C.R. for Stir-
ling, v.-c. 86.
- p. 110. 623/2. Remove brackets from v.-c. 38 in *C.F.*
- p. 115. 783/2. Remove brackets from v.-c. 17 in *C.F.*
- p. 115-116. 826/7. Add var. *genuina* to *List* as var. a.
Add var. *vulgaris* to *List* as var. a(2).
826/7 e. The names *pruinosa* (Hack.) and *glaucescens* Heg.
& Heer. are apparently not synonymous, as
they are made in the *List*.
- p. 116. 826/3. Add var. *orientalis* to *List* as var. d.
- p. 122. Line 32. For 79 read 91.
- p. 130. Line 36. For 341/5 read 341/6, see correction to *Rep.*
B.E.C., 1928, 617, above.

- Line 44. Delete this note and read "correct name to *acino-*
dontum, vide p. 880, *loc. cit.*
- p. 131. Line 1. Delete this note.
- p. 134. Line 36. For 62(3) read 62(2), see correction to *Rep. B.E.C.*,
1928, 880, above.
- p. 135. Line 42. For *gracilis* read *gracilipes*, see correction to *Rep.*
B.E.C., 1929, 22, above.
- p. 137. Line 43. Delete this note and substitute "for 428/88 read
423/35."
- p. 141. Line 35. For 194/7 read 194/12, and for var. q. read var. o.,
see correction to *Rep. B.E.C.*, 1930, 263, above.
Line 36. For var. o. read var. p., see correction to *Rep.*
B.E.C., 1930, 263, above.
- p. 142. Line 43. For var. c. read var. d., see correction to *Rep.*
B.E.C., 1930, 278, above.
- p. 146. Lines 20 to 24. See corrections to *Rep. B.E.C.*, 1930, 371,
above.
- p. 161. Line 13. For var. r. read var. q.
For var. s. read var. r.
- p. 162. Line 16. For *tomentosa* read *suberecta*.
- p. 163. Line 18. For 668/3 c. read 668/3 b.
E. dumensis Godf. will be 668/3(2) in the *List*.
- p. 164. 88/31. Delete this note, already recorded in *C.F.*
190/18. For "brackets" read "query."
194/10. Delete words "delete brackets from v.-c. 85," and
add * for N.C.R.
304/2. Delete this note, already recorded in *Rep. B.E.C.*,
1929, 118.
- p. 165. 753/12. Delete this note, already recorded in *Rep. B.E.C.*,
1929, 142.
753/55. Delete * and add "delete brackets from v.-c. 90
in *C.F.*"
- p. 246. Line 18. Add var. *bulbifer* to *List* as var. a.
- p. 247. Line 4. Delete ? from var. g. *valdepubens* in *List*.
Line 9. For "corn" read "corm."
- p. 248. Line 1. Add var. *macrorhizus* to *List* as var. h.
- pp. 249 seq. Add *Valeriana angustifolia* Host to *List* as
301/1(2).
- p. 251. In second line of footnote, for *dentifolia* read *dentatifolia*.
- p. 370. Line 9. Add *S. arenaria* L. to *List* as 650/11(2).
- p. 392. Line 9. Add var. *radicans* to *List* as 506/4 b.
- p. 397. Line 31. Add var. *tomentosa* to *List* as 184/11 a.

COMITAL FLORA OF THE BRITISH ISLES.

ADDENDA AND CORRIGENDA.

EDGAR THURSTON.

CORNWALL.

[] indicates that the plant is doubtfully native—*e.g.*, on ballast heaps or in harbours.

- 4/1. *Adonis annua* L. Add [2].
 6/21. *R. circinatus* Sibth. "1-3." Not known in 2.
 19/1. *N. lutea* L. Add [2]. Introduced into pond on Goss Moor.
 21/4. *P. Lecocqii* Lam. Add 1 and 2.
 32/1. *F. capreolata* L. Add 2.
 32/11. *F. micrantha* Lag. Add 1.
 32/13. *F. parviflora* Lamk. Add 1: [2].
 35/3. *R. amphibia* (L.) Dr. (*Nasturtium amphibium* Br.). Add 1.
 36/4. *B. arcuata* Rechb. Add 2.
 44/1. *E. verna* Meyer. Add 1 and 2.
 49/5. *S. Irio* L. Add [1 and 2].
 54/15. *B. alba* Boiss. Add 2.
 54/22. *B. incana* (*B. adpressa* Boiss.). Add [2].
 61/2. *L. latifolium* L. Add [1].
 61/3. *L. Draba* L. Add 1, if not already added.
 64/2. *T. perfoliatum* L. Add [1].
 68/1. *I. tinctoria* L. Add 68 to the genus, [1] to the species.
 92/2. *D. deltoides* L. Add [1].
 96/3. *S. conica* L. Add [2].
 96/4. *S. noctiflora* L. Add 2.
 100/7. *C. pumilum* Curt. "1." Recorded, apparently by mistake, in *Top. Bot.*, 1873, p. 94, from "Corn. West. C.C.B. (Babington), 1839" (Davey, *Flora of Cornwall*).
 112/13. *H. Desetangii* Lam. Add [1].
 112/16. *H. linariifolium* Vahl. Disappeared long ago from Cape Cornwall, v.-c. 1. The plant recorded from Budock, v.-c. 1, is possibly a narrow-leaved form of *H. perforatum* which is plentiful in the neighbourhood.
 116/2. *L. sylvestris* Brot. Should be 1, Scillies. Also recorded (as *L. cretica* L.) from several localities on the mainland.
 127/6. *G. Endressi* Gay. (Recorded in error as *G. nodosum* in Davey, *Flora of Cornwall*).
 127/7. *G. pyrenaicum* Burm. f. Add 1.
 142/2. *A. campestre* L. Add 1 and 2.
 151/3. *O. spinosa* L. Add 2.
 153/2. *M. sylvestris* Fr. Add [1].

- 155/18. *T. suffocatum* L. Re 2, Briggs doubted the accuracy of the record from near Craffthole.
- 166/1. *A. glycyphyllos* L. Add 1.
- 176/36. *V. gracilis* Lois. Add 2.
- 178/9. *L. Aphaca* L. Add [1 and 2].
- 257/1. *M. Odorata* Scop. Add [1]. Tresco, Scilly Isles.
- 261/3. *C. Cerefolium* (*Anthriscus Cerefolium* Hoffm.). Add [1], Scilly Isles and several localities on the mainland.
- 283/8. *C. latifolia* L. Add 1.
- 296/12. *G. spurium* L., var. *Vaillantii* DC. Add 1. Specimens in Marlborough College Hbm. from Sennen Cove, Druce thought they were this.
- 301/1. *V. officinalis* L. Add 1.
- 328/3. *G. sylvaticum* L. Add 2.
- 367/1. *D. maritima* Cass. Add 2. Par sands, 1915; still there.
- 368/1. *A. tinctoria* L. Add [2].
- 378/5. *A. Stelleriana* Bess. For Penzance, read sandy coast, Marazion, abundant.
- 383/7. *S. squalidus* L. Add [1 and 2].
- 383/8. *S. viscosus* L. Add [2].
- 393/1. *A. Lappa* L. Add 1.
- 397/1. *O. Acanthium* L. Add [2].
- 405/15. *C. calcitrapa* L. Add [2].
- 415/2. *P. Hieracioides* L. Add 2.
- 419/2. *H. Peleterianum* Mérat. Add 1.
- 446/4. *E. ciliaris* hybridises with *E. Tetralix* in West Cornwall.
- 462/1. *C. hederifolium* Ait. Add [2]. Naturalised in a wood by Ready-money Bay, Fowey.
- 486/1. *P. caeruleum* L. Add [2].
- 506/1. *M. palustris* Hill. Add 1.
- 527/6. *V. pulverulentum* Vill. Add [2]. With the hybrid *V. pulverulentum* × *nigrum*, near ballast heaps, Charlestown.
- 527/7. *V. Lychnitis* L. Add [2]. Also the hybrid *V. Lychnitis* × *nigrum*, Par harbour.
- 532/4. *L. Pelisseriana* Mill. For [1] read [2].
- 532/5. *L. supina* Desf. Add [1], Railway line, Penzance, spreading: [2], Par harbour, with the hybrid *L. repens* × *supina* = *cornubiensis* Druce. For St Blayey's read Blazey.
- 537/1. *M. guttatus* DC. Add 2.
- 543/17. *V. triphyllus* L. Alter genus number to 543. Add [2].
- 548/5. *B. stenophyllus* (Schur) Druce. Add 2.
- 550/4. *O. major* L. Add 1 and 2.
- 561/6. *T. lanuginosus* Mill. Add 2.
- 562/8. *Calamintha Acinos* Clairv. Add 1, Scilly Isles and several places on the mainland.
- 600/5. *C. urbicum* L. Add 2.
- 606/2. *A. littoralis* L. Add 1 and 2.

- 618/7. *R. sanguineus* L. Druce suggested that the records for this in *Fl. Cornwall* require overhauling.
- 625/1. *H. Rhamnoides* L. Add [2].
- 628/10. *E. Esula* L. Add [1].
- 628/16. *E. Lathyris* L. Add 1 and 2.
- 669/5. *O. Morio* L. Add 1 and 2.
- 669/11. *O. Fuchsii* Dr. Add 1.
- 674/6. *H. virescens* (*Platanthera chlorantha* Rehb.). Add 1.
- 679/1. *R. Columnae* Seb. & Maur. 2. Not seen at Polruan for many years.
- 680/1. *S. angustifolium* Mill. Add [2].
- 702/9. *A. oleraceum* L. Add [1].
- 702/11. *A. Schoenoprasum* L. Add 2.
- 703/1. *M. racemosum* Lam. & DC. Add [1 and 2].
- 718/14. *J. compressus* Jacq. Add 1, Scilly Isles and several localities on the mainland.
- 718/16. *J. macer* S. F. Gray. Add 1.
- 723/1. *A. italicum* Mill. Add 2.
- 727/4. *L. gibba* L. Add 1.
- 739/2. *Z. pedunculata* Reichb. Add 1.
- 745/2. *E. uniglumis* Sch. Add 1, Scilly Isles, teste Bennett. See Davey, *Flora of Cornwall*.
- 753/1. *C. Pseudo-cyperus* L. Add 2.
- 753/34. *C. pallescens* L. Add 1.
- 753/68. *C. divisa* Huds. Add 2.
- 754/11. *P. Ischaemum* Schreb. (*P. lineare* Krockner). Add [1].
- 765/1. *P. minor* Retz. Add [1].
- 778/1. *M. minima* (L.) Desv. Add [2].
- 780/1. *A. verticillata* Vill. Add [1 and 2].
- 782/1. *P. monspeliensis* (L.) Desf. Add 2.
- 785/1. *A. Spica-venti* (L.) Beauv. Add [2].
- 797/1. *C. Dactylon* Pers. Add [2].
- 809/3. *K. britannica* (Domin as sub-sp.). Add 2. (Alter sp. No. to 3).
- 818/1. *M. nutans* L. Add 1 and 2.
- 824/5. *P. palustris* L. Add [2].
- 827/1. *B. rigens* L. Add [2].
- 827/22. *B. arvensis* L. Add 1 and 2.
- 828/2. *B. pinnatum* (L.) Beauv. Not known to me in 1. Add [2].
- 830/2. *A. pungens* R. & S. Add 2.
- 830/6. *A. caninum* Beauv. Add 2.
- 835/3. *H. marinum* Huds. Add [1 and 2].
- 836/1. *E. arenarius* L. Add 2.
- 872/7. *N. gracilis* Ag. Add 2.
- 876/2. *C. canescens* Lois. Add 1, Swanpool, Falmouth: Lizard peninsula. Not known to me in 2.
- 876/5. *C. hispida* L. Not known to me in 2.

A FEW GENERAL ADDITIONS AND CORRECTIONS TO
COMITAL FLORA.

PATRICK M. HALL.

1. *Clematis*. For [Tourn.] L. read [Dill.] L.
 32/5. *Fumaria Boraei* Jord. Add 68 (Wallace).
 37/4. *Arabis alpina* L. For 104 in heavy type read Scot. 1. 104.
 176/35. *Vicia tetrasperma* (L.) Moench. For *tetraserpma* read *tetra-*
sperma.
 190/6(2). *Alchemilla heteropoda* Buser. Alter specific number to 4(2).
 217/6. *Callitriche autumnalis* L. Add 76 (Wallace).
 250/2. *Carum verticillatum* Koch. Add 9 !
 405/9. *Centaurea nemoralis* Jord. Alter specific number to 11.
 542. *Veronica*. Alter generic number to 543.
 545/1. *Euphrasia officinalis* L. In penultimate line of this section,
 for *brevifolia* read *brevipila*.
 560. *Origanum*. Add generic number 560.
 561/1. *Thymus Pulegioides* L. and
 561/2. *Thymus glaber* Mill. According to the re-arrangement of
 "Rep. B.E.C.," 1928, 663, these should be amalgamated
 under *T. Pulegioides*.
 664/1. *Spiranthes aestivalis* (Lam.) Rich. Add 37 extinct.
 664/3. *S. Romanzoffiana* Cham. Delete brackets from Scot. 1 and
 read 1. 104.
 753/21. *Carex lepidocarpa* Tausch is printed out of order, after 753/22.
 825/2(2). *Glyceria declinata* Breb. Alter specific number to 3(2).
 826/14. *Festuca sulcata* Hack. Specific number should be 9e.

ADD TO LISTED SPECIES.

- 876/15. *Chara fragifera* Durieu.
 876/16. *C. fragilis* Desv.
 876/17. *C. delicatula* Ag.

ADDITIONS AND CORRECTIONS TO COMITAL FLORA FOR
HAMPSHIRE AND THE ISLE OF WIGHT.

Vice-Counties 10, 11 and 12.

PATRICK M. HALL.

Note.—The prefix * indicates an introduced or alien species. Brackets () indicate erroneous or doubtful records requiring confirmation.

- 2/3. *Thalictrum marinum* Dr. Delete 12; must be an error.
 6/10. *Ranunculus sardous* Cr. Bracket 12; one very old record only.
 6/12. *R. ophioglossifolius* Vill. Bracket 11; extinct if not originally an error.
 6/22. *R. trichophyllus* Chaix. Add 12.
 9/1. *Helleborus viridis* L., var. *occidentalis* (Reut.) Dr. Remove brackets from 10.
 13/3. *Delphinium Ajacis* L. Add *11.
 22/1. *Meconopsis cambrica* (L.) Vig. Add *12.
 32/1. *Fumaria capreolata* L. Add (11).
 32/9. *F. Bastardi* Bor. Add 10.
 32/13. *F. parvifolia* Lam. Add 10 as var. *acuminata*.
 33/1. *Matthiola incana* Br. Add *11.
 35/2. *Radicula sylvestris* (L.) Dr. Add 10.
 39/3. *Cardamine impatiens* L. Add (11).
 39/6. *C. bulbifera* Crantz. Delete 11; an error probably derived from "Top. Bot. Supp." 2. Specific number should be 7 instead of 6.
 43/4. *Draba muralis* L. Add *11.
 44/3. *Erophila praecox* (Stevens) DC. Add 12.
 49/2. *Sisymbrium Sophia* L. Add *11.
 49/5. *S. Irio* L. Add *10; extinct.
 54/5. *Brassica monensis* Hudš. Delete (11); the plant was recorded (correctly) as *Cheiranthos* and not as *monensis*.
 61/2. *Lepidium latifolium* L. Add *11.
 61/3. *L. Draba* L. Add *10 and *12.
 61/4. *L. ruderale* L. Add *10.
 65/1. *Iberis amara* L. Add *11; *Note.*—10 is bracketed and 12 is not; I do not see that in the case of weeds of cultivation there is any point in trying to distinguish between native and introduced stations.
 68/1. *Isatis tinctoria* L. Add generic number 68.
 Add *10, *11 and *12.
 88/10. *Viola calcarea* (Bab.) Greg. Add 10.
 88/14. *V. contempta* Jord. Add 11.
 88/15. *V. variata* Jord. Add 12.

- 88/17. *V. monticola* Jord. Add 12.
 88/18. *V. alpestris* Jord. Add 12.
 88/19. *V. Lejeunei* Jord. Add 10.
 88/20. *V. Lloydii* Jord. Add 12.
 88/23. *V. segetalis* Jord. Add 12.
 88/30. *V. derelicta* Jord. Add 10.
 89/5. *Polygala calcareum* F. Schultz. Add 10.
 92/2. *Dianthus Deltoides* L. Add *11; 12 should also be *.
 93/1. *Tunica prolifera* (L.) Scop. Extinct in 10.
 96/3. *Silene conica* L. Add *11; 12 should also be *.
 96/6. *S. quinquevulnera* L. Add *11.
 96/10. *S. nutans* and *S. dubia* Herbich. The distribution of these two plants needs to be entirely revised as it has been shown that what was formerly called *dubia* is the true *nutans* L., and what was called *nutans* is now known as var. *Smithiana* Moss.
S. nutans L. occurs in 10 and 11.
Smithiana does not occur.
- 103/9. *Sagina Reuteri* Boiss. Add 10.
 105/2. *Spergularia media* (Pers.) Presl. For 9, 11 read 9-11; the total distribution is given correctly as 64, but the numbers as printed add up to 63.
- 110/1. *Tamarix gallica* L. Delete (12).
 116/1. *Lavatera arborea* L. Remove brackets from 10.
 123/3. *Tilia cordata* Mill. Add 12.
 127/1. *Geranium sanguineum* L. Add *10; 11 should also be *.
 127/11. *G. rotundifolium* L. Add (12).
 127/15. *G. purpureum* Vill. Add 11.
 128/1. *Erodium maritimum* L'Hérit. Add (12).
 128/2. *E. moschatum* L'Hérit. Bracket 10; doubtful.
 133/1. *Impatiens Noli-tangere* L. 11 should be *, certainly introduced. Add *12.
- 133/3. *I. parvifolia* DC. Add *11.
 151/1. *Ononis reclinata* L. Add (11).
 153/1. *Medicago Falcata* L. Add *10.
 153/2. *M. sylvestris* Fries. Add *10.
 153/6. *M. minima* (L.) Desr. Add (11).
 155/5. *Trifolium Molinerii* Balb. Add *11.
 155/19. *T. agrarium* L. Add *12.
 160/6. *Lotus tenuis* W. & K. Add 12.
 176/1. *Vicia sylvatica* L. Add (*11); doubtful, in any case adventive.
 176/9. *V. lutea* L. Add *11.
 176/14. *V. Lathyroides* L. Add (12); one old record only.
 178/4. *Lathyrus maritimus* Bigel. Add 10; extinct.
 178/5. *L. palustris* L. 10 and 11 both extinct.
 178/9. *L. Aphaca* L. Add 10.
 189/6. *Potentilla verna* L. Add 12, probably *.
 190/1. *Alchemilla pubescens* Lam. Add (11).

- 190/4. *A. minor* Huds. Add 11.
 193/2. *Poterium polygamum* W. & K. Add 10 and 11.
 193/4. *P. officinale* (L.) A. Gray. Add 12.
 194/5. *Rosa stylosa* Desv. Add 10 and 12.
 194/18. *R. obtusifolia* Desv. Add 10, 11 and 12.
 194/19. *R. tomentosa* Sm. Add 10 and 11.
 194/21. *R. villosa* L. Add (10), (11) and 12.
 195/9. *Pyrus intermedia* Ehrh. Add 11 and 12.
 195/16. *P. germanica* Hook. fil. Add *11; now lost.
 196/2. *Crataegus oxyacanthoides* Thuill. Add 11 and 12.
 205/1. *Parnassia palustris* L. Add 10, extinct.
 209/1. *Tillaea muscosa* L. Add 12.
 211/2. *Sedum rupestre* L. Add *11.
 213/1. *Drosera anglica* Huds. Add (12), very doubtful; recorded in Rayner's "Supplement" as var. *ramosa*.
 217/3. *Callitriche palustris* L. Add 12.
 220/6. *Epilobium Lamyi* F. Schultz. Add 11 and 12.
 220/8. *E. roseum* Schreber. Add 10.
 223/3. *Oenothera odorata* Jacq. Add *11.
 225/2. *Circaea canadensis* Hill. Add *11.
 239/1. *Eryngium campestre* L. Add 12; well established but probably adventive.
 244/1. *Smyrniolum Olusatrum* L. Add 12.
 250/1. *Carum Carvi* L. Add *10 and *11.
 250/5. *C. Bulbocastanum* (L.) Koch. Delete (11 error); the record was for 12. Add *12.
 253/1. *Sium latifolium* L. Add 12.
 265/5. *Oenanthe silaifolia* Bieb. Add (11); a very old record, never confirmed but in a situation where the plant might well occur.
 283/8. *Caucalis latifolia* L. Add *10 and *11.
 290/1. *Linnaea borealis* L. Bracket 11, doubtless error; there is one old record and in Townsend's "Flora" it is suggested that there was confusion with *Wahlenbergia*; confusion with *Anagallis tenella* is more probable.
 296/3. *Galium erectum* Huds. Bracket 12; queried in Townsend and never confirmed.
 301/1. *Valeriana officinalis* L. Add (10).
 304/4. *Valerianella carinata* Lois. Add 11 and 12.
 320/3. *Erigeron canadense* L. Add 10.
 324/4. *Filago gallica* L. Add 11.
 333/1. *Inula Helenium* L. Add *12.
 378/5. *Artemisia Stelleriana* Bess. Add *11.
 380/3. *Petasites fragrans* Presl. Add *12.
 381/1. *Doronicum Pardalianches* L. Add *12.
 381/2. *D. plantagineum* L. Add *11.
 383/1. *Senecio sarracenicus* L. Add *12.
 383/4. *S. erraticus* Bert. Add 10.

- 383/8. *S. viscosus* L. Add 10, 11 and 12.
- 395/3. *Carduus pycnocephalus* L., var. *tenuiflorus* (Curt.). Delete 12; it is recorded in 2nd ed. "Top. Bot." without personal authority and apparently nowhere else.
- 405/8. *Centaurea nigra* L. (*obscura* Jord.). Add 11 and 12.
- 416/9. *Crepis foetida* L. Add (11).
- 419/8. *Hieracium aurantiacum* L. Add *12.
- 425/2. *Lactuca Serriola* L. Add 10 and 11.
- 435/2. *Campanula latifolia* L. For (11) read (12).
- 446/7. *Erica vagans* L. Add *11 and *12.
- 457/5. *Limonium binervosum* C.E.S. Add (10); an old record, needs confirmation.
- 458/3. *Statice planifolia* (Syme) Dr. Add 10.
- 466/1. *Glaxa maritima* L. Add 10.
- 478/4. *Centaurium pulchellum* (Sw.) Dr. Add (12).
- 480/6. *Gentiana lingulata* Ag., var. *praecox* Towns. Add 11.
- 497/2. *Symphytum tuberosum* L. Add *11 and *12.
- 509/2. *Echium plantagineum* L. Add *10, *11 and *12.
- 521/1. *Atropa Belladonna* L. Add 10 and 11.
- 527/4. *Verbascum virgatum* Stokes. Add *12.
- 527/6. *V. pulverulentum* Vill. Add *11.
- 527/7. *V. Lychnitis* L. Add *11 and *12.
- 532/4. *Linaria Pelisseriana* Mill. Add *12.
- 535/1. *Scrophularia vernalis* L. Add *11.
- 537/1. *Mimulus guttatus* DC. Add *10.
- 546/4. *Bartsia viscosa* L. Add (12); old record, needs conf.
- 549/2. *Melampyrum arvense* L. Add *11.
- 550/9. *Orobanche amethystea* Thuill. Delete 10.
- 552/1. *Utricularia vulgaris* L. Delete 10; add 11.
- 552/2. *U. major* Schmidel. Add 10.
- 558/3. *Mentha longifolia* (L.) Huds. Remove brackets from 10.
- 558/4. *M. spicata* Huds. Add 11.
- 558/6. *M. piperita* Huds. Add 12.
- 558/10. *M. gentilis* L. Add 11.
- 558/11. *M. cardiaca* Baker. Add 11.
- 561/6. *Thymus lanuginosus* Mill. Add 12.
- 561/8. *T. Drucei* Ronn. Add 10.
- 562/4. *Satureia sylvatica* (Bromf.) Dr. Bracket 12.
- 562/7. *S. Nepeta* (L.) Scheele. Add (11) and (12).
- 566/1. *Salvia pratensis* L. 11 should be *.
- 573/2. *Prunella laciniata* L. Add 10.
- 577/2. *Stachys germanica* L. Add *10.
- 577/4. *S. ambigua* Sm. Add 11.
- 578/1. *Galeopsis speciosa* Mill. Add 11 and 12.
- 587/4. *Ajuga Chamaepitys* (L.) Schreber. Add 11.
- 600/12. *Chenopodium ficifolium* Sm. Add *10.
- 612/1. *Suaeda fruticosa* Forsk. Delete 10; 11 extinct.
- 615/15. *Polygonum minus* Huds. Add 10, 11 and 12.

- 618/10. *Rumex rupestris* Le Gall. Delete 11; the only record seems to be that in "Top. Bot."
- 618/13. *R. maritimus* L. Add 10 and 12.
- 626/1. *Viscum album* L. Remove brackets from 10.
- 628/9. *Euphorbia virgata* W. & K. Add *10 and *12.
- 628/12. *E. Paralias* L. Delete 12.
- 628/17. *E. Peplis* L. 10 extinct.
- 637/3. *Urtica pilulifera* L. For (12) read (11).
- 651/3. *Populus nigra* L. Add *10, *11 and *12.
- 653/2. *Ceratophyllum demersum* L. Add 12.
- 654/1. *Hydrocharis Morsus-ranae* L. Add 12.
- 659/1. *Malaxis paludosa* (L.) Sw. Add (10); an error, given with ? in "Top. Bot."
- 664/4. *Spiranthes aestivalis* (Lam.) Rich. Read S. before Hampshire.
- 668/3. *Helleborine leptochila* (Godf.) Dr. Add 11 and 12.
- 668/4. *H. purpurata* (Sm.) Dr. Delete 10; an error derived from "Top. Bot.," where *purpurata* is made, incorrectly, a synonym of *media*, which has been recorded from 10.
- 669/18. *Orchis hircina* (L.) Crantz. Add 10.
- 671/1. *Aceras anthropophora* (L.) Br. Add 11.
- 672/2. *Ophrys sphegodes* Mill. Add 11; appears to be extinct in 10 and 12.
- 674/3. *Habenaria albida* (L.) Br. 11 should be bracketed.
- 680/1. *Sisyrinchium angustifolium* Mill. Add *11.
- 684/3. *Narcissus biflorus* Curt. Alter specific number from 2 to 3. Add 10, 11 and 12.
- 685/1. *Galanthus nivalis* L. Add 10.
- 702/7. *Allium triquetrum* L. Add *11.
- 702/11. *A. Schoenoprasum* L. 11 should be *; add *12.
- 703/1. *Muscari racemosum* Lam. & DC. Delete 11.
- 706/1. *Scilla verna* L. Add (10); extinct or error.
- 707/1. *Ornithogalum pyrenaicum* L. 11 should be *; may be native but status at present doubtful.
- 710/1. *Tulipa sylvestris* L. Add *10 formerly, *11 and *12.
- 711/1. *Gagea lutea* (L.) Ker-Gawler. Add 11.
- 713/1. *Colchicum autumnale* L. Add 11.
- 718/16. *Juncus macer* S. F. Gray. Add *12.
- 722/2. *Sparganium ramosum* Huds. (segregate). Add 10.
- 723/1. *Arum italicum* Mill. Remove brackets from 11 and add 12.
- 737/13. *Potamogeton lucens* L. Add (10), error.
- 737/27. *P. trichoides* Cham. & Schlecht. Add 12.
- 737/29. *P. interruptus* Kit. Add 10, 11 and 12.
- 739/2. *Zannichellia maritima* Nolte. Add 11.
- 746/9. *Scirpus nanus* Sprengel. Add 11.
- 746/10. *S. Holoschoenus* L. Add 11 formerly, extinct.
- 747/4. *Eriophorum vaginatum* L. Bracket 10; error or doubtful.
- 753/57. × *Carex axillaris* Good. Add 10 and 11.

- 753/58. *C. canescens* L. Add 12.
 753/61. *C. Pairaei* F. Schultz. Add 10 and 11, as var. *Leersii*.
 753/63. ×*C. Boeninghausiana* Weihe. Add 10.
 753/67. *C. arenaria* L. Add 12 to inland counties.
 754/8. *Panicum Crus-galli* L. Add *10.
 754/10. *P. sanguinale* L. Add *10 and *11.
 754/11. *P. Ischaemum* Schreber. Add *10.
 765/1. *Phalaris minor* Retz. Add *10 and *11.
 766/2. *Anthoxanthum aristatum* Boiss. Add *10.
 770/6. *Alopecurus aequalis* Sobol. Add 11.
 780/3. *Agrostis capillaris* L., var. *nigra* (With.). Add 12.
 782/1. *Polypogon monspeliensis* (L.) Desf. Delete "somewhat doubtfully native;" this species is undoubtedly native in salt-marshes in S. Hants and elsewhere in S. England. 10; now extinct as native but occurs as an adventive.
 785/1. *Apera Spica-venti* (L.) Beauv. Add *10 and (*11).
 797/1. *Capriola Dactylon* (L.) O.K. Add *10 and *11.
 808/1. *Cynosurus echinatus* L. Add 10 and 12.
 824/5. *Poa palustris* L. Add 11.
 824/13. *P. bulbosa* L. Add 11.
 826/16. *Festuca ambigua* Le Gall. Add 10.
 827/1. *Bromus rigens* L. Add *10.
 827/5. *B. madritensis* L. Add *10.
 827/19(2). *B. britannicus* Williams. Add 12.
 829/3. *Lolium remotum* Schrank. Add *10.
 836/1. *Elymus arenarius* L. Add 10.
 848/1. *Adiantum Capillus-veneris* L. Add *11.
 856/2. *Dryopteris cristata* (L.) A. Gray. Add (10) and (12), both errors.
 856/11. *D. Robertiana* (Hoffm.) Christ. Add 12, possibly native.
 857/4. *Cystopteris Filix-fragilis* (L.) Bernh. 11 should be *.
 868/1. *Azolla Filiculoides* Lam. Add *11 and *12.
 Add 876/16. *Chara fragilis* Desv. 10, 11 and 12.
 Add 876/17. *C. delicatula* Ag. 10 and 11.

ADDITIONS AND CORRECTIONS TO THE COMITAL FLORA
FOR LINCOLNSHIRE.

F. T. BAKER.

- V.-c. 53, South Lincolnshire. V.-c. 54, North Lincolnshire.
- The numbers are those of the second edition of "The British Plant List."
- 6/23. Add v.-c. 53.
 7/2. Add v.-c. 54.
 9/1. Add v.-c.s 53 and 54. Not native.
 11/1. Add v.-c. 53. Naturalised.

- 21/6. Add v.-c. 53.
 22/1. Add v.-c. 54. Casual.
 32/5. Add v.-c. 53.
 32/9. Add v.-c. 54.
 39/4. Add v.-c. 53.
 44/1. Add v.-c. 53.
 44/2. Add v.-c. 54.
 49/5. Add v.-c. 53.
 52/1. Add v.-c. 53.
 60/1. Add v.-c. 53.
 61/4. Add v.-c. 53.
 88/3. Add v.-c. 53.
 88/20. Add v.-c. 53 (det. Dr Drabble). We have *no* record for v.-c. 54.
 88/22. Add v.-c. 53 (det. Dr Drabble).
 88/26. Add v.-c. 53 (det. Dr Drabble).
 88/27. Add v.-c. 53 (det. Dr Drabble). We have *no* record for v.-c. 54.
 88/28. Add v.-c. 53 (det. Dr Drabble). We have *no* record for v.-c. 54.
 96/3. Add v.-c.s 53 and 54. Casual species.
 96/6. Add v.-c. 54. Adventive.
 96/10. Add v.-c. 54. Adventive.
 101/4. Add v.-c. 54.
 112/14. Add v.-c. 53.
 116/1. Add v.-c. 54. Casual.
 117/4. Add v.-c. 54. Casual.
 124/1. Add v.-c. 53.
 127/5. Add v.-c. 53. Casual.
 149/3. Add v.-c. 53.
 154/3. Add v.-c.s 53 and 54.
 155/4. Add v.-c.s 53 and 54. Often an escape from cultivation.
 166/1. Add v.-c. 53.
 170/1. Add v.-c. 53.
 173/1. Add v.-c. 53. Adventive.
 178/4. Extinct in v.-c. 54.
 189/8. Add v.-c. 53.
 194/2. Add v.-c.s 53 and 54.
 194/21. Add v.-c. 54.
 211/3. Add v.-c.s 53 and 54. Escapes.
 217/3. Add v.-c.s 53 and 54.
 217/5. Add v.-c.s 53 and 54.
 220/5. Add v.-c. 53.
 220/8. Add v.-c. 54.
 276/3. Delete v.-c. 54 in brackets.
 291/5. A mistake in Peacock's "Check List of Lincolnshire Plants," where county Division 5 was printed instead of Division 15. Therefore *delete* v.-c. 54, and *add* v.-c. 53.

- 304/4. Delete v.-c. 53, add v.-c. 54.
 368/1. Add v.-c.s 53 and 54. Adventives.
 371/3. Add v.-c.s 53 and 54. Now well established in both.
 381/1. Add v.-c. 54. Adventive.
 383/8. Add v.-c. 54. Adventive.
 383/34. Should read 54 *not* 53. Believed to be extinct.
 405/7b. Add v.-c. 54.
 463/5. Add v.-c. 53.
 486/1. Add v.-c.s 53 and 54. Possible escapes.
 527/4. Should read v.-c. 54 *not* v.-c. 53.
 539/1. Delete v.-c. 54. Probably extinct in v.-c. 53.
 543/6. Add v.-c. 53.
 550/12. Add v.-c. 54.
 600/6. Add v.-c.s 53 and 54.
 632/2. Add v.-c. 53.
 644/1. Add v.-c.s 53 and 54. Introduced.
 651/3. Add v.-c. 54.
 653/1. Add v.-c. 54.
 669/8. Add v.-c.s 53 and 54.
 669/10. Add v.-c. 53.
 669/18. Add v.-c. 53.
 685/1. Add v.-c.s 53 and 54. A very old introduction.
 689/1. Add v.-c.s 53 and 54. Planted.
 702/4. Add v.-c. 53.
 724/1. Add v.-c. 53.
 730/1. Add v.-c.s 53 and 54.
 737/18. Add v.-c. 53.
 826/18. Add v.-c. 53.
 840/1. Add v.-c. 53 and 54. Planted probably in most cases.
 841/1. Add v.-c.s 53 and 54. Planted.
 851/5. Add v.-c. 53.
 872/2. Add v.-c. 54.
 876/7. Add v.-c.s 53 and 54.

[To most people the more natural order would appear to be N. 53, S. 54, but all Watsonian divisions give South before North, as in this case—S. Lincs. 53, N. Lincs. 54—and this is probably how many of errors in this and other vice-comital records have arisen.—W.H.P.]

A HOLIDAY IN NORTH DEVON.

I was quite unable to make any arrangements about holidays this year until the 1932 Report was "off the stocks," so that when my copy arrived late in August I was still undecided as to locality. However, a most kind and opportune invitation from Dr F. R. E. Wright received about the same time settled the matter at once in favour of Braunton, N. Devon, which I reached on September 1. I was already steeped in information bearing on the botany of the district for I had been compelled only a few months previously to read the MS. and proofs of Dr Wright's paper in the 1932 Report and had, moreover, thoroughly enjoyed his arresting little book on Braunton reviewed on p. 47 of the same Report. I was therefore more than ordinarily interested in my first visit to this district.

My first reaction was to the exceptional abundance and beauty of several of my favourite species, seldom seen in such profusion elsewhere—the beautiful bright blue *Cichorium Intybus*; the massed yellow heads of *Inula Conyza*; the pale reddish-purple flowers of *Eupatorium cannabinum* with their very long deeply-cloven white styles, and the waving silky plumes of *Phragmites*. Later I was very greatly impressed by the famous Braunton Burrows through which I was conducted on several occasions by my friend, Dr Wright. The compactness of this sand-dune area—roughly three miles long by one mile broad—is in strong contrast to somewhat similar areas in Cumberland, where the sand-hills run along the coast for some twenty miles and afford space for the trial of long range naval guns. The vegetation, too, is in Devon much more varied and interesting. My first "thrill" was the sight of huge tufts of *Scirpus Holoschoenus*—some taller than myself—which is very abundant and occurs as a native only here and in one small patch in Somerset. It is also rare and adventive in Glamorgan. The late W. D. Miller told me that he had taken seeds hence and scattered them plentifully near the Somerset habitat but none germinated. Almost equally imposing were the tufts of *Carex acutiformis* which were among the finest I've seen.

"Roughly speaking, the Burrows may be divided into two parts: the Western, consisting of large hills chiefly clothed with Marram Grass (*Ammophila arenaria*), and the inner Eastern portions of small hills and plains. On the level areas where water does not stand in winter, one walks on a crisp grey lichen almost everywhere. This is the Reindeer Moss (*Cladonia rangiferina*). In the plains where water has stood during the winter, the little Shoreweed (*Littorella lacustris*) grows, and is easily mistaken for Buckshorn Plantain. Other minute flowers which through their modest size may pass unnoticed are the little white star-like blossoms of the Knotted Pearlwort (*Sagina nodosa*) and the Cathartic Flax (*Linum catharticum*), usually growing together. The sweet pink flowers of the Bog Pimpernel (*Anagallis tenella*) produce sheets of colour which can be seen from a distance. Among the better Labiates

the White Horehound (*Marrubium vulgare*), the Black Horehound (*Ballota nigra*), and the Cat Mint (*Nepeta Cataria*) are common. The rare Water Germander (*Teucrium Scordium*) grows in great abundance, its pale purple flower being one large lip. In bud the middle lobe of the lip bends upward, forming a complete protective dome over the anthers and opening to the flowers before they are mature. The anthers mature before the style, and are at first placed well in front, so as to come in contact with visiting insects. Later they are curled back over the calyx, and the style bends down and comes into the position previously held by the anthers to receive pollen of these visitors brought from other plants. The whole plant is covered with grey downy hairs which form a great protection against loss of moisture, for although the plant grows in moist places, the Burrows in summer may become very dry. The Yellow Bartsia (*Bartsia viscosa*) is common on the Eastern side. The short hair which covers it is sticky and prevents small insects climbing up the stem and biting through the calyx or corolla to rob the honey without fertilising the flower. Usually small dead insects may be seen sticking on the stem, but these are not the only thieves who go in by the back door—bees are known to bite through the calyx of some Campions, which they find less trouble than in reaching the nectaries by the proper route. Plants which are robbed in this way are thought to date back to a time when that particular type of robber was not present in their district. Some of the Campions have large inflated calyces. The enlarged calyx is thought to be an attempt at protection against such robbery."

In such an environment I expected to find Henbane (*Hyoscyamus niger*) but was unable to discover a plant. I was informed that it used to be common but has now almost disappeared. In Lancashire and Cumberland its most noteworthy character is the intermittent nature of its appearances. You find a promising colony of plants one year but none in the same place for several successive years, in each of which you may with diligent search find it at a distance.

"Both in the Burrows, as well as in the Marshes, we see great numbers of Horsetails (*Equisetums*). These throw up in the early part of the year light brown-coloured fruiting shoots which may be mistaken for another plant altogether, being so different in appearance from the green summer sterile shoots. These Horsetails are very ancient plants, which are plentifully represented in the fossils of the Carboniferous Period. Now the surface of the earth before this period must have been mainly composed of Silica, the early rocks being chiefly composed of Quartz, Mica and Felspar (all containing mostly Silica). The present-day Horsetails are very rich in silicious particles. When their vegetable substance is destroyed by maceration it is possible to produce complete silicious skeletons of these plants, maintaining their erect form. The ash of Horsetails contains half its weight of Silica.

They are useless as fodder, and are even avoided by cattle, but they have a great local reputation here for fattening horses, being locally known as 'tidy pipe.'

The Horsetails have, like the Ferns, in their life history what is known as an alternation of generations, the spore of the Horsetail developing into a separate plant form known as a prothallium, a structure like a thin green foliage leaf growing on the surface of the ground. These prothallia are of two kinds, one producing male elements, the other female. After fertilisation of the female elements of the prothallia they can develop into Horsetails again. The spores of the Horsetail have four long filaments, which when dry are spread out and act as wings, enabling the spores to be carried by the wind for dispersion. Usually several are tangled together by these filaments and blow away together, for if one travelled singly, remembering that each produces only one sex, if it landed alone it could never reproduce. Now these spores require a damp place for germination. The filaments are very hygroscopic (sensitive to wet) and falling on a suitable spot the action of dampness causes the filaments to coil tightly round the spore like a ball so that it blows away no more."

I was much too late for the Orchids but saw abundant evidence of the Marsh Helleborine. For a fascinating and finely figured account of this I must refer the reader to Dr Wright's "Braunton" (pp. 26-29), published by A. E. Barnes, 107 High Street, Barnstaple. Herein will be found also full lists of the flora and fauna of the Burrows.

Among plants not recorded for North Devon in the *Comital Flora* were the following species: *Carex acutiformis*, *C. Oederi*, *C. lasiocarpa*, *Cladium Mariscus*, *Catabrosa aquatica*, *Colchicum autumnale*, *Scirpus pauciflorus*, *Agrostis setacea*, and *Mentha Pulegium*—see list of New County and other Records.

Along the Burrows there is already one fine golf course but we were very perturbed to see another in course of construction, with the inevitable removal of hundreds of square yards of native turf and the suggested planting of *Hippophae Rhamnoides*. The area is so unique in being the habitat of many of the rarest species of our flora and fauna that the danger of their extinction is imminent. This Society is keenly interested in the preservation of our native flora and is represented on The Wild Plant Conservation Board. The following extract from the minutes of the Board's Meeting on November 14th, 1933, will be read with great interest by our members:—

"The question of the development now taking place at Braunton Burrows, Devon, was brought to the notice of the Board, and it was pointed out that the area is the home of some of the rarest plants, insects and animals in England. It was resolved that the following be forwarded to the National Trust and the Society for the Promotion of Nature Reserves.

"That in the opinion of the Wild Plant Conservation Board the Braunton Burrows is especially notable for rare birds, wild flowers and insect life, and the Board suggests therefore that every effort should be made to preserve the whole of the Burrows if possible as a Nature reserve."

Professor E. J. Salisbury has always taken an interest in the Burrows and I gladly acknowledge the value of his kindly offices in connection with the above resolution.

In the nature of things my visit was too late in the year for appreciating the full glory of the flowering season but I saw enough of the vestigial traces of spikes and stems to enable me to imagine what a brave show the flowers must have made. Not only were the Burrows so impressive but the surrounding district is of exceptional interest—Baggy Point to the north; the saltmarshes to the south, and the rolling downs rising behind Braunton to the east—all afforded evidence that Nature had been lavish in her gifts.

The pleasant memories of such a delightful holiday will long remain. I am one of those who consider that the social side is one of the most attractive features of Botany—even as a hobby—and to go out with two or three botanists who know their plants is a sheer joy. The late Mr W. D. Miller was a conspicuous example of the ideal companion for such an excursion and as he was staying in Braunton for his health he was induced to accompany us one afternoon to the Burrows. Dr Wright took us by car to see *Panicum lineare*, in which we were all greatly interested. Although obviously extremely weak poor Miller appeared to be greatly pleased by his outing and we hoped for the best, but, alas, it was not to be—only two months later we received the sad news of his passing.

W. H. P.

A FEW ADDITIONS TO THE FLORA OF NORTHAMPTONSHIRE.

(IN MEMORIAM—GEORGE CLARIDGE DRUCE).

EDMUND B. BISHOP.

Circumstances, connected chiefly with the health of my sister, impelled us to spend many weeks of the summers of both 1932 and 1933 at a farm in Northamptonshire, instead (as in the past) of exploring those favoured parts of our native land more noteworthy, both from the points of view of the botanist and of the lover of natural beauty.

If, by such enforced sacrifice of long-anticipated hopes, we have lost much, there have been most wonderful compensations. It just happened that our intimate association with the native county of Dr Druce almost immediately followed upon the passing from us of that loved and revered friend. In the quiet lanes and fields of Northamptonshire, again and again we have felt in communion with his spirit. Every bush of *Rosa Rothschildii* has recalled at once his vivid and kindly personality. Also it has just happened, by no conscious choice of ours, that the village which became our temporary home was actually adjacent to the birth-place of John Clare, the peasant-poet and nature-worshipper, whose poems had so great a fascination for Druce, as is evidenced on page after page of his *Flora of Northamptonshire*.

It has been our practice in any new neighbourhood, in addition to exhaustive collecting, to make notes of plants seen, other than those most common. Naturally, we followed this practice here, and accumulated a quantity of notes. Gradually it dawned upon us that these notes might be of service in filling up a few gaps in the *Flora of Northamptonshire*, and possibly be of interest to some members of our Society, especially those to whom the memory of Druce is still dear. Above all, we feel that the publication of these notes would not have been unwelcome to Druce himself, all too inadequate a tribute to him as they are.

The small corner of Northamptonshire specially worked by us is in the extreme north of that county, in the area between the rivers Welland and Nene, when they begin to flow roughly parallel towards the Wash. This part is known as the "Soke of Peterborough," and has a separate County Council from that which governs by far the greater portion of Northamptonshire. We could not work even a tithe of the diminutive Soke, and were unable to get into the fenland proper, but made odd visits beyond, now and then into Lincolnshire and Rutland.

Bainton, our headquarters, is a pleasant thinly-peopled village, of only 140 inhabitants, about five miles from Stamford and ten from Peterborough, just a mile south of the boundary of Lincolnshire. Most of our collecting and observing was made to the south of Bainton, on the (usually) easy slopes of those low oolitic hills, seldom rising much above 200 feet, which form the watershed between Welland and Nene. Although the Soke now possesses no actual open commons (so far as I

know) there is much rough uncultivated pasture, and a considerable acreage of fine woodland. Self-advertised "hikers" would probably be looked upon with coldness at least, and any crowd, even of decent rambles, regarded with some suspicion. But two quiet unassuming old folk such as ourselves—who lay claim with pride to the possession of "country manners," and always shut gates after us—never met with other than true courtesy and most kindly welcome, even when technically trespassing. Indeed, our most profitable hunting grounds were usually those glorious hedges, broad and dense, often obviously untrimmed for many years, which border the large fields so characteristic of that neighbourhood.

Another feature thereabouts, none too common in the South of England, is very dear to our hearts, and must be specially mentioned. No botanist, nor any other decent human being, could help loving those wide grassy "verges," frequently bush-strewn, which add so much charm and elbow-room to almost every lane (and even high road) in the district. It is a country-side of quiet beauty, still largely unspoiled, retaining much of the old-time fragrance of the true England, before petrol and its attendant horrors were permitted to defile our most precious heritage.

With reference to the following list of species and localities, a few explanatory details are necessary.

In general, the arrangement, nomenclature and methods adopted in the *Flora of Northamptonshire* have been followed. New localities have been added, other than those already mentioned by Druce, in the case of every species or variety found by us, except of those quite common. Many of such may appear of trifling value, but I have tried to act as I think Druce himself would have done in the circumstances. An exception has been made of the genus *Rosa*, as will be seen. Here I have acted as a disciple of Col. Wolley-Dod, and have adopted the arrangement and nomenclature of his "Revision of the British Roses."

In every case where a plant was found by my sister, Mrs C. L. Wilde, the name of the locality is followed by "W." In two or three instances the names of friends who have made finds have been set out. All other records are my own.

Whenever "Ashton" is mentioned in these notes, the reference is to the hamlet in Bainton parish (Div. 4), not to that near Oundle (Div. 7). From the context at times, I am rather afraid that Druce occasionally confused these two, but cannot attempt to disentangle them.

In certain other instances where Divisions 4 and 7 are concerned, again I fear that a few of Druce's localities have got into the wrong Division, but here also I must leave them.

Re "Helpstone Heath," often given in *Flora of Northamptonshire* as a locality, I am not clear as to where this is (or was) situated, but have an uneasy feeling that it may be one and the same as my "Ailsworth Heath." The latter name is that which appears upon the 6-inch Ordnance Map, and is shown as being in Ailsworth parish, therefore it has been so cited by me.

“Upton Heath” is but our own name for the more or less open, rough heathy fields, adjacent to each other, in the parish of Upton. Much of our time was spent there, and many of our most interesting plants were discovered on this favourite spot.

As more distant—and more famous—haunts of Flora are now beyond our ken, we hope in 1934 to re-visit some of the places mentioned in these notes, and if possible to get further afield.

In the meantime, often in memory we are on a gentle upland, under a spacious heavenly dome of a full hemisphere, not often seen on land, though familiar to those who roam the sea. In every direction, melting away into a very distant horizon, is an extensive peaceful landscape, dotted with seemingly innumerable church spires and towers, the works of Nature and of man, from our viewpoint, for a brief while almost in harmony.

Nearer, and more intimate, is the mental vision of “the wind in the willows,” as seen from the farmhouse of our ever-kindly host and hostess. Are there anywhere such entirely lovable trees as those waving white willows of Bainton? Almost worth missing glorious tramps over fell and crag to have been privileged to greet them. Almost worth breaking solemn tryst with blushing *Rosa mollis* in fairy-haunted Allendale to have known them. *Almost.*

<i>Clematis Vitalba</i> L.	4.—Ufford Quarries, W.
<i>Thalictrum flavum</i> L.	4.—Bainton, W.
<i>Ranunculus repens</i> L.	4.—A double-flowered form at Ufford, W.
<i>auricomus</i> L.	4.—Ashton, W. 7.—Wittering, W.
<i>peltatus</i> Schrank	7.—Upton Heath.
(Not recorded in <i>Fl. Northamptonshire</i> . Probably overlooked.)	
<i>Caltha palustris</i> L.	
Var. <i>Guerangerii</i> (Bor.)	7.—Wittering Marsh.
<i>Castalia alba</i> (L.) Link	4.—Lolham Bridges, W.
<i>Papaver Rhoeas</i> L.	
Var. <i>Pryorii</i> Druce	4.—Ashton. Bainton. 7.—Barnack. Wittering, W.
<i>P. hybridum</i> L.	7.—Southorp, W.
(Not recorded in <i>Fl. Northamptonshire</i> , but is given for v.-c. 32 in <i>Comital Flora</i> .)	
<i>Radicula Nasturtium</i> Dr.	
Var. <i>stifolia</i> (Reichb.)	4.—Bainton.
<i>Sisymbrium altissimum</i> L.	4.—Bainton Ballast Pits, W.
<i>Lepidium densiflorum</i> Schrad.	4.—Bainton Ballast Pits, Mrs R. Dallas. (Probably.)
<i>Draba</i> L.	4.—Bainton Ballast Pits, W.
<i>Thlaspi arvense</i> L.	4.—Bainton Ballast Pits, W.
<i>Saponaria officinalis</i> L.	4.—Bainton Ballast Pits, W.
<i>Silene angustifolia</i> S. & T.	
Var. <i>pubescens</i> (DC.)	4.—Ufford (frequent).
<i>S. noctiflora</i> L.	4.—Barnack. 7.—Wittering, W.
<i>Lychnis dioica</i> L.	4.—Bainton, W. Wakerley, W.
(Very rare, only found twice.)	
<i>L. Githago</i> Scop.	7.—Walcot.
<i>Sagina apetala</i> Ard.	4.—Burghley Park wall, near Stamford.

- Geranium pratense* L. 4.—In glorious profusion by the east edge of Wakerley Wood. Already recorded from here, but the sight was too lovely to be passed by without mention.
- G. pusillum* L. 4.—Burghley Park, W.
- G. lucidum* L. 4.—Ufford, W.
- Ilex Aquifolium* L. (Nowhere seen in a wild situation. The entire absence of this familiar tree from the most likely heaths and woods was very strange to us.)
- Rhamnus Frangula* L. 7.—Ailsworth Heath. (Several bushes growing with *R. catharticus*. The latter is common throughout the greater part of our area, but only in this one situation did we find *R. Frangula*.)
- Genista tinctoria* L. 4.—Ashton, W. Ufford.
- Cytisus scoparius* (L.) Link 7.—Southey Wood, Ufford. .
- Ononis repens* L. 4.—Bainton.
- O. spinosa* L. 4.—Barnack.
- Melilotus altissima* Thuill. 4.—Bainton Ballast Pits, W.
- M. alba* Desr. 4.—Bainton Ballast Pits, Mrs R. Dallas.
- M. indica* (L.) All. 4.—Bainton Ballast Pits, W.
- Trifolium fragiferum* L. 4.—Bainton, W.
- T. procumbens* L. 4.—Bainton, W.
- T. filiforme* L. 7.—Upton Heath.
- Astragalus glycyphyllos* L. 4.—Ufford, W.
- 7.—Upton, W. Near Sutton Heath.
- A. danteus* Retz. 4.—Ufford, W.
- Vicia tetrasperma* (L.) Moench 7.—Ailsworth Heath.
- Prunus Avium* L. 4.—Ufford.
- P. spinosa* L.
- Var. *macrocarpa* Wallr. 4.—Ufford.
- Spiraea Filipendula* L. 4.—Ashton, W.
- 7.—Ailsworth, W. Upton, W.
- Fragaria vesca* L.
- Var. *leucocarpa* Dr. 7.—Walcot, W. (Common in one restricted spot.)
- Alchemilla minor* Huds. 7.—Southey Wood, Ufford, W. Ailsworth Heath, W.
- Agrimonia Eupatoria* L. 7.—Ailsworth road, W.
- (A large plant making some approach towards *A. odorata*, perhaps. var. *umbrosa* Coss. & Germ.)
- Poterium polygamum* W. & K. 4.—Ufford. W. Easton-on-the-Hill, W.

Rosa (Fourn.) L.

Probably more attention was paid to this genus than to all the other genera combined, many thousands of rose bushes having been examined by us. In connection with this genus I have followed the arrangement and nomenclature of Lt.-Col. A. H. Wolley-Dod, as set out in his "Revision of the British Roses." Also, in every case where a Rose is new to v.-c. 32, in *Col. Wolley-Dod's records*, I have given it the N.C.R. mark. This does not in the least imply that any record given in *Fl. Northamptonshire* for a particular var. or f. is unsound, and most certainly is not intended as a reflection upon any recorder. In most cases of real doubt,

especially where a rare Rose was concerned, the specimen has been referred to Col. Wolley-Dod.

R. arcensis Huds.Var. *vulgaris* Ser.

- f. *major* Coste 7.—Ailsworth Heath. Upton Heath (towards *laevipes* Grem.).
- *f. *hispida* L  j. & Court. 4.—Ashton, W.
7.—Upton. Southey Wood, Ufford.
- *Var. *ovata* (L  j.) Desv. 4.—Ashton. Helpstone.
- *Var. *biserrata* Cr  p. 4.—Ashton.
- ?*Var. *laevipes* Grem. 7.—Upton, W. (Near this var., but in view of a few glands on peduncles I can only record as N.C.R. with a query.)
- *Var. *gallicoides* (D  s  gl.) Cr  p. 4.—Ashton, W.
7.—Castor Hanglands. Upton (good forms from at least two distinct stations. Some of those from Upton Heath are truly magnificent, the best I have ever seen.) Marholm (very weak f.), W. Collyweston Great Wood.

R. canina L.

- Var. *lutetiana* (Lem.) Baker 4.—Ashton. Bainton. Ufford, W. Easton-on-the-Hill, W.
7.—Upton, W.
- ?f. *lasistylis* Forb. 4.—Barnack (not without doubt, so will record as N.C.R. with a query).
- Var. *sphaerica* (Gren.) Dum. 4.—Bainton (nearest *sphaerica*, but off type).
- *Var. *flexibilis* (D  s  gl.) Rouy 7.—Upton Heath (confirms a doubtful record).
- Var. *senticosus* (Ach.) Baker 4.—Ashton, W. Bainton.
7.—Ailsworth (nearest this var), W.
- f. *mucronulata* (D  s  gl.) W.-Dod 4.—Barnack. Bainton, W.
7.—Upton Heath. Wittering, W.
- Var. *spuria* (Pug.) W.-Dod 4.—Pilsgate. Ashton.
- f. *syntrichostyla* (Rip.) Rouy ... 4.—Bainton.
7.—Ailsworth, W. Whitewater. Collyweston Great Wood, W.
- Var. *globularis* (Franch.) Dum. 4.—Ashton.
- Var. *ramosissima* Rau 4.—Barnack.
7.—Upton Heath; W.
- Var. *dumalis* (Bechst.) Dum. 4.—Ashton, W. Bainton, W.
7.—Upton Heath. Ailsworth Heath, W. Collyweston Great Wood, W.
- f. *viridicata* (Pug.) Rouy 4.—Helpstone. Ufford, W.
7.—Upton Heath. Marholm.
- f. *cladoleia* (Rip.) 4.—Bainton. Ashton, W. Ufford, W.
7.—Ailsworth Heath. Upton, W. Wittering, W.
- Var. *stenocarpa* (D  s  gl.) Rouy 7.—Wittering, W. (nearest *stenocarpa*).
- *Var. *medioxima* (D  s  gl.) Rouy ... 4.—Helpstone.
7.—Collyweston Great Wood, W.
- *Var. *biserrata* (M  r.) Baker 4.—Ashton, W.
- *f. *eristyla* (Rip.) W.-Dod 7.—Upton Heath (confirms a doubtful record).
- *Var. *Carioti* (Chab.) Rouy 7.—Upton Heath.

- ?*Var. *fraxinoides* H. Br. 7.—Southey Wood, Ufford. (Nearest *fraxinoides*, but recorded with some doubt.)
- *f. *recognita* Rouy 4.—Lolham (passably good), W. Ashton. Helpstone. Ufford, W.
7.—Ailsworth.
(All \pm untypical, most not free from doubt.)
- *Var. *syvularum* (Rip.) Rouy 4.—Helpstone. Ashton, W.
7.—Wittering, W. (At least four gatherings from different bushes). Ailsworth.
- *f. *adscita* (Déségl.) Rouy 4.—Ashton.
7.—Ailsworth Heath, W. Upton Heath.
- Var. *andegavensis* (Bast.) Desp. 4.—Ashton. Bainton. Helpstone, W.
7.—Upton, W.
- Var. *verticillacantha* (Mér.) Baker 4.—Ashton, W.
*f. *Lemaitrei* (Rip.) W.-Dod 7.—Upton Heath, W.
- ?*Var. *Schottiana* Ser. 7.—Marholm (with slight doubt).
- Var. *Blondaeana* (Rip.) Rouy
*f. *Beatrixis* (Burn. et Greml.)
Rouy 7.—Upton Drift. Upton Heath, W.
- R. dumetorum* Thuill.
- Var. *typica* W.-Dod. 4.—Ashton, W.
f. *urbica* (Lem.) W.-Dod Too common in 4 and 7 Divisions to mention localities.
f. *semiglabra* (Rip.) W.-Dod ... 4.—Bainton. Ashton, W.
7.—Ailsworth Heath, W. Marholm, W. Near Pilsgate (towards Wittering).
- *Var. *ramealis* (Pug.) W.-Dod 4.—Ashton, W. Helpstone.
- Var. *Gabrielis* (F. Gér.) R. Kell. ... 4.—Ashton, W.
7.—Upton. West of Southey Wood. Ailsworth Heath, W. Marholm, W.
- ?*Var. *calophylla* Rouy, non Chr. 4.—Ashton (but off type).
- Var. *platyphylla* (Rau) W.-Dod ... 4.—Bainton. Ashton, W. Barnack.
7.—Ailsworth Heath. Marholm (with some doubt).
(Mostly with untypically rather small leaflets. Personally, I am sorry that Wolley-Dod dropped *jac-tata* Déségl., and merged it in *platyphylla*.)
- Var. *sphaerocarpa* (Pug.) W.-Dod ..
*f. *spinetorum* (Déségl. et Ozan.) W.-Dod 4.—Ashton, W. (I think this is good enough to confirm a previous doubtful record for the County.)
7.—Marholm (towards *sphaerocarpa*). Near Pilsgate, W.
- Var. *hemitricha* (Rip.) W.-Dod 4.—Ashton. Barnack.
7.—Ailsworth Heath. Upton, W.
- Var. *incerta* (Déségl.) W.-Dod 4.—Bainton, W. Ashton, W.
7.—Upton Heath. Marholm, W.
- R. coriifolia* Fr.
- Var. *typica* Chr.
*f. *frutetorum* (Bess.) W.-Dod,
non Chr. 7.—Wittering, just above the Marsh, W. (Confirms a doubtful record.)
- *Var. *subcollina* Chr. 7.—Wittering, W.

R. obtusifolia Desv.

- ?*Var. *typica* W.-Dod 7.—Near Pilsgate (not quite satisfactory, so record with a query).

[To us, residents in Surrey, where this variety is so common, its almost total absence from Northamptonshire seems very strange. The more so, as the other rarer *Obtusifoliae* are so much in evidence in the latter county. But Wolley-Dod's records do not show it from any adjacent county, except Warwick which is remote from our special corner of Northamptonshire.

The records under *obtusifolia*, in *Fl. Northamptonshire*, evidently refer to the aggregate species, not to var. *typica*.

Possibly the two records for Leicestershire, by A. E. Wade, in the recently published *Fl. Leicestershire and Rutland* (under "Sub-var. *typica* Chr."), may refer to var. *typica* W.-Dod.]

- Var. *tomentella* (Lem.) Baker 4.—Ashton, W. Lolham, W.
7.—Ailsworth Heath, W. Upton.
- f. *canescens* (Baker) W.-Dod ... 4.—Helpstone.
7.—Wittering (with some doubt).
- Var. *decepiens* Dum.
f. *glandulosa* Crép. 7.—Upton.
- Var. *Borreri* (Woods) W.-Dod 4.—Bainton. Ashton. Helpstone, W.
7.—Ailsworth Heath.
- Var. *sclerophylla* (Scheutz) W.-Dod 4.—Bainton. Ashton. Helpstone.
7.—Ailsworth Heath, W. Upton Heath,
W. Wittering.
(Fairly frequent in our area.)
- Var. *Rothschildii* (Druce) W.-Dod .. 4.—Bainton, W. Ashton. Lolham. Helpstone, W.

[This most striking and distinct Rose is not uncommon in some parts of our area, especially at and about Ashton. My sister also found it in Lincs (S.), v.-c. 53, and Rutland (part of v.-c. 55), in each case a N.C.R. Its extreme forms are truly magnificent. My sister and I have much sympathy with Druce in giving it specific rank. We know nothing of chromosomes, and but little of the intricacies of plant physiology, etc. On the field, and in subsequent herbarium examination, *Rothschildii* seems to us as deserving of being considered a species as either *Sherardi* or *agrestis*. Some of its marked characters suggest affinity with Subseries *Rubiginosae*. Perhaps its nearest (or rather least distant) relative in our British flora is the very rare *seticaulis* W.-Dod, whilst somewhat more remote are *sclerophylla* and *Borreri*, its present neighbours in Wolley-Dod's "Revision." Indeed, quite frequently, these two last-mentioned are actual neighbours of *Rothschildii* on the field in our corner of Northamptonshire, and also occasionally in those parts of Rutland and South Lincolnshire visited by us. Possibly, in some future disturbance of our present classification, these four (i.e., *Borreri*, *sclerophylla*, *seticaulis* and *Rothschildii*) may be constituted a separate Group of the *Obtusifoliae*.]

- R. tomentosa* Sm.
 *Var. *typica* W.-Dod 4.—Ashton, W. Helpstone.
 7.—Ailsworth Heath, W. Upton Heath.
 Castor Hanglands. Collyweston
 Great Wood, W.
 *f. *eglandulosa* W.-Dod 4.—Ashton, W.
 *Var. *pseudo-cuspidata* (Crép.) Rouy 4.—Lolham Bridges, W.
 7.—Ailsworth Heath (not without doubt).
 Var. *scabriscula* Sm. 4.—Ashton, W.
 7.—Ailsworth, W. Oldfield Common, W.
 Marholm.
- R. rubiginosa* L.
 Var. *typica* W.-Dod 4.—Barnack, W.
 7.—Ailsworth Heath, W.
 *Var. *rotundifolia* Rau 7.—Ailsworth Heath, W.
 *Var. *echinocarpa* (Rip.) Gren. 7.—Upton (quite good), W. Ailsworth
 Heath (rather weak f.), W.
- R. micrantha* Sm.
 Var. *typica* W.-Dod 4.—Ashton, W.
 7.—Southey Wood, Ufford, W. Upton,
 W. Ailsworth Heath, W.
- Pyrus communis* L.
 Var. *Pyraster* (L.) 7.—Upton, W.
- Crataegus Monogyna* Jacq. 4.—Ashton. (A most interesting and
 striking form, with very small
 flowers in dense clusters, very
 small leaves, and long prickles
 which constitute its very short
 branches. Quite new to me, and
 I know no var. under which to
 place it.)
- C. monogyna* Jacq.
 × *oxyacanthoides* Thuill. 4.—Ashton, and elsewhere.
 7.—Ailsworth, Upton, and elsewhere.
 (Often seen by us.)
- C. oxyacanthoides* Thuill. 4.—Bainton, Ashton.
 7.—Ailsworth Heath, Upton Heath.
 (Rather common in our area.)
- Ribes Uva-crispa* L. 4.—Ufford, and elsewhere, W.
R. rubrum L. 4.—Bainton Ballast Pits, W.
 7.—Walcot, W.
- Sedum album* L. 4.—Very common on walls at and about
 Bainton and Ashton.
- Callitriche ? obtusangula* 4.—Wothorp, abundant in pond near
 ruins of Manor House.
- Epilobium tetragonum* L. 4.—Bainton, W.
 7.—Ailsworth Heath, W.
- Oenothera odorata* Jacq. 4.—Bainton Ballast Pits, W.
Stum erectum Huds. 4.—Bainton, W.
Pimpinella major Huds. 4.—Ashton, and elsewhere, W.
- P. Saxifraga* L.
 Var. *poterifolia* (Wallr.) 4.—Barnack, W.
Oenanthe fistulosa L. 4.—Ashton.
Silaum Silaus (L.) Schinz & Thell. 4.—Ashton.
Galium Mollugo L. × *verum* L. (= *ochroleucum* Wolf.) 4.—Hills and Holes, Barnack, W. Uf-
 ford, W. (Good intermediates. In
 each case both putative parents
 growing very close to each other.)
- Valerianella dentata* (L.) Poll. 4.—Ashton, Barnack.
 Var. *mixta* (L.) 4.—Ufford, W.

- V. carinata* Lois. 4.—Bainton Ballast Pits, W. (Only one other station given by Druce in the county.)
- Erigeron acer* L. 4.—Bainton Ballast Pits, W.
- Gnaphalium sylvaticum* L. 7.—Ailsworth Heath. (Not uncommon in this one spot.)
- Inula squarrosa* (L.) S. & T. 4.—Ashton, W.
7.—Ailsworth Heath.
- Matricaria suaveolens* (Pursh) Buch. ... 4.—Bainton. Ashton, W.
- Senecio viscosus* L. 4.—Bainton Ballast Pits, in abundance.
- Carlina vulgaris* L. 7.—Ailsworth Heath.
- Cirsium eriophorum* (L.) Scop.
Var. *britannicum* (Petrak) 7.—Ailsworth Heath (very fine). Upton, W. Marholm, W.
- Onopordon Acanthium* L. 7.—Near Castor Hanglands, W.
- Centaurea Scabiosa* L. 7.—Barnack (rayed and non-rayed forms with pure white flowers), W. Marholm (with very beautiful musk-white flowers), W.
- C. Cyanus* L. 7.—Ailsworth, W.
- Cichorium Intybus* L. 4.—Bainton Ballast Pits, W.
7.—Ailsworth, W.
- Picris Hieractioides* L. 4.—Ufford Quarries.
- Leontodon nudicaulis* (L.) Banks 7.—Ailsworth Heath, W.
- Lactuca virosa* L. 4.—Bainton Ballast Pits, W.
- Tragopogon pratensis* L. (As segregate =*geminus* Syme, in which floret rays equal phyllaries) 7.—Barnack, towards Whitewater. Ailsworth, J. E. S. Dallas.
- Calluna vulgaris* (L.) Hull 7.—Southey Wood, Ufford, W.
- Samolus Valerandi* L. 7.—Ailsworth Heath, W.
- Syringa vulgaris* L. 4.—Bainton.
- Ligustrum vulgare* L. Seemingly native in several places, but most abundant and quite at home on Ailsworth Heath (Division 7). Here it is often almost a dominant shrub, a great attraction to the numerous butterflies found on the Heath.
- Blackstonea perfoliata* Huds. 7.—Southey Wood, Ufford. Walcot, W. Ailsworth Heath.
- Menyanthes trifoliata* L. 4.—Lolham Bridges, W.
- Myosotis caespitosa* K. F. Schultz 7.—Upton Heath, W.
- M. arvensis* (L.) Hill.
Var. *sylvestris* (Schlecht.) 7.—Southey Wood, Ufford, W.
- Lithospermum officinale* L. 4.—Ufford, W.
- L. arvense* L. 7.—Upton.
- Echium vulgare* L. 4.—Bainton Ballast Pits, W.
7.—Ailsworth Heath.
- Cuscuta epilinum* L. 7.—On a detached portion of Ailsworth Heath. All three species growing more or less together in dense masses, parasitic on many host plants, extending over more than an acre. All submitted to Mr W. H. Pearsall, and named by him.
- C. europaea* L.
- C. trifolii* Bab.
- Verbascum virgatum* Stokes 4.—Bainton Ballast Pits, W.
- Linaria spuria* (L.) Mill. 4.—Ashton.
- L. Elatine* (L.) Mill. 4.—Bainton, W.
7.—Barnack.

- Digitalis purpurea* L. 7.—Southey Wood, Ufford, W. Ailsworth Heath, W.
- Veronica aquatica* Benquerel 7.—Ailsworth Heath.
- Bartisia Odontites* Huds.
 Var. *verna* (Reichb.) 7.—Upton, W.
- Melampyrum cristatum* L. 7.—Still in fair quantity at a station (extending for about 100 yards) in Ufford Parish. Probably the same as that given in *Fl. Northamptonshire*, p. 174. "Ufford, H. C. Watson *Herb.*, 1831."
- Orobanche major* L. 4.—Bainton, W. Ufford Quarries, W.
 7.—Ailsworth, W. Marholm, W.
 (Locally rather common, in restricted spots. Fine plants.)
- Origanum vulgare* L.
 Var. *albiflorum* Lej. 4.—Ufford Quarries, W.
 7.—Ailsworth Heath.
- Satureia ascendens* (Jord.) Dr. 4.—Ashton.
- S. Actinos* (L.) Scheel: 7.—Upton.
- Nepeta Cataria* L. 4.—Ufford, W.
 7.—Barnack, towards Whitewater, W.
- Lamium amplexicaule* L. 4.—Ufford.
 7.—Southorp.
- Polygonum Convolvulus* L.
 Var. *subalatum* Lej. & Court. 4.—Duddington.
- P. petecticate* (Stokes) Dr. 4.—Bainton, W.
- Rumex pulcher* L. 4.—Bainton, W. Ufford, W.
- Daphne Laureola* L. 4.—Ashton.
- Euphorbia platyphyllos* L. 7.—Ailsworth.
- Ulmus* × *hollandica* Mill. (probably) .. 7.—Edge of Walcot Park (along Ermine Street), abundant, W.
- Betula alba* L. 7.—Southey Wood, Ufford, W.
- Betula pubescens* Ehrh. 7.—Southey Wood, Ufford, W.
- ? *Quercus Robur* L.
 × *sessiliflora* Salisb. 7.—Southey Wood, Ufford, W. Collyweston Great Wood, W.
- Q. sessiliflora* Salisb. 4.—Helpstone.
- Q. Cerris* L. 7.—Walcot, with self-sown seedlings.
- Juglans regia* L. 4.—Hills and Holes, Barnack. Ufford Quarries.
 (Sturdy saplings, 3 or 4 feet high, obviously not deliberately planted.)
- Populus tremula* L. 7.—Southey Wood, Ufford.
- Orchis pyramidalis* L. 4.—Ufford, W.
 7.—Ailsworth Heath. Upton, W. Walcot, W. Wittering, W.
- Aceras anthropophora* (L.) Br. 4.—Ashton. Easton-on-the-Hill, W.
- Ophrys apifera* Huds. 4.—Ashton.
 7.—Southey Wood, Ufford, W.
- Habenaria virescens* (Zollik) Dr. 7.—Ailsworth.
- Allium ursinum* L. 7.—Southey Wood, Ufford, W.
- Juncoides pilosum* Morong. 7.—Southey Wood, Ufford, W.
- Zannichellia palustris* L. 7.—Ailsworth Heath.

CAREX (Dill.) L.

All gatherings of this genus, in any sense critical, have been submitted to Mr W. H. Pearsall, who has been kind enough to name them for us in his usual thorough manner, unsparing of any trouble to himself.

Notes and comments by Mr Pearsall are set out below, under the various species and varieties.

- C. hirta* L.
 Var. *hirtaeformis* (Pers.) Kunth ... 4.—Ashton (pond at edge of Lawn Wood).
 "All fruits abortive through the action of mites," W.H.P.
 Var. *spinosa* Mort. 4.—Bainton Ballast Pits (not an extreme form), W.
C. binervis Sm. 7.—Southey Wood, Ufford, W. Wittering Marsh, W. Ailsworth Heath (two distinct stations, about a mile apart), W. "All *C. binervis*," W.H.P.

This species is stated, in *Flora of Northamptonshire*, to be very rare in the county, and only one station is given—Evenley Camp (No. 2 Division). This is in the extreme S.W., more than fifty miles distant from either of our stations. Both *C. distans* and *C. fulva* have been recorded from Wittering Marsh, but we have not yet found either species there.

- C. flava* L. 7.—Wittering Marsh. "*C. flava* (type)," W.H.P.
C. lepidocarpa Tausch 7.—Wittering Marsh, W. "*C. lepidocarpa*," W.H.P.
C. Goodenowii Gay
 Var. *recta* Fleischer 7.—Ailsworth Heath. "Probably the f. *aquatiformis* Kükenth., which has narrow glumes," W.H.P.
 Var. *stenocarpa* Kük. 7.—Wittering Marsh, W. "An extreme f. of *stenocarpa* with glumes very long, exceeding the fruit and *very acute*," W.H.P.
 Var. *strictiformis* L. H. Bailey 7.—Wittering Marsh. "Var. *strictiformis* L. H. Bailey," W.H.P.
C. leporina L.
 Var. *longibracteata* Peterm. 7.—Upton Heath (growing with type), W.
C. vulpina L.
 Var. *nemorosa* (Rebent.) Lej. 4.—Ashton.
C. contigua Hoppe (*muricata* L.) 7.—Ailsworth Heath, W. Some of these are "abnormal plants with *elongate* fruits (8-9-10 mm.×2 mm.) containing nothing but abortive orange (galled ?) ovaries, not developed," W.H.P.
 f. *pallida* Appel ex Woerlein ... 7.—Upton, W. (So named by W.H.P.)
C. disticha Huds.
 Var. *longibracteata* (Schleich.) 7.—Wittering Marsh.
C. dioica L. 7.—Still growing in Wittering Marsh (1933), E.B.B.

GRAMINEAE.

Our Grasses have been submitted to Mr W. Biddiscombe, who has kindly devoted much time and attention to them. All critical determinations are his, and the names set out here are given on his authority.

- Milium effusum* L. 7.—Southey Wood, Ufford.
Calamagrostis epigeios (L.) Roth 4.—Bainton, W. Ashton, W. Ufford, W.
 7.—Ailsworth Heath, W.
Deschampsia caespitosa (L.) Beauv.
 Var. *argentea* S. F. Gray 4.—Ashton, W.
Trisetum flavescens (L.) Beauv. 7.—Wittering Marsh, W.
 Var. *variegatum* (Mert. & Koch) ... 4.—Ashton, W.
Cynosurus echinatus L. 4.—Bainton Ballast Pits, W.
Koeleria britannica (Domin) Dr. 4.—Ufford, W.
 7.—Upton Heath, W.
Briza media L.
 Var. *albida* Lej. 7.—Wittering Marsh
Poa pratensis L.
 Var. *strigosa* Parn. 7.—Upton, W.
Glyceria fluitans (L.) Br. × *plicata* Fr.
 (= *pedicellata* Townsend) 7.—Upton Heath, W. Wittering Marsh, W.
G. plicata Fr. 4.—Wothorp, W.
 7.—Upton Heath, W.
 Var. *declinata* (Breb.) 4.—Wothorp, W.
Festuca elatior L.
 Var. *pseudo-loliacea* (Hack.) 4.—Bainton, W.
F. elatior L. × *Lolium perenne* L.
 (× *F. adscendens* Retz.) 4.—Easton-on-the-Hill, W.
F. Bromoides L. 4.—Bainton, W. Ufford, W.
**Bromus rigens* L. (= *maximus* Desf.) 4.—Bainton, by roadside, W.
 N.C.R. not only to *Flora of North-*
 amptonshire, but also to *Comital*
 Flora.
Brachypodium pinnatum (L.) Beauv.
 Var. *pubescens* S. F. Gray 4.—Ufford (Upton Lane), W.
 Var. *corniculatum* Breb. 7.—Upton Heath, W.
 (near possibly a ×) 7.—Upton (Upton Lane), W.
 Var. *compositum* Parnell 4.—Barnack, W. Duddington, W.
Agropyron repens L.
 Var. *Leersianum* S. F. Gray 4.—Ufford (Upton Lane), W.
Hordeum nodosum L. 7.—Upton, W.
Elymus europaeus L. 4.—Ashton, W. Barnack, W.
 7.—Ailsworth Heath, W.
Equisetum maximum Lam. 7.—Wittering, W.
Asplenium Trichomanes L. 4.—Barnack, W.
A. Ruta-muraria L. 4.—Ufford, W.
Dryopteris aristata (Vill.) Dr. 7.—Southey Wood, Ufford, W.
Ophioglossum vulgatum L. 7.—Ailsworth Heath, W.

VARIATION AND A VARIANT OF CERASTIUM VULGATUM
FROM DORSET.

W. B. TURRILL, D.Sc., F.L.S.

The study of intraspecific variation is becoming increasingly important with the advent of new methods of botanical research, which have often a very direct bearing on taxonomic problems. Taxonomy is, or should be, the alpha and omega of botanical investigations. The geneticist, cytologist, ecologist, and workers in other branches of botany need to have their plants identified with the utmost possible precision. On the other hand, their results may lead to revision of taxonomic opinions, such as the status to be given to some morphological entity or the interrelationships of a group of species. Most certainly the controlled breeding of plants and the intensive autecological field studies now being increasingly pursued are modifying our views with regard to the polymorphism of species. It is being shown that there are many kinds of variation within what is usually accepted as a taxonomic species and it is probable that the taxonomist will eventually be forced to modify both his theory and his practice. For the moment, the writer and some of his colleagues are collecting data and experimenting, in a non-revolutionary manner, with various possibilities.

It seems advisable to use the term "variation" in a wide sense to include all deviation from a standard. It is becoming customary to fix a specimen as the taxonomic type of a species. Such a specimen fixes the specific name to plants accepted as conspecific with it. It further supplies a standard for defining variation *in a taxonomic manner*.* Unfortunately for many common European species no real type specimen exists, no adequate figure was provided by the author of the earliest name, and the original description is frequently meagre. This state of affairs is often more unfortunate for the student of variation than for the nomenclaturist (1) (2). How far "type specimens" should be chosen for such species, how they should be chosen, who should choose them, and where they should be kept when chosen, are matters for careful thought. In the meantime it is often advisable to fix a standard for a species or subspecific unit from material in one of the public herbaria, or to fix a standard and to deposit the material in a public herbarium. Such a standard specimen at least gives an indisputable basis for research in the sense of avoiding vagueness and ambiguity.

That there are fundamentally different kinds of variation has been clearly shown by much recent work. Broadly speaking, there is fluctuation and genic variation. In the former, deviation in morphological and/or physiological characters is caused by different environmental fac-

*It is unavoidable that, with existing methods, the taxonomic type may or may not have characters coinciding with mean or modal values for the species.

tors acting on the same gene complex. In the latter, different gene complexes are acted on by the same or different environmental factors. Both fluctuation and genic variation require, however, a much deeper analysis than this and it is hoped to supply one, with a definite taxonomic bias, at a later date. One *must* admit that some deviations within any species are due to different environments in the sense that they only appear in these environments, while there may be others which indicate real constitutional differences. Both kinds of variation are much greater than acknowledged in any descriptive British flora. It is useless for the taxonomist to ignore variation. At least, if he does, he will become more and more ignored by workers in other branches of botany and the hope of combined team-work will be lessened. There arises, then, the important question as to how variations should be treated by the taxonomist. It is probable that some compromise is best for the moment between those who argue that varieties (genic variations) and forms (fluctuations) should not be given names and those who give names to every specimen showing more than a very small deviation from an accepted standard. The writer has previously pointed out (3) how absurd it is to attempt to give names to all varieties originating through hybridisation of accepted species, back-crossing, and the resultant segregation. Such varieties are combinations of characters and a simple mathematical exercise shows that there are frequently hundreds of thousands of combinations any of which may equally well occur as any other. To burden nomenclature with names for all of them is useless and absurd, to deny or finally ignore their existence is unscientific.

A similar problem (not, however, quite the same) has been solved for intraspecific hybridisation in *Silene vulgaris* (*S. Cucubalus*, *S. angustifolia*, etc.) and *S. maritima* by the adoption of letter and figure symbols by means of which any variety can be precisely defined in one or two lines of print in such a manner that any one variety (or any individual specimen) can be quickly and accurately compared with any other (4). The scheme avoids the absurdities of subordinate classification (5) or of character-naming of "varieties" (6). A similar scheme has been applied to intra-specific variation in *Glaucium* (7) and is being tested in other genera. It is capable of modification and has the great advantages of precision, conciseness, indefinite elasticity, and of avoiding additions to an overburdened nomenclature. It is possible that a great simplification and much increased accuracy of determination could be obtained in such genera as *Rosa* and *Rubus* by the use of a similar scheme with certain modifications. The problems of so-called sub-species and the difficulties inherent in the taxonomic study of apomictic plants (*Taraxacum*, *Hieracium*, *Alchemilla*, etc.) cannot be considered here, but it is obvious that existing treatments are very unsatisfactory.

There remain for consideration those numerous genetic variations which result directly from mutations. Plants showing these deviate from the type in one or more characters. A single gene mutation may modify quite a number of characters and conversely one character is

affected by many genes—indeed, by the gene complex. We cannot, therefore, balance genes and phenotypic characters in any simple quantitative manner, such as “one gene, one character” or “one character, one gene.” Yet gene mutations are of great scientific interest and the taxonomist must recognise them by description. He can apply names to them as variant units of his specific type, or he can use symbols other than Latin names, or he can modify his specific description (and sometimes his differential diagnosis) to include their characters. The last method has the great disadvantage that an emended specific description is needed whenever a new mutant is found. The least ambiguous method taxonomically is to have a full description of the type specimen and to give all deviations from this recognition as varieties or forms. It has, however, to be remembered that the type specimen has, as such, no more botanical value than any other equally well prepared specimen. That is to say, it can tell us no more about the characters or distribution of the species (which is a general population) than any other specimen. There is also the difficulty, already indicated, that the type specimen may have characters deviating widely from the species (population) as a whole. This difficulty is probably not often acute or of practical importance. It is doubtful if a full symbolic scheme can often be used advantageously for varieties originating directly from mutations and occurring spasmodically in a species, until intensive and extensive studies (herbarium, field, and controlled breeding) have been made on the species as a whole. That is to say, there has to be a tentative recording of such varieties, and names may well be given to such as are particularly well-defined morphologically and/or have some special interest (ecological, phytogeographical, genetical, or economic). At the same time it is undesirable to publish new names merely for the sake of labelling. An unnecessary name is a curse and no new name should be given unless it is really needed.

Some of the above remarks are illustrated by a *Cerastium* collected by Mr J. E. Lousley in Dorset and sent by him to Kew for identification. No difficulty was experienced in naming the plant *Cerastium vulgatum* L. var. *murale* (Desp. ex DC.) Gren. The interest lies in deciding what is its status relative to or within the species *C. vulgatum*. This last name is adopted in the sense of Babington (8, p. 65). Rouy and Foucaud (9, p. 206) use the name *C. triviale* Link, and Ascherson and Graebner (5, p. 637) the name *C. caespitosum* Gilib.

The following is the known history of the variant. De Candolle (10) published, as a species, *Cerastium murale*, with the following description: “Au milieu des nombreuses variations du *C. commun*, on ne peut affirmer d’une manière positive si cette plante est une espèce particulière; elle paraît cependant distincte par sa racine plus dure, peut-être vivace, par ses tiges droites, un peu roides, par sa superficie très-velue, mais non visqueuse; par ses feuilles pointues et non très-obtuses; elle ne peut se confondre avec le *C. visqueux*, parce que les pédicelles n’y sont pas plus longs que les fleurs. 1? Cette plante m’a été communiquée par M. Desportes, qui l’avait observée aux environs du Mans.” In the

Prodromus (11) he supplies a Latin description in the following terms: "*C. murale* (Desp. in DC. Fl. Fr., 5, p. 609), hirsutum suberectum rigidum, foliis ovato-oblongis acutis numerosis, floribus fasciculatis longitudine pedicelli, petalis emarginatis calycem aequantibus, capsulis oblongis calyce calycem vix superantibus. ? Circa Coenomanum. (v.s. comm. à cl. Desp.)."

Holandre (12) supplied a description in French which also seems worth quoting: "Elle est très-velue et très rameuse, en touffes composées de tiges droites, roides et dures, hautes de 2 à 3 pouces, garnies de feuilles très-nombreuses, plus longues que les entrenœuds, ovales-oblongues, chargées de poils et blanchâtres ainsi que la tige et les pédoncules; fleurs ramassées en un bouquet serré au sommet de chaque tige, sur des pédoncules très-courts; pétales de la longueur du calice; capsules, oblongues, dépassant à peine le calice; capsules oblongues, dépassant à peine le calice. Bisann. ou viv. Fl. en juin. Sur les rochers et sur les murs; je l'ai recueilli sur la montagne du Calvaire, près de Sarrelouis."

A specimen of Holandre's is preserved at Kew and, with the above descriptions, serves to fix Mr Lousley's plant as belonging to the same entity.

Grenier (14) reduced the species to *C. vulgatum* var. *murale*. Rouy and Foucaud (9, p. 207) use the name *C. triviale* Link var. *murale*. Ascherson and Graebner (5, p. 642) follow Gürke (15) and place the plant (as a sub-var.) under *C. caespitosum* and note that it occurs "auf Mauern, an Felsen und in Geröllern sehr zerstreut." Preuss (13) describes and figures, under the name *C. triviale* fr. *maritimum*, a plant which is very similar to that now being discussed and which belongs to the same taxonomic entity so far as one can judge from description and figure only. It was found between Gdingen and Oxhöft, in East Prussia at the time of publication, now in Polish territory.

Since *C. vulgatum*, *C. triviale*, and *C. caespitosum* are, from the standpoint of the above authors, intended as names of the same species, it follows that the supposed taxonomic entity we are considering has been accepted as a species, a variety, a sub-variety, and a form. Further, the possibility of hybrid origin, with *C. vulgatum* and *C. viscosum* L. (*C. glomeratum* Thuill.) as parents, cannot be entirely ignored.

Mr Lousley has kindly supplied the following field notes regarding the material collected by him in 1932 and 1933: "It grows on an unenclosed part . . . near Wareham, Dorset, in company with *Trifolium glomeratum* (and I think *scabrum*), *Sagina apetala*, *Potentilla argentea*, *Hypochoeris glabra*, *Sagina ciliata*, *Thrinicia hirta*, and other *Cerastia*—the typical vegetation of heaths of that part. I have no doubt at all that it is native. The *Cerastium* grows in small quantity scattered over about an acre of ground. It is not a starved form, as I at first thought, as it remains quite constant when growing in the shelter of other vegetation. I do not think it is connected with nibbling by rabbits, as there is plenty of *glomeratum* and *vulgatum* practically bitten down to the ground, but showing no malformation."

The following description has been drawn up from Lousley's material: A perennial or biennial low-growing plant growing in tufts. Stems much branching from the base, the flowering ones 1.5 to 10 cm. high, the internodes very short and mostly hidden by the leaves, in the upper part with a dense indumentum of spreading hairs of different lengths but eglandular, in the lower part tending to become glabrescent. The leaves are oblong-lanceolate, sub-acute, sessile and only slightly narrowed at the base, about 7 mm. long and 3 mm. broad, with long distinct hairs on both surfaces. In most of the flowering stems the leaves are longer than the internodes and, in the dried material, they stand erect, so that one pair is imbricated over the next higher pair and little or no stem is visible till the leaves are bent back. Inflorescence of 2-16 flowers, compact, the pedicels up to 4 mm. long, but generally much shorter than this and the flowers frequently nearly sessile, densely hairy as the upper stem internodes. On several flowering branches the stem internodes are rather longer and the pedicels reach a maximum length, giving a looser appearance to the inflorescence. Bracts hairy, upper with narrow membranous margins; lower herbaceous. Sepals 5, 5 mm. long, with membranous margins. Petals (in all flowers dissected) 4, oblong or oblong-spathulate, apex emarginate, 3 mm. long. Capsule often poorly developed, splitting early into valves and not projecting beyond the persistent calyx; in a few of the looser inflorescences single capsules project 1-2 mm. beyond the sepals. Apparently relatively few good seeds developed, but some have been seen in the better formed capsules and these had the characters of those of *C. vulgatum* (typical British material) but were slightly smaller.

The account and description given above must confirm the identification of the Dorset plant as *C. vulgatum* L. var. *murale* (Desp. ex DC.) Gren., and this is the best tentative determination if a name is really desirable. Yet such a determination tells us little beyond indicating an unknown relationship with *C. vulgatum* L. and permitting the statement that plants with similar characters have occurred in France and the Polish Corridor.

Various questions can be asked which can only be answered by further intensive investigation. Does the plant set viable seed? If it is itself fertile, do all or some of the offspring from selfing reproduce the supposed varietal characters? If not, what are the environmental causes of the peculiar characters, Are they due to disease? (Some cells with dark contents were noted in association with some of the leaves and Miss E. M. Wakefield has kindly determined the presence of *Sep-toria Cerastii* Rob.) Do plants showing characters intermediate between this and typical *C. vulgatum* occur in the neighbourhood? Can the var. *murale* and typical *C. vulgatum* be crossed and with what results to the F₂ generation? Is the var. *murale* better adapted to certain environmental conditions than is typical *C. vulgatum*? Are there any striking features in the life-history—seed germination, seedling behaviour, flowering period, duration, seasonal aspects, etc.? And so on. Answers to these questions might well confirm the taxonomic status of the plant

as a variety of *C. vulgatum*, or might, on the other hand, show it to be a mere habitat form, an aberrant form caused by some pathological agent, or a hybrid or hybrid segregate.

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MINTS THAT SPORT.

J. FRASER.

Collectors of Mints may have noticed that the early leaves of some of the species look quite different from those present at the time the plants are in bloom, when they are usually collected. *Mentha longifolia* Huds. is noticeable in this respect. The primordial leaves in May and June look quite green and apparently glabrous to the naked eye, but a lens will show that they are thinly pubescent, with short hairs on both sides. By the time the plants come into bloom most of these primordial leaves have fallen, and the upper cauline leaves are densely pubescent on the upper side, tomentose beneath, and their whole aspect is grey. \times *M. niliaca* Jacq., var. *sapida* (Tausch) Briq., behaves in a similar way, being relatively thinly hairy in early summer and grey-white when in bloom. Briquet described specimens from Angus in 1913 as *Valde lanigera*. I do not consider these two samples as sports. The condition of the early leaves merely indicates that the natural situation of Mints is in or near water, and the ultimate hairiness a provision of nature to prevent undue transpiration (loss of water).

It is well known, I think, that *M. rotundifolia* Huds. gathered by roadsides and other dry places has very hairy or tomentose leaves; but in wet places and on river banks the leaves are thinly pubescent above but sometimes, at least, a little more hairy beneath. Specimens of this type I gathered in 1885 on the banks of the R. Towy, at Carmarthen, with the roots in water, and also on wet ground at Pennar, Pembroke. Plants in the garden from Eglorshayle, Wadebridge, give more densely pubescent leaves on the upper part of flowerless shoots, but the flowering ones are quite thinly pubescent. The plants at this station would appear to have escaped from a garden or were outcasts, for the leaves were slightly variegated with white for the first few years of cultivation. I have had no tomentose leaves of this species in the garden for the last thirty years, and flowers of one were white. This seems to me a form of sporting, induced by the tilled soil and an adequate supply of moisture.

Vegetative sporting of quite another kind occurs amongst hybrids. In 1914 I had a root of *M. rotundifolia* \times *spicata* (\times *M. cordifolia* (Opiz) Fraser), from Swanage, Dorset, and in 1922 it gave a hairy-leaved sport, with narrow leaves measuring 2.5-6 cm. long, and 5-19 mm. broad. This is a sport towards *M. spicata* in the narrow leaves, and slender flower spikes; and derives a dense pubescence and rugosity of the leaves from *M. rotundifolia*. A few years later the same hybrid gave rise to a sport with leaves like \times *M. cordifolia*, but densely pubescent above and softly tomentose beneath; the stems and branches were also tomentose. During the very dry season of 1933 the leaves were lanceolate and more

or less subcordate at the base. Whether or not the leaves will retain this narrow form remains to be seen. $\times M. cordifolia$ has been a subglabrous Mint from the time of Linnaeus and Smith, with the smell and flavour of *M. spicata*.

By some authorities *M. piperita* L. is considered to be a hybrid, namely, *M. aquatica* \times *spicata*, and as the type and varieties are mostly always functionally female, they are suggestive of this supposition. The leaves of the type vary considerably in the amount of pilosity. Only once have I seen the var. *subcordata* with a few perfect stamens. I have seen four varieties varying considerably in the width of the leaves, and it is just possible that all have arisen by sporting vegetatively from the original or from one another.

$\times M. rubra$ (Sm.) is reputedly the hybrid $\times M. verticillata$ \times *spicata*, and as described by Smith the calyx tube and pedicels are quite glabrous, with a few cilia on the calyx teeth. The leaves have a sprinkling of hairs on both faces, especially on the midrib beneath. The variety *raripila* is considerably more hairy on the stem, leaves and their petioles. In the *B.E.C. Report* for 1929, I described the variety *Turreffi*, from a gathering of eighteen specimens gathered by the Rev. Francis Turreff on the banks of the Mill of Tifty Burn, Fyvie, Aberdeenshire. These were modelled on the plan of var. *raripila*, but the stem, leaves and petioles were very much more hairy but very irregularly so in different specimens, and on different leaves on the same stem. The tube of the calyx was thinly furnished with hairs, and the pedicels were glabrous or thinly sprinkled with hairs. Calyx and pedicels thus contravene or violate the recognised description of the group, yet I can see no evidence of a second cross with $\times M. verticillata$. The calyx is tubular as in the type and most other varieties. I regard it as a sport from the var. *raripila* to which it is most closely allied, or independently from any other form. The composite characters of hybrids can become disassociated from one another vegetatively. We have evidence of this in hybrid Chrysanthemums, which often give rise to flowers of two different colours on the same plant, and sometimes to two forms of flowers. Roses, Carnations and Dahlias often hybridised or crossed in gardens may give two colours on the same plant, or half a flower of one colour and the other half different, and vegetatively in all these cases. Growers of these plants take cuttings of the sported portions, which remain permanent, or may sport again into a different colour.

The $\times M. gentilis$ group, or some of them, are very much given to sporting. The calyx tube and pedicels are normally glabrous, these characters being derived from the *M. spicata* parent. The reputed parents are *M. arvensis* and *M. spicata*. I have a sheet of $\times M. gentilis$ from Swanage, Dorset, with a few hairs on the calyx tube; another from Potterne, Devizes, with numerous hairs all over the calyx tube and, occasionally, a few on the pedicels; one from Speymouth, Morayshire (Coll. K. D. Little, 1929), with short hairs on the tube, especially at the base; and one from Stanmore, Middlesex (Coll. J. E. Lousley, 1928) in which the calyx is almost nude, even on the teeth.

Specimens from Broadham Green, Oxted, Surrey (Coll. Mrs R. W. Robbins and four others), are notable for the great length of the cilia on the calyx teeth. The reduced forms with extra hairs on the calyx and pedicels were in sandy soils or had suffered from drought. A specimen from a stream near Colbourne Station, Isle of Wight (Coll. J. H. A. Steuart, 1894) is notable for the great size of its leaves, resembling those of $\times M. rubra$, but distinguished from that by its campanulate calyx. All these variations are disconcerting to collectors, but one must be guided by technical characters, when the specimens are more or less disguised.

$\times M. gentilis$, var. *Wirtgeniana* (F. Schultz), sometimes sports with a few hairs on the pedicels, as shown by a specimen collected by H. J. Riddelsdell and Mrs Wedgwood at Symonds Yat, W. Gloucester, in 1925. Typically, $\times M. gentilis$ (L.), var. *cardiaca* (Baker) Briq., is subglabrous, the hairs being most prominent on the bracteoles and calyx teeth. It varies greatly in the length and breadth of the leaves and in being more hairy than it should be. Specimens I collected at Seven Stars, Ripley, Surrey, in 1901, had leaves up to 2 cm. wide. In a dry spot at the same station in 1912 the leaves were only 6-12 mm. wide. In the garden they became 1-7 cm. wide. Specimens from Woking in 1925 had leaves up to 6 cm. long and 1-9 cm. wide. In the garden they were wider, especially the primordial leaves. All these variations are due to soil and an adequate or inadequate supply of moisture. The sporting in this hybrid consists in the development of hairs on different parts of the plant. In 1925, amongst a colony of the typical form, in Fair Oak Lane, near Oxshot, Surrey, I collected a branching plant with narrow leaves, hairy stems and pubescent leaves, densely so on the upper ones and the floral bracts (leaves of some writers). While some of the whorls had only an excess of hairs on the calyx teeth, others had the calyx tube hairy all over. I have also passed through my hands a specimen collected by Dr Druce at Newbury, Berks, having short, ovate leaves, with a considerable development of hairs, as well as on the stems.

I have only seen one authentically named specimen of *M. gracilis* Sm., and that a poor one, collected at Saham, Norfolk. Smith's description just fits $\times M. gentilis$ L., var. *cardiaca* (Baker) Briq. Under it he quotes *M. gracilis*, Sole *Menth.*, 37, t. 16, and *M. gentilis*, Sole *Menth.*, 35, t. 15. Both of these figures can fit var. *cardiaca* quite easily. Smith had difficulty with his Mint and said: "In garden specimens I find the floral leaves vary too much in size to enable me to come to any positive determination." He also quotes *Ger. em.*, 680, *ex icone*, who named it *Mentha cardiaca*, Heart Mint.

NOTES ON THE VARIATION OF THE BRITISH SPECIES OF
ZOSTERA.

By R. W. BUTCHER, Ph.D., F.L.S.

INTRODUCTION.

Grass Wrack, Eel Grass or Widgeon Grass (*Zostera* spp.) is an abundant plant in sandy or muddy estuaries, on the sea-shore and sometimes in salt lagoons. It is so abundant and widely distributed that, like so many common plants, it is frequently passed unnoted or unrecorded.

This plant has been brought into prominence during the last two years by the fact that it is reported to be dying away, through disease or some other cause, in a great many places along the Atlantic seaboard of Canada (9) and the United States (4) (8); in France (7), Holland, England (4) and Denmark (2). A survey, during autumn 1933, of a large part of the English coast where *Zostera* occurs, was made by the author in the course of his official work for the Ministry of Agriculture and Fisheries in order to discover the state, quantity and condition of the plant in this country. The report of this survey has been published in the "Journal du Conseil pour l'exploration de la mer" (3) so the ecological side of the problem need not be dealt with here.

The findings, however, have raised a very important taxonomic question with regard to the various forms and species which occur in this country. Briefly, as the result of the survey it was found that, whereas typical *Zostera marina* L. had evidently decreased to a marked extent, the forms usually known as *Zostera marina*, var. *angustifolia* Roth and var. *stenophylla* Aschers. and Graebner, and the second British species, *Zostera nana* Hornem., were still quite plentiful.

The question therefore arises as to whether these forms, known as *Zostera marina*, var. *angustifolia*, should be considered as (1) separate species, (2) hybrids and segregates between *Zostera marina* and *Z. nana*, (3) forms immune from the disease which is considered to be responsible for the diminished quantity of the plant as a whole or (4) merely ecads induced by a change of physiological or environmental conditions.

CHARACTERS OF THE SPECIES.

The chief taxonomic differences of the two species of *Zostera* which occur in Britain, though outlined in most works on the British flora, are not sufficiently comprehensive. The matter is dealt with more thoroughly in a monograph of the genus by Setchell (12). The chief differences may be summarised as follows:—

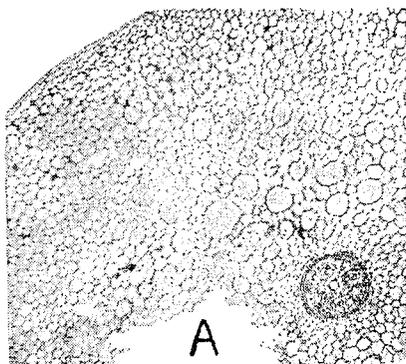
Zostera marina L., type.
Stem.—Transverse sections shows fibrous bundles in the outermost layers of the cortex and no starch grains (see fig. 1).

Zostera nana Hornem.
Transverse section shows fibrous bundles, not in the outermost cortex, but about one-third of the way to the centre. Starch grains abundant in cortical cells (see fig 2).

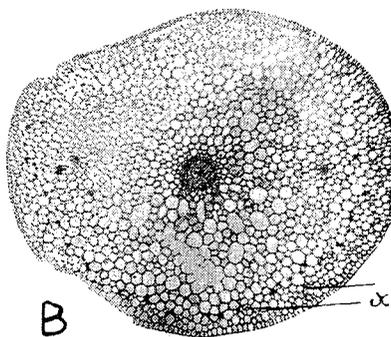
FIG. 1.

TRANSVERSE SECTIONS OF ZOSTERA STEMS.

α = fibre strands.



Z. MARINA L. from Walton on the Naze.



Z. MARINA, var. ANGUSTIFOLIA Hornem. from R. Blackwater.

ments of the fibrous bundles and all forms of the variety *angustifolia* have a stem identical with that of *Z. marina* L., type.

2. *Leaf*. The distinguishing feature of *Z. marina*, var. *angustifolia*, is the size of the leaf and, reading the brief descriptions in works on the British Flora, one would imagine that this plant occupies a position intermediate between the two species. This is hardly so, however, for, as mentioned above, all sizes of leaf between 4 mm. and 0.5 mm. wide may be found. Thus it is impossible to decide whether certain plants with leaves about 4 mm. wide should be considered as narrow-leaved forms of the type or broad-leaved forms of the variety. Similarly with the narrowest leaved forms, it is impossible on the size of leaf alone to distinguish specimens of *Zostera nana* and *Z. marina*, var. *angustifolia*, since undoubted examples of the former possess leaves up to 2 mm. wide, while plants with the stem and flower characters of the latter have leaves as narrow as 0.5 mm.

The veining of the leaves also shows similar variation. Typical *Z. marina* has 7 or 5 veins, 3 is the rule in the var. *angustifolia*, while *Z. nana* has 1 or 3 veins. The number of veins, however, shows no relation to the width of the leaf so that some plants with leaves 3 mm. wide and, therefore, correctly referred to var. *angustifolia* may possess 5 veins, while others of the same width have 3 veins. Similarly the smallest leaves of var. *angustifolia*, like *Z. nana* have only 1 vein. A further complication arises in the position of the lateral veins. In some 3-veined plants these are in the centre of the space between the margin and the midrib, whereas in other 3- or 5-veined leaves the veins gradually move towards the margin, and so do not remain central throughout the length of the leaf. Similarly the outermost veins may run into the margin thus making the lower part of a leaf 5-veined, and the upper part 3-veined!

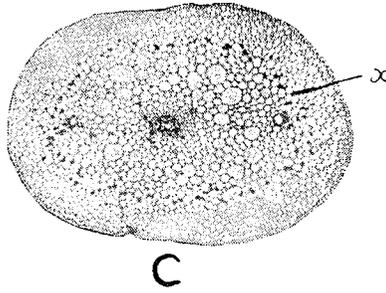
Ascherson and Graebner (1) describe the plant with leaves 3-4 mm. broad and possessing three equidistant veins as *Zostera marina*, var. *stenophylla*, but since the numbers and situation of the veins have proved to be so variable, a form based on such characters is obviously unsatisfactory.

Since the size of the leaf gives to the var. *angustifolia* its characteristic appearance it must follow that, as this size can vary within wide limits, so also does the appearance of the plant. As, also, there is a continuous gradation of size of leaf between that possessed by typical *Z. marina* and that possessed by the smallest forms of *Z. nana* and *Z. marina*, var. *angustifolia*, the range of variation of these latter forms is set artificially by the limits set to the range of variation of this same character in the type of the species. Such a variety appears, therefore, to be valueless from a taxonomic point of view.

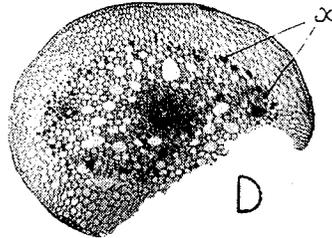
The variations in size shown by various populations of *Zostera* may be taken either as evidence of hybridisation and consequent segregation, or for the plasticity of the species under various conditions. Hence they are of no help in solving the problem of the status of these forms.

FIG. 2.

TRANSVERSE SECTIONS OF ZOSTERA STEMS.
x = fibre strands.



Z. NANA Roth, from Pagham Harbour.



Z. NANA Roth, from Ryde, showing the starch grains more clearly.

ZOSTERA MARINA × *NANA*.

The existence of a hybrid between *Z. marina* and *Z. nana* is a reasonable hypothesis since the two species, together with all the varying forms, occur in the same locality. In addition, the peculiar pollination of the plant would favour crossing. Long thread-like pollen grains are released into the water and these are caught up indiscriminately by projecting objects including the styles of the appropriate plants. If such pollen grains from *Z. marina* can fertilise the ovaries of *Z. nana* and *vice versa*, then hybrids should frequently occur. Yet, as far as can be ascertained, no var. *angustifolia* forms exist in herbaria or elsewhere, which show any of the salient characters of *Z. nana*, except those of stature and size of leaf which, as indicated above, are not to be relied upon. The record of the hybrid appears in the *London Catalogue* (10) and Druce's list (6) doubtless through a specimen of Marshall's from Hayling Island which is labelled "*Zostera marina*, var. *angustifolia*" and "perhaps *Z. marina* × *nana* since both these species occur here." This, however, cannot be taken as proving the hybrid origin. There should be an intermingling of characters of the two parents or dominance of one parent linked with a constancy of form. Such, however, is not the case. In this, as in many other so-called hybrids, the only convincing method of proving their status is to produce the hybrid from the putative parents.

CONCLUSION.

Summarising, two species of *Zostera* undoubtedly exist in Britain both of which are polymorphic. These are *Zostera marina* L. and *Z. nana* Hornem.

Because of its greater abundance, the forms of *Z. marina* are more obvious than those of *Z. nana* and have been called *Z. marina*, var. *angustifolia* Roth.

This variety or collection of forms possesses the salient feature of *Z. marina* and none of those of *Z. nana* save the small size of leaf which is very variable.

Such forms are scarcely worthy of varietal rank.

It is not clear how these forms have arisen.

There is no real evidence that they are the result of hybridisation between the two major species, though this is possible. Even if hybridisation between *Z. marina* and *Z. nana* had not produced these forms it is quite likely that cross-pollination of the forms themselves has helped to produce even greater variety.

They may be forms induced by local environmental conditions, but cultivation of the plants can alone prove this.

There is no doubt that in 1933 these forms were more abundant than the type which, for some reasons, had been disappearing for many years. Hence there is a possibility that these forms have increased because they have survived a disease, but the disease would hardly have produced them in the first place.

ACKNOWLEDGMENTS.

My best thanks are due to Mr A. D. Cotton of the Royal Botanic Gardens, Kew; to the keeper of the Bailey Herbarium, Manchester, for loan of specimens, and to the very large number of botanists who helped by sending information about the state of *Zostera*.

A collection of plants on which this paper is based has been deposited in the Herbarium, Royal Botanic Gardens, Kew.

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THE CLASSICAL CARPEL AND RECENT ATTACKS.

JOHN PARKIN, M.A., F.L.S.

The Carpel of the Flowering Plants (Angiosperms) is regarded on orthodox lines as the equivalent of a leaf folded upwards and along the midrib, so that the margins of the two halves of the leaf cohere, enclosing a cavity, the ovary, in which are borne the ovules destined to become the seeds. The apical region of the midrib (dorsal suture) is fashioned into the pollen-receiving mechanism, the stigma. Primitively the ovules are considered to be arranged along the incurved cohering margins of the leaf, known as the ventral suture. Such an unmodified carpel is to be found in the follicle of the Ranunculaceae, e.g., in *Caltha* and *Trollius*. An early type of flower was probably characterised by having an indefinite number of pluriovulate carpels arranged spirally on an elongated axis (receptacle). Though the British flora does not afford an example of this arrangement, a near approach thereto is seen in *Myosurus*, which has in fact numerous carpels borne spirally on a long receptacle, but these are only uni-ovulate. In some of the Magnoliaceae, however, the carpels so arranged may each have several ovules.

The whole of the female part of the flower is now generally spoken of as the gynœcium. The older term, pistil, is perhaps better relinquished as being somewhat confusing.* The gynœcium, then, is composed of carpels, just as we speak of the andrœcium as composed of stamens. From such a primitive gynœcium, as defined above, it is not difficult to derive the various forms which the female part of the flower has assumed in existing Angiosperms. The main steps taken in gynœcial evolution may be stated as follows:—(1) The shortening of the receptacle with a reduction in the number of the carpels and the substitution of a whorled for a spiral arrangement; (2) the cohering together of the carpels so as to form an ovary of several compartments (loculi), or, it may be, by further modification one of a single loculus; and (3) the hollowing out of the receptacle so that the carpels become sunk, as it were, in the floral axis with the ultimate production of the inferior ovary.

On the above view of carpel morphology certain difficulties in the interpretation of some advanced syncarpous gynœcia have arisen. These are to my mind of a minor character and do not render untenable the above conception of the carpel. For instance, much unnecessary controversy has been raised over such questions as to whether certain

*The term, pistil, has been used in two senses, (1) for the whole female part of the flower when the carpels composing it are joined together (syncarpy) and (2) for each individual carpel when these are free from one another (apocarpy).

gynœcia may not be partly cauline in constitution, and certain carpels and ovules terminal rather than lateral in position. Positive answers to these queries have been supposed to invalidate the foliar conception of the carpel. It is not difficult to see how a syncarpous gynœcium can become partly cauline in composition through the adhesion of the concrescent carpels to that part of the receptacle which may be prolonged beyond the point of their attachment to the flower-axis. When the carpels in an apocarpous gynœcium are reduced to unity, as for example in the Leguminosæ, the single carpel may assume a terminal position through the growing point of the flower-axis ceasing further development after the emission of the carpel primordium, or, in other words, the growing point may be considered as wholly absorbed in the production of this single primordium. A similar line of reasoning can be advanced to explain the terminal position of the ovule which is to be found in a few syncarpous gynœcia with unilocular ovaries and solitary ovules, *e.g.*, in the Polygonaceæ. For descriptive purposes we may apply such terms as cauline and terminal to certain carpels and ovules, at the same time recognising that these are not primitive but derivative positions arising from reduction, concrescence, compression or displacement.

Another difficulty also over-emphasised is the presence in certain families of the so-called commissural stigma—the centering of the stigmatic surface over the ventral instead of the dorsal suture. This will be briefly referred to later.

In recent years the classical conception of the carpel and gynœcial morphology generally have been seriously challenged in more than one quarter.

CARPEL POLYMORPHISM.

Miss E. R. Saunders, in her genetical work on the Stock (*Matthiola incana*), came across some exceptional fruits which led her to a fresh enquiry into the composition of the Cruciferous gynœcium. The interpretation of this has in the past been a matter of some dispute as to whether two or four carpels are involved in its construction. Lindley, a century ago, put forward the 4-carpellary view in order to explain the presence of the commissural stigma. That astute botanist, Robert Brown, showed that this difficulty could be surmounted otherwise than by imagining the presence of an additional pair of carpels. Eichler accepted Brown's explanation, and ever since the 2-carpellary view has been the one usually assumed and taught. Miss Saunders has not only revived the 4-carpellary interpretation, but has made a determined attempt to revolutionise the whole domain of gynœcial morphology by postulating the presence in most gynœcia of one or two other types of carpel besides the conventional hollow or valve one set forth above (9). These supposed types she has named the solid and semi-solid respectively and her whole theory Carpel Polymorphism (10). This is based almost entirely on vascular anatomy.

The theory was launched by Miss Saunders ten years ago, and in a series of papers published since she has fairly well surveyed by means

of its most groups of the Angiosperms, including both those of the Monocotyledons and Dicotyledons. Hardly a gynœcium escapes alteration, unless it be some of the Ranunculaceae and allied families with free carpels. Usually the number of carpels in the gynœcium is doubled—ordinary valve carpels alternating with solid or semi-solid ones. But in some of the Cruciferae she finds as many as sixteen and in *Eschscholzia* even twenty instead of the orthodox two! One thought the Leguminous pod would have been above suspicion and still held to be comparable to the single follicular carpel of the Ranunculaceae. Not so. As tested by the polymorphic idea it is considered to consist usually of two fused carpels—one solid and the other semi-solid. But it may be composed of more, *e.g.*, in *Arachis* (the ground or monkey nut) ten to twelve solid carpels are held to be present, corresponding to the similar number of parallel and equally strong vascular cords running the full length of the pod!

Miss Saunders put forward her theory with so much assurance and replied to her early critics with so much vigour that in some quarters a certain amount of sympathy was shown towards it. Not only seeing no firm basis for such a superstructure, but also fearing that on her authority carpel polymorphism might creep into elementary text books or be taught to students, I felt constrained to criticise the theory adversely as early as 1926 (8). Carpel morphology on orthodox lines is sufficiently complex without further complicating it by the addition of this polymorphic speculation, unless there are adequate grounds for doing so. Incidentally, the theory has also been opposed by Professor Eames (4), Dr Agnes Arber (2), and Professor Bugnon (3), and when it came up for discussion at the last International Botanical Congress held at Cambridge in 1930* no one except the originator herself spoke in favour of it. Quite recently it has been referred to as a theory in which "no one believes except its author."† Hence it would seem to be unnecessary to discuss it further except to say that it is totally lacking in a foundation based on comparative morphology, and relies almost entirely on the peculiar interpretation of one form of evidence—the vascular. To imagine nearly every stout fibrovascular cord running longitudinally as the midrib of a carpel is surely bordering on the fantastic.

A theory, even if proved unsound and so unacceptable, may yet have been of use in stimulating enquiry. This has happened to some extent in the case of carpel polymorphism. On the one hand, attention has again been turned to the composition of the Cruciferous gynœcium, and, on the other hand, to carpel morphology generally.

THE CRUCIFEROUS GYNŒCIUM.

Professor Eames, a specialist in plant anatomy, though strongly opposed to the polymorphic theory as applied generally, has by it been

*Report of 5th Inter. Bot. Congress, Cambridge, 1931, p. 295.

†*Nature*, November 25th, 1933, Vol. 132, p. 803.

led to a re-examination of the Cruciferous gynoecium, and has become a convert to the 4-carpellary interpretation on novel lines (5 and 6). This gynoecium is held to consist of two whorls of two carpels each. Those of the lower (outer) whorl are of the usual valve pattern but sterile. Each carpel of the upper (inner) whorl has become so compressed as to lose its loculus entirely, and in the process the ovules have been, as it were, forced through the collapsing carpellary wall, and thus come to lie in the loculus of the carpel of the outer whorl. The author is careful to state that he believes this to have taken place in evolution (phylogenetically), since there is in development (ontogenetically) no actual evidence for it. Though Miss Saunders and he reach a somewhat similar conclusion regarding the constitution of the Cruciferous gynoecium, viz., the presence of a pair of sterile valve carpels and a pair of solid fertile ones, they do so in different ways. Miss Saunders's solid fertile carpel appears to have no past! She postulates its presence. As to how it arose she does not enlighten us. Eames *does* show how his solid carpel could have arisen, but its mode of origin, though ingenious, is so startling and unique as to make us sceptical, unless some clear ontogenetical evidence can be produced for it either from the Cruciferae or from one of the allied families. He does refer briefly to the Fumariaceae and the Capparidaceae, families in this circle of affinity, but the evidence he gleans from these is meagre and unconvincing. The Papaveraceae, a more promising family for supplying evidence, was not studied.

Eames's theory is founded on the presence in the ventral suture (commissure) of the Cruciferous gynoecium of one or two inverted vascular bundles situated ventrally (internally) to the more prominent main bundle. The vascular supply of the follicle, generally regarded as the simplest type of carpel, consists of one median cord forming the midrib bundle and two lateral forming the marginal or placental bundles which supply the ovules. Owing to the incurving of the margins of the carpellary leaf the phloem and xylem of these placental cords become orientated in the opposite way to what they are in the midrib bundle. Such a vascular bundle is described as inverted. Eames sees, therefore, in the venation of the commissure the complete vascular supply of a valve carpel which has become so compressed as to have lost its loculus, to have squeezed out its ovules and so been rendered solid. It is putting, I think, too great a strain on the inverted bundle as evidence.

Owing to the carpellary make-up of this gynoecium being once more in dispute, Dr Agnes Arber, one of our leading morphologists, steps in and examines anatomically for her own satisfaction the Cruciferous flower (1). She comes to the conclusion that the 2-carpellary rather than the 4-carpellary theory should be retained as "an instrument of description," and adds characteristically:—"To ask how many carpels are involved in such a gynoecium is a purely scholastic question which can never receive an answer, because no answer exists." I am afraid I am not philosophically minded enough to appreciate to the full this qualification of her main conclusion. At any rate, we may at present

rest content with the conventional view that the Cruciferous gynœcium is composed of two conerescent carpels with parietal placentation, and that the cross-partition (the replum) is of a secondary character arising from placental ingrowths. This interpretation is supported on comparative grounds. Similar gynœcia without or with partial partitions are to be found in the Capparidaceae and Papaveraceae. The commissural stigma usually present in the Cruciferae is not necessarily a difficulty in the 2-carpellary interpretation. It can be regarded as derived from the fused stigmatic margins of adjacent carpels. This can be readily followed in the Papaveraceae.

ACARPY.

The researches to which attention is now directed, whatever else they may lack, do not lack originality! Miss Saunders with her polymorphic theory generally increases the number of carpels in a gynœcium. Professor McLean Thompson, on the other hand, abolishes the carpel altogether! There is no such thing as a foliar carpel—at any rate in the two groups of Angiosperms he has so far investigated. Hence the term, acarpy.

Aroused by Miss Saunders's interpretation of the legume, he examines in great detail the development of the flower in the Leguminosae (16). Not only does he reject *in toto* the polymorphic idea but, instead of maintaining the current view, comes to the novel conclusion that the ovule-bearing organ of this order of plants is a flattened stem-structure—a phylloclade, in fact—the margins of which have curved inwards, enclosing the ovules. He imagines the primitive Leguminous flower to have terminated in a stalked and branched gynœcium bearing phylloclades with exposed ovules. A figure of this hypothetical flower is given (16, p. 43). The single pod of the Leguminosae has been reached through the reduction of the phylloclades to unity, the enclosure of the ovules and the suppression of the stalk (gynophore). Dr Newman, in a recent investigation of the Australian Acacias (7), sees no evidence for either the polymorphic or phylloclade view, and is in favour of retaining the classical interpretation of the legume as "a unitary foliar structure."

McLean Thompson's second elaborate study (17) has to do with the development of the flower in quite a different group of plants, viz., the Monocotyledonous order, Scitamineae, which includes the bananas, cannas, gingers, etc. These plants have a 3-locular inferior ovary. The gynœcium is consequently regarded on orthodox lines as composed of three united carpels sunk in the receptacle. Not so Thompson. If I understand him rightly he regards the ovules as originally borne directly on the hollowed out receptacle without any carpellary structure intervening. The styles with their stigmas are looked upon as independent organs which have arisen from sterilised stamens! A drawing is given of his imaginary ancestral Scitaminean flower (17, p. 108).

We have already seen to what apparent absurdities reliance wholly on one kind of evidence, the vascular, may lead. One is tempted to

see in these conclusions of McLean Thompson something of the same character. He relies wholly on another kind of evidence, the ontological, ignoring the comparative. If the Scitamian flower had been the only one extant, then the ontological method would have been about the only one available for its elucidation, and his interpretation might possibly have been entertained. Though the Scitamianae are a well-defined order of plants and not closely linked to any other, yet they belong to the Monocotyledons, in which can be traced the gradual evolution of a 3-carpellary gynæcium at first apocarpous, then syncarpous with a superior ovary, and finally syncarpous with an inferior ovary. Comparative morphology supplies no evidence for the origin of the style with its stigma from modified stamens as suggested by Thompson for the Scitamianae.

THE CAYTONIALEAN "CARPEL" AND THE "NEW MORPHOLOGY."

Dr Hamshaw Thomas, through his notable discovery of a new race of fossil plants—the Caytoniales—has recently attempted to evolve the Angiospermous carpel from the type of fruit-body there exhibited (12). In doing so he discards the classical conception of the carpel. It may be that Miss Saunders's polymorphic theory first suggested the speculative lines on which he proceeds. This, as already shown, usually postulates two carpels where, according to current notions, one only is considered to be present.

The fruit-bodies of the Caytoniales were arranged in pinnate fashion on the axis. The first step towards the Angiospermous carpel, Dr Thomas imagines, would be the reduction of such a fructification to a single opposite pair of fruit-bodies. At the same time he suggests that a length of axis persisted beyond the point of attachment of this pair of fruit-bodies. The next step postulated is the uniting of these two fruit-bodies with each other and also with the persistent sterile piece of axis. The structure resulting from this triple union is put forward as the equivalent of an Angiospermous carpel, the piece of axis incorporated representing the midrib. In these fruit-bodies of the Caytoniales the stigma considered to be present is not apically but basally situated, the whole having somewhat the appearance of an anatropous ovule with the stigma in the position of the micropyle. Consequently, to arrive at the recognised simplest type of carpel, the follicle, the composite structure, is regarded as having undergone orientation to the effect of bringing the stigmatic region into the terminal position.

It seems to me that a speculation as plausible, evolving the Angiospermous carpel from a fructification of the Caytonialean type, might be advanced on the supposition that each of these fruit-bodies was the equivalent of an anatropous ovule. In consideration of Dr Thomas's further discovery in the triassic rocks of South Africa of Pteridospermous plants with fruit-bodies similar in shape to those of the Caytoniales, but open and not stigmatic (14), it becomes legitimate, or at any rate plausible, to homologise the Caytonialean fruit-case with the Pteridospermous cupule. In the speculation now put forward it is

suggested that the outer integument of the Angiospermous ovule may be the equivalent of this cupule. Imagine, then, a Pteridospermous megasporophyll bearing Caytonialean-like fruit-bodies to be reduced to a simple leaf structure with these bodies marginally borne, and then to enfold itself in the Angiospermous fashion, a carpel similar to a follicle would result except for the presence of a localised stigma. There would at first be a series of stigmata corresponding to the fruit-bodies (now the ovules) along what has become an incipient ventral suture. By the coalescence of these stigmata and the general extension of stigmata to the carpellary margins and finally its gradual localisation at the apical region, a structure similar to a follicular carpel would be reached. A sessile stigma somewhat decurrent as a double line down the ventral suture would seem to be the primitive form among Angiosperms. In support of the possible homology of the outer integument with the cupule may be mentioned the fact that Angiosperms have primitively two integuments, while Gymnosperms (disregarding the Gnetales), Bennettitales, and Pteridosperms have only one. The fact that the fruit-bodies of the Caytoniales contain several seeds is no great bar to this speculation, as it is easy to imagine a reduction to one. Indeed, many Pteridosperms had only one seed to a cupule, including Dr Thomas's recently discovered triassic ones. Among Angiosperms there is some evidence, both comparative and developmental, for considering the curved (anatropous) ovule as primitive and the straight (orthotropous) one as derivative.

This, of course, is sheer speculation, but no more I think than Dr Thomas's. To be fair, however, some reference must be made to the evidence he brings forward for the compound nature of the carpel from a study of the venation of certain follicles and legumes (12). By a number of diagrams he shows that the vascular system connected with the marginal (placental) cord is marked off from that connected with the midrib cord. In fact, the latter may be unbranched, all the lateral veins arising from the two placental bundles. This is strikingly shown in the follicle of *Caltha*, where the lateral veins from the marginal bundles slip short a little distance from the simple midrib bundle. Dr Thomas suggests that the midrib venation corresponds to that of the axis, and the two marginal venations to those of the two fruit-bodies of the Caytoniales. The intimate union of these three originally separate structures has outwardly rendered unrecognisable the compound nature of the carpel, yet this is supposed to have been preserved internally in the venation. One questions very much whether venation can be used to this extent in phylogeny. The developing seeds naturally make the chief call on the conducting elements of the carpel, and the system of veining observed in these follicles may have become so established for this purpose and thus have little or no phylogenetic significance. Dr Agnes Arber in a recent paper (2) emphasises this and issues a timely note of warning regarding vascular evidence generally.

In a discussion entitled "The Old Morphology and the New," held by the Linnean Society of London in November 1932 (13), Dr Hamshaw

Thomas, the opener, laid stress on the possibility of the carpel and stamen of the Flowering Plant having no true homology with the foliage leaf at all. Accepting the attractive view that the large fern-like leaf has arisen through the limitation in growth of an arm of a forking thallus, then on *a priori* grounds it could be advanced that in one or more lines of descent the spore-bearing branches of the original thallus became segregated from the vegetative ones before these latter had assumed the character of foliage leaves. In such an event it would be morphologically incorrect to homologise modifications of these fertile branches with foliar organs. This apparently is Dr Thomas's contention. In other words, the spore-bearing branches may never have passed through the foliar stage. Dr Thomas is further of the opinion that the Angiosperms have descended from the Pteridosperms. If so, the evidence to be derived from this great plexus of extinct plants points rather the other way, viz., that the reproductive and vegetative organs were not evolved separately from a branching thallus. The primitive leaf, in fact, carried out originally both functions. That is to say the leaf had the same form whether it was fertile or not. We see this exemplified in the fronds of many existing ferns.

At the last (Leicester) meeting of the British Association, Dr Thomas endeavoured to strengthen his carpellary speculation by an appeal to the stigma, the nature and origin of which he discussed (15). The full paper is to appear this year in *The New Phytologist*. He lays stress not only on the double nature of the stigma, but also on the presence in the carpellary wall of a band of tissue which transmits the pollen tube. In many cases, he states, this band extends to the bottom of the carpel before spreading into the ovarian cavity. He argues from this that the transmitting tissue and therefore the stigma in the course of evolution must have originated at or near the base of the carpel and then later extended upwards. Such a conclusion naturally fits in with the connection he supposes exists between the Angiospermous carpel and the Caytonialean fruit-body, which has its stigma basally situated. The reasoning here thus seems a little forced.

On classical lines the double nature of the stigma presents no difficulty. It readily follows from the view expressed earlier in the paper that the primitive form of stigma among existing Angiosperms is the one which may be described as sessile and decurrent. Examples occur in the Ranunculaceae and allied families. The uppermost parts of both margins of the carpellary leaf are here stigmatic. This stigma has thus a mouth-like shape, the glandular margins forming the lips. Since the transmitting band runs along the ventral suture, it may possibly have arisen phyletically from stigmatic tissue at the time when the carpel according to theory was partially open with stigmatic margins running more or less the whole length of the carpellary leaf.

In conclusion, one may say that though these attempts to reach a new conception of the Carpel are welcome, none of them is likely to be accepted whole-heartedly. The time has not yet arrived when we can

abandon with equanimity the classical interpretation. There is nothing at present very satisfying to put in its place. There is general agreement that the simplest and presumably the most primitive type of Angiospermous Carpel is the follicle. What immediately preceded this in evolution we do not know. Conventionally an open carpel with the ovules marginally borne is imagined, such as occurs at the present day in Cycas. The Cycadales, however, can hardly be considered as at all near the main line of Angiospermous descent. The Gnetales are usually held to be closer, but their gynœcium affords no clue as to the origin of the carpel. The Bennettitales with a fructification so suggestive of the Angiospermous flower had the female part so stereotyped and peculiar as to preclude drawing any homology between it and the carpel. In fact, it is in itself a morphological puzzle. To trace a connection between the Caytonialean fruit-body and the Angiospermous carpel needs, as has been shown, the ingenuity of a Hamshaw Thomas! So, in the words of the late Dr D. H. Scott, given during the recent Linnean Society discussion referred to above, we may say that "The old carpellary theory, so well re-stated by Goebel in his great 'Organography,' will probably continue to hold the field until more definite evidence can be brought against it" (11).

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CURIOSITIES OF PLANT LIFE.

An Address given to Tunbridge Wells Natural History Society by
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It may come as a matter of surprise to many to learn in how many ways plants move, and in fact some of their movements seem to indicate some form of intelligence, though thinking without a brain would be a contradiction in terms. Plants cannot even be said to act by instinct, which itself is only a form of reasoning or acting on past experience.

I wish to direct your attention to the principal ones of these movements. It is not difficult by observation and experiment to show what all the movements are and even to discover the exciting causes, but to determine *why* they so move seems for the present to be beyond the wit of man to explain.

We will begin with the seed itself. Although it is not directly part of my subject I think you will all agree that it seems a miracle that so small an object as a seed should know, so to speak, that it has to grow into a definite species of plant. There is obviously something in its constituents that governs this, yet no chemical analysis shows its nature. In fact it is not the elements of which it is composed but their structure, or the way in which they are arranged which is one determining factor, and recent research has shown the first class importance of the chromosomes, microscopic organisms within the cells. These exist in all living matter, animal and vegetable, and in certain definite numbers and grouping, which are constant within each species. Each chromosome governs some feature of the plant or animal; thus one may determine the colour, another the scent, another the size and so forth. A knowledge of the normal numbers and groupings in a species enables scientists to determine the origin of hybrids, and this is especially useful in the genus *Rosa*, perhaps our most difficult and most hybridised genus. But this investigation can only be made in a chemical laboratory with the aid of a microscope, and has the somewhat disconcerting result that plants may be proved to be hybrids of known parents though their vegetative characters give no guide whatever to the systematist or field botanist, who does not go further than a pocket lens.

When the seed germinates it produces a radicle or embryo root, and a plumule or embryo stem. It is a matter of common knowledge that the former grows downwards and the latter upwards, but the reason for this is not known. It is said to be a *property* of the radicle to grow downwards as if gravity were a controlling factor, but to put it unmathematically, gravity means weight, but weight alone certainly is insufficient to account for the downward force, which has been measured and is found to be at least a quarter of a pound and perhaps considerably more. It does not matter which way a seed is planted in the ground. The

radicle may emerge at the top but will immediately turn downwards. I cannot trace that the experiment has been tried but it is quite probable that if a growing seed were to be subjected to centrifugal force the radicle would develop outwards and the stem inwards. [It transpired during the remarks after this lecture that this experiment had been successfully carried out, and that both root and shoot grow in any direction indifferently.]

As the root advances the part immediately behind it expands. This is due to the absorption of moisture by the growing tip, and this expansion exhibits a surprising force, more than eight pounds in one case, causing it to enlarge the hole for the passage of the machinery for feeding the stem with water, &c. In order that the downward thrust of the growing tip shall not cause the cotyledons of the seed to be forced out of the ground, minute hairs are developed on the sides of the rootlet and these are directed backwards and so resist the tendency. It must not be supposed that the root itself advances through the soil. Only the tip apparently does so by the continuous building up of new material at the apex, which is formed into a sheath of specially strong cells.

But although this desire, so to speak, to grow downwards is surprising and inexplicable, the movement of the root tip is more wonderful still. Its progress is not straight downwards but sinuous, in a sort of corkscrew movement. The diameter of the spiral formed by the root tip of a bean has been measured and found to be about 2mm. The advantage of this movement is that the growing tip can, as it were, sample the soil through which it grows, and in doing so it has been observed that moisture is a governing factor in determining its direction. Experience shows that the better soils usually contain humus, which is hygroscopic and the moisture which it attracts also attracts the root tip.

In addition to the downward and gyratory movement of the tip there is another which it makes. It is natural to suppose that if the tip meets a solid obstacle it will turn aside to avoid it, but this movement is not confined to mere stoppage of its progress. If even the side of the root comes in contact with any obstruction not directly impeding its progress, it will turn away from it, and it has been shown that the turning of the growing tip when it meets an obstacle is not entirely due to force of circumstances but to the inherent nature of the root to turn from any obstacle.

I will not now speak of the functions of the root, but pass on to other movements shown by plants.

Apart from normal growth and the movements due to wind, the leaves, twigs, and the ends of stems are constantly in motion. This motion, which is called circumnutation, is a movement up and down or from side to side, usually in an ellipse. The time occupied in completing a cycle of such movement varies. It may be twenty-four hours or only one hour, depending on the species, its age, &c. It is most noticeable in the seed leaves, which usually move up and down only, their direction varying about 20 degrees above and below the horizontal, though some-

times considerably more, and with a tendency to erection at night. The mature leaves move in irregular ellipses and by irregular stages, sometimes moving by jerks. This movement is quite independent of the diurnal movements so commonly observed when plants go to sleep. Excepting the special movements to be described later, they do not appear to be of any special importance to the plants, but there is little doubt that one gain to them is in the better circulation of the sap, just as exercise in an animal assists in the circulation of the blood.

But there are special movements other than these periodic ones which are of obvious value to the plant.

Carnivorous plants have special movements in order to entrap the insects on which they feed. A common example is the sundew, the leaves of which are covered with numerous gland-tipped hairs or tentacles. So soon as an insect settles on the leaf of one of these species the tentacles begin to bend over it. The time for this movement varies with the circumstances. It may begin in a very few seconds, and it has been observed that the tentacles close much more quickly over a live insect than a dead one, also over a thin-skinned than a thick-skinned one, the period varying from one to four or five hours. The inward movement is accompanied by an increase in the sticky secretion, which also becomes more acid, thus the insect is soon smothered in the juices and digested by the acid, so as to be absorbed by the plant. That the juices of the insect are actually absorbed by the plant may be shown by placing minute particles of some chemical on the leaves, which soon cause discolouration in their internal parts. Moreover, since the plant depends for its living on the insects it captures, its root system is not more developed than is necessary for its anchorage to the ground and not for the absorption of food material. [It was afterwards pointed out that this statement is not wholly in accordance with the facts.] The insect thus captured may be killed in a quarter of an hour and may take a few hours for its digestion, after which the tentacles slowly return to their upright position ready for another victim. It has been observed by experiment that the inflection of the tentacles over an inorganic object is much less definite than over an organic one, and this seems to indicate some power of discrimination. For example they are not affected by water but if milk be applied to them they commence to inflect at once. This, and many other movements seems to indicate the presence of some form of intelligence in plants, but it is not necessarily present. It is an inherent property of the organs, the exact nature of which is not understood. It indicates a sensory system, but not a governing mind.

There are other carnivorous plants which exhibit various movements, differing in details, for example *Dionaea muscipula*, the Venus's Fly-tray, *Sarracenia*s or Side-saddle plants, *Nepenthes* or Pitcher plants, etc., but I will not go into details of these now.

A familiar instance of the movement of plants is seen in their heliotropism, or tendency to turn towards the sun, or at least to the light. It may be noticed that there are very few exceptions to the property of

turning towards the light which is possessed by leaves, in order to get the maximum of sunlight. This is also aided by their shape, designed so as not to shade one another. They are thus able to absorb the maximum of carbonic acid so essential to their growth. Even here nature steps in to save energy, because it is found that insect-eating plants, which do not require carbonic acid for their sustenance, do not possess this property of turning their leaves towards the light, nor, as said before, is their root system more than just sufficient to anchor them to the ground and not to absorb nourishment therefrom.

But this tendency to seek the light is hardly a case of true heliotropism, such as may be seen in a sunflower, which always turns its face towards the sun. This is a classic example, but all plants exhibit the same tendency to a greater or less degree. The flowers always tend to face the sun in its path across the sky, thus performing a partial twist upon their stems, returning after dark to their normal position. I have not been able to ascertain whether flowers in latitudes where the sun is above the horizon for twenty-four hours will ultimately twist their heads off, but it is not likely since the sunlight must be strong in order to produce this heliotropism, which does not take place for some time after sunrise and ceases before sunset.

I have seen a striking effect of heliotropism in a field full of *Dimorphotheca pluvialis* in South Africa. The ray florets of this composite are pure white on the face and dull purple at the back. If they are looked at with one's back to the sun the field appears to be dazzling white, but when facing the sun hardly any flowers are visible at all. The same effect may be seen in a garden.

There is another form of heliotropism seen chiefly in subtropical climates where the leaves will turn their edges to the sun when its light is very intense, while some will keep their leaves with their faces permanently parallel to the meridian, doubtless for a similar reason, namely, to check the evaporation from their surfaces. An example of the latter is seen in the Compass Plant of the American prairies, *Silphium laciniatum*, the young leaves of which lie with their edges north and south, thus indicating the points of the compass.

Examples of apheliotropism, or turning from the sun, are much less common than the converse. This must not be confounded with geotropism or a tendency to turn towards the earth, exhibited by our *Trifolium subterraneum*, *Arabis hypogaea*, the Monkey nut, *Cyclamen* species, etc., which turn their fruiting peduncles to the ground, and which movement is found not to be affected by light.

Perhaps the most important instance of special movement in plants is exhibited by climbers, which is really an effect of circumnutation. They may be considered under four classes, Twiners, Climbers by tendrils, Scramblers, and Root climbers.

The most important class is that of Twiners, or plants which have the property of winding spirally, or more correctly helically, round a more or less vertical support. The growing end of the stem of such plants is

subject to a well developed circumnutation, such as has already been defined. If quite free to move it will describe a circle of which the end of the stem is the radius, which may be 2 or 3 feet long. In an experiment carried out by Darwin the length of the generating vector or arm was about $2\frac{1}{2}$ feet, thus describing a circle of 5 feet diameter. The circle was completed in $5\frac{1}{2}$ to 6 hours, which means a movement of about 32 inches per hour. The rate of revolution depends on the species and is influenced by its age and climatic conditions, and some species will rotate clockwise, others counterclockwise, this being quite independent of the sun or the hemisphere in which the plant grows. Incidentally no reason has been discovered for this predilection of certain species, any more than for many other vegetable phenomena.

Now when this revolving stem meets an obstacle it responds to the check just as the growing root tip will do, but in a converse manner, since it will turn towards, instead of away from, the obstructing influence as the root does. If the obstacle be an upright post, the stem will wrap itself around it, while at the same time it grows upwards, thus forming a helix, which may be clockwise or counterclockwise according to the species. It is more informative to define the direction thus, or to say with or against the sun, than to say from right to left or conversely, since that depends on whether you consider the near or the far side of the post up which the stem twines, and is often to my mind wrongly defined. It is more common for plants to twine counterclockwise than the reverse, e.g., scarlet runners, convolvulus, etc.; while hops, black bryony and others twine clockwise, i.e., with the sun. Some species will twine either way indifferently and occasionally some twine first one way and then the other, the idea about this last movement being that the continuous twining in one direction puts a torque on the stem, to which the species objects, though why all species do not show the same objection is one of the many unanswered questions in the habits of plants.

The time taken to complete a revolution of the stem varies, observations of different plants showing that it may be anything from $1\frac{1}{4}$ hours to 18 hours, and probably the limits are wider. The ratio between the rate of volution and the rate of progression of the apex will, of course, determine the angle of the helix. In some cases, as with the honeysuckle, the constricting force of the stem is apparently so great that it embeds itself deeply on that of the plant up which it may be climbing, but it is inaccurate to attribute this to the constricting force of the point. The real cause is the expansion of the stem by its normal increase after the twining is complete.

The second class of climbing plants contains those which do so by means of tendrils or by the petioles of the leaves. The tendrils, which are only modifications of leaves, or an expansion of their midribs, behave in a similar manner to the growing tips of the stems; that is to say they circumnutate and are sensitive to a touch which causes them to bend towards the object which touches them. The circumnutation may take place over a circle of 15 inches or more in diameter and it may take from

one to several hours to describe the circle. On meeting an obstacle they almost instantly begin to bend towards it and ultimately encircle it. If the object which incites the bending be removed the movement will cease, though the general circular motion of the whole end of the tendril will continue. Experiments have shown that a tendril will respond to an exciting cause for many times, but gradually the tendency to curl weakens and eventually ceases altogether. In training my Sweet peas it has appeared to me that only the young tendrils have the property of climbing. If a leaf with an old tendril be adjusted to its support it refuses to clasp. I must admit, however, that I have not experimented on this point enough to establish it as a fact.

It will be noticed that when a tendril has encircled a support it hardens and strengthens to a remarkable degree, which is obviously necessary for its function of supporting the weight of the plant.

Tendrils will attach themselves to objects by other methods than by twining alone. Some have little hooks at their extremities which tend to insert themselves into crevices in walls or the bark of trees, which it will be seen affords an example of apheliotropism. Sometimes instead of hooks the ends of the tendrils swell out so as to fill the recess. This swelling does not occur until the tendril has entered some crevice where it can fix itself. Another method of obtaining support is by the formation of sticky discs at the tips of the tendrils, such as may be seen in the Virginia Creeper. Here again the discs are not formed until the tips touch something. The sticky secretion hardens and serves as a very strong glue. It has been found that a single tendril disc can support a weight of two pounds, while if there are several branches the capacity for supporting weight is correspondingly increased.

Climbers which are not furnished with tendrils may obtain support by means of their petioles, which behave in the same manner as tendrils do, and exhibit the same tendency to induration as them, which is not developed until an object has been encircled. The Clematis is an example of this kind of climber.

The next class of climbers is the Scramblers, and these form a considerable proportion of our hedgerow plants, exhibiting their tendency to scramble in various ways. Thus the common Goose-grass is furnished along its stems with reversed bristles, so that while the stem can readily grow upwards it is by no means so easily drawn downwards. It is noteworthy that the stems of such plants are destitute of any of the stiffening materials which non-climbing plants have. Nature here exhibits her conservative tendency, though in many other respects she seems to be extravagantly wasteful. Roses may seem to be an exception to this weakening of the stem, but such is only the case in Dog Roses, which grow chiefly in hedges, the prickles of which are obviously intended to support the stem. Other species although they have prickles, inhabit open places and so do not use their prickles for support and have stiff self-supporting stems.

The last class of climbing plants is a small one, namely the root climbers, of which the Ivy is a familiar example. I would remind you that the processes thrown out by the stem, and which attach themselves to a support, are not roots in any sense of the word, since they have no function in the nourishment of the plant, hence "Root-climbers" is a misnomer. An interesting point is that when the ivy stem has reached the top of the tree or other support, it ceases to throw out these processes, since they are no longer required, the free ends of the stem being without them.

A different sort of movement takes place in sensitive plants. I have already told you how the leaves and stems of all plants are continuously subject to circumnutation, and how climbers and their tendrils will respond to a touch in order to make them function, but in sensitive plants this tendency is developed to a specially high degree, and it is not always very obvious what benefit the plants derive from the motion thus acquired.

The most familiar example is the Sensitive Plant, *Mimosa pudica*, a native of South America. It is a species with bipinnate leaves, having a pair of pinnae standing at right angles and furnished with numerous pairs of pinnules, and a second pair is developed later beyond them on the common petiole. A very slight touch will cause all the pinnules to rise and touch one another by their faces while the two pinnae approach so as to become nearly parallel instead of at a right angle to the midrib. This movement takes place very quickly and may be caused even by a puff of wind. After remaining closed for some time the pinnae and pinnules very slowly regain their normal position. Intense sunlight as well as darkness have the same effect as a touch, but in prolonged darkness the leaves will ultimately unfold.

A more striking example is the Telegraph Plant of Brazil, *Desmodium gyrans*. Here the leaves have one large terminal and two small lateral lobes. The lateral leaflets or lobes are continuously in up and down motion, the opposite leaflets moving in opposite directions. The terminal leaflet oscillates more slowly from right to left and also up and down. If these movements are retarded in any way they are renewed with greater velocity when set free. The movements are continuous, both in daylight and darkness and are not affected by touch. They are visible to the eye without the necessity for measuring them. They will continue for about 24 hours on a stem which has been severed from the main plant.

Apart from its habit of going to sleep, our own Wood Sorrel shows signs of irritation if roughly handled, closing its leaves as in sleep. The stamens of various plants exhibit a certain amount of irritability. Thus if the point of a pencil be inserted into the flower of a *Mahonia* the stamens will instantly bend forward against the pistil. I have said that many of these movements seem to be meaningless but it is not so in the case of the *Mahonia*. It might be supposed that it would assist self-fertilisation, but the contrary is the case. It has been observed that when an insect enters the corolla, which it does between the stamens

and the pistil, the former at once bend over the back of the insect which thus receives the pollen from the anthers, and this is carried on to the stigma of the next flower visited, thus effecting cross- not self-fertilisation.

London Pride, Parnassus Grass, French Willow herb and other species exhibit some similar movement of their stamens, but in these cases the movement is spontaneous and is not effected by insects. In many of the Orchids the pollinia have a sticky disc to which they are attached at the base. An insect on entering a flower comes in contact with this sticky disc which adheres to its head so that it draws out the pollinia as it leaves the flower. This phenomenon may be seen by the insertion of the point of a pencil. After withdrawal of the pollinia the stipe on which they are borne immediately bends forwards so that they are in a horizontal position, and come in contact with the stigmatic surface of the next flower entered by the insect.

The so-called sleep of plants is known to the most casual of observers but the term is a misnomer since there is no analogy between the sleep of animals, which is for their rest, and that of plants which is for their protection. For this reason the word *nyctitropism* is used to mean what is popularly called sleep, the word meaning turning or folding at night. Plants which are subject to sleep will close or turn their leaves so that their faces are not exposed to the sky, thus saving the chilling effects of radiation at night. It has been demonstrated that when leaves are prevented from assuming the sleeping attitude they may even be killed by cold due to radiation.

The seed leaves of many plants exhibit a tendency to erect themselves in the young state, thus partly closing over the young shoot for its protection, but it is not all plants which possess this property. The sleeping attitude may be assumed by the bending of the petiole so as to turn the edge of the leaf upwards, as in the garden *Nasturtium*. The Telegraph plant already mentioned has an exceptional behaviour. Only the terminal leaf lobe turns downward and sleeps at night, while the lateral lobes continue to oscillate just as much at night as in the daytime. Examples of sleep of plants may be seen in Wood Sorrel and Dutch Clover.

The opening and closing of flowers is a different movement from that of the sleep of leaves. Many species will close their corollas or turn them downwards on the approach of and during rain, which is in order to protect the pollen from being washed away. But some have the habit of opening and closing at fixed hours. I should say "more or less" fixed, because apart from rain, the time is affected by wind, light, and temperature, but normally a definite time can be assigned to the closing and opening of many species, so that botanists have constructed what is called a "Floral Clock" based on the times, but it would not be safe to rely upon this for catching a train. We all know the Evening Primrose which opens about sunset, and many of the Catchflies somewhat later, and it is noteworthy that the flowers of the latter which are strongly scented when open have no odour in the daytime. Those of

you who know *Crepis taraxacifolia* may have noticed that a field which is yellow with its flowers in the morning looks quite bare in the afternoon, and the common Goat's-beard, which closes before 12 o'clock, has consequently received the name of John-go-to-bed-at-noon.

I have, up to the present, confined my remarks to the movements of plants, a subject on which I might have given you a much longer discourse by giving you details of the experiments and researches of Darwin, but these would be rather of the nature of statistics, and therefore much duller than the conclusions which only I have dealt with. Consequently I have come to the end of my subject but not to the end of the statutory time.

There are very many other interesting phenomena connected with the vegetable kingdom, but I will confine my concluding remarks to two.

The behaviour of plants in the struggle for existence gives rise to what J. G. Taylor calls "Robbery and Murder" which indeed some of it seems to be.

An ordinary climber may be regarded as a plant which does not take the trouble to stand up by itself but uses the stems of others in order to get its head into its place in the sunlight. In many cases, in fact in most of the British climbers, this may be looked upon as a sort of companionability, or the helping by one plant to allow another to grow, but it may develop into a more serious form of parasitism. The common Ivy may choke a tree, as we have seen discussed in "The Times" lately. There seems to be diverse opinions as to the harm it does, or how it does it, but it certainly is not a true parasite, which lives on the sap of its host. Nor does it usually kill other plants by strangulation, but rather by suffocation, surrounding it so closely with a dense covering of leaves that it deprives it of light and air, and therefore may eventually kill it. In which case it ought to be classed as a murderer and not as a mere robber.

Another climber, which may become a murderer, is our Honeysuckle. This may sometimes entwine a tree or shrub so tightly as to choke it, though I have not often seen cases of absolute murder. It usually only embeds itself deeply into the stem up which it climbs. But in the tropics there are many murderous climbers which kill trees by strangulation.

In Britain cases of robbery are common enough, and some of these may become instances of murder. Mistletoe is a well-known robber. It is a true parasite, living on the sap of its host. If a branch of tree on which it grows be examined its stems may be found under the bark far from where it grows into the air. This sucking the juices of its host cannot do the latter any good, but I do not think any harm accrues to a tree even when badly infested with Mistletoe. May this be because it is only a partial parasite, growing green leaves by which it absorbs and breaks up carbonic acid, and therefore does not take a very heavy toll of its host; but in tropical countries again Mistletoe species may be very harmful, one in Brazil being capable of destroying whole fields of Coffee plants or Oranges.

The Broomrapes are a more indolent class of robber. These form no green leaves, but live entirely on the sap of their hosts. I am not aware of any serious harm coming to plants on which they grow in Britain, but in other countries they may become a serious pest. In the south of Spain a fine species with blue and white flowers, *Orobanche crenata*, may take possession of a whole field of peas or beans and utterly destroy the crop, and there are other species hardly less destructive. Dodder, of which three species are natives of this country, is not above reproach, though the two commonest, *Cuscuta epithymum* and *C. europaea* do not do much harm. But one which not many years ago was much commoner than it is now, was a deadly foe in clover fields. I refer to *C. trifolia*, which would kill square yards of the crop at a time.

We have many other parasites or partial parasites, which are disliked by farmers rather because they extract goodness from their hosts or from the soil rather than absolutely destroy them. Such are Yellow Rattle, Euphrasia or Eyebright, Cow-wheat, etc., while several others are suspected of parasitism and therefore deserve to be classified as robbers.

The last subject I shall bring before you is the dispersal of seeds. The most obvious means of dispersion is by a pappus or crown of hairs which occurs in a great many, but by no means all Compositae, as in thistles, dandelions, etc. The pappus may consist of a mere ring of hairs or bristles, the chief function of which is to prevent the extrusion of the seed from the ground as it germinates, but the more fully developed ones are a sort of parachute which may be erected on a stalk or stipe. The rays may be of simple or of feathered hairs. The pappus of the Goat's-beard is a beautiful object of plumose hairs. The pappus enables the seed to be borne on the wind, often to very considerable distances, spreading the seeds all over the country to the detriment of agriculture. Here I may remark that one of our worst agricultural weeds, the creeping thistle, is said not to form seeds, on the common principle in nature that plants which reproduce themselves from running roots, do not take the trouble to make seeds, the Couch Grass is another example of this. I am unable to verify this from my own observations and have certainly found well formed seeds on both these species, though in small quantity.

Other British genera which have a pappus to their seeds are the Willows and Willowherbs. The similarity is in the English names only, the genera being very widely distinct, though perhaps the Willowherb derived its name from the similarity in the seeds. The wide dispersion of these species, so that they both appear on building sites in the heart of London, is accounted for by the easy dispersion of their seeds by the pappus.

Another method of atmospheric distribution of seeds is by means of wings on them or on the capsules. Winged seed pods, called *Samarae*, are seen in the Maple, Ash, Elm, etc. They are of course much less efficient than a pappus but enable the plant to scatter its seeds more widely than those with no such appendage.

Spines, which may or may not be hooked at the tips, are a very common means of distribution through the agency of furred animals or the feathers of birds, and one may add the clothing of men. Medicago may be a positive plague to those who cultivate animals for their hair or wool, becoming firmly entangled in that so as to be most difficult to comb out. We all know what it is to walk through woods or fields in the autumn with burdocks, goosegrass, houndstongue and many other plants growing in them, so that we thus become unwilling distributors of their species. In tropical countries these burrs or hooks assume formidable proportions, making a sort of grapnel, which fixes itself to the noses of sheep and cattle, thereby being carried about, but thus stamping themselves as murderers, since the animals are liable to die of starvation.

Another interesting method plants have of dispersion of their seeds is by the elastic opening of their seed vessels. The common Balsam is a familiar example, the capsules opening with a spring, which projects their seeds for some feet. The Common Hairy Bitter Cress is another example. It is one of the most troublesome weeds to get rid of in a garden. It germinates and ripens its seeds several times in a season, and when touched the pod springs open and there are a prospective couple of dozen plants in the place of one. Although small and probably taking very little nourishment out of the soil, it makes up for that by its immense numbers. The Witch Hazel expels its seeds with such force as to give one quite a smart blow in the face, and lower in the vegetable scale are some of the Bird's Nest fungi, which shoot their seeds six or eight inches into the air.

Seeds are also dispersed by flotation in water. The coco-nut will float from one island to another, and the *Nelumbium* or Egyptian Bean has a floating capsule in which the seeds are embedded. When they germinate they form a sort of cornucopia, until the dissolution of the capsule enables them to take root.

A curious story attaches to the fruit of the Monkey Pot, a species of *Lecythis* in Brazil, though it is not strictly a case of dispersion of seeds. The receptacle is like an urn with a lid, which becomes detached when the seeds ripen, so as to allow them to escape. After it is empty the inhabitants use it as a trap for monkeys. They fill it with sugar which is very attractive to those animals. They insert a paw and grasp the sugar but the orifice is not large enough to allow them to withdraw their closed paw, and they have not the sense to open it. Consequently they have to walk away with the capsule attached to their foot, and thus their movements are so hampered that they are easily caught. It is said that only young and inexperienced monkeys can be caught in this way, giving rise to the saying of a cautious person that "He is too old a monkey to be caught by a Cabomba."

There are many other ways in which seeds are distributed which I will not detail to you, but will conclude with one very interesting example in the case of an Indian species of *Loranthus*, of the Mistletoe Order. The fruit, as is usual in the order, has a viscid pulp surrounding the

seed so that it adheres to whatever it falls upon. When it germinates the radicle at first grows out and when it has grown to about an inch in length it develops upon its extremity a flattened disc. The radicle then curves about until the disc is applied to any object that is near at hand. This you may notice is a case of circumnutation. If the spot upon which the disc has fastened is suitable, the germination continues and no locomotion takes place, but if the spot should not be a favourable one the germinating embryo has the power of changing its position. This is accomplished by the adhesive radicle raising the seed and advancing it to another spot, or to make the process plainer the disc at the end of the radicle adheres very tightly to whatever it is applied to, the radicle itself straightens and tears away the viscid berry from whatever it has adhered to and raises it in the air. The radicle then again curves, and the berry is carried by it to another spot where it adheres again. The disc then releases itself and by the curving about of the radicle is advanced to another spot where it again fixes itself. This may happen several times so that the young embryo still within the seed is moved about till it finds a place to its liking. It seems to select certain places in preference to others, especially leaves. The berries on falling are almost certain to alight upon leaves, and although many germinate there, they are sometimes observed to move from the leaves to the stem, and finally fasten there.

THE BRITISH SPECIES OF MYRIOPHYLLUM.

W. H. PEARSALL.

We have three species of this genus in Britain and as they are frequently confused or found impossible to determine by members, the following notes may be helpful and may also save time both to collectors and myself. The species vary greatly in their size and characters according to the conditions under which they grow—the depth of water and nature of the bottom being of the greatest influence. Like most flowering aquatics these plants send up their flowering spikes above the surface of the water and these are mainly wind-pollinated. This usually occurs in June, July, or August. During a wet summer it frequently happens that the water-level is much above the normal during the flowering period and the spikes fail to reach the surface. All flowering aquatics are able to “stretch” their spikes (or peduncles) considerably to meet this emergency—often twice their normal length—so that it behoves us to accept all dimensions given in descriptions with all due reserve. In spite of this ability to lengthen the spike it frequently happens—especially in lakes—that plants such as *Myriophyllum* and *Potamogeton* are quite unable to elevate their flowers above the water-surface at such flood periods and depend entirely upon special resting or winter-buds for their propagation. These are surrounded by closely packed leaves; in late autumn they drop off and sink into the semi-liquid mud where they remain quiescent until the following spring. All three species of *Myriophyllum* have unisexual flowers—i.e. the stamens and pistils are in separate flowers but on the same (monoecious) plant. Usually the upper flowers are staminate and the lower pistillate in the same spike. Occasionally the intermediate flowers are 2-sexual (perfect or hermaphrodite) and in that case the plant is polygamous.

Myriophyllum is sometimes confused with the somewhat similar *Ceratophyllum*, but the leaves of the latter are quite stiff, do not collapse when taken out of the water, are not pinnately divided but two or three times forked, and the segments are distinctly toothed along their margins. To those interested in microscopic forms of plant or animal life the leaves of *Myriophyllum* are among the most prolific sources of interesting material.

Little dependence can be placed upon the number of leaves in a whorl in the determination of a species. This often varies on the same plant. In *M. alterniflorum* it may be 3 or 4, in *M. spicatum* more usually 4 (but may be 3 or 5 on occasion) and in *M. verticillatum* it is more often 5 than fewer. The length of the leaves is also variable but those of *M. verticillatum* are the longest, those of *M. spicatum* next in length (often from 1-3 cm.), and those of *M. alterniflorum* are rarely more than 1 cm. long.

When flowers are present determination is easy, when absent it is difficult. In the former case the following key may be used:—

MYRIOPHYLLUM.

1. All flowers in whorls—often reddish. 2
Uppermost flowers solitary—alternate—yellowish. *M. ALTERNIFLORUM.*
2. Uppermost bracts entire (or merely dentate)—shorter
than or only slightly exceeding the flowers. *M. SPICATUM.*
Uppermost bracts pinnatifid, much longer than the
flowers. *M. VERTICILLATUM.*

I. *M. ALTERNIFLORUM* DC. This species is more common in the lakes and tarns of hilly districts in the North than elsewhere but is very generally distributed in streams and ditches throughout Britain. It possesses a slender stem and leaves—in whorls of 3 or 4—with very fine capillary segments. The leaves are much shorter than those of the following species and have finer segments. The spike is very slender, lax, short, few-flowered, usually curved at the top but *always hooked in bud*. The upper flowers are staminate, solitary, alternate (or occasionally opposite), and springing from the axils of bracts which are *entire* (or merely denticulate or serrate) and *shorter than the stamens*. The lower flowers are pistillate, yellowish, solitary or in alternate groups of 2-4 in the axils of pectinate bracts resembling small leaves. The fruit is slightly smaller than that of *M. spicatum*, ovoid-conical, truncate.

II. *M. SPICATUM* L. A species more common in the South than in the North but like the preceding very widely distributed throughout Britain at somewhat lower levels. It usually retains its green colour throughout the winter. It is rather more robust than the preceding, and possesses a more rigid stem and leaves. The latter are more distant, usually in whorls of 4 (rarely 3 or 5), longer and with longer segments than those of *M. alterniflorum*. The spike is always *erect in bud*, elongate, interrupted, possessing many dull reddish flowers arranged in whorls, provided with bracts shorter than or only slightly exceeding the flowers, entire or merely dentate, the upper often ovate. The upper flowers are staminate with narrowly oblong anthers on short filaments and with minute sepals often deep purple. The lower flowers have roundish closely sessile stigmas *not elongate*. The whole spike is not leafy as is the case in the following species. The fruit is sub-globose but less so than in *M. verticillatum* being often slightly oblong, a little longer than broad and sometimes irregularly tuberculate, 2-3 mm. long.

M. VERTICILLATUM L. is the largest and rarest species of the three and recorded only for about half the number of vice-counties of the two preceding species. Its distribution extends from Cumberland in the North to Cornwall in the South but between these extremes there are many counties from which it has not yet been recorded. It is extremely variable according to the ecological conditions under which it grows and usually is not green in winter. The leaves are usually long

(1 in.-2 in.), in whorls of 5 (only rarely 4) with opposite \pm distant capillary segments. As in all species of *Myriophyllum* these segments are entire, smooth—although often mud-encrusted—and collapsing when taken out of the water (cf. *Ceratophyllum*). The spike is very long (10-20 cm.), much interrupted and leafy to the summit where it is often terminated by a tiny crown of empty bracts. The flowers are normally reddish, all in whorls arising from the axils of leaf-like bracts many times longer than themselves. Even the upper bracts are pinnatifid and much longer than the flowers. The uppermost flowers are staminate, with greenish-yellow boat-shaped petals about 2 mm. long, large yellow anthers and pale green to pinkish sepals. The lower flowers are pistillate with stigmas rather *elongate* and recurved. The fruit is small—to 3 mm. long—sub-globose, olive-green and rounded on the back. The var. *pectinatum* DC. is merely an ecological state induced by shallow water conditions. It has the habit of *M. spicatum*, a rather slender spike with much shorter bracts whose lobes are closer together than in normal *M. verticillatum*.

ORCHIDACEAE.

Mr P. M. Hall and myself have completed our survey of the British distribution of *Himantoglossum* and *Aceras*, and the results are summarised in our papers in this Report. We are greatly indebted to all those who so readily contributed to make that survey so complete.

We are now undertaking a similar investigation into the past and present distribution of the MILITARES section of ORCHIS—*O. simia*, *militaris*, *purpurea*, and *ustulata*. We shall be very grateful for your co-operation in supplying localities, counties, collectors' names and dates for any herbarium specimens or recent stations known to you. Notes on any observed increase or decrease of a species in a given area are of the greatest value. In the case of Orchid species which are in danger of extinction we publish no list of actual localities—but we shall include a further paper giving the vice-comital distribution of these species in next year's Report.

W. H. PEARSALL,

DESIDERATA.

At the last Conversazione, 15th November 1933, some extremely beautiful water-colour paintings of British wild flowers by Miss Lucy Burton were exhibited and greatly admired as being not only of high artistic merit but also botanically accurate and true to life. Over 800 similar paintings have already been completed with a view to their ultimate publication, but the following species—numbered as in Fitch & Smith's Illustrations—are still required, and we should be grateful to any member who could send a fresh and typical specimen of any of them—carefully packed in a tin box—to Miss Lucy Burton, Stott Park, Lake Side, Ulverston, Lancs.

2. *Thalictrum alpinum*. 13. *Ranunculus ophioglossifolius*. 19. *R. flabellatus*. 43. *Roemeria hybrida*. 48. *Matthiola incana*. 59. *Arabis alpina*. 71. *Sisymbrium Irio*. 87. *Alyssum calycinum*. 94. *Camelina sativa*. 99. *Teesdalia nudicaulis*. 106. *Lepidium latifolium*. 110. *Isatis tinctoria*. 116. *Reseda alba*. 117. *Helianthemum guttatum*. 118. *H. canum*. 124. *Viola arenaria*. 129. *Dianthus prolijer*. 130. *D. Armeria*. 131. *D. deltoides*. 134. *Silene acaulis*. 138. *S. gallica*. 145. *Lychnis Viscaria*. 146. *L. alpina*. 162. *Cerastium alpinum*. 199. *Althaea officinalis*. 230. *Genista pilosa*. 235. *Medicago falcata*. 245. *Trifolium incarnatum*. 247. *T. stellatum*. 250. *T. medium*. 253. *T. Bocconi*. 258. *T. resupinatum*. 284. *Vicia lutea*. 297. *Lathyrus niger*. 301. *Spiraea salicifolia*. 304. *Dryas octopetala*. 311. *Rubus Chamaemorus*. 321. *Potentilla rupestris*. 368. *Sedum sezangulare*. 370. *S. reflexum*. 378. *Saxifraga Hirculus*. 382. *S. cernua*. 459. *Cornus suecica*. 467. *Ionicera Caprifolium*. 469. *Linnaea borealis*. 487. *Valeriana pyrenaeica*. 499. *Aster Linosyris*. 501. *Erigeron alpinus*. 508. *Gnaphalium luteo-album*. 515. *Inula salicina*. 520. *Xanthium Strumarium*. 534. *Diotis maritima*. 549. *Senecio paludosus*. 551. *S. pulustris*. 552. *S. campestris*. 557. *Saussurea alpina*. 577. *Gentaurea solstitialis*. 613. *Lobelia urens*. 616. *Phyteuma spicatum*. 631. *Arctostaphylos Uva-ursi*. 636. *Menziesia caerulea*. 643. *Pyrola uniflora*. 679. *Gentiana nivalis*. 710. *Asperugo procumbens*. 721. *Orobanche elatior*. 723. *O. caerulea*. 727. *Verbascum Blattaria*. 729. *V. nigrum*. 730. *V. Lychnitis*. 731. *V. pulverulentum*. 733. *Antirrhinum Orontium*. 737. *Linaria supina*. 817. *Teucrium Botrys*. 977. *Damasonium stellatum*. 980. *Stratiotes aloides*. 981. *Malaxis paludosa*. 982. *Liparis Loeselii*. 987. *Cephalanthera ensifolia*. 988. *C. rubra*. 992. *Epipogum aphyllum*. 995. *Spiranthes Romanzoviana*. 1008. *Habenaria intacta*. 1039. *Lloydia serotina*. 1045. *Scilla autumnalis*. 1055. *Allium triquetrum*.

ZOSTERA MARINA IN BRITAIN.

A. D. COTTON, F.L.S.

During the past three years a remarkable reduction in the growth of *Zostera marina* has taken place on the Atlantic coast of North America. Practically the whole coastline from New Brunswick to North Carolina is affected and in some areas the reduction amounts to its total disappearance. Observations made in Western Europe show that a somewhat similar situation exists. The affected areas include the North and West coasts of France, South coast of England, Holland, parts of Denmark and Sweden. Making allowances for certain exaggerated reports as to the extent and suddenness of the reduction, there can be no question that during the last few years *Z. marina* has very largely disappeared over large areas on both sides of the North Atlantic. The cause of this remarkable biological phenomenon has not so far been determined. French authors have attributed it to a bacterial pathogen, but American pathologists have not been able to confirm this.

In a preliminary survey of the *Zostera* situation on the British coasts, we have been impressed with our ignorance as to the ecology and biology of the various forms which occur. Two species of *Zostera* exist in this country, *Z. marina* and *Z. nana*, and a third form is recognised and known as *Z. marina*, var. *angustifolia*. The latter figures largely in all reports as to the disappearance of *Z. marina*. It has been regarded either as a narrow-leaved form of *Z. marina* or as a hybrid between *Z. marina* and *Z. nana*. In certain localities where the normal *Z. marina* has disappeared (e.g. Abbotsbury, Dorset) the ground has apparently been colonised by the narrow *Z. marina*, var. *angustifolia*. Being a much smaller form the "drift," which is used for various purposes, is perhaps only 1/10th of that washed up by *Z. marina*. The substitution of one form for the other raises in acute form the question of its taxonomic status. If it were a narrow-leaved form of *Z. marina*, it is remarkable that a variety of a species should survive where the normal form has been exterminated, and if it were a hybrid it would afford an interesting case of a natural hybrid succeeding where one of its parents has locally completely disappeared. In many localities various intermediates are found and it was subsequently ascertained that some of the records received as to the flourishing condition of *Z. marina* concerned in reality the variety *Z. angustifolia*. Published records from other countries are also unreliable owing to this form not being clearly defined.

Certain data are available as to the biology of *Z. marina* as it occurs in the Pacific through the researches of W. A. Setchell, but no detailed observations have been made in England. As is well known, the genus *Zostera* is of special interest in that it possesses filiform pollen grains, and some interesting accounts of its pollination have been published.

Various details, however, require to be filled in, such as the method of discharge of the pollen grains from the anthers, whether pollination takes place at the surface of the water, or in the water, and the development of the germ tubes from the filiform pollen grains. No observations have been made on the fertilisation mechanism of the supposed hybrid or on *Z. nana*, which occurs at a higher level on the mud flats and which, presumably, sheds its pollen only during high tides. Apart from the biological investigations referred to below, it is most important for a comprehensive biological and ecological examination of all the forms to be initiated.

It is satisfactory to be able to record that Mr T. G. Tutin has commenced an investigation on the *Zostera* problems at the laboratory of the Marine Biological Association at Plymouth. Though he will naturally include survey work over a wide area, his task is essentially an intensive investigation of the problems as presented in the Plymouth district and research into the various problems involved from as many angles as possible supported by all the unrivalled resources of the Plymouth laboratory. Mr Tutin will be interested to learn of any observations on the subject which members of the Botanical Exchange Club may have made, or may be able to make during the coming season.

CREPIS BIENNIS L. IN YORKSHIRE.

The above is the title of a paper published in *The Naturalist*, p. 51, on 1st March 1933, by Dr Eric Drabble, and which is reproduced herewith.

“ With the question of the presence of *Crepis biennis* in Yorkshire has become involved the identity of certain plants gathered near Bridlington by Messrs Lawson and Flintoff and others. As one of those whose misfortune it is to have been drawn into the discussion, a short statement from me may, perhaps, be permitted. In 1929 the late Dr G. C. Druce sent me a sheet labelled ‘ *Crepis niceænsis* Balb., N. Yorks, June 1929, ex R. J. Flintoff ’ for my determination. The plant clearly was not *niceænsis*, as the hairy inner surface of the phyllaries at once showed, but the specimen was in such extremely poor condition and so incomplete that no determination was possible. A plant, however, was raised from a fruit of this specimen, and this formed a good rosette in 1930 and flowered in 1931, but it was apparently self-sterile, as no fertile fruits could be obtained. This plant was similar to a *Crepis* found by me in that year at Freshwater, Isle of Wight, and was identified as *C. oporinoides* Boissier, Voyage botanique dans le Midi de l’Espagne.

I have seen the specimen from Allerston, which Mr Flintoff says is now ‘ at rest ’ in the Herbarium at Kew. It would have been well could that rest have remained unbroken, but it has been disturbed by Mr Flintoff himself in *The Naturalist*, November 1932, p. 318. The specimen as I saw it was an incomplete plant without ripe fruit, and, in my opinion, was not one on which a determination could firmly be based for purposes of record.

In July of the same year (1932) Mr Lawson sent me plants with ‘ Bridlington ’ as the only indication of locality. One of these was distinctly hairy, but the rest were apparently large forms of the same plant as that sent me by Dr Druce and grown by me from seed. There were no ripe fruits, but I was told that if I would only wait patiently they would ripen off. My previous experience with the cultivated plant led me to watch this with interest and it was no surprise to find that this did not happen, thus confirming my impression that the plant was self-sterile.

Later in the same year Mr Lawson sent what he stated to be fruiting heads of a large *Crepis*, presumably from the same locality. The pappus was well formed, but there was not a single fertile fruit. These specimens had markedly hairy peduncles and involucre, and were probably *biennis*. Thus from North Yorkshire I have seen plants which I regard as (1) *biennis*, (2) *oporinoides*.

Firstly with respect to *biennis*. This is recorded in J. G. Baker’s ‘ Flora of North Yorkshire ’ as ‘ In Cleveland in cultivated fields, Great Ayton, W. Mudd! ’ This, with Baker’s confirmatory ‘ !, ’ should be a

satisfactory record, and my experience with the North Yorkshire plants offers no challenge to Baker's mark of exclamation. It is probably thoroughly justified, and Mr Flintoff's ambition to furnish a record 'without the addition of a note of exclamation' is surely a very strange one.

The other plant, *C. oporinoides* Boiss., is, in my opinion, merely a variety of *C. biennis* (see *Journal of Botany*, October 1932, p. 280), and I shall not be at all surprised should it be found in other parts of the country. That it has until this year (1932) been recorded, so far as I know, only from the Sierra Nevadas in Spain may well be due to lack of extensive and intensive study of *C. biennis* throughout its geographical area in this country and on the Continent. It does not seem to me likely that *oporinoides* has had a separate distribution from *biennis sensu stricto*. It may well be a mutational form which may crop up anywhere, and its occurrence at Freshwater—a *biennis* area—may be significant.

During the coming season plants should be gathered in North Yorkshire by some responsible collector and the same material be circulated to all those who have previously tried to furnish help, and here it should be noted that fruiting heads must be sent if determination is to be secured. The plants ought also to be observed in cultivation, and to this end ripe fruits must be collected on the spot, where pollination from plant to plant may have taken place. That *oporinoides*—though probably self-sterile—does produce fertile fruit in Yorkshire is shown by my success in raising the plant from seed. Meanwhile, may not all of us who have been drawn into this discussion agree to let the matter rest until we have all examined adequate and identical material?"

On 3rd July 1933 I received through Mr R. J. Flintoff a box of *Crepis* and an accompanying letter received from Mr A. E. Greaves, of Goole. From the letter I gathered that Mr Greaves had collected the plants in the "neighbourhood of Howden" and thought them *C. biennis*. I replied to him that I did not think they could be referred to that species, and sent him authentic examples of *C. biennis* for comparison. I further stated that I would keep the plants and subsequently send them to my friend Dr Drabble who was unfortunately ill at the time. I deeply regret that he never saw them. As these plants came from Howden (S.W. of v.-c. 61) over 30 miles south of Allerston (v.-c. 62) referred to in the above paper, they have no direct bearing on the point at issue, and are only mentioned to further suggest that there are other species besides *C. biennis* in Yorkshire.

Among the late Dr Drabble's letters on this subject are some which the writers now probably wish had never been written, but there are two which in justice to my friend, in accordance with one of his last-expressed wishes, and in the interests of scientific accuracy should be published. They are from Prof. E. B. Babcock, Professor of Genetics at the University of California and author of the standard *Conspectus* on this genus. The first is dated 16th March 1933, to Dr Eric Drabble.

"Dear Sir,—On a herbarium sheet from Kew carrying a specimen of *Crepis oporinoides* Boiss., I have found a very interesting note from you to Mr Cotton under date of May 21, 1932. From this note I learn that you have been growing this rare and interesting species for several years. As I am trying to bring to completion a monograph on the *Crepis* of the world and have long wanted to obtain living material of this species, naturally I am greatly interested to learn that you have it under cultivation.

I have gone over the material on this Kew sheet very carefully, comparing it with my notes, fragments and drawings from the type of the species in the Boissier herbarium, and I am satisfied that your identification is correct. There are a few minor variations from the type in your material but none of much importance. Of course I should be still better satisfied if there had been a mature achene in the packet on this sheet but the immature ones there compare very well with the mature ones from the type. If it is impossible for you to send me any live roots I hope you can send me some viable seeds. These can be sent in a letter directly to me and no special permit is required for importation of any seeds.

Thanking you in advance for your kind co-operation.

Very sincerely yours,

E. B. Babcock, Professor of Genetics."

A further letter is dated 16th May 1933.

"Dear Dr Drabble,—Acknowledging your kind note of April 17, I am sorry to hear that you have been ill and I am looking forward to hearing from you further concerning material of *Crepis oporinoides*. I am very sorry that the original collector has got some of the material mixed and sent out under other names.

Sincerely yours,

E. B. Babcock, Professor of Genetics."

All who knew Dr Drabble's painstaking efforts to arrive at the correct determination of any plants submitted to him will welcome this further corroboration of his opinion from Prof. Babcock.

W. H. PEARSALL.

A VISIT TO THE DAGENHAM DUMPS IN SEPTEMBER 1933.

SIR ROGER CURTIS.

These notes are compiled from the humanistic standpoint; they make no claim to be scientific. Rather the purpose is to show the value the ordinary member may obtain from membership of a Botanical Society. I take it that the vocation of the ordinary member, both here and hereafter, is scarcely to promulgate micro-species. These must be left to more expert workers. Ours may be the province to admire and possibly to envy, it is scarcely ours to compete. None the less the ordinary member is not denied the thrill of Botany, that glow of inward satisfaction which comes after our day's labour in the field when confronted with new plants. Such was my experience after some hours' roam amid London's unsightly and malodorous rubbish colonies at Dagenham. I was fortunate on this occasion to have the company of Mr R. Melville who skilfully elucidated for me the mysteries of its alien flora. It was pleasant to behold a *Gossypium* species after being clothed for so many long years in cotton underwear. How many Botanists have been privileged to see this plant of first-class economic and historical importance?

Among edible plants we were rewarded by seeing such foreigners as Maize, several Millets (*Panicum miliaceum*, *Setaria viridis*, *S. italica*), and *Sorghum halepense*. A fine crop of tomatoes, much prized and guarded by the Dagenham natives, was also on view. Among more luscious plants we saw specimens of the water-melon and marrow, though hardly fit for the table I admit.

For toxic medicinal plants we were amply contented by a sight of *Hyoscyamus muticus* and *Datura Stramonium*. The latter, indeed, was most plentiful, forming in one place a veritable thicket. And what a glamour there is about the tribe of Solanaceae! No other Natural Order appears to possess such mysterious fascination over the hearts and bodies of man.

The more conventional inhabitants of rubbish heaps were well represented by the usual Sisymbrium tribe (*S. altissimum*, *S. orientale*); the dingy Chenopods by *C. rubrum*, *C. ficifolium*, *C. Vulvaria*, *C. polyspermum*. Atriplices were not to be denied a footing and we saw *A. deltaidea* and *A. littoralis*. *Diptotaxis tenuifolia* made a handsome showing and its flowers gave out a pleasant fragrance in contrast to the melodorous *Chenopodium Vulvaria*.

Among the really handsome plants we saw must be reckoned the vigorous growth of *Aster Tripolium*, a really creditable British plant. Less attractive were *Mercurialis annua*, *Erigeron canadensis* and *Senecio viscosus*. Only one alien shrub was seen, but it alone was worth the journey, *Colutea arborescens*.

My first reflections were (1) how dull and dingy much of the British flora is compared with its alien cousins, (2) a good tramp in the country,

even under wet skies, produces a glow of physical well-being which intellectual interests alone can never yield. It is the supreme privilege of the field botanist that these two satisfactions are his to enjoy. A Club, too, surely exists that its members may join forces on such expeditions and so add human comradeship to other gains.

NOTES ON THE ORCHIDACEAE OF KENT.

W. H. PEARSALL.

As I am now resident in Kent I have recently been afforded exceptional opportunities for acquiring first-hand knowledge of many of the rarer species of this Order by their examination *in situ*. In addition to this I have acquired a mass of authentic information from the members of the Society and others as to their distribution, and decrease or increase.

On May 18, Mr H. D. Stanley and I explored the district N.E. of Ashford and saw *Orchis purpurea*, *Ophrys apifera*, *O. muscifera*, *O. aranifera*, *Anacamptis pyramidalis*, *Aceras anthropophorum*, *Cephalanthera grandiflora*, and several of the Marsh Orchids. We were also fortunate in finding a colony of *Pyrola minor* in flower at this early date in a sheltered situation of sunny aspect.

During the following week Mr P. M. Hall asked me to join him at Wye for a week-end. We went over most of the ground I had traversed ten days before, but even in that short interval there was a marked falling-off in the numbers of the more conspicuous species. Where previously I could have easily gathered 50 specimens of *Orchis purpurea* we now had difficulty in discovering half a dozen. The area of our investigations was therefore extended, especially to the south-east, and we were rewarded by the discovery of several additional species. It is perhaps necessary to say that we were not "collecting," but a list of the species actually seen—on May 27-28, 1933—will be of value as a record:—*Cephalanthera grandiflora* (in quantity), *Orchis purpurea* (in several places), *O. Morio*, *O. ustulata*, *Platanthera chlorantha*, *Anacamptis pyramidalis*, *Aceras anthropophorum*, *Ophrys apifera*, *O. muscifera*, *O. aranifera* and *O. arachnites*. Of the last-named we saw some half-dozen flowering specimens *in situ* and met an entomologist with 2 more in his button-hole. He said they were Bee Orchids and there were plenty in the neighbourhood! However, as he kindly offered us the flowers we were grateful for their gift.

About a fortnight later I spent an afternoon with Dr H. Gray, of West Malling, studying these species on the downs N.W. and N. of Maidstone. In both vice-counties we saw large numbers of *Cephalanthera grandiflora* under the identical ecological conditions found previously in the S.E., but in neither instance under Beech. *Aceras an-*

thropophorum and *Gymnadenia conopsea* also, were frequent in each v.-c. In v.-c. 16 only there were some exceptionally fine colonies of *Herminium monorchis* and, of course, *Ophrys apifera*.

I am deeply grateful to my friends for their kindly offices in affording me so many opportunities for the study of these fascinating and thought-compelling plants in their natural haunts. In each district of the county I was much struck by the general similarity of the special habitat conditions necessary for each species. However, the danger of generalising from insufficient data was again apparent for Mr Hall was more impressed by the dissimilarity of some of the habitats with those favoured by the same species in Hants and its neighbouring counties. However, it was obvious that a wide and intimate knowledge of the individual ecological conditions under which each species grows is the best guide to its discovery.

The Lizard Orchid eluded us and I have yet to see it growing in its natural surroundings. However, through the willing co-operation of members and others I have been able to compile a complete list of its recorded Kentish stations and also of its vice-comital distribution elsewhere. According to a letter in the "Times" during the summer of 1933 a specimen had been discovered near Sevenoaks and the fortunate finder rushed into print with the statement that this species had been practically extinct in this country for nearly a hundred years. However, the facts do not support him. The Lizard Orchid has been seen in some part of Kent alone nearly every year of this century—it was seen at 4 other stations in Kent during 1933, also in E. Sussex and N. Somerset. During the past 10 years—only—it has also been recorded for Surrey, Hants, Wilts, Bedfordshire, Cambridge, Herts, Lines and E. Norfolk; and seen growing in other counties by botanists who wisely wish to protect it. We trust that any individual who makes a further discovery of this plant will "blush to find it fame."

BEGINNING THE STUDY OF GRASSES.

W. H. PEARSALL.

The study of Grasses is commonly neglected because of its difficulty, but this is very largely due to the absurd confusion of names used by various authors in describing the parts of the flower-spikelets. This short article is written, by request, solely for beginners working alone, and is an attempt to deal with all the difficulties they have already encountered or may ultimately meet. In commencing the study of Grasses it is unwise to select those in which the flowers are not fully opened and anthers displayed. When this later stage is reached half the difficulties of determination disappear. There is the same difference in appearance between the early and later flowering stages of most grasses as between those of a closed and open umbrella, and most of the book illustrations show only the later stage. Having waited, therefore—say, till June—we select a large grass whose spikelets are on spreading branches and whose flowers are well opened. These spikelets are simply small clusters of flowers and their protecting scales. They are usually oval or lanceolate in outline and vary in length from 2 mm. (*Agrostis*) to 20 mm. (*Bromus*), without including the awn. With the aid of a small pair of scissors cut off a single spikelet and place it on a post-card. We are now about to dissect the spikelet and a word of caution is necessary as to its perverse tendency to fly off into space during the process! By means of the small blade of a pen-knife, a large needle and a lens, make out the following parts. At the bottom of the spikelet where it joins the stalk are two boat-shaped *glumes*, unequal in size, opposite each other, hinged together and tightly clasping the base of the spikelet. With the help of knife and needle remove them. If your blade is well sharpened this is most easily and quickly done by cutting across their hinged base. These are what Bentham and Hooker (and many other authors) call the “empty glumes” or the “outer glumes,” but modern authors simply “glumes.” As a general rule, each spikelet possesses a pair of these glumes and usually they are not awned. (There are exceptions to these two statements, but they are very few, the only one worthy of mention being that of *Anthoxanthum odoratum*—Sweet-scented Vernal-grass—whose spikelets possess 2 pairs of glumes, the inner pair being awned).

Inside this pair of glumes—now removed—are the flowers, one or several. The flowers of a grass have no petals and consist mainly of a tiny ovary (with the 2 delicate plumes of the stigma at its apex) and 3 slender stamens. These flowers have no glumes, but each flower is enclosed between 2 *pales*, the outer and the inner. These pales are very similar in appearance and form—“boat-shaped”—to the discarded glumes but are usually larger, more delicate and often possessing awns at their tips. The larger outer pale—or palea—(O.P.) is of the utmost

importance in the determination of the grass, so the greatest care must be exercised in its examination. The inner pale is smaller, more delicate and sometimes very difficult to see, but at this stage we shall rarely require to detach it.

Here it will be necessary to deal at some length with the great difficulty experienced by botanists who possess one or more of the following British Floras—Bentham and Hooker, Babington, Watts, Johns or Hayward. Most often a student possesses two of these and finds much difficulty in making their descriptions of the flowers of Grasses agree. The "outer pale" is termed the "flowering glume" by several of these authors, and by Babington the "lower pale." *These three terms—outer pale, flowering glume, and lower pale—are simply different names for the same thing.* The term "pale" means in Johns the inner pale, but in Hayward the outer pale—*e.g.*, 4 times on p. 235. This is sufficiently confusing to those who use these two authors in conjunction, but by no means the end of the story, for we find in Hayward's Botanist's Pocket Book no fewer than 5 different terms used for the outer palea:—

outer pale	p. 237, <i>Trisetum flavescens</i> .
lower pale	p. 237, <i>Avena fatua</i> and <i>A. strigosa</i> . (For <i>A. pubescens</i> "outer pale" is used).
pale	p. 235, <i>Aira caryophyllea</i> and <i>A. praecox</i> .
flowering glume	...	p. 235, <i>Apera Spica-venti</i> and <i>C. epigeios</i> .
glume	p. 237, <i>Deschampsia caespitosa</i> . p. 249, <i>Brachypodium sylvaticum</i> and <i>B. pinnatum</i> .

As the glumes of none of the last three species possess awns this use of the term "glume" is very misleading, especially as the same term is correctly used on the same page!

It is to be hoped that the foregoing explanations will enable members to more easily follow the descriptions given in their Floras, and at the same time to accustom them to the use of modern terms in general use.

Having thoroughly grasped the fundamental fact that the "glumes" are only to be found at the base of each spikelet—and not at the base of each flower—and that above them are the pales, we are in a position to take a further step and ascertain how many flowers each spikelet contains. It may perhaps help us to recognise the very similar glumes and pales by remembering that they, together, form the "chaff" of the miller. (*L. palea* = chaff). It is necessary to know the number of flowers in each spikelet before we can follow the book descriptions or use a Key. As each flower is enclosed between a pair of pales if we count the number of pairs we know the number of flowers. In actual practice it is much easier simply to count the larger outer pales—*e.g.*, 4 outer pales = 4 flowers. Do not include the glumes, it is better to remove them before commencing to count.

We have deliberately chosen a grass whose flowers are arranged in a loose branched panicle, as we consider this type of grass presents to the beginner less difficulty than the spike or spike-like type, and therefore the student feels that he is making satisfactory progress from the start. He will soon notice that in many cases the outer pale (O.P.) ends in a long bristle, but in other cases it is simply acute or even blunt and jagged. This long bristle is the "awn" and it needs very careful examination to find out where it is attached to the pale. Although it appears to be merely a prolongation of the apex of the pale—and therefore a "terminal" awn—it is more often attached to the back of the pale, or even to its base. Insert a needle between it and the pale to discover its point of insertion (attachment). If inserted near the middle of the back of the pale, the awn is "dorsal," and if starting from the bottom of the back, it is "basal." It is often so closely pressed against the back of the pale that botanists hastily conclude that it is "dorsal," but by inserting the needle between the awn and the back of the pale it is possible to work it right down to the base, proving that the insertion of the awn is "basal."

Even more common is the mistake made by looking casually at the spikelets as a whole and because no protruding awn is visible, concluding that there is none present. This is one of the reasons why so many beginners fail to recognise *Aira caespitosa* (*Deschampsia caespitosa*)—a common tufted species found on wet grassland or the borders of woods. In this grass the outer pale possesses a very fine hair-like and straight basal (or almost basal) awn about as long as the pale and therefore not protruding beyond it. The glume hides this awn from view and only by the preliminary removal of the glumes is it likely to be seen—and even then, it is so fine as to be often missed except by the discerning!

The awn of grasses may be very slender or quite stiff, smooth, or very rough, twisted, straight, or bent in the middle ("knead")—often both twisted and knead. These characters are very important in the determination of species. Some genera (*Poa*) never possess awns, while many others are at once recognised by their awns. Another prominent character in the grasses belonging to some genera—*e.g.*, *Avena*, *Aira*, *Arrhenatherum*, and *Phalaris*—is the presence of a tuft of hairs at the outer base of the pales. These hairs are situated between the glumes and the pales. They are seen directly the glumes are removed and distinguish these genera from others (*e.g.*, *Bromus*) which possess no basal tufts of hairs.

We may now examine the grass selected. If there is only one perfect flower in each spikelet the grass will probably be either a species of *Agrostis*—a very delicate grass—or *Melica uniflora*. All the species of *Agrostis* may be known by their very slender spreading branches, tiny spikelets and glumes longer than the pales they contain. *Agrostis vulgaris* With. is a characteristic grass of heaths and commons. Its panicle is very fine and graceful—Fine Bent-grass—and its leaves are narrow and possess a *short* blunt ligule. Another common species found

in meadows, marshes, woods or by the wayside is *Agrostis alba* L. (Fiorin). Its ligule is long, erect and rounded at the apex. There are other species and varieties for which a Flora must be consulted.

Melica uniflora is found on shady banks, especially those near woods, and can be distinguished at once by its few chocolate-coloured spikelets on long slender branches. The O.P. is awnless, broad, rounded at the apex and 5-7 nerved. This grass flowers about June and is one of the easiest with which to commence the study of grasses.

If our selected grass (with one-flowered spikelets) is neither a species of *Agrostis* nor *Melica*, it may possibly be *Milium effusum*—a grass found in damp shady woods—or *Molinia caerulea* (Purple Moor-grass) found on moors or in marshes, but avoiding those on limestone or chalk.

For grasses whose spikelets contain 2 or more flowers it will be best to use a Key, such as that of Bentham and Hooker's British Flora. In doing so, it is necessary to remember that we need only commence at No. 31 and that the "flowering glumes" are the "outer pales." The lengths of the spikelets are given in "lines;" this is an old-fashioned method of measuring length—one line equals one-twelfth of an inch or roughly, 2 mm. Modern books give these lengths in millimetres.

It will be noticed that this Key (from No. 31) is in 2 parts: 31-39 dealing with grasses the pales of which are *awned*, and 40-49 including those having *awnless* pales. Of the latter we need only concern ourselves with No. 48—*Poa* and *Festuca*—at this stage of our study. Both these genera are very common and differ chiefly in their outer pales; those of *Poa* are obtuse or only sub-acute at the apex and possess *no awns or awn-points*. The outer pales of *Festuca* are very much more pointed and end in a *short awn or awn-point*. Having decided to which genus our grass belongs it becomes necessary to ascertain its species. Here, unfortunately, we shall get little assistance from the Key to either *Poa* or *Festuca* in Bentham, although the descriptions of the species may be helpful. We need only consider *P. annua*, *P. pratensis*, *P. trivialis*, and *P. nemoralis*.

P. annua is a little tufted annual, flowering nearly all the year round and abundant on gravel paths and waste places everywhere. Its panicle is triangular in outline, often somewhat 1-sided, and 1-2 inches long. The leaves are flat—often puckered—limp, dull pale-green in colour, and glabrous. The O.P. is 2-3 mm. long, 5-nerved, with membranous margins above.

P. pratensis (Smooth-stalked Meadow-grass) is a perennial species which has a creeping root-stock with runners. Its leaves are variable, short or long, with nearly parallel margins suddenly narrowing at the apex to a blunt point. The ligule at the base is short and blunt. The O.P. is blunt, and often ragged at the apex. This species is abundant in meadows and by the wayside.

P. trivialis (Rough-stalked Meadow-grass) is also a perennial, abundant in moist places. It may be distinguished from *P. pratensis* by the

absence of runners, a general roughness of stem, leaves broadest at the base and gradually tapering to a rather acute point. The ligule of the uppermost-leaf is long, acute and glossy. The O.P. is acute at the apex.

P. nemoralis (Wood Meadow-grass) is a tufted or slightly creeping perennial only found in shady places—woods or banks shaded by high hedges. It is much less frequent than the preceding species, and much more slender and delicate in its rather drooping panicles, often rather close, seldom very spreading.

The genus *Festuca* is very similar to *Poa* and needs very careful examination of the points of difference before it can be confidently distinguished. Its spikelets are often slightly larger than those of *Poa* as they contain more flowers. The outer pale always ends in an awn or awn-point. There are only 2 species of this genus which are likely to be gathered, as both are very common in moist situations. *Festuca elatior* (Tall Fescue) is commonly found on damp clay soils and in wet marshy places. It may be from 3-5 feet high. Its leaves are long, dark-green, firm and keeled only at the base. If held up to the light white lines will be seen between the ribs. The sheaths at the base of the stem are red or pink. The flowering panicle is large, spreading and rather drooping at the top. The O.P. is 5-9 mm. long, boat-shaped, round-backed and with 5 faint nerves, the dorsal (middle) nerve ending in an acuminate point or very short awn.

F. pratensis (Meadow Fescue) is similar but much smaller—18 inches to 2 feet high. It is most commonly found in moist pastures on good soils, or in damp grassy places by the wayside. Its panicles are less branched and less drooping than those of the preceding species. Its leaves, also, are limp and not firm and rigid as in *F. elatior*. The O.P. is shorter (5-6 mm.) and although it may be very shortly awned, usually is blunter at the apex.

F. ovina (Sheep's Fescue) does not concern us, at this stage. It is a small grass whose flowering stems are only about 6-9 inches high. It forms a close mat of wiry herbage on dry limestone hills and chalk downs. We may, however, meet with one of its varieties in moister and richer soils; this is *F. ovina*, var. *duriuscula* (Hard Fescue). It flowers early in June and may be 1 or 2 feet high. The basal leaves are permanently folded but a few on the stem below the flowering panicle may be flat. Its O.P. is round-backed, 4-5 mm. long and ends in an awn about half as long as itself. *F. rubra* L. (Red Fescue) is a very similar grass found in sandy places or among loose stones. The importance of noticing the habitat conditions of all grasses cannot be too strongly emphasised.

We now turn to grasses, the outer pales of which terminate in awns which are usually long and easily distinguished. One of the commonest tall grasses—often lining country lanes for miles about the end of June—is *Arrhenatherum avenaceum* (False Oat-grass). The joints of its stem are frequently conspicuous from their covering of downy-white hairs. The stem is from 2-4 feet high and the panicle 6-10 inches long, closed at first but spreading when the flowers are ripe. The spikelets

are from 8-10 mm. long and each contains only 2 flowers, the upper one perfect, the lower one having stamens only. The glumes are very unequal in size. The O.P. of the lower flower has a long twisted and "kneed" dorsal awn. The O.P. of the upper flower may be similar but more often its awn is only short and nearly terminal.

Very similar in general appearance are the species of *Avena*, but they are less common and their spikelets contain 2-5 flowers—if 2 only, both are perfect. *Avena pratensis* and *Avena pubescens* are frequent or common in pastures on calcareous soil. *Avena flavescens* (*Trisetum flavescens*) the Yellow Oat-grass, is often found in similar situations, especially where the grass is mown, and occasionally by the roadside. Its panicle is of a golden-yellow colour and very delicate in appearance.

We now come to the consideration of two common and important grasses—*Deschampsia flexuosa* and *D. caespitosa* (or *Aira flexuosa* and *A. caespitosa*). Both species are characteristic of special and distinctive habitats—the former *dry*, the latter *wet*, using these terms in a broad and general sense. *Deschampsia flexuosa* (Silver Hair-grass) is partial to dry heaths, heathy ground and the drier oakwoods or grasslands on non-calcareous soils. *Deschampsia caespitosa* (Tufted Hair-grass) is found in wet undrained grassland, damp oak-woods, marshy places on heaths, ditches, and boggy soils generally. It grows in dense tufts, 1½-4 feet high and is a most graceful grass. The upper surfaces of its leaves possess very high, rough and acute ridges and the basal ligule is long and pointed. The 2-3 flowered spikelets are silvery-grey or purplish in colour. The O.P. is thin, whitish, jagged at the apex and has a fine, hair-like, nearly straight basal awn about its own length, rarely protruding, and therefore often overlooked. *Deschampsia flexuosa* is a similar but much smaller grass, 12-18 inches high and its narrow leaves have their edges tightly inrolled, making them appear solid. The O.P. bears a twisted and "kneed" basal awn distinctly longer than itself.

So different are the habitats of these 2 species of Hair-grass that, after reading the above, it may be concluded that they are never found growing in close proximity. However, in actual field-work you may frequently have on one side of your path a heather-covered tableland or bank, and on the other damp ground sloping to a brook or drain. On the higher and drier side the presence of *Calluna* (Heather) leads you to expect *D. flexuosa* also, while on the lower and damper side the presence of species of *Juncus* warns you that the tufts of a similar grass there will probably be those of *D. caespitosa*.

The last of the grasses to be mentioned in this preliminary paper is the well-known Cock's-foot (*Dactylis glomerata*). This grows on almost every type of soil and is met with everywhere. Its stem is stiff, erect, 2-3 feet (or more) in height and very rough to the touch. At its top are usually 3 or 4 short stiff branches with large ovate clusters of spikelets at their ends. It thus presents a somewhat dense, heavy and less pleasing appearance than other grasses. The spikelets contain 3-5 flowers, the glumes are nearly equal and the O.P. ends in a slightly curved point often about one-third the length of the pale itself.

It is hoped that this short paper will remove some of the difficulties members have met with in using their Floras, and may have stimulated interest in these beautiful plants. A subsequent paper will deal with the grasses of particular associations. Meanwhile, to any students desirous of more serious study of grasses I would strongly recommend Armstrong's British Grasses, Cambridge University Press, as by far the most useful book for the purpose.

EVIDENCE OF A PREHISTORIC FLORA IN THE IVEL DISTRICT.

J. E. LITTLE.

The reference numbers are those of the Bibliography published in the *Report of the Botanical Society and Exchange Club*, 1932, pages 384-387.

In 1891, W. Hill, my friend and companion of many rambles, described, under the title of "Our Forgotten Lake" (15, p. 91), a fresh-water deposit lying above Boulder Clay and at the base of Brick-earth then being worked for brick-making on the southern outskirts of the town of Hitchin, in the district known as "Sunnyside" or "The Folly," sloping towards the present drainage basin of the Ippolyts Brook, of which the nearest point is about 225 feet O.D. This fresh-water deposit lies slightly higher than the present stream level. The nearest bench-mark on the Sunnyside road is 243 feet, and the fresh-water deposit lay at this point about 10 feet down in the nearest pit, whence in 1907, under W. Hill's direction, I obtained nucleuses of *Chara* and carapaces of Ostracods. The brick-making has now (1932) been discontinued for a good many years, and all the exposures have been filled in.

The associated strata were in 1897 examined by Clement Reid (56), who gave determinations of Phanerogams and Cryptogams found in the fresh-water deposit. These determinations are here reproduced in full as they carry back our knowledge of the existing local Flora to a period preceding the "Palaeolithic brick-earth" (Reid) which overlies the fresh-water deposit, whether it be the result of a lake (Hill) or of a slow-flowing river (Reid).

"Hitchin yields strong corroborative evidence in favour of the conclusions arrived at in the Hoxne (Suffolk) Report, and adds somewhat to our knowledge of the temperate flora of the ancient alluvial strata lying between the chalky boulder clay and the Palaeolithic brick earth" (Reid).

"Such trees as the oak, ash, sloe, cornel, elder and alder point unmistakably to a temperate climate, and the fauna and flora as a whole suggest climatic conditions not differing greatly from those which we now enjoy. Mr Mitten writes of the mosses that 'all these are inhabi-

tants of a sylvan temperate region . . . and none point to a different environment from that now existing; they are not arctic ' ' (Reid).

It may be added that the part of the lake-bed first discovered by Hill lies very near the central line of a deep buried valley in the chalk of a northward-flowing river, proved by Hill in 1908 to extend from Langley to Holwell (57), and in 1912 extended to Henlow, Beds (58).

FLOWERING PLANTS.

(Det. C. Reid, 56, p. 45.)

<i>Ranunculus aquatilis</i> L. (aggr.).	<i>Menyanthes trifoliata</i> L.
<i>R. sceleratus</i> L.	<i>Lycopus europaeus</i> L.
<i>R. repens</i> L.	<i>Ajuga reptans</i> L.
<i>Montia fontana</i> L.	<i>Alnus glutinosa</i> L.
<i>Prunus spinosa</i> L.	<i>Quercus Robur</i> L.
<i>Poterium officinale</i> Hook. fil.	<i>Ceratophyllum demersum</i> L.
<i>Pyrus Torminalis</i> ? Ehrh. (identical with seed found at Hoxne).	<i>Sparganium</i> sp. ?
<i>Hippuris vulgaris</i> L.	<i>Potamogeton crispus</i> L.
<i>Myriophyllum</i> sp.	<i>P.</i> sp. ?
<i>Cornus sanguinea</i> L.	<i>P.</i> sp. ?
<i>Sambucus nigra</i> L.	<i>Naias marina</i> L.
<i>Eupatorium cannabinum</i> L.	<i>Scirpus lacustris</i> L.
<i>Fraxinus excelsior</i> L.	<i>S.</i> sp. ?
	<i>Carex</i> sp. ?

MOSESSES.

(Det. W. Mitten.)

<i>Antitrichia curtispindula</i> Brid.
<i>Homalothecium sericeum</i> Bry. Europ.
<i>Hyocomium brevirostre</i> ? Bry. Europ.
<i>Isothecium</i> ?
<i>Neckera complanata</i> Bry. Europ.
<i>Stereodon cupressiformis</i> Brid.
<i>Zygodon</i> ?

CHARACEAE.

Several species indet.

Of the Phanerogams one, *Naias marina*, does not now occur; and one, *Poterium officinale*, has not recently been recorded. There is a sheet in Henry Brown's herbarium, l, vii, 1842, named *Sanguisorba officinalis*, but without locality. He was, however, on this date in the High Down-Pegsdon region, and the specimen may have been gathered in Herts or in Beds.

Poterium officinale was recorded by both Abbot and Saunders for several Bedfordshire localities, but the writer has never seen it in the Ivel basin of either county; and it may, like *Pimpinella major* Huds. in Herts, be one of the plants which is dying out, owing to drier conditions.

Montia fontana is not known to me as occurring during the last 40 years in the Ivel district, but was found at Hertford Heath, 1910, and Mardley Heath, 1914, in the Lea basin; and at Colney Heath, 1913, in the Colne district.

The other Phanerogams on Clement Reid's list still occur in the Ivel district. *Pyrus torminalis* is, however, represented only by a single tree.

Hill (15, p. 95), speaking of the nucules and casts of the stems of *Chara* discovered by him, remarked that plants of this group were "not now living in this immediate neighbourhood." They are indeed not abundant. But *C. vulgaris* was recorded from Offley in 1883 (12, p. 516). It occurred at St Faith's Well, Hexton, 1918 (det. J. Groves); the Stratiotes pond, Ickleford, 1922; Lax's pond, St Ippolyts (det. T. B. Blow).

A *Chara* was growing in a recently-made watering-place for cattle, below the spring on the Riddy Lane, Hitchin, 1932, but was cleaned away before it could be determined. It was probably introduced by some water-bird.

THE HEDGE WOUNDWORT—STACHYS SYLVATICA L.

G. F. SCOTT ELLIOT, M.A., B.Sc.

This is one of those very common "hedgers" which appear at first sight to be uninteresting and commonplace. It has a strong and rather unpleasant smell.

Flowers begin to appear in June and continue until October or even the second week of November.

It often grows profusely in wood-clearings or on the outskirts of all sorts of deciduous woods, even alder and willow brakes, but its favourite place is along a ditch below a hedge bank where sunlight falls upon it. It is not a true marsh plant like its first cousin, *S. palustris*. Nor is it really an alpine plant, though it has been found at 1500 feet in Northumberland (Tansley: Types of British Vegetation), at 1400 feet on the Whitehope, Dumfriesshire, at 1250 feet in Perthshire, and at 1600 feet on Snowdon.

It prefers a good loose and fairly rich soil, loam, leaf mould or even a rich roadside soil, though on main highways, which are carefully groomed, it is often replaced by *S. Betonica*, another cousin.

The flowers appear from June and last into October, which covers the busy season of the Bumblebee. At first sight there is nothing arresting about the rather dingy-red flower. But even a casual glance with a lens reveals a scheme of colouring which is delicate and charming.

It is really a harmony in reds; the upper lip of the corolla is dark and rich; the sepals are greenish-red with pink tips, whilst the lower lip is a fine purplish-red set off by ornamental pure white lines and spots. This three-lobed lower lip is the landing place for insect visitors and has a distinct velvety sheen produced, as in the Sloe, by the play of light amongst the little hillocks of the epidermis cells. At the tube-entrance there are stout white cushions with stiff hairs.

A strong stem may produce from 60 to 70 flowers. From quite early in the morning till dark, one has seldom to wait more than a minute and a half before seeing Bumblebees very busy amongst them. *Bombus* is recorded as the regular pollinator from Bremen, Brunswick, Schleswig, Flanders and Dumfriesshire.¹

The Hive bee and a few of the smaller wasps and larger "hoverflies" also visit the blossoms, but it is essentially a Bumblebee flower.²

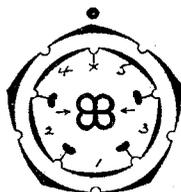
The insect works from below upwards, just as she does when engaged on Foxgloves; she alights on the lower lip, then holding on to the cushion-ridges at the throat of the corolla, her proboscis is guided in

¹Probably all species of *Bombus* visit the blossoms. In Dumfriesshire *B. pratorum*, *B. lucorum* and *B. Muscorum* are frequent.

²*Anthidium*, *Anthophora*, *Andrena*, *Podalirius* and *Eristalis* are recorded by various observers.

between these ridges and down to the honey which is secreted by the fleshy nectary below the four nutlets.

Now Bumblebees are often large and heavy, and the corolla during their visits must be subjected to considerable strain. Sometimes, indeed, one finds that five per cent. of the flowers are split lengthwise or torn, apparently through rough behaviour on the part of some boisterous visitor. Yet the arrangements for bearing the *Bombus* are ingenious and usually sufficient for the purpose. The upper lip has a slight forward curve. This part of the corolla, that is the upper line, is stout and strong and is also kept rigid by the stamen-filaments which are united to it. The calyx is also tough and mechanically strengthened by very thick-walled cells of which there are two or three layers. The calyx teeth assist for they also are firm and resistant.



FLORAL DIAGRAM OF THE LABIATÆ.

x Indicates the position of the missing stamen.

The arrows point to the line of division between the carpels.

● Position of the axis of the stem.

The outer ring consists of the 5 sepals.

The inner ring shows the 5 petals: 1, lower lip; 2 and 3, lateral petals; 4 and 5, upper lip, united.

The 4 stamens are shown as reniform figures.

The really interesting part, is, however, the lower line of the corolla. There is a narrow entrance where are the tough thickened cushions; then the corolla curves forward so as to form a slight bulge near the base, which rests on the lower part of the calyx tube.

Through these arrangements, the weight or forward thrust of the bee is distributed all over the corolla tube which, though tough, is not rigid but elastic, and the strain is also in part taken by the calyx tube. Nor is this last rigid; both the calyx and the pedicel can be seen to give or yield a little under the weight of the bee.

When just open, the two longest stamens are pollen covered; after an interval, they move to the side, out of the way, and the other two then move and shed their pollen; finally the style grows a little, curving downwards, and its two stigmatic surfaces open out so as to lick off any pollen which may be on the bee's head. As the younger flowers are towards the top, the head is well dusted with pollen before the bee flies off to older flowers at the base of the next spike.

Within the corolla tube, just above the four nutlets, is a little circlet of white hairs; possibly these may help to conceal the honey or discourage small thieves.

No unprejudiced person who examines the flowers or watches the bees at work can doubt but that these arrangements for pollination are both adequate and efficient in practice.

But to make out how they were ever developed, just along these particular lines, is a difficult problem.

The flower-buds do, however, suggest how some of the modifications may have arisen. The bracts are opposite; each successive pair being at right angles to the one below. The middle flower of each little group of three is covered by the main bract and is packed into the groove of the stem. The two side flowers (in bud) occupy vacant spaces above the centre flowers of their two neighbours. The internodes in bud are very short so that all the developing flowerets are very closely pressed under the bracts and between them and the stem.

It is at once clear that the fifth stamen-rudiment, of which the position is shown by an x in the figure, has had no chance of developing and must have been suppressed; as it is not there, one naturally finds no trace of a vascular bundle leading where it ought to be.

The stalks of the other four stamens are pressed against and adhere to the corolla.

In bud, one finds the upper lip of the corolla (two united petals) blocking the entrance of the calyx: it is folded over the lowest petal (under lip) which is bent inwards and downwards within the corolla tube: the two side petals are bent over and lie between the lower and the upper lip. These two lateral petals have very little chance of developing at all and become mere side ornaments of the landing-stage.

During the development of the flower, the corolla tube elongates; the upper lip can arch more and more upwards, but its tip is caught for a time within the throat of the corolla tube: the lowest petal (lower lip) can also grow downwards within the tube. All this time the four anthers are arranged in two pairs and almost fill the corolla tube below the throat.

The catching of the end of the upper lip in a little hollow within the entrance, and the position of the anthers seemed to me to involve the formation of the slight bulge at the base of the corolla. But I came to the conclusion that a satisfying explanation of the shaping of the corolla required what I have never received, viz., a thorough training in the art, or science, of dress-designing.

The lower lip does not get free so as to turn outwards and downwards until at quite a late period. It is only then able to spread out sideways and face the light: before it can do so, the veins which supply it have to pass round a curve of very short radius, for the line of the platform is at an angle of 240° to the line of the tube. This abrupt bend in the line of food-supply possibly explains the thick white cushion-ridges.

As to the circlet of white hairs above the nutlets, there will be in this part of the corolla an abundant supply of water: in both the upper and lower lip, growth is going on, but with difficulty. Yet these hairs and those on the cushion at the entrance of the throat have space in which to develop.

Now excess of water and a sudden arrest of growth sometimes result in the production of hairs. For instance, when the leaves of *Tropaeolum canariense* are eaten by snails, this plant, which is normally glabrous, becomes hairy. Dr Hill removed the leaves and found that a dense felt of hairs was produced in a few days. (3) It would be incorrect to suppose that this is a general law governing the production of hairs. Still it is the fact that one does find them in this flower both at the entrance and near the bulge of the lower part of the corolla throat, just where, according to this suggestion, they ought to appear.

So also the part below the ovary is just the place where one might expect an accumulation of sugar and it is here that the nectary is formed. This is the most usual place for the nectary (*Digitalis*, *Cardamine*, etc.).

Parts of the lower lip are folded inwards during the growth of the flower and may be in shade: it seemed to me that these folds afterwards became the ornamental white lines which set off the rich red of the platform, but as to this point, I am not quite satisfied. All these details seem minute and trifling; yet the peculiar folds during the development of the flower do, on the whole, seem to have had an influence in fashioning a corolla which is undoubtedly suited to the habits of *Bombus*. The insect no doubt assisted in the process of development, for those flowers which it liked and found convenient would be most frequently visited.

Towards the end of the season, grasses and other tall herbaceous plants are developing rapidly; the flowering stems of the Woundwort also become much taller. Growth whilst the seed is ripening is natural enough, for abundant food material is available and the shade and shelter of the companion grasses favour the quick formation of internodes.

After the corolla drops off, one sees inside the calyx-tube the four nutlets which are at first white and shining, but soon turn black. As the stem begins to wither, it becomes dry, tough and elastic and a vigorous swing of the stem flings out the little nuts. These last are each half carpels: the way in which they are placed close together in a circle involves two rather sharp edges or corners.

The epidermis cells in fruit are very thick-walled, but along these corners, the cells are drawn or squeezed out and their walls are thinner: when the embryo within begins to grow and enlarge, it is along these edges that the wall splits. (4)

The distance to which the nutlets are thrown may be perhaps 10 to 20 feet, which means that it might travel a mile during 300 years. But this would depend on the wind blowing along the road or woodside, and not towards the hedges or into a field, for it is very unlikely that the fruit would be able to find a good place to grow in either of these places.

I therefore tried a little experiment. The seeds were moistened with water; then I brushed them lightly with a pheasant's tail feather: they stuck to the feather and could be carried a mile and placed in a jar for two hours without falling off.

So in nature a pheasant could, in wet weather, carry the seeds for a mile or more. The seeds of the Foxglove and of Gorse can also be carried about by birds in the same way.

Most of the order Labiatae secrete essential oils of some kind. Sweet Basil, Marjoram, Balm, Lavender, Mint, Peppermint, Sage, etc., etc., belong to this order.

These oils are derivatives of sugars and glucosides, and are decidedly poisonous.

A plant of peppermint, if placed under a bellglass, will be poisoned by its own exhaled vapour in eleven days. If the air within the glass is artificially saturated with oil of peppermint, *Mentha piperita* will die in 74 hours. Lavender in a similar experiment was killed in 140 hours. (5)

The strong scent of these Labiates is of the very greatest importance as a protection against grazing animals.

This is particularly well seen in the south of Spain. Near Ronda, although the flat valley or "Vega" is rich and green and most carefully cultivated, the surrounding mountains and hills are stony and barren. Thorny plants, others which are excessively gummy such as *Cistus*, but especially strong-scented Labiates (Lavenders, Hyssops, Rosemaries, etc.) are, however, able to flourish, and one finds numbers of them all over the dry rocky hillsides.

In the morning, all sorts of animals, lean horses, patient cows, cynical goats, agile sheep and families of pigs, are driven out to pasture on the hillsides. They avoid the Labiates but are most efficient in discovering anything that could, even with difficulty, be eaten.

The strong scent of *Stachys sylvatica* probably explains the fact that it is not usually touched by rabbits or roedeer. Nor have I noticed any signs of injury by sheep or other domestic animals.

Insects do not appear to dislike this ethereal oil, for greenfly are often found on it: sometimes, indeed, 40 per cent of the leaves are holed or otherwise injured.

A common parasite is a "leaf miner," that is, a caterpillar which forms a winding burrow between the upper and lower surface. The egg is apparently laid within the leaf, and the grub's meandering path, which is white, contrasting with the green of the leaf, grows wider with the increasing fatness of the caterpillar.

I have not found records of true parasitic fungi on *Stachys sylvatica*, though other species are attacked by Rusts and Mildew (*Erysiphe*, *Septoria*, etc.).

Though it is improbable that Hedge Woundwort should entirely escape the attentions of fungus enemies, still the strongly scented oil may really be of some help as a fungicide.

But how is it that the order Labiatae managed to develop these essential oils?

Quite a considerable trade is carried on in Essences, Perfumes and the like, and, as is usual when business people are interested in a

botanical question, observations and experiments of a reliable character are available.

In the first place, manufacture of perfumes is only commercially possible in countries where there is strong sunshine and a rather dry climate, as, *e.g.*, on the French Riviera. Attar of Roses is an important article of export in Bulgaria, but rosegrowing is only profitable in exposed and sunny situations. Sunshine and exposure seem, therefore, to assist in the formation of these essences. This is clear from the careful experiments of Lubimenko with Sweet Basil (*Ocimum basilicum*). He found that the energy of production of the essential oil depends strictly upon the intensity of sunlight. (6)

The sugars formed during the working of the green leaf are changed into celluloses, glucosides and essential oils. Are these latter due to the breaking down of glucosides under the strong respiration due to excessive sunlight?

Now let us assume that these essences or ethereal oils of the Labiatae are wasted glucosides, that is, pathological products brought about by excessive sunshine; this may be considered to be an adverse or distressing condition. Yet how extraordinary are the results of this evil. For, as we have seen, the plants themselves disgust grazing animals whilst they attract useful pollen-carrying insects. It is even possible that the exhalation of these essential oils in some desert plants forms an invisible halo in the air surrounding them.* This surrounding vapour is supposed, by some authorities, to assist in preventing loss of water by transpiration.

Nor for mankind are these products of disease without many and diverse advantages. All sorts and conditions of men, whether savage or civilised, appreciate the sweet scents derived from flowers. Moreover drugs, tonics, stimulants and disinfectants are derived from them, such, *e.g.*, as Lavender, Rosemary, Balm, Hyssop, Peppermint, Marjoram, Dittany, Menthol and Thymol. But we are forgetting Sage (which it is almost a duty to use with goose) and mint, which is inseparable from lamb.

Both leaves and stems are covered by coarse hairs (1-2 mm. long) amongst which are seated other glandular hairs.

The leaves are broad, ovate to cordate and coarsely toothed with a fairly long stalk. When plants are growing as they often do, amongst the common Nettle, the foliage is seen to be of a similar type, but only a rather unobservant animal could confuse the two.

On the upper side, there is the usual system of sunken veins and veinlets to carry off rain water, which drips from the point and is also carried down the grooved stalk to the stem and thence to the ground.

There is a stage in development in which the buds are quite beautiful: petiole and stem are bright red, while the young leaves are covered by pure white, silky hairs.

*It is this vapour which flames up when a match is struck near a plant of Dittany.

In the bud, the leaf edges overlap and small red points can be seen on each tooth. If one dissects out the very youngest buds one finds leaves 1 mm. long, without hairs and with hardly any petiole. But there is a slight swelling where the petiole will develop.

As each pair of leaves is at right angles with the next oldest, this swelling blocks the entrance to the bud between the two older petioles.

Stachys sylvatica grows in a more or less shady place, and its leaves have to struggle for their place in the sun. Both stems and petioles are extremely sensitive to light. In the evening, I arranged a young stem in water, hanging over so that it pointed downwards: the two youngest leaves had also their upper surfaces facing downwards. I placed the vase near a window and found next morning that the stem had twisted right round. The leaves had also so turned that the light was nearly at right angles to the upper surfaces.

This experiment shows that stem and leaves are extremely sensitive to light from one side. It does not explain (nor do any other experiments known to me), how it is that the current of high speed electrons from the sun expend their energy in bringing the sensitive leaves into their natural and normal position.

But it is only when the stem and leaf are placed in their natural position that the upward flow of sap, the exit of water vapour from below the leaf, the entrance of carbonic acid gas and the inward or downward flow of sugar and other material can proceed in a symmetrically balanced manner. But of course this does not explain how this correct position is brought about. The hydrostatic pressure within the living cells no doubt keeps the stem upright.

If one takes a stalk of Woundwort and divides it in four, lengthwise and along the four grooves, each quarter curves strongly outwards, showing that there must be a strong pull or state of tension along the four corners of the stem.

It is by the balance of these four tensions along the ribs that the stem is held steady and erect.

Now if light falls upon one side of the stem only, the living cells on the dark as compared with those on the illuminated side, are under different conditions, and in all probability their turgidity or hydrostatic pressures differ considerably. This may have something to do with the curvature towards the light. This turning towards the sun can hardly be due to the mere pressure of light: this last has been measured and only amounts to some 4 mg. per square metre of absorbing surface. Yet tendrils do react to far less pressure than this, for they have been observed to contract under a weight of only .0002 mg. It is more probable that the cells which are alive and sensitive work differently under the light stimulus. Therefore their state of tension (or the hydrostatic pressure within them) must be changed by the incidence of light. However, this subject on which hardly two authorities agree, is too abstruse for treatment here.

The structure of the stem shows that the development of supporting or mechanical cells is chiefly along the ribs where, of course, the strain is greatest.

At each corner there is a mass of white collenchyma: the epidermis cell-walls are slightly thickened; just within the four pillars or buttresses, there is also a continuous ring (or rather rounded square) of mechanical tissue to which the bundles are attached: there are four large ones at the corners and smaller ones half way between these. Similar strong cords of collenchyma run along the corners of the petiole and a large bundle protected by a "deck" above and a "hull" below occupies the centre.

At the base the more or less horizontal roots from the lowest nodes assist in holding up the stalk: these have a central mass of wood and are tough and well suited to resist a tug or pull if the stem is bent sideways.

Stachys sylvatica has managed to develop a most remarkable arrangement for spreading in all directions. It is not at all easy to dig up a single plant: one finds many side-branches which began either above or just under the soil; they grow outwards and downwards to a little distance before they become erect and form a flowering stem. Some of these subterranean runners may come to the surface and then creep or wind along it even to six feet away from the parent stem. These may, when they find a suitable place, become vertical and flower: or they may turn down into the soil and form a winter bud. Other underground runners only grow a short distance before doing so. The runners have absorbing roots and their leaves are reduced to mere scales: the terminal bud which lives through the winter underground is covered by scale leaves and is packed full of reserve material.

Another species, the Japanese *Stachys tuberifera*, which is cultivated as a food plant, forms small elongated tubers which resemble contracted and specially thickened runners: the flavour of the tubers may, perhaps, resemble that of artichoke, especially if one imagines them to do so.

These wandering stems and runners above and below the ground can, of course, be most easily produced in leaf mould or rather loose soil. M. Chaillot also explains that, in shade, branches which should have grown upwards and flowered, simply creep along the surface: without light, they cannot form the necessary upright stem and enough food material for flowering. (7)

A plant happened to be growing in my garden between rather a thick hedge and a garage. Thus there was a shortage of sunlight, as the hedge was only 4 feet away from the garage. A strong runner with many branches grew out to beyond the garage, until it got into the open a distance of some 12 feet, and then flowered.

Each winter-bud may next year develop a similar complicated arrangement of colonising shoots.

The flower of the Labiates is characteristic; moreover almost all the 134 to 150 genera of this order seem to have precisely the same design, except for the extraordinary, balanced seesaw stamens of *Salvia* and

a few others, and for a few modifications in the nutlets. But a number of curious departures from the ordinary type of *Stachys sylvatica* have been recorded by Mr Cutting in a most interesting research. (8)

He found many cases of united flowers (similar to those which may be noticed in *Prunus spinosa*), and which, through insufficient light, frost, or other adversity, were unable to open and pollinated themselves in bud. Sometimes also the carpels became like ordinary leaves and the flowers were green: this last sport may have been induced by insect parasites.

The most interesting departure from the regular type were, however, symmetrical or nearly symmetrical flowers, and others with the variations shown below.

	Number.	Number of individuals.
Sepals	4	11
Petals	divided	many
Stamens	5	10
Carpels	3	5

There were also cases in which the anthers were included in the throat of the corolla (as in *Marrubium*) or in which there was one petal in the upper lip and four below (compare *Teucrium*).

Now the ancestor of *Stachys* was surely quite regular and symmetrical with all its parts in fives. Those with five stamens show that a primitive member, once lost, can be developed again; so also do the others with 3 carpels. The symmetrical ones are the most interesting of all. Of these Mr Cutting says "one flower, a middle one of a stalked side-inflorescence, was pseudoterminal owing to the destruction of the adjoining side inflorescence and of the main axis."

It developed in an almost symmetrical manner. All his nearly regular flowers were apical flowers on side inflorescences, "and their position on the plant was rendered more symmetrical either by injury to the main stem" or by the development of other flowers between it and the main axis.

These unusual cases seem to favour our suggestion that one of the impulses which ended in the Labiate design was the tight packing of the infant flower between the grooved stem and its covering bract.

With reference to the variant with four sepals, this is a new departure. Mr Cutting suggests that four sepals were formed in consequence of there not being sufficient food material to produce the usual five. The case of *Caltha palustris* seems to bear out this theory.

All these variants or original departures appear to show that even in highly specialised flowers, modifications may be produced to-day. Plants have not lost the power of variation: if any minute difference was of the least appreciable advantage, it might in a certain number of generations end in becoming a new species.

As we have seen above, one flowering stem may form 60 flowers and 240 nutlets. If one takes 5 flowering stems as being on an average the number produced by a plant, then 1200 plants might grow from a single

nutlet. If the number of plants remains unaltered from year to year, the chances of survival are therefore less than one in a thousand, and the slightest real advantage would have a distinct effect.

Has the Woundwort any particular share in the work of the Oak forest association? It is not at first sight obviously useful. But, in prehistoric times, there were no hedges; the country where it grew was covered by Oak scrub or forest. Its favourite situation must have been then (as it is to-day) about the edges of a wood or in clear spots such as might be produced by a fallen tree. It requires shelter, light from one side, and prefers rather loose, fresh or moist soil such as good leaf mould.

Stachys sylvatica, moreover, seldom remains more than one or two years in the same situation, at least, under natural conditions. It is often suppressed by a thicket of thorny plants, especially raspberry, bramble and rose. This thorn entanglement, as I have tried to show elsewhere, is a definite stage in the natural reafforestation of the Oak-wood.

What would happen if *Stachys sylvatica* had not been present when an open place was formed as by, e.g., the fall of an ancient tree? The sunlight would reach the forest floor, the surface would be dried up; sour acid humus would develop, and whole populations of worms, bacteria, fungi and protozoa would perish. So one may suggest that *Stachys sylvatica*, with its possible twelve hundred offspring from every single fruit, acts as a sort of catchdrop. By quick and dense growth, it keeps the forest soil in good order and in due course makes way for the pioneer Raspberry and Bramble. Whether this suggestion is correct or not, *Stachys sylvatica* merely by the fact that it makes use of sunlight energy, which would otherwise be wasted or even harmful, has clearly a part to play in the work of its association.

Sometimes one finds *Stachys sylvatica* along the edge of a plantation, whilst a little way within the wood, it is replaced by the Wood Sage (*Teucrium Scorodonia*). Experiments (Rosé) have shown that this last-named plant prefers a dim light equivalent to three-fourths of full sunshine. (9)

There are more than 200 species of *Stachys*. It would require more space than can be allowed here to trace its distribution in an adequate manner. *Stachys* does not occur in either Australia or New Zealand, but has been found in most temperate countries, including South Africa and Chile.

S. sylvatica appears to occupy the whole of that area which had been devastated during the Ice Ages and afterwards occupied by the central European Oak Forest.

It has been found in the Mid Pliocene deposits of Tegelen s. Meuse, as well as at Cromer Upper Pliocene by Dr and Mrs Reid, and in the Hitchin warm interglacial interlude beds.

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THE BIRCH—BETULA ALBA L.

G. F. SCOTT ELLIOT, M.A., B.Sc.

The Silver Birch is perhaps the most charming, graceful and elegant of all our British trees. Yet it is a very ancient type, dating back to the end of the Chalk period, when archaic conifers and the clumsy Cycas still dominated the world.

During the Cretaceous and Tertiary period there were some 27 species of Birch growing in North America, and our Common Birch (that is *B. alba* L. in the general sense) has been recorded in Europe and America from the last of the Tertiary period (Pliocene) until the present day.

At Andebot, France, in the early (4) and at Cromer in the uppermost Pliocene, the true Birch was growing in abundance and was no doubt devoured by *Elephas meridionalis* and other animals of the period. Dr Reid records it for West Wittering (Sussex) during a warm interlude in the Ice Ages, whilst towards the close of the Glacial period its remains have been detected at Bovey Tracey, Devon, in the Isle of Man, and at Crianlarich in Perthshire.

Before describing the present world range of *Betula alba* (*sensu Linnaei*) it is interesting to trace the modern distribution of the genus *Betula*. If we assume that its original birthplace was in North America and that it spread westward over Asia and Europe, then we find that some ten species have been differentiated in North America. Korea and Manchuria have each two species. Japan has six, and China fifteen or more. One may suppose there was a forking of the highways of distribution at Behring Straits; along the northern route there is a special species in Kamschatka and six in Siberia; in Northern Europe, *i.e.*, in Scandinavia, there are six species. Along the route running south of the Gobi and the Central Asian deserts one finds two special species along the Himalayas. There is one in Central Asia, another in Asia Minor, one in Hungary, and again another in Belgium.

I admit that there is no convincing proof that North America was its original birthplace. The original ancestor of all the Birches was no doubt a hardy, adaptable, and very ill-defined species. *Betula alba* itself is still hardy, adaptable, and not very well defined.

Linnaeus, as well as both Bentham and Hooker, considered *Betula alba* to be one species. Modern botanists prefer to divide it into two distinct species with several varieties and forms. This difference in opinion arises merely from the way in which the word "species" is construed. The two forms which are common in Britain are *B. pubescens* Ehrh., the usual Birch of wet places, marshy ground or peat mosses, and *B. verrucosa* Ehrh., the dry ground form.

I have, for form's sake, placed in an appendix the best distinctions between these two species. But those differences between the two which

are unmistakable are not reliable and those which are reliable are not at all easy to make out.

When the Ice Age had passed away, almost all Europe, as well as much of Asia and North America, were devastated areas covered by barren rock, sands composed of the most refractory minerals and wide stretches of boulder clay, interrupted by enormous expanses of lake and marsh. All this desolation had to be rendered fit for occupation by vegetation. Nature proceeded to do so after a careful systematic fashion which has been revealed by the laborious and systematic study of the peat mosses of Scotland, England, Holland, Norway, Sweden, Schleswig Holstein and North Germany.

In the Netherlands one finds, at the bottom of the peat, mosses and lichens such as now flourish in the desolate "tundras" of the Arctic Circle (13). Next there is a layer of Dwarf Birch with little polar willows. Above these, remains of *Betula alba* and Scots Pine are found. The next layer contains Oak with Hazel nuts, and, at a much later period, a Beech forest replaced the Oak and covered a large portion of Holland.

In Schleswig Holstein also, the oldest forests consisted of Birch and Aspen Poplar (14). These were followed by Pine and Spruce which gave way to Oak Woods. The Beech to-day is the usual natural forest. Quite a similar succession has also been recorded in Denmark as well as in Scotland, Norway, Sweden and North Germany (15). The evidence is a little confused and difficult to read because the Ice Age did not die gradually away with a slow, steady, and continuous improvement of the climate. There were relapses in which cold conditions prevailed and which were followed by genial periods. Nevertheless, it is impossible to doubt that the conquest of the land by vegetation proceeded in an orderly succession of the following five or six stages:—(a) First, algae, lichens and mosses; (b) then dwarf shrubs, chiefly belonging to Ericaceae (*Vaccinium*); (c) Birch, with very soon afterwards (d) Scots Pine or some other conifer; (e) there was an invasion of Oak forest which in many parts of Europe was eventually suppressed by Beech (f).¹

But as in (*e.g.*) Northern Sweden, where the country has not been entirely changed by the action of grazing animals, and by the burning of heather, it is just exactly this succession which one discovers whether one proceeds north or ascends the hills (16). After passing through a forest of Pine or Spruce, one finds Birch beginning to appear. On still more exposed and colder summits, Birch grows by itself. At a still higher level, there is a country of dwarf shrubs such as Blaeberry, other Ericaceae and *Betula nana* (obviously stage b) and at the very summit or in extreme northern latitudes, one finds only lichens, mosses and a few scattered alpine-arctic pioneers.

A similar succession may be found on almost every mountain range, even quite far to the South. There is almost always a "summit flora"

¹The succession was very clearly stated by the late Dr R. Smith; most unfortunately it was not taken as a classification for British oecology (12).

in which the most exposed rocks are covered only by lichens, mosses and alpine. Below this are Blaeberry, Heather, Dwarf Birch or other small shrubs. Great stretches of the mountain side are usually covered by Conifers. Below them again is the domain of the Oaks and other deciduous trees.

The vast pre-historic forest of Germany or rather of Central Europe, in which Oak was the dominant tree, was therefore nearly the final stage in the new reclamation of the land after the disappearance of arctic conditions. So also the great conifer forests of Norway, Sweden, Russia, and Siberia represent the fourth stage in this succession.

Betula alba (third stage) seems always to be the pioneer of the Conifer forest, although it holds its own in clearings both in Pine and Oak woods.

Besides the fact, not without importance, that the vegetation of the Northern world is still at work in reclaiming Europe and Asia, the reader will observe that it is always the better, the more complex and more interesting form of vegetation that overcomes.

However, one at once asks why is it that the Birch is found farther north and at higher elevations than any other tree? Both its pioneers and itself have a very uncomfortable existence. In Lapland the Birch may require fifty to sixty years to form stems only six feet in length and four centimetres in thickness (17). These are often prostrate, either hugging the ground because of the greater warmth near the soil or simply because almost constant blizzards keep them from growing up. Even in Lapland, however, one does find trees, three to six feet high, but only in genial, sheltered places. Once established, more and more trees grow up and provide mutual protection.

Within the Arctic Circle and on Kabnekaise, 67° N. lat. (which is some 2123 metres in altitude), there is a rich growth of *Betula* and its usual associates. In Asia and even in North America one also finds a *Betula* of some kind thriving nearer the north pole than any other tree. In America there are special species in the far north of Alaska (*B. alaskana* and *B. Kenaica*) but the Paper Birch (*B. papyrifera*), which was supposed by Hooker and other botanists to be a mere variety of *B. alba*, grows on the shores of the Great Slave Lake, of Hudson's Bay, and in Labrador.

So, also, even as far south as Spain and Corsica, Birch is the hardiest of mountain climbers. There are forests of it in the Caucasus and in Afghanistan. On the Himalayas, Younghusband, during his descent from the snow line, passed first through birch woods and then through the forest of Conifers (1, Younghusband).

There are reasons for this extraordinary adaptability of *Betula*. Except that it is not so common on limestone, the character of the soil does not seem to influence its development, for it flourishes on the warm, sun-scorched sandstone of Saxon Switzerland, on the granites and gneisses of archaic mountain ranges, but also in swampy woods of willow and alder, on boulder clay and even on the surfaces of peat-mosses which are beginning to dry up.

One of the chief difficulties in the early stages of colonisation is that the peat-moss *Sphagnum* is apt to invade the dwarf-shrub stage.

If *Sphagnum* is favoured, as by want of drainage, a peat-moss will develop; the growth of the *Sphagnum* so long as it is saturated with water is so vigorous that roots of other plants cannot obtain oxygen, and are suffocated and the result is a peat moss.

Such a moss goes on growing upwards vertically and also increases at its edges until there comes a time when the upper surface is so exposed to wind and sun that it can no longer remain full of moisture.² It is then invaded by Cottongrass and by two heathers (*E. cinerea* and *E. Tetralix*).

The process is very well illustrated by the story of Lochar Moss in Dumfriesshire. It was originally the estuary of the river Nith and, of course, suffered the transgressions of the sea, followed by elevations of the land which characterised most of the Pliocene and Glacial periods. Towards the end of the latter era, the river Nith was finally blocked out of its estuary by the last elevation when the 25-30 feet beach was formed. No doubt the enormous deposits of gravel, sand and mud carried by the river choked its own channel so that it was diverted westward and had to cut a new path seawards by Dumfries and Glencaple (17).

So far as Dr Lewis' researches have shown, the present valley became a vast marsh of *Phragmites*, resembling that which exists to-day in the Danube region. Then there was an invasion of *Sphagnum*. For some time Cottongrass and Birches managed to hold their own on the surface but they were eventually conquered and the whole valley became unhealthy, marshy and mossy. Remains of dug-out canoes, precisely similar in design to those of central Africa, have also been found in it. The Lochar and other small streams did their best to clear the channel, but their want of fall produced no real satisfactory drainage.³ Considerable portions of it were in 1810 to 1830 reclaimed by a few energetic and enterprising proprietors, but even to-day the fight between *Sphagnum*, Cottongrass and Birch is still going on. The Cottongrass (*Eriophorum*) and Heaths (*Erica cinerea* and *E. Tetralix*) can be found establishing themselves in places where the surface is not quite saturated. After these plants have managed to form a thin layer of more or less dry, peaty material, the common heather (*Calluna*) manages to develop. Hardy little Birch seedlings may be found at this stage growing vigorously, and even amongst the bell-heather. In a few places where there are old Scots pines somewhere at hand, one even finds stunted shrubs (often attacked by caterpillars) or seedlings of this pioneer tree. So one can actually see in action to-day that natural reclama-

²The extraordinary shrinkage of peat mosses when drained has been clearly shown by Major Gordon Fowler, *Geographical Journal*, February 1933.

³It remained a most dangerous place throughout mediaeval times. A knight and his horse or rather the remains of them are said to have been discovered in it. Until 1914 a curfew bell was rung in Dumfries every evening, to warn travellers who might have lost their way.

tion of the land by Birch and Scots Pine which has proceeded all over Northern Europe during the retreat of the Northern ice.

The Birch is therefore a most important agent in the improvement of the world. Having established itself on peaty moorlands and even on old mosses, it will be eventually suppressed by the Scots Pine for it is neither so long lived nor can it endure the denser shade.

A peculiarity of the Birch is that it is an excessively thirsty tree; it is "constitutionally dry." According to Von Höhnel, a birch tree, with say 200,000 leaves, will, in hot weather, transpire from 300 to 400 kilograms of water per day, that is, from 6 to 8 cwts., or from 66 to 88 gallons. An acre of birches (6 feet apart), that is, 1210 trees, would extract and evaporate from 363,000 to 484,000 kilograms of water, that is, up to 106,480 gallons, per day.

As a drier-up of the soil, Birch is easily first, as the following figures show:—

Average transpiration from June 1st to November 30th.	
Birch,	67.987 ⁴
Lime,	61.519
Ash,	56.689
Beech,	56.251
Oak,	28.345
Scots Pine,	5.847

Another method of estimating the force with which water is absorbed and transpired consists in placing a young branch in a glass tube full of water which dips into a bowl of mercury. The suction due to the transpiration of the leaves draws the mercury up into the tube. By experiments of this kind, shoots of *Betula alba* were found to exert a suction or pull equivalent to the pressure of three atmospheres. The extremely thirsty nature of the Birch is clearly an advantage when it is either colonising or holding on in wet mossy land. It has also an advantage in its arrangements for protecting the young flowers.

Catkins are formed early in the summer of the previous year. (In Austria in 1890 the infant male catkin was produced on the 8th May, that of the female on the 4th June.) As the pollen is not scattered until the following April (that is, just before the leaves unfold), the young catkins are exposed throughout the winter to rain, frost and insects. The outside covering of the catkin is composed of the bud scales, which are gummed together; rain runs off the surface without wetting it, and so no film of moisture is left in which dangerous fungus spores might germinate.

The best time to examine the male flowers is in April or May, when they are just opening. If a small branch is placed in water, they will develop quite well indoors and all the stages can be easily seen.

⁴The figures represent number of grammes of water lost per 100 grammes of dry weight of leaves or needles (10).

The central part of the scale is brown; there are two side lobes which are united to it. Within are three much reduced flowerets consisting of apparently four stamens and two sepals.⁵ The scales overlap in a very peculiar way so that in the winter the outside surface is continuous, brown and gummy; the little hollow between the bracts is completely filled by the flowers which are enclosed in the white, papery sepals.

The catkins droop, hanging nearly vertically, so that the oldest flowers are above the younger. When the catkin is going to open, the main stalk elongates and separates the individual scales; thus a little open chamber is formed, of which the floor is the back of the younger bract below, with its two attached bracteoles. Bright yellow pollen falls into this little receptacle and is there heaped up.

I arranged a jar with opening catkins at a height of seven inches above the surface of the table. Tapping the catkins resulted in clouds of pollen. Some of the pollen-grains rose upwards and were carried off by faint currents of air; those which fell on the table took from 3 to 8 seconds to drop seven inches. Thus if a birch tree is only 50 feet or say 49 feet high, the pollen-grain would require from four to eleven minutes to reach the ground, and the slightest wind would carry it a very long distance away. Enormous quantities of pollen are produced. Indeed, in the Oldenburg so much birch pollen falls in certain lakes that it is found possible to use the humus-slime technically.

On comparing the scale of a very young male catkin (next year's) with one which is mature, one seems to get a hint as to how the peculiar structure is brought about. Those parts of the scale which are exposed to the air become hard and brown and are soon gummed together, forming the outside casing. Within this, growth continues in the lower parts of each scale, and results in the remarkable shape of the mature bract.

The drooping male catkins, their yellow pollen, the upright females, which have bright red styles, and the young unfolding leaves, are exceedingly beautiful.

To examine the female catkins, it is perhaps best to wait until the fruits are ready, which is not until August. They are then from 1.5 to 2.2 cm. long and nearly 1 cm. wide.

Here again the protection of the young developing fruits is of an exceedingly thorough character. The outside of the bract is sticky or viscous; each has also a border of minute hairs: the stalk is stout and is seen (under the microscope) to be mechanically very strong. Each bract is firmly pinned down by its neighbours. Indeed to open out one bract, some five to seven others have to be forced upwards. Yet in spite of all these precautions, insects very often do injure them. The enemy burrows along the main stalk and groups (or even a whole row)

⁵Some authorities believe that there are only two stamens each divided or branched; the sepals are sometimes supposed to be the two bracteoles of the lateral flowers.

of flowers, are robbed of nourishment and become dead, brown and withered, before they have the chance to open.

The tiny nutlets lie within the concave inside of the bract: the two side ones occupying vacant spaces below the lateral lobes. This explains their shape for the thin white wings can only develop sideways. These wings are prolongations of the mid-rib part of the carpels.⁶ They can just find space to grow in the positions in which they lie.

The smooth nutlet with its streamline contours and thin wings is a miniature glider of a most efficient design.

It is recorded that, during snow storms, birch-nutlets were carried right over the tops of snow-covered or bare hills, and to measured distances of from 500 to 1000 yards.

The quantity produced is enormous: an ordinary catkin has some 80 bracts, that is, 240 nutlets.

In an old oak coppice where there happened to be a few birch trees, every handful of soil contained hundreds of nutlets. They occurred even within the bark of rotting branches, which makes me suspect that worms or insects carry them about, but I could never catch one doing so.

According to Dr Guppy, the nutlets float for a few days and he often found them in the drift of the Rivers Lea and Thames. A water bird might quite easily carry away mud with nutlets sticking to it.

I wanted to get a rough idea of the chances of any single nutlet replacing its parent in a particular place. So I cut down a young healthy tree, which turned out to be 55 years old, and counted the number of male catkins. There were 4692 of them. I estimated that there were at least 3128 female catkins.

Then as there are some 80 scales on a female catkin, and each scale has 3 nutlets, this made 240 nutlets per catkin. As 3128×240 makes 750,720, three-quarters of a million nutlets were being launched upon the world by that one tree in a year!

After the nutlet has finished its travels by air, water, or on a bird's foot, it will not, even if exposed in a cold frosty situation, be injured, for its reserve material consists of fat or oily matter, not of starch.

In germination it splits open along the attachment of the wings; M. Joxe explains that this is the thinnest part of the shell: this must also be the very last part of the carpel to harden off. The minute embryo root then grows downwards into the soil.⁷ The two cotyledons soon get out of the seed-coat; they are small (3-4 mm. \times 2.5-3 mm.) oblong-ovate, and have a short stalk 1.5 mm. They are carried up to about 8 mm. above the soil. The first ordinary leaf is not much like those of the typical birch, being small ovate, three-lobed or trifid and

⁶According to M. Joxe they are almost entirely formed by the epidermis (2).

⁷According to Mr Paulson there are minute points or hooks all over its surface which carry down into the earth any fungus-mycelium which it happens to encounter. Fungus hyphae (*Sporotrichum* sp.) are often to be seen on the styles of the nutlet. These and other fungi in the soil are thus, in his view, brought into close contact with the root from the very beginning (4).

three or obscurely five-nerved. The second and third are more of the ordinary birch type.

Sometimes, as in Lord Avebury's figure, the fourth and fifth leaves are cordate, closely serrate and velvety hairy. These last resemble the leaves of suckers growing from the stump of a felled tree (5).

Birch roots possess business friends in the shape of mycorrhiza fungi. These are particularly useful to pioneer birches. According to the excellent account given by Paulson, the work of absorption is left to the mycorrhiza. As a rule no root hairs are developed and seedling birch-roots are swathed in the mycelium from a very early stage. These fungus threads penetrate into the root, whose outer cells become enlarged: the root itself is thickened and becomes white or yellowish-brown. Both the root and the mycelium of the mycorrhiza grow through the layer of leaf mould below the mosses which in a birchwood generally cover the ground. The following fungi have been recorded as birch mycorrhiza in Britain. *Agaricus muscarius* (Fly mushroom), *Boletus scaber*, *B. radicans*, *Amanita vaginata* and the Puffball (*Scleroderma vulgare*) (9). *Cortinarius* sp. and *Boletus scaber* have also been noticed on the Paper Birch in North America (9b).

The foliage buds, which are most easily seen in the month of May, are very carefully protected. The very young leaf has no leaf-stalk: its two halves are folded together and are enclosed in the stipules which are green, spoon-shaped, and sticky, as well as hairy along the edges: these stipules soon fall off. The outermost five or six bud-scales seem to have been arrested in growth and killed off; they are hard and chestnut brown in colour. The lowest scale is like that of the Sloe, a mere rim with a point.

If one tries to lever up a single scale with a pin, the overlap and arrangement of the scales is such that it is most difficult to do so: the tough stipules, hairs and general stickiness would seem to make it almost impossible for insects to do any harm. And yet, very soon after the buds had opened (May 24th, 1923), I once found that 79 per cent. of them had been more or less injured by insects.

The structure of the leaf is simple yet effective. At the midrib there is a strong development of supporting or strengthening material: crescents of this hard tissue enclose the main bundle: the upper one of these is joined on to the epidermis; there is another independent supporting crescent on the under surface just below. The petiole is remarkably tough and flexible: in microscopic section, there is an infolding along the upper line of the bundle.

The object of some of these minute details is quite clear if one watches a birch tree in a severe gale of wind. Everything yields and sways: branches, branchlets and petioles are flexible and, so far as may be, tend to get in line with the direction of the wind. The petiole inclines to twist and untwist, and the flat part of the leaf flutters, curving upwards and then downwards. The vascular bundle, owing to its peculiar shape, will not be injured during the twists, nor will the blade of the leaf be damaged, for the arrangement of the strengthening

material is such that it always tends to come back to the correct normal shape (6). The curve of the base of the leaf and the series of teeth along the edge will also throw off the wind just as a ship's bow throws off the water. At the ground the trunk ends like the base of a pillar in an outward curve; the roots also act as buttresses. In a violent gale, when the trunk is swaying to and fro, the advantages of this arrangement are obvious.

Now all ordinary trees increase in diameter every year by the growth of a circle of living cells, the cambium, which lies between the wood and the bark. By the division of the cambium cells new wood (that is, water conducting tissue) is formed inside, and on the outside new bark (*i.e.*, sieve tubes for conducting more or less elaborated material).

At the beginning of growth in spring, the whole outer surface of the tree is covered with a continuous sheet of cork. The growth or expansion of the cambium has to overcome the restraint of this tough elastic covering.

The pressure due to the weight of the tree acts vertically downwards: this is counter-balanced by the resistance of the main roots. So there must be a resultant force tending outwards, that will assist the expansion of the cambium, which is probably also stimulated by the strain. Those of its cells which are forming the annual ring in this part of the stem are favoured: they show as M. Jaccard puts it, "transgressive growth;" the width of the annual ring is distinctly greater in this part of the stem (8). This, of course, results in the graceful outward curve at the base of the tree with which our eyes are perhaps unconsciously satisfied just because of its architectural effectiveness.

Here again a danger has of itself produced an adequate reaction. The roots spread more or less horizontally. In dry ground, birches are seldom uprooted, but a solitary birch in very wet or marshy places is often torn up, carrying with it an enormous mass of mud.

One of the special beauties of the birch is the shimmering white stem: the younger branches are yellow or red, whilst the twigs are almost red or dark purple. There are differences in the colour of a birch wood as seen in mass throughout the winter, but at one particular time, a rich and vivid red colour suddenly appears, which is perhaps specially attractive because it shows that "gloomy winter is now awa'."

It is worth while trying to explain these changes, for, besides being beautiful, they are of real importance in the life of the tree. The white colour is due to the effect of light on the numerous very thin sheets of the cork cells which contain birch-camphor (betulin).

But underneath the thin, paper-like layers of cork-cells one finds (in a microscopic section), the outermost still living cells which are full of a rich orange-tawny material. It is clear then that in the vigorous rush of the spring-sap for the use of developing buds, the outer layers of cork break and peel off, so displaying this splendid red. Beneath these cells one finds in young branches bright green cells which, of course, assimilate and produce sugar. They are strengthened by being thickened at the corners so forming a peculiarly tough outside layer.

It is not possible here to go fully into its anatomy, but the wood is remarkable for its close even character, and for the numerous medullary rays full of protoplasm.

In a twig only one year old, the outside is generally plastered over with an extraordinary collection of dust, algae, bacteria, lichen-soredia and the like, through which the hairs protrude. Amongst these the green four-celled packets of the alga, *Pleurococcus*, are most conspicuous.

Now if one puts oneself in the position of a hungry insect or of the delicate germ tube of a parasitic fungus trying to penetrate the stem, one realises how difficult its task must be.

On the one-year-old twigs, the mixed population of lichens, algae and dust is a hard proposition for an invader. The next younger twigs are smooth so that they dry quickly and the cork is full of antiseptic betulin. Birch bark in fact contains 12 to 14 per cent. of this substance. Moreover the regular peeling off of the bark, which is a real spring-cleaning, removes both insect eggs and fungus spores.

But, if an entrance can be managed, there is a rich store of food in the living cells, for the sap itself contains 2 per cent. of sugar, and there are rich reserves in the medullary rays and pith. Even the dead cells within the layers of cork are able to yield a livelihood to many different fungi.

These remarkable points in the anatomy of the stem are of great interest to mankind, for the birch is one of the most useful of trees (7).

Thus "Birchwine" or "Birch champagne" can be made from the sap. Birch bark is used for canoes, roofing and wigwams. In Russia the inner bark is ground up, mixed with caviar and eaten. Extract of the bark is also used for tanning, as, *e.g.*, in the manufacture of Russian leather: the oil distilled from it waterproofs leather. Professor Henry states that the oil of birchwood mixed with alcohol and smeared on the face and hands is the very best protection against midges and mosquitoes. Birch tar still appears in books on *Materia Medica* (Dagget, *Oleum Rusci*) and is described as a *stimulant*, *irritant* and *insecticide*. In medical practice during the middle ages, its properties were held to be of the most remarkable character. It was used for diseases of the digestive system, of the kidneys, for lithiasis, scurvy, itch, worms, hypochondria and melancholy. Persons suffering from consumption were bathed in its sap, and those troubled by unrequited love were advised to drink it as a love potion. Possibly physicians endeavoured to make it plain that there were things far worse than celibacy.

The Birch is grossly neglected in Great Britain, and indeed is often considered by foresters as a mere weed to be ruthlessly eradicated. There is some foundation for this prejudice for the growth is so rapid and vigorous that young larches or other conifers may be suffocated: a young tree not more than 17 years old was 24 feet 6 inches in height; whereas one foot per annum is considered quite a good average growth for Conifers. Mixed planting of birch and conifers is objectionable, for the tough flexible twigs are apt to do harm by whipping the foliage of Scots Pine and Spruce. A Birch stake or stob used in fencing becomes

rotten in five or six years. The wood when attacked by fungi and insects crumbles to powder though the bark is almost indestructible, and is hardly injured at all.

But few people seem to realise the usefulness of Birch. The twigs and finer branches are of value especially, and first of all, in education. Even in Roman times, children were doubtless in after life most grateful to its tough, fine wiry and flexible twigs. These twigs up to half or even three-quarters of an inch in diameter can be made into brooms, besoms, baskets, mats, peasticks and ships' fenders.

Until recently, in those steel works where ships' plates were manufactured, one could see a huge mass of red-hot glowing metal carried on chains and laid on the ground. Quantities of birch twigs were quickly scattered over it and disappeared in a moment. This process destroyed the "scale" of the iron.

Branches from a half to one and a half inches in diameter can be used for crate-wood and garden stakes. Larger branches and stems from one and a half to six inches supply stakes and stobs, especially when creosoted.

From four inches diameter to any size, the wood is made into clogs, pattens, and bobbins of all kinds. It is also the very best of fire-wood and has a slight pleasant fragrance when burning. The wood is easily worked and takes a beautiful polish. Spoons, plates, toys, bowls, cigar boxes, handles for tools, carding teeth, etc., etc., are all manufactured from it. All these varied and manifold uses of birch depend on the even close character of the wood. Sometimes one finds burrs of large size upon the branches: these are curiously marked and in Germany, beer-jugs are carved from them.

The food material stored up in the stem consists either of starch, or in winter of fats or oils. Fats prevent too severe cooling of the tissues and are themselves the result of very low temperatures.

The enemies of the Birch are of the most varied character. Roe-deer, rabbits and indeed all grazing animals greedily devour the young shoots and especially the seedlings. If, however, even a small piece of a seedling escapes destruction, it puts out a fresh branch next year, and goes on doing so every season afterwards. The result is a short, scraggy, stunted and much branched shrub. If the ground is favourable and is not set on fire, and if there are not too many cattle, sheep and rabbits, a dense thicket develops into which nothing but a half starved beast would care to struggle. Then when the natural vigorous rapid growth of *Betula alba* has a chance of showing itself, a birch forest will develop, for the stems will soon be above the reach of all enemies. In prehistoric times, until man began to want firewood and invented the destructive habit of burning off natural woods to grow bere (or barley), the number of deer would be limited by wolves, so that it is probable that forests of Birch and Scots Pine covered the whole countryside.

Blackcocks and greyhens are fond of the catkins and devour the buds, especially in January and February. Many caterpillars attack the leaves: one of these (*Rhynchites betulae*) cuts away half the leaf

and then rolls the rest of it into a neat spiral chamber in which it forms a chrysalis.⁸ Many other insects injure it: one often finds galls or deformed buds like the "Big Bud" of currant, and also raspberry-red galls with insect eggs. Indeed, on July 2nd, I found in one locality, that from 60 to 80 per cent. of the leaves were damaged by insects.

Few plants support so formidable an army of parasitic fungi. The "Witches Broom," which is a mass of dead dry twigs rather like a crow's nest is due to a fungus, *Taphrina betulae*.

The fructification will be found on the underside of the leaves which are crumpled and distorted. The twig above the injured spot soon dies back; but the demand of the fungus for food material causes a flow of sugar towards the place. Any dormant bud in the neighbourhood therefore develops a twig which also is promptly killed and becomes withered as soon as the fungus reaches the spot. The fungus lives as long as its unwilling host. Nevertheless trees with 10 to 12 witches' brooms do not seem to be very much the worse,⁹ and are quite vigorous.

The leaves (from August to November) are occasionally attacked by a Rust (*Melampsora betulina* Pers.). The orange-red fructifications are on the underside of the leaf; the spores formed in summer are yellow, but towards autumn one finds black or brown thick-walled spores which remain all winter on the ground and germinate in spring. They then produce tiny sporules, which are blown to the young needles of the Larch (May); the birch leaves are again infected in July or August. This interesting history is given on the authority of Grove (19). It is probable that the visit to the larch leaves in spring is optional and that it can perhaps infect Birch leaves as early as May.¹⁰

Three kinds of mildew also invade the leaves. The undersides may be more or less covered with fine, white or grey threads rather like a spider's web, amongst which one finds the minute black dots which are the fructifications of the fungus.¹¹

Many fungi which appear in autumn attack dead and decaying leaves, but there are at least six which are specially devoted to the first stage of destruction of the dead birch-leaf.¹²

As we have seen, the arrangements for spring cleaning of the bark are of the most elaborate character, but, nevertheless, many kinds of fungi are found on the branches and trunks.

⁸I have to thank Professor Stebbing for the identification. He says, "It does no particular harm in this country. I have seen one of the species of this genus in a village of the Western Himalayas, which completely defoliated a very valuable . . . tree."

⁹Pith, cortex and medullary rays become enlarged and abnormal (18).

¹⁰I find this Rust in places 500 yards from any larch.

¹¹*Microsphaera alni* DC., *Uncinula salicis* DC. and *Phyllactinia suffulta* Rab. (20).

¹²*Lachnella araneocincta* Phill; *Sphaerella narthenensis* Auers; *Gnomonia emarginata* Fk.; *G. campylostyla* Fr.; *Venturia ditricha* Fr.; *Dothidea betulina* Fr.

It is impossible to draw a definite line between those which are real parasites attacking sound and healthy trees and those others which are simply breaking up diseased, dying or dead specimens.

The Polypori are, however, true parasites. The razorstrop Fungus (*P. betulinus*) forms hoof-like, semi-circular or kidney-shaped masses on the trunks: the upper surface is brownish-red. Underneath it is white with innumerable tiny pores which are covered inside by the spore-forming cells. If a spore is carried into a woodpecker's hole, or on to a freshly broken branch or by a burrowing beetle or other insect into the trunk so as to reach the living cells (or sugary sap), it will germinate there: the fine filaments of the fungus then begin to grow in the cambium, cortex or medullary rays. They can secrete ferments which dissolve both cellulose and wood (lignoses) and the whole of the centre becomes entirely rotten. Six other Polypori grow on *Betula*.¹³

Unfortunately it is not possible to give any adequate account here of the fifty or more Pyrenomycete fungi which attack the bark or wood of fallen branches and twigs. Some are true parasites (as, e.g., *Dothidea*, which grows on the living cambium) but most manage to find a living in the bark usually between the layers of cork and it is by their efforts that the bark is eventually and at long last disintegrated.

Even the tiny birch nutlet has its own special fungus, *Apollyon*. It has been found amongst fallen leaves in May; the nutlet attacked is deformed and heart-shaped. The fungus has a small stalk with root-like hairs which ends above in a yellow or reddish saucer-like fruit some 1-4 mm. broad. The spores are pressed out as the fruit develops and thrown forcibly into the air. If they reach young green catkins, the minute nuts are infected. This has been recorded for Russia, Germany, North America and Japan, but not to my knowledge in Britain (18).

We have already mentioned the curious and mixed flora of Algae and other lowly organisms which cover the one-year-old twigs. In exposed, windy places quite a rich collection of lichens and mosses can be made on the stems and branches. In such situations, growth is difficult and the spring cleaning is not so thoroughly carried out.

At the base of the tree, *Hypnum cupressiforme*, tufts of *Dicranum scoparium*, *Polytrichum formosum* and other mosses are very common. The trunk and branches carry lichens such as *Evernia prunastri*; *Usnea ceratina*, *Platysma glaucum* and many Parmelias,¹⁴ whilst *Lecanora tartarea* and other crust lichens are frequent on the bare cork.¹⁵

Now the twigs and branches of Birch are, as we have seen, remarkable for the elaborate nature of the system of bark discarding and yet they offer a field for colonisation! Sooner or later all these bark floras are, however, thrown off and when they reach the ground are broken

¹³*P. laevigatus*, *P. pinicola*, *P. marginatus*, *P. radiatus*, *P. hirsutus* and *P. nigricans*.

¹⁴*P. saxatilis*, *laetevirens*, *physodes*, *caperata*, *fuliginosa*, etc.

¹⁵—Further details will be found in an interesting paper by the late Professor W. West, who estimates the percentages of the bark covered in various cases (21).

up. Hence everything that the lichens have accumulated, mineral salts obtained from dust, organic waifs and strays left by the atmosphere as well as what they have manufactured themselves during their own brief career goes into the general reserve of the wood-soil and is utilised by the growing trees.

Almost all the points mentioned above help towards an explanation of the problem of how and why Birch succeeds as a pioneer where other trees fail. Special peculiarities are that its nutlets are easily distributed and especially over snow. Its reserve of food is in the form of fat and oil and is therefore suitable to cold and exposed situations. It is hardy and adaptable, being able to vary with changing conditions. The character of its stem, branches and roots enables it to resist violent winds.

Still more important is the fact that its roots, like those of *Vaccinium*, other Ericaceae and indeed of almost all plants of peaty soil, possess a mycorrhiza or fungus-assistant, as we have already seen.

Perhaps also its extraordinary powers of absorbing water and of transpiration may be another useful quality.

APPENDIX.

Betula alba L. (B. pubescens Ehrh., B. glutinosa Fr.).

Marshy ground, wet places and peat mosses.

Tree seldom over 100 feet. Branches never drooping.

Twigs downy or covered with short hairs.

Leaves ovate, cordate or rhomboid-ovate. Acute at tip, 3-5 cm. long and 1.5-3.5 cm. broad.

Petioles at first hairy, 1-2.5 cm. long. Rather leathery in texture: veins prominent below often with hairy pockets in vein angles (due to mites).

Buds ovoid. *Stipules* ovate, blunt: length twice the breadth. *Catkins* 2.5-3 cm. long, 6-9 mm. in diameter. *Bracts* slightly hairy. *Fruit*, wings twice breadth of nutlet.

Betula alba L. (B. verrucosa Ehrh., B. odorata).

Dry ground.

Tree reaching 120 to 130 feet.

Branches sometimes drooping.

Twigs smooth, often sticky or glandular or shortly hairy.

Leaves rhomboid-ovate or almost triangular with fine drawn-out point. 4-7 cm. long and 2.5-4 cm. wide. *Petioles* smooth 2-3 cm. *Leaves* thin: veins slightly prominent above. Glabrous or when young with scattered hairs on the nerves.

Buds conical. *Stipules* ovate lanceolate acute: length three times breadth. *Catkins* 2-3 cm. long and 8-10 mm. in diameter. *Stalk* slender 10-18 mm. long.

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A FLORA OF GLAMORGANSHIRE.

(Supplement to the *Journal of Botany*, 1907.)

[The Rev. H. J. Riddelsdell has sent in the following list for my consideration. I am pleased to say that I entirely agree with his insistence on the fact that accuracy is a matter of the first importance. Twice in the 1932 *Report* (pp. 17 and 18) I refer to the need for "completeness and accuracy" in our records and the text of the *Report* bears ample evidence that no efforts have been spared to secure them. The publication of the accompanying list is therefore highly desirable.—W.H.P.]

The little book entitled *A Flora of Glamorganshire* which I published in the *Journal of Botany*, 1907, as a Supplement, was largely if not altogether passed over by the compilers of the Second Supplement to Watson's Topographical Botany (see *Journ. Bot.*, 1929 and 1930, Supplement). First records are matters of secondary importance: accuracy is a matter of primary importance. My records of 1907 show that first notices—i.e., from the point of view of Topographical Botany—were then given for the following plants in v.-c. 41:—

- THALICTRUM DUNENSE Dum.
 RANUNCULUS HETEROPHYLLUS Web.
 R. PELTATUS Schrank.
 R. TRICHOPHYLLUS Chaix.
 R. BAUDOTII Godr.
 R. LUTARIUS Bouv.
 R. PARVIFLORUS L.
 HELLEBORUS FOETIDUS L.
 ACONITUM NAPELLUS L.
 CORYDALIS CLAVICULATA DC.
 FUMARIA BORAEI Jord.
 F. PURPUREA Pugsł.
 LEPIDIUM LATIFOLIUM L.
 DRABA BRACHYCARPA (E. PRÆCOX DC.).
 NASTURTIUM AMPHIBIUM (ARMORACIA AMPHIBIUM Peterm.).
 BRASSICA OLERACEA L.
 VIOLA CALCAREA Greg.
 V. SYLVESTRIS Lam.
 V. LACTEA Sm. (V. STAGNINA, v.-c. 41 record, is an error).
 V. LUTEA Huds.
 DIANTHUS DELTOIDES L.
 SILENE QUINQUEVULNERA (Alien).
 SAGINA APETALA Ard.
 S. CILIATA Fr.

- SPERGULA VULGARIS Boenn., omitted in *Top. Bot.*, Supp. 2.
 S. SATIVA Boenn., omitted in *Top. Bot.*, Supp. 2.
 SPERGULARIA RUPESTRIS (ALSINE RUPICOLA Hiern).
 CERASTIUM AQUATICUM (MYOSOTON AQUATICUM Moench).
 POLYCARPON TETRAPHYLLUM L.
 HYPERICUM MONTANUM L.
 ACER CAMPESTRE L.
 ERODIUM MOSCHATUM L'Hérit.
 GERANIUM PRATENSE L.
 MEDICAGO MACULATA (ARABICA Huds.).
 TRIGONELLA ORNITHOPODIODES DC.
 TRIFOLIUM STRIATUM L.
 T. GLOMERATUM L.
 T. FILIFORME L.
 LOTUS TENUIS Waldst. & Kit.
 ASTRAGALUS GLYCYPHYLLOS L.
 ONOBRYCHIS VICIAEFOLIA Scop.
 LATHYRUS NISSOLIA L.
 PRUNUS CERASUS L.
 PYRUS COMMUNIS L.
 EPILOBIUM LANCEOLATUM Seb. & Maur.
 E. TETRAGONUM (ADNATUM Griseb.).
 MYRIOPHYLLUM ALTERNIFLORUM DC.
 CALLITRICHE STAGNALIS Scop.
 C. HAMULATA Kuetz. (in "A Flora of Glam.;" but recorded long previously).
 SEDUM ROSEUM L.
 S. SEXANGULARE L.
 S. FORSTERIANUM Sm.
 SAXIFRAGA GRANULATA L.
 SMYRNIUM OLUSATRUM L.
 PETROSELINUM SEGETUM Koch.
 FOENICULUM VULGARE Mill.
 PASTINACA SATIVA L.
 GALIUM BOREALE L.
 G. UMBELLATUM Lam. (G. SYLVESTRE Poll.).
 VALERIANA MIKANII Syme.
 VALERIANELLA CARINATA Lois.
 DIPSACUS PILOSUS L.
 ANTHEMIS COTULA L.
 A. NOBILIS L.
 PETASITES OVATUS Hill.
 ARCTIUM LAPPA L. (MAJUS Bernh.).
 A. NEMOROSUM Lej.
 A. INTERMEDIUM Lange.
 CARDUS TUBEROSUS L.
 ONOPORDON ACANTHIUM L.
 CREPIS BIENNIS L.

- HYPOCHAERIS GLABRA L.
 PYROLA SECUNDA L.
 GENTIANA AMARELLA L.
 CUSCUTA EUROPAEA L.
 ATROPA BELLADONNA L.
 OROBANCHE MINOR Sm.
 LATHRAEA SQUAMARIA L.
 UTRICULARIA NEGLECTA Lehm.
 MENTHA RUBRA Sm.
 NEPETA CATARIA L.
 MARRUBIUM VULGARE L.
 CHENOPODIUM VULVARIA L.
 ATRIPLEX DELTOIDEA Bab.
 A. LACINIATA L.
 SALICORNIA APPRESSA Dum.
 POLYGONUM MINUS Huds.
 P. MACULATUM Bab.
 RUMEX MARITIMUS L.
 R. PULCHER L.
 DAPHNE LAUREOLA L.
 EUPHORBIA LATHYRIS L. (10 years earlier than the authority quoted).
 BETULA PENDULA Roth.
 SALIX ALBA L.
 S. CAPREA L.
 S. VIMINALIS L.
 PINUS SYLVESTRIS L.
 HYDROCHARIS MORSUS-RANAE L.
 LIPARIS LOESELII Rich.
 ORCHIS PYRAMIDALIS L.
 O. MASCULA L.
 HABENARIA CONOPSEA Benth.
 GALANTHUS NIVALIS L.
 POLYGONATUM MULTIFLORUM All. (the record given is a year later).
 CONVALLARIA MAJALIS L.
 ALLIUM OLERACEUM L.
 SCILLA AUTUMNALIS L.
 GAGEA LUTEA Gawl.
 JUNCUS TENUIS Willd.
 LUZULA CAMPESTRIS DC.
 SPARGANIUM NEGLECTUM Beeby.
 S. NATANS L.
 ACORUS CALAMUS L.
 LEMNA GIBBA L.
 L. POLYRRHIZA L.
 SAGITTARIA SAGITTIFOLIA L.
 POTAMOGETON INTERRUPTUS Kit.
 RUPPIA MARITIMA L.
 ZANNICHELLIA PALUSTRIS L.

RYNCHOSPORA FUSCA Ait. (6 years earlier than the record used: but the true record dates from an even earlier time).

- CAREX DIANDRA Schrank.
 C. LEERSII F. Schultz.
 C. PATRAEI F. Schultz.
 C. MONTANA L.
 C. BINERVIS Sm.
 C. OEDERI Ehrh.
 C. PSEUDO-CYPERUS L.
 C. VESICARIA L.
 ANTHOXANTHUM ODORATUM L.
 A. PUELI Lecoq & Lamotte.
 ALOPECURUS MYOSUROIDES Huds.
 CORYNEPHORUS CANESCENS Beauv.
 CALAMAGROSTIS EPIGEIOS was recorded even before 1907.
 AVENA PRATENSIS L.
 POA BULBOSA L.
 P. NEMORALIS L.
 P. COMPRESSA L.
 GLYCERIA BORRERI Bab.
 FESTUCA SYLVATICA Vill.
 F. ARUNDINACEA Schreb.
 BROMUS ERECTUS Huds.
 B. STERILIS L.
 BRACHYPODIUM PINNATUM Beauv.
 TRITICUM PUNGENS Pers.
 T. ACUTUM DC.
 HORDEUM MARINUM Huds.
 ELYMUS ARENARIUS L.
 EQUISETUM MAXIMUM L., in the 1907 *Flora* and recorded prior to that.
 PILULARIA GLOBULIFERA L., in the 1907 *Flora* and recorded prior to that.

The records under v.-c. 41 given in the form "Fl. 155" (as for *Colchicum autumnale*, etc.) refer to Trow's *Flora of Glamorgan* which appeared later than mine and which embodied most or all of the distribution details found in "A Flora of Glamorganshire." The *Journal of Botany* is not an obscure publication and the names of the three compilers of the 2nd Supplement to *Top. Bot.* are those of well-known and careful men. It is therefore hard to understand the occurrence of some 150 errors (mostly omissions) with respect to one county, all of which could have been put right by reference to one easily accessible publication.

H. J. RIDDELSDELL.

NOTES ON THE BRITISH ORCHIDACEAE.

PATRICK M. HALL and W. H. PEARSALL.

As the result of somewhat extensive enquiry and of the examination of these plants *in situ* we have acquired a considerable amount of information concerning their characters and distribution. The publication of Colonel Godfrey's Monograph will no doubt have the effect of stimulating interest in this family, but it is a book for the specialist rather than the general botanist: moreover certain aspects of the subject are only more or less cursorarily dealt with, particularly the details of the distribution of the species in Britain.

For these reasons, therefore, we consider it to be an opportune moment to commence the publication in this Report of a series of papers dealing with the past and present distribution of the British members of the Order. We shall pay particular attention to contemporary knowledge as we consider that a complete, up-to-date, and accurate survey of the present position of a species is an essential preliminary condition for the further study of its future increase or decrease, and for ascertaining the causes of either. Among subsidiary objects each paper will include the correction of the corresponding section of the Comital Flora; will deal with any points which may arise as to the nomenclature or taxonomy of the genus or species concerned; and will give some similar account of their variations and hybrid offspring.

The genera will not be dealt with in taxonomic order, but it is our intention to deal first with those presenting fewer difficulties. It was with this in mind that we selected for the first paper the two allied genera, *Himantoglossum* and *Aceras*, but it immediately became apparent that each had its own problems of nomenclature and taxonomy: further, the collection of accurate and authoritative information with regard to the *present* distribution (as opposed to the historical distribution) of a well-known, though comparatively scarce, species is by no means easy.

This, therefore, is an appropriate time at which to acknowledge the ready assistance given to us by the authorities of the national museums, the curators of many county and civic museums, and also by a very large number of correspondents, for the most part members of this Society. We wish especially to thank Dr T. A. Sprague of Kew for his help in matters of nomenclature, to which fuller reference is made below.

I.

Himantoglossum hircinum Koch.

NOMENCLATURE.

It will be seen from the above heading that the name which we propose to adopt for this species is a departure from usual practice. Recent authorities have employed three different generic names, viz.,

Orchis L., *Loroglossum* Rich., and *Himantoglossum* Spreng.: of this varying usage the following are illustrations:—

- Druce, *Br. Pl. List*, 2nd ed. (1928), 109, gives 669/18 *Orchis* (Section *Loroglossum*) *hircina* Crantz.
- Druce, *Com. Fl.* (1932), 285, gives *O. hircina* (L.) Crantz, with synonyms *Loroglossum hircinum* Rich. and *Himantoglossum hircinum* Spreng.
- Rouy, *Fl. Fr.*, xiii, 182, and Camus, *Iconographie des Orch. d'Eur.*, i, 118, both adopt the name *Loroglossum hircinum* Rich.
- T. and T. A. Stephenson, *Lond. Cat.*, 11th ed. (1925), 42, list *Himantoglossum* Sprgl. as genus No. 407 with species No. 1801 *hircinum* Sprgl.
- Godfery, *Mon. and Icon. Br. Orch.* (1933), 158, adopts *Himantoglossum hircinum* Sprengel; his reasons for rejecting the earlier *Loroglossum* Rich. are not explicit but are apparently based on the inclusion of *Aceras* in that genus.

Orchis L. being inadmissible on taxonomic grounds (see below), we referred the respective claims of *Loroglossum* and *Himantoglossum* to Dr Sprague and quote his reply *in extenso* as follows:—

“The earliest legitimate generic name available for the Lizard Orchis appears to be *Himantoglossum* Koch, *Syn. ed.* i, 689, 841 (1837). *Loroglossum* Rich. (1818) included *Aceras* R. Br. (1813) and *Loroglossum* Rich. was therefore illegitimate, since it was a superfluous name for *Aceras*. *Himantoglossum* Spreng. (1826) was illegitimate for exactly the same reason. *Himantoglossum* Koch did *not* include *Aceras* and was therefore neither superfluous nor illegitimate. One might hastily have concluded that it was a *later homonym* of *Himantoglossum* Spreng. and was therefore illegitimate. But the definition of a later homonym is a name which ‘duplicates a name previously and validly published for a group of the same rank *based on a different type*’ (the italics are mine). The type-species of both *Himantoglossums* is *Satyrium hircinum* L. Hence *Himantoglossum* Koch is *not* a later homonym. Of course if it were found that *Loroglossum* had been used previously to *Himantoglossum* for the Lizard Orchis and its allies (but excluding *Aceras*), then *Loroglossum* would have precedence, but we do not find any such previous use. Hence *Himantoglossum* Koch should be adopted. . . . N.B.—The incorrect spelling *Himanthoglossum* used in Koch *Syn.*, 689, was corrected to *Himantoglossum* on p. 841 (index).”

This appears to us to be a particularly neat solution of the problem, retaining the familiar name and involving only the minor change of the authority, instead of necessitating the major change to an unfamiliar, or even possibly an entirely new, name. We propose, therefore, to adopt the name *H. hircinum* (L.) Koch for this species.

TAXONOMY.

The taxonomic position of the genus *Himantoglossum* is uncertain. Although the conformation of the column and pollinia closely resembles

that of *Orchis*—so closely, in fact, that an inter-generic hybrid has been recorded from France—yet there is an important distinction between the two genera in the fact of *Himantoglossum* having both pollinia attached to one viscidium, while in *Orchis* the viscidia are separate. If Godfery's very reasonable theory is accepted (that evolution in the Orchidaceae is in the direction of perfecting the methods adopted for the preservation and economical removal of the pollinia), *Himantoglossum* is a more ancient type than *Orchis*. It is probable, however, that *Himantoglossum* is not in the direct line of descent of *Orchis*, the latter being more closely connected with the *Gymnadeniinae*. While it is not impossible that the single viscidium of *Himantoglossum* arose from the coalescing of the two viscidia of *Orchis*, in the same way that *Anacamptis* with a single viscidium appears to be a direct descendant of *Gymnadenia conopsea* with two viscidia, Godfery believes *Himantoglossum* together with the Southern European genera *Barlia* and *Serapias*, which also have a single viscidium, to be on a separate line of descent parallel to that of *Orchis*. In order not to disturb the sequence from the *Gymnadeniinae* to *Orchis* and at the same time to bring out the affinities between *Orchis* and *Himantoglossum*, we suggest that the most convenient position for the latter is immediately following *Orchis*.

POLLINATION.

There is little to be said on this point, as in general the mechanism for cross-fertilisation is similar to that of *Orchis*, except that the pollinia are attached to one viscidium. It is worth mentioning that on only one occasion have the visits of insects to this species been recorded in Britain, when a railway employee observed the visit of a wasp-like fly, *Odynerus parietum*, but the removal of pollinia was not observed. Colonel Godfery has seen the removal of pollinia by hive-bees in France. Further records of insect-visitors to this species would be valuable.

DISTRIBUTION IN BRITAIN.

We give here only a summary of a large mass of data collected in regard to this species. A list has been prepared, as complete as it could possibly be made, of all the authenticated occurrences of the species in this country. It is not considered advisable that this information should be published but copies of this list have been made and deposited in the principal Herbaria. A further reason for publishing here only a summary is that much of the information regarding this species was obtained in collaboration with Mr R. D'O. Good of University College, Hull, and will be used by him in a forthcoming paper on the relation of *H. hircinum* to certain theories of plant-geography.

The text-books dealing with the vice-comital distribution of British plants differ widely in their treatment of this species:—

<i>Lond. Cat.</i> , 11th ed., 1925,	16.
<i>Brit. Pl. List</i> , 2nd ed., 1928,	Eng. 10. Jersey.
<i>Com. Fl.</i> , 1932,	Eng. 22 (H. error). Jersey.
	6-8, 11-17, 20, 22-25, 27-29, 33, 34, 54, 55.

As the result of our investigation we find that the distribution given in the *Comital Flora* should be corrected to read as follows:—

Eng. 24 (6). Jersey. 6-17, 20, 22-25, 27, 29, 30, 33, 53-5.

(Errors. 26 in *Herb. Druce* for 25.
23, 34 in *Comital Flora*.
56, 57, 70 in *Topographical Botany*, ed. II.
H. 9 in Wade's "Plantae rariores in
Hibernia inventae."')

In all *H. hircinum* has been recorded from not less than 99 separate localities in the 24-vice counties in addition to Jersey and it is significant that the species has been seen in 76 of these localities (and in Jersey) since 1900. It should be pointed out that the total number of occurrences is very much greater than 99, as in many localities the plant has been recorded many times; for example, in the N. Somerset locality it has been seen annually since discovery in 1923. The number of occurrences since 1900 would represent an even greater proportion of the total than in the case of localities.

It will seem somewhat remarkable at the present time that the authors of the *Flora of Kent*, published in 1899, should have said of this species "now verging on extinction," but that was undoubtedly endorsed by every botanist at that time and for several years subsequently. It seems that the species was not infrequent in W. Kent in the vicinity of Dartford at the end of the 18th and beginning of the 19th centuries but later became extremely rare in Kent and was practically unknown in other counties. So that, for example, in the *Flora of Hants*, 2nd ed., 1904, Townsend excluded as erroneous a record of this species from St Mary Bourne, N. Hants, c. 1866; few species can be so free as this from errors of identification and in the light of modern knowledge there seems to be little reason for rejecting such a record.

Kent is the headquarters of this, as indeed it is of other Orchidaceous species in Britain, nearly one half (45) of the total number of recorded localities being in that county; of the localities in which the plant has been seen since 1900, 26 (or 34%) are in Kent. But whereas of the total 45 Kentish localities 29 are in East and 16 in West Kent, of the 26 post-1900 localities only 2 are in West Kent.

The following table summarises the data in regard to relative frequency in the various vice-counties and also gives the dates of the first and latest records. As far as we have been able to ascertain, *H. hircinum* was seen in no less than 12 British localities in 1933, viz.:— N. Somerset, Dorset, Isle of Wight, W. Sussex, E. Sussex, E. Kent (4 separate stations), W. Kent, Oxford, and Jersey. The statement in the *Comital Flora* "increasing its range" is clearly justified; speculations as to the reason for this increase we leave to Mr Good. Even though this species may be spreading, it must be borne in mind that in point of numbers it is exceedingly scarce; the largest colony in Britain, of which we have been able to find evidence, numbered 27,

while in an overwhelming number of cases the records refer to a single plant having been found.

Vice-county.	Total number of recorded localities.	Number of localities recorded since 1900.	Date of first record.	Date of latest record.
6	1	1	1923	1933
7	2	2	1907	1931
8	4	4	1907	1929
9	2	2	1923	1933
10	1	1	1933	1933
11	5	5	1925	1931
12	5	3	c. 1866	1930
13	4 (at least)	4 (at least)	c. 1850	1933
14	6 "	6 "	1911	1933
15	29 "	24 "	ante 1796	1933
				4 locs.
16	16 "	2	1641*	1933
17	8 "	7	1821	1931
20	1	1	1931	1931
22	1 (or 2?)	1 (or 2?)	1921	1931
23	2	2	1920	1933
24	1	1	1931	1931
25	3	2	1847	1926
27	1	1	1923	1923
29	2	2	1921	1924
30	1	1	1932	1932
33	1	1	1917	1925
53	1	1	1931	1931
54	1	1	1929	1930
55	1	1	1931	1932
Jersey	1	1	1918	1933
	<hr/> 100	<hr/> 77		

* First record for Britain.

Aceras anthropophorum (L.) R. Br.

NOMENCLATURE.

As in the case of the previous species, it has been necessary to make a slight change from the name in general use. In the paper on Plant Nomenclature written by Dr Sprague in the 1932 *Report*, he referred on p. 301, §2, to the method by which the gender of generic names is determined. *Aceras* is not a Greek or Latin word, but a modern compound, formed from two Greek words, *a* and *keras*, the second of which is neuter in gender; the compound name therefore has to be treated as neuter also.

TAXONOMY.

Godfery, *Monograph*, p. 160, shows quite conclusively that *Aceras* has two viscidia and that the pollinia can be separately detached from the anther, although many Continental authorities, including Schlechter and Keller and Camus, have described it as having one viscidium only. In this connection it is noteworthy that, although the Continental authorities, who place *Aceras* with one viscidium, accept that name given to

the genus by Robert Brown, yet Brown's original description differs from their rendering of it. Mr Summerhayes of Kew has kindly supplied us with Brown's original generic description, as follows:—"Cor. ringens. Labellum ecalcaratum. Glandulae pedicellorum pollinis cucullo communi inclusae." The use of the word "glandulae" makes it clear that Brown considered the genus to have 2 viscidia and not a single viscidium, which Mr Summerhayes has confirmed by the examination of spirit material. This point is of some importance as it removes all doubt as to the validity of the name *Aceras* on that score.

The absence of a spur is therefore the only structural distinction between this genus and *Orchis*. In general conformation and in the common possession of coumarin, it is clear that *Aceras* is very closely related to *Orchis simia* and it has been included in *Orchis* by some authorities, e.g., Allioni. In *Aceras* the nectary is replaced by two shallow depressions at the base of the labellum and we consider that this in conjunction with the entire absence of spur is sufficient to differentiate *Aceras* from *Orchis*, in which the spur is no longer a true nectary but secretes liquid between the inner and outer walls of tissue. *Aceras*, in our opinion, is best regarded as a rather more primitive genus than *Orchis* and as such should be placed taxonomically next to, and immediately preceding, *Orchis*.

VARIATION.

The range of variation in this species is very small and such forms and varieties as have been described by Continental botanists differ from the type only in minor details such as stature, coloration, and shape of the labellum. British specimens vary to some extent in colour, which ranges from pale straw-yellow to reddish brown more or less suffused with green; occasionally specimens will be found growing with the type which lack the narrow red edging of the perianth segments; these come under f. *flavescens* Zimm. In *Herb. C. E. Salmon* in the British Museum Herbarium is a specimen sent by F. H. Elsley from Hackhurst Downs, Gomshall, Surrey, to which the following note is attached:—"This is, I believe, rather a rare specimen of *Aceras*. It is the var. *fulva* without a brown edge to the flowers and is very interesting," to which Salmon added "many specs. on Colley Hill seem identical." In the same Herbarium there is a sheet from Colley Hill, Surrey, gathered by Salmon himself and dated 21.6.1919, on which appears the note "and many are the var. *fulva*." We have not been able to trace any form or variety of this name but it is clearly the same as f. *flavescens* Zimm.

POLLINATION.

Godfery refers to two observations of visits by insects. In one case in France ants visited flowers and removed pollinia; in the other case observed in this country flies attacked aphides on spikes of *Aceras* and in so doing removed pollinia. In the latter case the plants were in a green-house and conditions were therefore unnatural. No visits have been recorded in Britain in a state of nature.

TIME OF FLOWERING.

Aceras is an earlier-flowering species than is generally realised. The text-books give June (Babington's *Manual*), and June-July (Godfrey and Hayward's *Pocket Book*); in southern England in an average season the plant is in good flower by mid-May and is past its best by mid-June.

DISTRIBUTION IN BRITAIN.

The vice-comital figures given by the three standard British lists are as follows:—

<i>London Catalogue</i> , 11th edition (1925),	23.
<i>British Plant List</i> , 2nd edition (1928),	Eng. 20 (3).
<i>Comital Flora</i> (1932),	18 (5).
	6, 10, 12-19, 25-30, 32, 63. Errors 20, 22, 24, 33, and 54.

All three authorities, therefore, are in agreement as to the total number of vice-counties, but differ as to the number considered to be erroneous.

From the evidence which we have examined in the form of published records, specimens in public and private herbaria, and communications from a large number of correspondents, we find that the appropriate section of the *Comital Flora* should be emended to read as follows:—

Eng. 17. <3>. [9]. 10-17, 19, 20, 25-30, 32.
<Extinct. 6, 18, 23>.
<Doubtful or errors. 3, 7, 8, 22, 24, 33, 54, 55, 63>.

This distribution is a remarkably close parallel to that of *Himantoglossum*; each has a single recorded station in the Isle of Wight, each extends to a single station in N. Somerset (unfortunately now eradicated in the case of *Aceras*), while the northern limits reached—Lincolnshire in one case, Northampton and Norfolk in the other—are approximately similar.

While, however, as we have shown, there is reason to believe that *Himantoglossum* is increasing its range, the evidence in the case of *Aceras* points to the reverse. Numerically, of course, *Aceras* is by far the more abundant of the two species; a very large proportion of the recorded occurrences of *Himantoglossum* are of single individuals, in exceptional cases colonies of 20-30 plants have been recorded, whereas in the stations where *Aceras* thrives colonies of some hundreds of individuals may still be seen. Although in many places *Aceras* is still abundant, yet looking at its distribution in Britain generally, it must be said that it is decreasing and has disappeared from a large number of its localities. This is especially true of the Eastern counties and parts of Kent and Surrey. In the case of the two latter counties this decrease is no doubt due to suburban expansion but in the Eastern counties the cause probably lies in the great increase of arable farming in the early years of the 19th century. Though there are large areas of chalk in Essex, Suffolk, Norfolk and Cambridgeshire, the terrain is

much flatter than in the case of the downland of southern England; the depth of overlying soil is in consequence greater and larger areas were converted to arable. On the steeper North and South Downs there still remained large areas suitable to the needs of *Aceras* and in parts of these it holds its own and indeed in some instances seems to be increasing. Generally speaking, in Britain at least, *Aceras* is confined to the short turf of chalk downs, the floors of chalk-pits and roadsides but there are records of occurrences in open woods: the now extinct Somerset locality was on the carboniferous limestone, while in Northamptonshire the species grows on limestone as opposed to chalk.

We give below a summary of the data collected with regard to the past history and present circumstances of the species, arranged in vice-comital order:—

- WIGHT (10). First recorded from near Shanklin by Mr E. H. White in 1905; see *Journ. Bot.*, 1905, and Rayner, *Supplement to the Flora of Hants*, 1929, 103. Still exists in one locality only, very scarce indeed, never more than about a dozen plants.
- S. HANTS (11). First recorded from Exton in 1922 by Miss Davidson. This and two other localities are given by Rayner, *l.c.*, and one more locality was added in 1930; see *Rep. B.E.C.*, 1930, 450. Still exists and appears to be increasing (see note below).
- N. HANTS (12). First recorded from East Woodhay in the extreme north of the county, c. 1849, by Mrs Cardew. This and two other early records are given by Townsend, *Flora of Hants*, 2nd Edition, 1904, 405. Also found near Winchester in 1910; see *Rep. B.E.C.*, 1922, 748; now extinct in this locality. Near Steep, 1925. Browning in Rayner, *l.c.*, is the most recent record we have been able to trace; it probably still exists in this area.

Note as to occurrences in v.-cs. 10-12.—Twenty-five years ago this species was practically unknown in Hants. There were three very old records for N. Hants, and the late Canon Vaughan and a very few other botanists knew the Shanklin locality. The Winchester (v.-c. 12) locality was discovered in 1910, not in 1907 as stated by Rayner; Vaughan's 1907 plants in *Herb. Druce* described as from "Salchett Downs" were probably from Shanklin; Vaughan did not see the plant on the mainland of Hants until 1911, when the Winchester locality was shown to him by one of the present writers. No other locality was known before 1922, since when five new localities have been discovered. In one of these, Exton, the plant is abundant; Exton is less than four miles from Droxford and it is unbelievable that such a botanist as Canon Vaughan, when Rector of Droxford, could have overlooked this plant, if it then grew at Exton in such numbers as it does at the present time. There is thus reason to suppose that in Hants this species is spreading.

- W. SUSSEX (13). First recorded from Westergate, before 1843, by Tyacke; see Arnold's *Flora of Sussex* for this and other early re-

- corids. Has been recorded from at least seven localities in all; three of these are recent records, and in one locality at least the plant is plentiful.
- E. SUSSEX (14). Arnold, *l.c.*, gives several early records; first dated record from near Chailey, 1863, Edwards in *Herb. Roper*. Recorded from nine localities in all; four are recent records and the plant still exists in the Eastbourne district.
- E. KENT (15). Hanbury and Marshall, *Flora of Kent* (1899), state "frequent in districts 5, 6 and 7," and also give localities in districts 4, 9 and 10. The earliest dated herbarium specimens which we have seen are from Deal, 1835, E.M., ex *Herb. S. O. Gray* in *Herb. Univ. Manc.* The *Floral Guide for East Kent* (1839) gives four localities. In all the species has been recorded from at least twenty localities; by the word "locality" we mean groups of stations in the same neighbourhood, as for example the locality "near Wye" may and does cover more than one actual station. There is reason to suppose that the plant has much decreased in recent years but still exists in at least ten localities; we have recent records from Maidstone, Wye !, Dover and Folkestone area ("occasional specimens," J. Jacob), Nonnington, Barham ("scarce," J.J.), Chilham ("fairly abundant," J.J.), Wingham ("decreasing," J.J.), Sittingbourne, and Harrietsham.
- W. KENT (16). *Flora*, "frequent in district 2," *i.e.*, in the Dartford-Rochester area. First record at Greenhithe and Northfleet, 1724, Sherard in *Ray. Syn.*, ed. 3, 379. The earliest herbarium specimen we have traced is from Wrotham, 1774, Banks in *Herb. Mus. Brit.* Herbarium specimens from W. Kent localities dated in the first half of the 19th century are frequent but later examples are fewer. In all we have notes of thirteen locality-areas but it is clear that the species has decreased very much in recent years, especially in the north-western part of the vice-county; there are recent records in five localities only, *viz.*:—Cuxton, Shoreham, Dunton Green, West Malling (two stations, abundant, 1933 !), and Halling.
- SURREY (17). There are numerous early records; the earliest dated herbarium specimens we have traced are from Croydon, c. 1798, Dickson in *Herb. Mus. Brit.* A very large number of herbarium specimens occur from Surrey localities; for example, in *Herb. C. Bailey* in *Manch. Univ.*, there are no less than ten sheets from Boxhill alone. The species has been recorded from at least twenty locality-areas, from fifteen of which we have recent records; in many of these in spite of severe collecting throughout the last 100 years, the plant is still frequent; in fact it is only in the localities nearest to London, *e.g.*, Croydon, that the plant has disappeared. It is still very frequent in the Dorking-Boxhill-Reigate area and the statement in Salmon, *Flora of Surrey*, 1933, 601, "probably more abundant in Kent than in any other county," is truer to-day of Surrey.

- N. ESSEX (19). The first record is also the first record for Britain—Dallington (=Ballington), Ray, *Syn.*, 1690, 171; there are specimens from this locality dated 1715 in *Herb. Samuel Dale* (1659-1739) in *Herb. Mus. Brit.*; there are also specimens in the same herbarium from Belchamp St Paul and Walter Belchamp. There is only one recent record, Terling, near Witham, 1909, E. E. Turner in *Herb. Druce*. It is doubtful whether the plant still exists in v.-c. 19.
- HERTS (20). Very rare indeed, one locality only in which six plants were seen in 1931.
- E. SUFFOLK (25). First dated record, near Bungay, 1840, D. Stock in *Herb. Kew* and *Herb. C. Bailey*; five recorded localities in all, of which two are recent. In one of these at least, near Ipswich, there is still a colony of about 80 plants. Decreasing in Suffolk, teste F. W. Simpson.
- W. SUFFOLK (26). First dated record, Chilton gravel-pit, 25/5/1744, in *Herb. J. Andrews* in *Herb. Mus. Brit.*; there are also early records from Hadley, Stanton, Rougham, Great Barton and Hitcham. There are recent records from Whepstead (1911) and Nedging, in which locality the plant still exists in three stations but not in large numbers.
- E. NORFOLK (27). Nicholson, *Flora of Norfolk*, 1913, 145, gives eight localities in this v.-c.; the earliest dated record is from Fornecett, 1799, and there are specimens from here dated 1803 in *Herb. Kirby* in Ipswich Museum. We have not traced any other herbarium specimens from v.-c. 27. Nicholson, *l.c.*, states "rare," and it is very doubtful whether the plant still exists. Seven of the eight localities given were in the Wymondham-Diss area and the plant should be looked for in this district.
- W. NORFOLK (28). The earliest dated record is Narford, 4/6/1849, B. D. Wardale in *Herb. Kew*, *Mus. Brit.*, and Reading Univ. Nicholson, *l.c.*, gives three other localities, one of which—Thetford—is recent, with specimens dated 1912 from F. C. Newton in *Herb. Leeds Univ.* Present existence doubtful.
- CAMBS (29). Babington, *Flora of Cambridge*, 1860, 226, gives eight localities, in one of which only has the plant survived to recent times. There are specimens dated 7/6/1927 in *Herb. W. A. Sledge*. The first dated record is Linton, 1803, in *Herb Kirby* in Ipswich Museum.
- BEDS (30). Very sparingly in one locality only: first and only record Totternhoe, 1926, J. Douy; see *Rep. B.E.C.*, 1926, 135: specimen in *Herb. Druce*.
- NORTHANTS (32). Has been recorded from ten localities in all. The first dated record is Helpstone, 1820, in *Herb. Kew* without collector's name. This antedates by 30 years the earliest record in Druce's *Flora*, Barnack, c. 1850. There are recent records from seven localities, viz.:—Barnack, Colleyweston, East Haddon, Bedford Purlieus, Southorpe, Swordy Well, and Helpstone. The

plant is still plentiful at Barnack, whence it was distributed through the B.E.C. in 1914, and has been seen in at least one other locality in 1933.

EXTINCTIONS.

- N. SOMERSET (6). One record only, on carboniferous limestone between Portishead and Clevedon, c. 1892; see J. W. White in *Journ. Bot.*, 1907. There is an interesting account of the eradication of the plant from this locality in White's *Flora of Bristol*, 1912, 560; see also W. D. Miller in *Rep. B.E.C.*, 1932, 270.
- S. ESSEX (18). This v.-c. appears in *Top. Bot.*, without personal authority and is also given in *Com. Fl.* The only record we have been able to trace is in G. S. Gibson's *Flora of Essex*, 1862, "South Shoebury Common, 1835, F." There is a sheet in *Herb. Mus. Brit.* gathered by E. Forster in 1835 marked "below South-End, non South Shoebury Common."
- OXON (23). Druce, *Fl. Berks*, 1897, 477, states "recorded for Oxon on unsatisfactory authority" and in *Fl. Oxon*, 1927, 411, "very rare if correctly named." It is suggested that this species was confused with *Coeloglossum viride* and is excluded as an error. There are, however, specimens from Mapledurham, June 1853, J. T. Syme in *Herb. Mus. Brit.*

DOUBTFUL AND ERRONEOUS RECORDS.

- S. DEVON (3). There is a sheet in *Herb. Univ. Manc.*, ex *Herb. E. A. Lomax*, which purports to be from "railway bank, near Torquay, June 1873." The sheet, however, contains only one complete specimen of *Aceras*; 2 roots and leaf-rosettes of *Aceras*; and 2 inflorescences of *Listera ovata*, one of which is stuck into *Aceras* leaves to give the appearance of a complete plant. The *Listera* spikes are ringed round in pencil and marked "*Listera cordata*" (sic). There is also in the Manchester Museum a sheet of *Listera ovata* from Guildford as well as sheets of *Aceras* from Guildford, both ex *Herb. E. A. Lomax*, and this is probably the source of the error.
- N. WILTS (7). Preston, *Fl. Wilts*, 1882, 192, says "2 spec. found at Clyffe Pippard, c. 1868: also reported from 2 stations (both woods) near Corsham: doubtful." Druce, *Fl. Berks, l.c.*, "recorded from Wilts on unsatisfactory authority."
- S. WILTS (8). Two verbal reports to Miss Gullick of Salisbury of occurrences near Warminster, in which district the plant possibly occurs, and should be looked for.
- BERKS (22). Given in *Top. Bot.*, 2nd edition, without personal authority, and in *Com. Fl.* in brackets. Druce, *Fl. Berks, l.c.*, says "near the road from Wallington to Reading by Mr Browne, in Merrett's *Pinax* 1666;" suggested confusion with *Coeloglossum viride* and excluded.

- BUCKS (24). Given in *Top. Bot.*, 2nd ed., without personal authority, and in *Com. Fl.*, in brackets. Druce, *Fl. Berks, l.c.*, says "recorded for Bucks on unsatisfactory authority," and in *Fl. Bucks*, 1926, 332, gives one record, c. 1867, near Wendover, Rev. H. Harpur-Crewe. Very doubtful.
- E. GLOSTER (33). This appears in *Com. Fl.* in brackets but we have not been able to trace on what this is based. Error.
- N. Lincs (54). Appears in *Com. Fl.* in brackets. "Plentiful in Gate Burton Wood," Wollaston, in *Phyt.*, 1843, 543; see also Lees in *Science Gossip*, 1870, 189 and 211. Omitted by Woodruffe-Peacock from his *List of Lincolnshire Plants* as an error for *Listera ovata*.
- LEICESTER (55). Reported from Wardley Wood, Uppingham, by H. Candler, but bracketed as an error by Horwood in *Flora of Leics. and Rutland*, 1933, 532.
- S.W. YORKS (63). Lees in *Flora of W. Yorks*, 433, gives two records but excludes as an error. Included in *Top. Bot.*, 2nd ed., from Ham-pole Wood, Doncaster, on authority of Mrs Broadrick. Included in *Com. Fl.*, not in brackets.

SOME HYBRID CARICES.

W. H. PEARSALL.

Below we give for each of the British species of *Carex* the names of the other species with which it is known to hybridise. The asterisk denotes that this hybrid has been recorded for Britain. An examination of this list will suggest many problems, to only two of which we may briefly refer: 1. Why do some species apparently not hybridise at all? 2. How is it that some species found growing together in abundance never hybridise?

1. Among the commoner species not known to hybridise in Britain are the following: *pulicaris*, *pauciflora*, *disticha*, *divisa*, *capillaris*, *strigosa*, *humilis*, *depauperata*, *sylvatica*, *helodes*, *pendula*, *pallescens*.

C. pulicaris is frequently found within easy distance of *C. dioica* but whereas the latter hybridises occasionally with *incurva*, *lagopina*, *canescens* and *stellulata*, it does not do so with *pulicaris*, *flacca*, *ovalis* and *pauciflora*, which are usually more frequent in its immediate neighbourhood.

C. sylvatica, *helodes*, *pendula* and *pallescens* have always other species in their vicinity but do not hybridise with any of them.

2. Even more difficult to understand are cases such as these. In a wood near my house *sylvatica* and *helodes* grow in abundance within a few yards of each other but never hybridise. In an adjacent wood which is very wet, *pendula* and *paniculata* are dominant in close proximity over large areas but although I have searched diligently I have failed to find any trace of hybridity. Similar cases will be within the recollection of most botanists. The following list may be useful for reference and for economy of effort when searching for hybrids.

I.

DIOICA—*incurva*, *lagopina*, *canescens*, *stellulata*.

II.

ARENARIA—*remota*.

INCURVA—*dioica*.

VULPINA—**paniculata*, **remota*, **contigua*.

CONTIGUA—*stellulata*, *divulsa*, **remota*, **vulpina*.

DIVULSA—*contigua*, *ovalis*, **remota*, **vulpina* ?.

DIANDRA—*paniculata*, *paradoxa*.

PARADOXA—*paniculata*, *diandra*, *canescens*, *remota*.

PANICULATA—*stellulata*, *elongata*, *diandra*, *paradoxa*, *canescens*, **remota*, **vulpina*.

REMOTA—*arenaria*, **contigua*, **vulpina*, **paniculata*, *paradoxa*, *ovalis*, *canescens*, *elongata*, *stellulata*, **divulsa*.

STELLULATA—*dioica*, *canescens*, *remota*, *contigua*.

ELONGATA—*paniculata, canescens, remota.*
 CANESCENS—*dioica, paniculata, lagopina, elongata, remota, stellulata.*
 OVALIS—*remota, divulsa.*

III. A.

HUDSONII—**Goodenowii, gracilis, aquatilis.*
 RIGIDA—**Goodenowii, aquatilis.*
 GRACILIS—**Goodenowii, Hudsonii.*
 GOODENOWII—**rigida, trinervis, aquatilis, gracilis, Hudsonii, flacca.*
 AQUATILIS—**rigida, Goodenowii, Hudsonii.*
 ALPINA—*atrata.*
 LIMOSA—*magellanica, rariflora.*
 MAGELLANICA—*limosa, rariflora, panicea.*
 RARIFLORA—*limosa, magellanica.*
 PANICEA—*flacca, magellanica, Hostiana, vaginata.*
 FLACCA—*Goodenowii, montana, tomentosa, panicea, acutiformis, flava.*
 DIGITATA—*ornithopoda.*
 CARYOPHYLLEA—*ericetorum, pilulifera.*
 ERICETORUM—*caryophyllea, pilulifera, montana.*
 PILULIFERA—*ericetorum, caryophyllea, montana.*
 MONTANA—*ericetorum, pilulifera, flacca.*

III. B.

HOSTIANA—*panicea, distans, flava, lepidocarpa, Oederi.*
 PUNCTATA—**Oederi.*
 DISTANS—*Hostiana, flava, lepidocarpa.*
 BINERVIS—*Oederi, flava ? , rostrata.*
 EXTENSA—*Oederi.*
 OEDERI—*binervis, punctata, Hostiana, extensa, flava, lepidocarpa.*
 FLAVA—*distans, Hostiana, lepidocarpa, Oederi, flacca, binervis ? .*
 LEPIDOCARPA—*distans, Hostiana, flava, Oederi.*
 PSEUDO-CYPERUS—**rostrata, vesicaria.*
 ROSTRATA—**Pseudo-cyperus, vesicaria, riparia, lasiocarpa, hirta.*
 VESICARIA—**Pseudo-cyperus, rostrata, riparia, lasiocarpa, hirta.*
 ACUTIFORMIS—*flacca, lasiocarpa, gracilis, rostrata, riparia.*
 RIPARIA—**lasiocarpa, rostrata, vesicaria, acutiformis.*
 LASIOCARPA—**rostrata, vesicaria, acutiformis, riparia.*
 HIRTA—**rostrata, vesicaria.*

With regard to recognised hybrids the request for descriptions of these is hard to resist but more difficult to meet. It cannot be too often emphasised that the hybrids between two given species may differ greatly in their appearances and characters. They differ between the extreme limits of the characters of two very different species and any comprehensive description of them would be so vague as to be valueless. Where descriptions of a hybrid have been compiled it is usually because one of the parents is so much more vigorous than the other that its influence is normally predominant, and that particular form of the hybrid the one most frequently found, but it is always necessary to remember

that even in such a case we may occasionally come across a hybrid between the same two species showing the predominant influence of the other parent. The danger of depending upon hybrid descriptions is therefore very real. When your suspected hybrid agrees in the main with a published description all may be well, but to assume that because your plant does *not* agree with the description it cannot be a hybrid between the same two species is absurd. The hybrids between any two *Carex* species are usually separable into at least two distinct and very different classes—those in which the evidence for one parent species predominates, and those in which the influence of the other parent is the more apparent. Many continental authors realise this and differentiate in their descriptions and names accordingly.

In my previous paper (*Rep.*, 1932, 174-5) I give two descriptions of hybrids included in Bab. (*Man.*, 458) as species. Herewith I add several others having some bearing on the point raised above and also on plants distributed this year.

C. ROSTRATA × VESICARIA.

1. (Nearer to *vesicaria*).

C. PANNEWITZIANA Figert in *Deutsch. bot. Monatschr.*, v (1887), 97. Habit of *C. rostrata* but with broader ls., 4-5 mm. wide, flat or nearly so, green and grass-like, often exceeding the stem. Sp. broad and densely flowered. Fruits broadly ovate or ellipsoid with rounded bases; larger than those of *rostrata* and strongly inflated; ± abruptly narrowed into a moderately long neck and deeply bifid beak; normally sterile. Gl. long, narrow and acute, subequal to the fruit or slightly shorter.

2. (Nearer to *rostrata*).

Var. SUPER-ROSTRATA Kneucker in *Allg. bot. Zeitschr.*, vii (1901), 33. Ls. narrower, margins ± involute: more glaucescent. Sp. narrower and longer. Gl. more often subacute or obtuse. Fruits similar. Less frequent than the preceding.

C. PANICULATA × REMOTA.

×C. BOENNINGHAUSENIANA Weihe in *Flora*, ix (1826), 743. Beckmann et Figert in *Verh. bot. Ver. Brandenburg*, xxxii (1891), 272, distinguish two forms of this:

3. (Nearer to *paniculata*).

Var. PER-PANICULATA Beckm. et Fig., *l.c.* Habit of *C. remota* but larger and more robust, angles of stiffer stem acute and very rough, especially in the upper half. Inflorescence ± paniculate and strict. Ls. broader, as in *paniculata*. Spikelets lanceolate, greenish. Lowest bract equalling the stem. Gl. rusty brown with broad silvery margins. Otherwise as described in *Rep.*, 1932, 175.

4. (Nearer to *remota*).

Var. PER-REMOTA Beckm. et Fig., *l.c.* A much more slender plant, with stem less rough and inflorescence long, very flaccid and sub-

spicate. Sp. smaller, plainly distinct and the lowest very remote. Lowest bract very long, often exceeding the stem. Gl. much paler.

C. REMOTA × VULPINA.

5. ×C. AXILLARIS Good. (See description, *Rep.*, 1932, 175). This is by far the more common form of this hybrid and is much nearer *vulpina*.
6. VAR. REMOTOFORMIS Rouy (*Fl. Fr.*, xiii, 423) is nearer *remota*. It is the *C. Kneuckeriana* Zahn in *Österr. bot. Zeitschr.*, xi (1890), 412, and is a more slender and smoother form with weak stem and flaccid narrower leaves. Panicle less interrupted below. Fruits attenuate below. Gl. usually paler.

A LIST OF GLAMORGAN PLANTS.

E. VACHELL, F.L.S.

The following list of Glamorgan plants follows, in most cases, the nomenclature of the "British Plant List," Edition 2, published in 1928 by Dr G. C. Druce, including the additions and corrections that have since appeared in the "Reports of the Botanical Society and Exchange Club of the British Isles."

All plants recorded for Glamorgan, v.-c. 41, that appear in the "British Plant List" as native species, denizens, or naturalised aliens, printed in black type, black type with asterisk, or starred italics respectively, whether native or adventive in the county, have been as far as possible included, but about 200 dock and grain aliens, appearing in the "British Plant List" printed in unstarred italics have been purposely omitted with the exception of a few that are more or less established in the county, or are included in "The London Catalogue" of Plants, Sowerby's "English Botany," Bentham's "British Flora," or "Further Illustrations of the British Flora" by Dr Butcher, and may therefore be considered of interest to field botanists visiting the county. Being a list and not a Flora, the plan of including aliens with the native species adopted in the "British Plant List" has been followed, but local conditions make it almost impossible to follow the list too strictly as regards the starring of aliens, as in this respect every county has different difficulties to contend with. Also, as it is only a list it seems unnecessary to adhere to the practice generally adopted in Floras of giving priority to the oldest records, and therefore the most modern ones have where possible been quoted in preference, as likely to provide the more useful information to field botanists desirous of seeing, *in situ*, plants still occurring in the county.

The extensive coast line, high hills and varied geological features make the native Flora of Glamorgan an unusually rich and interesting one, while important sea ports on the shores of the Bristol Channel are responsible for an exceptional number of adventive species. When vessels were built to carry water ballast instead of sand, alien plants would have become less numerous had it not been for the erection of mills in the neighbourhood of several of the large seaport towns, which has resulted in the appearance of many grain aliens on the refuse dumped on waste ground and allotments in their vicinity. The fact that botanical observations have extended over an unusually long period accounts for many erroneous records that have caused considerable confusion. While recent discoveries have shown it to be unwise to entirely disregard all old records, since several once considered erroneous have recently been proved correct, a few improbable ones including those of *Iola Morganwg*, have purposely been omitted.

The list has been compiled from various sources, including:—

- The Botanist's Guide through England and Wales*, by Turner and L. W. Dillwyn, 1805. (B.G.)
- Materials for a *Fauna and Flora of Swansea and the neighbourhood*, by L. W. Dillwyn, 1848, unpublished. (L.W.D. Mat.)
- Topographical Botany and Supplements*, by H. C. Watson, etc. (J.B. Supp.)
- The Flora of Cardiff*, by John Storrie, 1886 (Fl. J.S.), and Notes.
- The Flora of Rhondda*, by H. Harries, 1905. (Fl. Rhondda.)
- A *Flora of Glamorgan*, by the Rev. H. J. Riddelsdell, published as a Supplement to the *Journal of Botany*, 1907. (J.B. Supp., 1907.)
- Catalogue of Swansea Plants, *Mag. Nat. Hist.*, iii (1839), by T. B. Flower (Flower).
- J. W. G. Gutch's "List of Plants near Swansea," in *Phytologist*, Vol. i, (1841 and 1842). (Gutch.)
- The Flora of Glamorgan*, edited by Dr Trow, 1908, containing notes made by numerous local correspondents. (Fl. Glam.)
- Notes and Lists published from time to time in *The Phytologist*. (Phyt.)
- The Proceedings of the Cardiff Naturalists Society*. (C.N.S. Procs.)
- The Proceedings of the Linnean Society of London*. (Proc. Linn. Soc.)
- The Journal of Botany*. (J.B.)
- The Reports of the Botanical Society and Exchange Club of the British Isles*. (B.E.C.)

As references are always quoted, the names of the recorders can be ascertained without difficulty in every case. There are also included numerous unpublished records made and collected by the compiler and her father, the late Dr C. J. Vachell, to whose co-operation and early teaching the completion of the list is due.

Plants seen by the compiler are marked ! All critical plants have been examined by experts and those whose names appear in the following pages are most warmly thanked for all the help so kindly given. In cases where the names of critical plants marked ! are not followed by the name of an expert, it may usually be assumed that specimens have been examined at one time or another by Mr A. Bennett, to whom all interesting Glamorgan plants were formerly sent, or by Dr Druce, under whose guidance the compiler has frequently been privileged to visit the many interesting botanical areas in the county and who has often examined the plants in her herbarium, including the sedges.

Warm thanks are also expressed to Mr R. E. Smith, who has spared no pains in helping to determine the status of the aliens, and to the others who have rendered invaluable assistance.

Although many distinguished field botanists have from early times visited the county, leaving behind them diaries and records of considerable interest, comparatively few belonging to a past generation have been resident in the county for any considerable period.

- CLEMATIS VITALBA L. Septal, Sylvestral. Locally common!
- THALICTRUM FLAVUM L., b. RIPARIUM (Jord.). Paludal. Scarce. Ewen-ny, etc.!
- T. MINUS L., agg., including *montanum* Wallr. and *collinum* Wallr. Littoral, Rupestral. Scarce. Llanmadoc, etc.!, teste Dr Butcher.
- (T. DUNENSE Dum. Llanmadoc!, *B.E.C.*, 151, 1905. Porthcawl!, *C.N.S. Procs.*, 1891-2, errors, sps. referred by Dr Butcher to *montanum*).
- ANEMONE NEMOROSA L. Sylvestral. Common!
b. PURPUREA DC. Tongwynlais!
- *A. RANUNCULOIDES L. Introduced. Penllergaer, Hb. Motley.
- *A. APENNINA L. Introduced. Fairy Hill Woods, *B.E.C.*, 102, 1926.
- *ADONIS ANNUA L. Casual. Penarth, etc., Fl. J.S., 12, etc.
- RANUNCULUS REPENS L. Agrestal, Viatical. Common!
- R. ACER L. Pascual. Common!
b. MULTIFIDUS DC. Gower, *J.B. Supp.*, 6, 1907.
c. TOMOPHYLLUS (Jord.). Locally common. *J.B. Supp.*, 6, 1907.
d. RECTUS Bor. Aberdare, etc., *J.B. Supp.*, 6, 1907.
e. STEVENI (Andrz.) Lange. Penard, G. C. Druce.
- R. AURICOMUS L. Pascual. Locally common!
- R. BULBOSUS L. Pascual. Common!
- R. LINGUA L. Paludal. Scarce. Near Cowbridge!
- R. FLAMMULA L. Paludal. Common!
b. ANGUSTIFOLIUS Wallr. Local. Kenfig Pool, etc.!, *B.E.C.*, 860, 1925.
- R. ARVENSIS L. Agrestal. Dinas Powis!
- R. SARDOUS Cr. Inundatal. Scarce. Llandough, etc.!
- b. PARVULUS (L.) R. & F. Swansea, B.G., etc.
- R. SCELERATUS L. Paludal. Locally common. Cogan, etc.!
- R. PARVIFLORUS L. Glareal, Littoral. Locally common near the coast!
- R. FLUITANS Lam. Llangenydd, *B.E.C.*, 715, 1922.
- R. CIRCINATUS Sibth. Lacustral. Scarce. Kenfig, etc.!
- R. TRICHOPHYLLUS Chaix. Lacustral. Locally common! *B.E.C.*, 442, 1921.
- R. RADIANUS (Revel.). Glamorgan, Pearsall, *B.E.C.*, 448, 1921.
- R. DROUETHI F. Schultz. Lacustral. Pearsall, *B.E.C.*, 445, 1921.
- R. HETEROPHYLLUS Weber. Lacustral. Locally common. Kenfig, etc.!
b. SUBMERSUS Bab. Cadoxton, etc., *J.B. Supp.*, 5, 1907.
- R. PELTATUS Schrank. Lacustral. Common! *B.E.C.*, 103, 1926.
b. TRUNCATUS (Koch). Kenfig!, teste W. H. Pearsall.
- R. PSEUDO-FLUITANS Baker. Lacustral. Locally common! *B.E.C.*, 332, 1930.
b. MINOR Pearsall. Locally common. River Ely!, teste W. H. Pearsall.

- R. BAUDOTH Godr. Lacustral. Locally common. Llandough, etc.!
B.E.C., 103, 1926.
- b. MARINUS (Arr. & Fr.). Cardiff Castle Moat!, also in reens.
B.E.C., 332, 1930.
- R. LUTARIUS Bouvet. Lacustral. Rhossili Down, *B.E.C.*, 452, 1921.
- R. LENORMANDI F. Schultz. Lacustral. Locally common!
- R. HEDERACEUS L. Lacustral, local. Kenfig, etc.!
- b. OMIOPHYLLUS (Ten.). Llanedarne, *J.B.*, 397, 1909.
- R. FICARIA L. Septal. Common!
- b. INCUMBENS Schultz. Ely, etc., *J.B.*, 397, 1909.
- c. SINUATUS Horwood. Near River Taff, Cardiff!, *B.E.C.*, 554, 1924.
- CALTHA PALUSTRIS L. Paludal. Common!
- b. GUERANGERII (Bor.). Scarce. Crumlin Bog, *vide* A. Bennett.
- TROLLIUS EUROPAEUS L. Pratal, Paludal. Scarce. Dulais River, etc.!
- *HELLEBORUS VIRIDIS L., b. OCCIDENTALIS (Reut.) Dr. Sylvestral. Rare.
 Oxwich Bay, *B.E.C.*, 366, 1918.
- H. FOETIDUS L. Sylvestral. Locally common; native in Gower!
- *ERANTHIS HYEMALIS Salisb. Near Caerau, *J.B.*, 411, 1909.
- AQUILEGIA VULGARIS L. Sylvestral, local. Llanishen, etc.!
- *DELPHINIUM AJACIS L. Casual. Cardiff, etc.!
- *D. CONSOLIDA L. Casual. Cardiff, Fl. *J.S.*, 14.
- ACONITUM ANGLICUM Stapf. Sylvestral. Locally common. River Ely,
 etc.!
- BERBERIS VULGARIS L. Septal. Scarce. Merthyr Mawr, etc.!
- *NUPHAR LUTEA Sm. Lacustral. Introduced? Penrice, etc.!
- NYMPHAEA ALBA L. Lacustral, local. Kenfig Pool, etc.!
- *PAPAVER SOMNIFERUM L. Casual. Scarce. Porthcawl, etc., *J.B. Supp.*,
 75, 1907.
- b. HISPIDUM H. C. Wats. Llantwit Major, etc., *J.B. Supp.*, 75,
 1907.
- P. RHOEAS L. Agrestal. Locally common!
- b. STRIGOSUM (Boenn.). Scarce. Porthcawl, etc., *J.B. Supp.*, 75,
 1907.
- P. DUBIUM L. Agrestal, local. Near Barry, etc.!
- P. LECOQUI Lamotte. Agrestal, etc. Local. Porthcawl, etc., *J.B.*
Supp., 74, 1907.
- *P. ARGEMONE L. Agrestal. Near Swansea. Casual, Cardiff, etc.!
- *P. HYBRIDUM L. Casual. Cardiff, etc.!
- MECONOPSIS CAMBRICA (L.) Vig. Rupestral. Rare. Pontneddfechan,
 etc.!
- GLAUCIUM FLAVUM Crantz. Littoral. Locally common!
- *G. CORNICULATUM (L.) Curt. Casual, Splott!, *B.E.C.*, 385, 1927.
- *ROEMERIA HYBRIDA DC. Casual. Splott!, *B.E.C.*, 104, 1926.
- *CHELIDONIUM MAJUS L. Septal, Viatical. Locally common!
- CORYDALIS CLAVICULATA (L.) DC. Rupestral. Scarce. Caerphilly, etc.!
- *C. BULBOSA (L.) DC. Naturalised. Near Cottrel, etc.!
- *C. LUTEA DC. Rupestral. Scarce. Southerndown, etc.!

- FUMARIA CAPREOLATA L. Agrestal, etc. Oystermouth. Sowerby, *E.B.*, i, 105.
- b. BABINGTONII Pugs. Oxwich!, teste H. W. Pugsley.
- F. PURPUREA Pugs. Agrestal, etc. Rare. Llandaff, etc.!, teste H. W. Pugsley.
- F. BORAEI Jord. Agrestal, etc. Scarce. St Nicholas, etc.!, teste H. W. Pugsley.
- *b. GRACILIS (Pugs.). Adventive. Barry Dock, *B.E.C.*, 861, 1925.
- F. MURALIS Sond. Agrestal, etc. Near Swansea, *T.B. Supp.*, 9.
- F. BASTARDI Boreau. Agrestal, etc. Scarce, Llandaff, etc.!, teste H. W. Pugsley.
- F. OFFICINALIS L. Agrestal. Common!
- *F. MICRANTHA Lag. Casual. Llandaff, Hb. N.M. of Wales.
- *F. PARVIFLORA Lam. Casual. Ballast, *Fl. J.S.*, 15; *T.B. Supp.*, 9.
- *MATHIOLA INCANA Br. Rupestral. Nash cliffs!, *J.B.*, 217, 1905.
- M. SINUATA Br. Littoral. Swansea! Extinct?
- *CHEIRANTHUS CHEIRI L. Rupestral. Locally common!
- b. FRUTICULOSUS (L.). Aberdare, *J.B. Supp.*, 76, 1907.
- ROSEPPA OFFICINALE Br. Paludal. Common!
- b. SIFOLIUM Reichb. Mayals, *B.E.C.*, 367, 1918.
- c. MICROPHYLLUM Crantz. Aberdare, *J.B. Supp.*, 8, 1907.
- R. SYLVESTRE Br. Paludal. Common!
- R. AMPHIBIUM Br. Paludal. Scarce. Near Morriston, *B.E.C.*, 386, etc., 1927.
- R. ISLANDICUM (Oeder). Inundatal. Common!
- *BARBAREA VERNA Asch. Viatical. Rare. Near Barry, etc.!
- B. VULGARIS R. Br. Septal, Viatical. Common!
- *B. INTERMEDIA Boreau. Viatical. Rare. St Fagans!, *B.E.C.*, 634, 1931.
- ARABIS HIRSUTA Scop. Rupestral. Common!
- b. GLABRATA (Syme) Dr. Newton sand dunes!, teste A. Bennett.
- *A. CAUCASIA Willd. Adventive. Merthyr Mawr Quarry, *B.E.C.*, 637, 1919.
- CARDAMINE PRATENSIS L. Pratal. Common!
- b. DENTATA (Schultes). Llanrhidian, *J.B. Supp.*, 9, 1907.
- C. AMARA L. Paludal. Very rare. Pontypridd. *J.S.*?. *T.B. Supp.*, 12.
- C. IMPATIENS L. Rupestral. Very rare. Morlais Castle, *J.B. Supp.*, 9, 1907.
- C. FLEXUOSA With. Rupestral, Sylvestral. Common!
- C. HIRSUTA L. Rupestral, etc. Common!
- *C. TRIFOLIA L. Established. Singleton, *B.E.C.*, 637, 1919.
- *ALYSSUM ALYSSOIDES L. Adventive. Penarth, etc., *Fl. J.S.*, 17.
- *A. INCANUM L. Adventive. Barry!
- *A. MARITIMUM Lam. Casual. Scarce. Porthcawl, etc.!
- DRABA AIZOIDES L., var. MONTANA Koch. Rupestral. Rare. Penard Castle and cliffs, Gower!

- (D. INCANA L. and D. MURALIS L. errors. *Sw. Sc. Soc. Procs.*, 1929.)
 EROPHILA VERNA (L.) Meyer, b. CABILLONENSIS (Jord.) O. E. Schulz.
 Barry Island, *B.E.C.*, 186, 1929.
- E. BOERHAVII (Van Hall) Dum., b. DECIPIENS (Jord.) O. E. Schulz.
 Kenfig, *B.E.C.*, 193, 1929.
- E. PRÆCOX (Stevens) DC. Porthkerry, *J.B.*, 398, 1909.
 b. VIRESCENS (Jord.) O.E.S. Cold Knap, etc., *J.B.*, 398, 1909.
- *COCHLEARIA ARMORACIA L. Viatical. Common!
 C. OFFICINALIS L. Littoral, etc. Scarce!
 C. ANGLICA L. Littoral. Locally common. Leckwith, etc.!
 C. DANICA L. Littoral. Locally common. Southerndown, etc.!
- *HESPERIS MATRONALIS L. Viatical. Scarce. Gower, etc.!
- *SISYMBRIUM SOPHIA L. Viatical. Scarce. Swanbridge, etc.!
- *S. ALTISSIMUM L. Viatical. Locally common!
 *S. ORIENTALE L. Viatical. Locally common!
 b. IRIOIDES (Thell.). Grangetown, *B.E.C.*, 213, 1920.
- *S. IREO L. Casual. Barry, *B.E.C.*, 168, 1923.
 S. OFFICINALE (L.) Scop. Viatical, Agrestal. Common!
 b. LEIOCARPUM DC. Locally common!
 S. THALIANUM (L.) Gay. Rupestral, Agrestal. Common!
 S. ALLIARIA Scop. Septal. Common!
- *ERYSIMUM CHEIRANTHOIDES L. Casual. Splott, etc.!
- *CONRINGIA ORIENTALIS (L.) Dum. Casual. Newton, etc.!
- *CAMELINA SATIVA Crantz. Casual. Splott, etc.!
- *C. ALYSSUM (Mill.) Thell. Barry Island, *J.B. Supp.*, 75, 1907.
 BRASSICA OLERACEA L. Rupestral, Littoral, native on lias sea cliffs!
- *B. NAPUS L. Viatical, Agrestal. Common!
 *B. RAPA L. Agrestal, Viatical. Common. Cardiff, *J.B.*, 257, etc.,
 1884.
 b. BRIGGSII Wats. Cardiff Docks, etc., *J.B. Supp.*, 75, 1907.
 B. MONENSIS Huds. Littoral. Very rare. Three Cliffs Bay! Extinct?
- *B. CHEIRANTHOS Vill. Viatical, local. Near Grangetown!
 B. NIGRA L. Viatical, etc. Native on sea cliffs!
 B. ARVENSIS Kuntz. Agrestal. Common!
 b. ORIENTALIS (L.) Aschers. Cardiff Docks, etc., *J.B. Supp.*, 10,
 1907.
- *B. ALBA (L.) Boiss. Agrestal, etc. Locally common!
 *B. GALLICA (Willd.) Dr. Casual. Splott!
 *B. INCANA (L.) F. Schultz. Adventive. Established near Docks, etc.!,
B.E.C., 168, 1923.
- *DIPLONTAXIS TENUIFOLIA (L.) DC. Viatical, local. Grangetown, etc.!
 D. MURALIS (L.) DC. Viatical, Littoral. Locally common!
 b. BABINGTONII (Syme). Gower, *J.B. Supp.*, 10, 1907.
- *D. ERUCOIDES DC. Casual. Barry, *B.E.C.*, 557, 1924.
 BURSA PASTORIS Weber. Viatical, Agrestal. Common!
 B. ABSCISSA (E. At.). Cardiff, Hb. N.M. of Wales.
 B. ANGLICA (E. At.). Barry, *B.E.C.*, 105, 1926.

- B. BATAVORUM (E. At.) Aberdare, *B.E.C.*, 197, 1920.
 B. BRITTONII (E. At.) Cardiff, *B.E.C.*, 637, 1931.
 B. DRUCEANA (E. At.) Barry, *B.E.C.*, 387, 1927.
 B. GALLICA (E. At.) Cardiff, *B.E.C.*, 863, 1925.
 B. GERMANICA (E. At.) Cardiff, *B.E.C.*, 863, 1925.
 B. LAEVIGATA (E. At.) Barry, *B.E.C.*, 387, 1927.
 B. ROBUSTA (E. At.) Grangetown, Hb. N.M. of Wales.
 B. SINUOSA (E. At.) Cardiff, Hb. N.M. of Wales.
 B. TREVIORUM (E. At.) Cardiff, Hb. N.M. of Wales.
 B. TURONIENSIS (E. At.) Cardiff, Hb. N.M. of Wales.
 B. VIMINALIS (E. At.) Taffs Well, etc., Hb. N.M. of Wales.
 B. SEGETUM (E. At.) Cardiff, Hb. N.M. of Wales.
 CORONOPUS DIDYMUS Sm. Viatical. Locally common! Doubtful native.
 C. RUELLII All. Glareal, Viatical. Locally common!
 *LEPIDIUM GRAMINIFOLIUM L. Viatical. Cardiff, etc.!, *B.E.C.*, 170, 1923.
 *L. LATIFOLIUM L. Littoral, local. Banks of River Taff!, *B.E.C.*, 718, 1922.
 *L. DRABA L. Viatical, local. Common!
 *L. RUDERALE L. Viatical. Cardiff!
 L. CAMPESTRE (L.) Br. in Ait. Agrestal, Viatical. Locally common!
 L. SMITHII Hook. Agrestal, Viatical. Locally common. Pwllypant, etc.!
 b. CANESCENS Gren. & Godr. Llancaiach, *J.B.*, 398, 1909.
 *L. NEGLECTUM Thell. Adventive. Cardiff!, *B.E.C.*, 388, 1927.
 *L. SATIVUM L. Casual, Local. Cardiff!
 *THLASPI ARVENSE L. Agrestal, Viatical, Local. Cardiff, etc.!
 T. ALPESTRE L. Pontneddfechan, etc., *B.G.*
 TEESDALIA NUDICAULIS (L.) Br. Swansea, L.W.D. Mat., 42. Extinct?
 *IBERIS AMARA L. Adventive. Kenfig, Hb. Motley, etc.
 HUTCHINSONIA PETRAEA Br. in Ait. Rupestral, Glareal. Locally common. Kenfig, etc.!
 *BUNIAS ERUCAGO L. Casual. Cardiff, *J.B. Supp.*, 75, 1907.
 *B. ORIENTALIS L. Casual. Penarth, etc., Fl. J.S., 110.
 CRAMBE MARITIMA L. Littoral. Rare. The Leys!, etc.
 *RAPISTRUM PERENNE L. Casual. Cardiff Docks, *J.B. Supp.*, 76, 1907.
 *R. RUGOSUM (L.) All. Casual. Port Talbot Docks, *J.B. Supp.*, 76, 1907.
 CAKILE MARITIMA Scop. Littoral. Locally common. Baglan, etc.!
 RAPHANUS RAPHANISTRUM L. Agrestal, Viatical. Locally common!
 R. MARITIMUS Sm. Littoral. Penclawdd, Hb. Brit. Mus., 1887, etc.
 *RESEDA ALBA L. Adventive. Near Docks, etc.!
 R. LUTEA L. Agrestal, etc. Locally common!
 R. LUTEOLA L. Viatical, etc. Common!
 *R. PHYTEUMA L. Casual. Cardiff, *B.E.C.*, 719, 1922.
 *R. STRICTA Pers. Casual. Splott, *B.E.C.*, 335, 1930.
 HELIANTHEMUM CHAMÆCISTUS Mill. Pascual. Common!
 H. CANUM (L.) Baumg. Rupestral, local. Gower!

- VIOLA SILVESTRIS* Lam. Sylvestral. Common!
 b. *PUNCTATA* Dr. Wenvoe, *B.E.C.*, 232, 1912.
- V. RIVINIANA* Reichb. Sylvestral. Common!
 b. *VICINA* (Martr.-Don.). Caerau, etc., *J.B.*, 399, 1909.
- V. RUPESTRIS* Schmidt, var. *GLABRESCENS* Schmidt. Ewenny Down!,
B.E.C., 335, etc., 1930. (Error, P. M. Hall).
- V. CANINA* L. Scarce. Ewenny Down!, teste P. M. Hall.
 b. *ERICETORUM* Reichb. Littoral. Locally common. Kenfig, etc.!
 c. *PUSILLA* Bab. Ewenny Down!, teste P. M. Hall.
- V. LACTEA* Sm. Pascual. Rare. Gower, as *stagnina*, *J.B.*, 312, 1904,
 and *J.B. Supp.*, 13, 1907, etc.
- V. ODORATA* L. Septal, Sylvestral. Common!
 b. *PRAECOX* Greg. Llandaff!, *B.E.C.*, 148b, 1917.
 c. *DUMETORUM* (Jord.). Common! *B.E.C.*, 106, 1929.
 d. *IMMACULATA* Greg. Fairwater!, *B.E.C.*, 107, 1926. (Error, P.
 M. Hall).
 e. *SUBCARNEA* (Jord.). Local. St Nicholas!, etc., *B.E.C.*, 106, 1929.
- V. HIRTA* L. Sylvestral, etc. Common!
 b. *PROPERA* (Jord.) Gillot. Cowbridge!, teste Gregory.
- V. CALCAREA* Greg. Glareal. Very rare. Ewenny Down!, teste P.
 M. Hall.
- V. PALUSTRIS* L. Uliginal. Common. Caerphilly, etc.!
V. EPIPSILA Ledeb. Uliginal. Very rare. Caerphilly, McLean.
- V. VARIATA* Jord. Agrestal, etc. Scarce. St Fagans!, etc., teste E.
 Drabble.
- V. LEJEBUNEI* Jord. Agrestal. Scarce. Llandaff!, teste E. Drabble.
- V. LLOYDII* Jord. Agrestal. Scarce. Llandaff, *B.E.C.*, 199, 1926.
- V. AGRESTIS* Jord. Agrestal. Common. St Lythans!, *B.E.C.*, 457, 1930.
- V. SEGETALIS* Jord. Agrestal, etc. Scarce. Llandaff, etc., *B.E.C.*,
 199, 1926.
- V. OBTUSIFOLIA* Jord. Agrestal, etc. Scarce. Llandaff!, teste E.
 Drabble.
- V. RURALIS* Boreau. Agrestal, etc. Scarce. Llwydcoed, *B.E.C.*, 199,
 1926.
- V. DESEGLISEI* Jord. Agrestal, etc. Scarce. Llwydcoed, etc., *B.E.C.*,
 199, 1926.
 b. *SUBTILIS* (Jord.). Scarce. Penarth Ferry, *B.E.C.*, 215, 1920.
- V. ARVATICA* Jord. Agrestal, etc. Scarce. Sker!, teste E. Drabble.
- V. LUTEA* Huds. Pascual. Rare. Craig Koynoch, etc., *B.E.C.*, 199,
 1926.
 b. *AMOENA* Hensl. Near Pontypridd, Hb. N.M. of Wales.
- V. CURTISII* Forst. Littoral. Locally common!
- V. MACKAYI* H. C. Wats. Littoral. Locally common! Kenfig!, *B.E.C.*,
 460, 1930.
- POLYGALA SERPYLLIFOLIUM* Hose. Ericetal. Scarce. Mynydd-y-glew,
 etc.!
P. VULGARE L. Glareal, etc. Common!

- P. DUBIUM Bellynck. Glareal. Locally common!
 b. DUNENSE Dum. Kenfig!, etc. (*B.E.C.*, 336, 1930).
- DIANTHUS DELTOIDES L. Glareal, etc. Rare. Mayals, *B.E.C.*, 866, 1925.
- D. ARMERIA L. Pascual. Very rare. Merthyr Mawr!, etc., Hb. Vachell.
- *D. CARYOPHYLLUS L. Rupestral. Cardiff Castle, extinct, Fl. J.S., 21.
- *TUNICA PROLIFERA (L.) Scop. Casual. Splott, *B.E.C.*, 181, 1926.
- SAPONARIA OFFICINALIS L. Viatical, etc. Common!
 b. HIRSUTA Wierzb. Merthyr Mawr, *J.B.*, 316, 1902.
- *S. VACCARIA L. Viatical, local. Cardiff Docks, etc., Fl. J.S., 112.
- SILENE MARITIMA With. Littoral. Locally common. Gower, etc.!
- S. ANGUSTIFOLIA S. & T. Agrestal, etc. Locally common. St Nicholas, etc.!
- b. PUBESCENS DC. Common. *B.E.C.*, 643, 1919.
- *S. CONICA L. Casual. Barry, etc., *B.E.C.*, 172, 1923.
- *S. NOCTIFLORA L. Agrestal. Rare. Gigman!; Casual, Cardiff, etc.!
- S. ANGLICA L. Agrestal. Locally common. Southerndown, etc.!
- *S. GALLICA L. Casual. Splott!
- *S. OTITES (L.). Casual. Ballast, Fl. J.S., 21.
- *S. NUTANS L. Casual. Barry, *B.E.C.*, 1007, 1925.
- *S. DICHOTOMA Ehrh. Casual. Splott, etc.!, *B.E.C.*, 172, 1923.
- *S. QUINQUEVULNERA L. Casual. Pontardulais, Hb. Motley, etc.
- LYCHNIS FLOS-CUCULI L. Paludal. Common!
 L. ALBA Mill. Agrestal. Scarce. Southerndown, etc.!
- L. DIOICA L. Septal, etc. Common!
- *L. GITHAGO (L.) Scop. Agrestal. Rare. Ely!, etc.; Adventive, near Docks!
- (CERASTIUM ERECTUM (L.). East Moors, Fl. J.S., 22).
- *C. ARVENSE L. Casual. Barry, etc., *B.E.C.*, 172, 1923.
- C. VULGATUM L. Agrestal, etc. Common!
 b. ALPINUM Gren. Aberdare, etc., *J.B. Supp.*, 15, 1907.
 c. PENTANDRUM (Syme). Kenfig, etc., *J.B. Supp.*, 15, 1907.
- C. VISCOSUM L. Agrestal, etc. Common!
 b. APETALUM (Dum.). Cardiff!
- C. PUMILUM Curt. Glamorgan, E. F. Linton, *T.B. Supp.*, 22, 1905.
- C. SEMIDECANDRUM L. Glareal. Locally common. Kenfig Dunes, etc.!
- C. TETRANDRUM Curt. Littoral. Locally common. Sand dunes, etc.!
- STELLARIA AQUATICA Scop. Paludal. Scarce. St Fagans, etc.!
- (S. NEMORUM L. Bodringallt Woods, *Fl. Rhondda*, etc., 14. *T.B.*).
- S. MEDIA Vill. Agrestal, etc. Common!
 b. APETALA (Ueria, 1796). Locally common. Dunes, Candlestone, etc.!
- S. NEGLECTA Weihe, var. DECIPIENS (E. S. Marshall). Scarce. Fairwater, *J.B.*, 399, 1909.
- S. HOLOSTEA L. Septal. Common!
 (S. DILLENIANA Moench, b. PALUSTRIS (Retz.) Dr. Records doubtful).
- S. GRAMINEA L. Pratal, Septal. Common!

- S. ALSINE Grimm. Paludal, Uliginal. Common!
- ARENARIA TRINERVIA L. Sylvestral. Common!
- A. SERPYLLIFOLIA L. Glareal, Agrestal. Common!
- b. VISCIDULA Roth. Penard, etc., *J.B. Supp.*, 15, 1907.
- c. MACROCARPA Lloyd. Scarce. Kenfig Burrows!
- A. LEPTOCLADOS Guss. Glareal. Common!
- A. PEPLIOIDES L. Littoral. Locally common!
- (A. TENUIFOLIA L. Doubtful records.)
- SAGINA NODOSA (L.). Inundatal. Scarce. Gower, etc.!
- b. GLANDULOSA (Bess.). Margam Moors, *J.B. Supp.*, 16, 1907.
- c. MONILIFORMIS Lange. Whiteford Point, *B.E.C.*, 476, 1916.
- S. CILIATA Fr. Glareal. Southerndown, *J.B.*, 399, 1909.
- b. FILICAULIS (Jord.). Near Cardiff!, *B.E.C.*, 338, 1930.
- S. APETALA Ard. Glareal. Common!
- b. PROSTRATA S. Gibs. Porthcawl, etc., *J.B. Supp.*, 16, 1907.
- S. REUTERI Lange. Glareal. Rare. Penarth, *B.E.C.*, 116, 1920.
- S. MARITIMA Don. Littoral. Locally common. Southerndown!
- b. DEBILIS (Jord.) Bab. Porthcawl, *J.B. Supp.*, 16, 1907.
- c. Densa (Jord.) Asch. Burry Holm, *J.B. Supp.*, 16, 1907.
- S. PROCUMBENS L. Viatical, etc. Common!
- SPERGULA ARVENSIS L. Agrestal. Common!
- *S. SATIVA Boehn. Casual. Splott, etc.!
- SPERGULARIA RUPICOLA Lebel. Littoral, Rupestral. Scarce. Porthcawl, etc.!
- S. MEDIA (Pers.) Presl. Littoral. Locally common. Near Cardiff, etc.!
- S. SALINA Presl. Littoral. Locally common. Aberthaw, etc.!
- *S. BOCCONEI (Soleir.) Steud. Casual. Barry!, *B.E.C.*, 39, 1927.
- S. RUBRA (L.) Presl. Glareal, etc. Scarce!
- *POLYCARPON TETRAPHYLLUM L. Near Pyle, *B.G.*, native?; adventive, Barry Docks!
- *CLAYTONIA SIBIRICA L. Casual. Penarth, Fl. J.S.
- *(C. PERFOLIATA Donn. Cardiff, Fl. J.S., 109. Extinct.)
- MONTIA FONTANA L. Inundatal. From 250 ft. to 800 ft. in Glam., *J.B.*, 230, 1912.
- b. BOREO-BIVULARIS Dr. The Bwlfa, Aberdare, at 700 ft., *J.B.*, 230, 1912.
- M. VERNA Neck. Inundatal. Common. Kenfig, etc!, teste A. E. Wade.
- *TAMARIX GALLICA L. Established near sea, Porthcawl, *Phyt.*, ii, 972, etc.
- ELATINE HEXANDRA DC. Lacustral. Rare. Mynydd-y-glew!, etc., *B.E.C.*, 376, 1921.
- *HYPERICUM HIRCINUM L. Penmaen, *Sw. Sc. Soc. Procs.*, 62, 1929.
- HYPERICUM ANDROSAEMUM L. Sylvestral. Locally common. Castell Coch, etc.!
- *H. ELATUM Ait. Sully, Fl. J.S., 111.

- *H. CALYGINUM L. Established. Nicholston wood, near Penrice Castle!,
L.W.D. Mat., 33.
- H. MONTANUM L. Sylvestral. Rare. Llansannor!, etc.
- H. HIRSUM L. Sylvestral. Scarce. Cogan, etc.!
- H. PULCHRUM L. Ericetal. Locally common!
- H. ACUTUM Moench. Paludal. Common!
- H. QUADRANGULUM L. Septal. Locally common. Llandaff, etc.!
- H. PERFORATUM L. Glareal. Common!
- b. ANGUSTIFOLIUM Gaud. Draethen, etc., *J.B.*, 399, 1909.
- H. HUMIFUSUM L. Pascual. Locally common!
- H. ELODES L. Uliginal. Locally common. Pendoylan, etc.!
- ALTHEA OFFICINALIS L. Littoral, local. Gower, etc.!
- *A. HIRSUTA L. Casual. Cardiff, Fl. J.S., 24.
- LAVATERA ARBOREA L. Littoral, local. The Leys, etc.!
- *L. SYLVESTRIS Brot. Adventive. Cardiff, *B.E.C.*, 730, 1928.
- MALVA MOSCHATA L. Septal. Locally common!
- b. HETEROPHYLLA Lej. & Court. Cwm Nash, etc!, *B.E.C.*, 391, 1927.
- M. SYLVESTRIS L. Viatical, etc. Common!
- b. LASIOCARPA Dr. Barry Docks, *B.E.C.*, 563, 1924.
- c. ACUTILOBA Celak. Nash!, *B.E.C.*, 391, 1927.
- M. ROTUNDIFOLIA L. Viatical. Locally common!
- *M. PUSILLA Sm. Casual. Splott!
- *M. NICAENSIS All. Casual. Splott!, *B.E.C.*, 391, 1927.
- *M. PARVIFLORA L. Casual. Splott!
- b. MICROCARPA (Desf.) Fiori & Paol. Splott, *B.E.C.*, 391, 1927.
- *(*TILIA PLATYPHYLLOS* Scop. Record probably erroneous).
- *T. EUROPAEA L. Often planted!
- T. CORDATA Mill. Sylvestral. Gower, Flower & Lees, etc.
- RADIOLA LINOIDES Roth. Ericetal. Scarce. Kenfig, etc.!
- LINUM ANGUSTIFOLIUM Huds. Glareal, local. Barry!, etc.
- L. CATHARTICUM L. Ericetal. Pascual. Common!
- *L. USITATISSIMUM L. Casual. Cardiff, etc.!
- GERANIUM SANGUINEUM L. Rupestral, etc. Locally common. Gower,
etc.!
- b. LANCASTRIENSE (Mill.). Inner Worm's Head, *B.E.C.*, 339, 1930.
- *G. VERSICOLOR L. Established occasionally!
- G. SYLVATICUM L. Llangiwig, *B.E.C.*, 109, 1929.
- G. PRATENSE L. Pratal. Scarce. Vale of Neath, etc.!
- *G. PHARUM L. Septal. Established, Glyn Heath, etc.!
- G. PYRENAICUM Burm. f. Viatical. Rare. Llandaff!, etc.
- G. COLUMBINUM L. Glareal, etc. Locally common!
- G. DISSECTUM L. Agrestal. Common!; Glareal, rare, and on lime-
stone!
- G. MOLLE L. Agrestal, Glareal. Common!
- G. ROTUNDIFOLIUM L. Viatical. Scarce. Newton, etc.!
- G. PUSILLUM L. Viatical, etc. Scarce. Langland cliffs, etc.!
- G. LUCIDUM L. Rupestral. Locally common!

- G. ROBERTIANUM L. Viatical, Rupestral. Common!
 b. CELTICUM (Ost.). Limestone hills, Llyn-llech-Owen, *B.E.C.*, 564, 1924.
 c. ALBUM. Pwllypant!
- G. PURPUREUM Vill., b. INTERMEDIUM Wilm. Barry, *B.E.C.*, 277, 1921.
- G. NODOSUM L. Established. Baglan, etc.!, *B.E.C.*, 175, etc., 1923.
- ERODIUM MARITIMUM L'Hérit. Littoral. Locally common!
- E. MOSCHATUM L'Hérit. Littoral. Scarce. Gower, etc.!
 b. MINOR Rouy. Apparently this variety at Port Talbot Docks, *J.B. Supp.*, 19, 1907.
- E. CICUTARIUM L'Hérit. Glareal, Agrestal. Common!
 b. GLUTINOSUM (Dum.). Gower, *J.B. Supp.*, 19, 1907.
 c. LEBELII (Jord.). Baglan Dunes, etc.!, teste E. G. Baker.
 d. NEGLECTUM (B. f. & S.). Gower!, teste E. G. Baker.
 *e. PIMPINELLIFOLIUM (Sibth.). Cardiff!, teste E. G. Baker.
- OXALIS ACETOSÉLLA L. Sylvestral. Common!
 b. SUBPURPURASCENS DC. Castell Coch!, etc.
- *O. CORNICULATA L. Casual. Scarce. Canton!
- *O. STRICTA L. Garden weed. Scarce. Duffryn!, *B.E.C.*, 109, 1929.
- *(IMPATIENS NOLI-TANGERE L. Swansea, etc. Records probably erroneous).
- *I. BIFLORA Walt. Established. River Ddaw near Llandough!
- *I. PARVIFLORA DC. Established. River Lougher, near Pontyffynon, *J.B. Supp.*, 78, 1907.
- *I. GLANDULIFERA Royle. Established. River banks. Common!
- ILEX AQUIFOLIUM L. Septal, Sylvestral. Common!
- EUONYMUS EUROPAEUS L. Septal, Sylvestral. Locally common!
- RHAMNUS FRANGULA L. Sylvestral. Locally common!
- R. CATHARTICUS L. Septal, Glareal, local. Near Newton, etc.!
- *STAPHYLEA PINNATA L. Sylvestral. Established. Penylan, etc.!
- *ACER PSEUDO-PLATANUS L. Planted. Common!
 A. CAMPESTRE L. Sylvestral. Common!
 b. LEIOCARPON Wallr. Roath, *B.E.C.*, 831, 1922.
- *LUPINUS NOOTKATENSIS Donn. Adventive. Blackpill, *B.E.C.*, 564, 1924.
- *LABURNUM VULGARE Presl. Established. Limestone cliffs, Langland, *B.E.C.*, 378, 1921.
- GENISTA ANGLICA L. Ericetal. Scarce. Penylan, etc.!
- G. TINCTORIA L. Pascual, etc. Locally common!
- ULEX EUROPAEUS L. Ericetal. Common!
- U. GALLII Planch. Ericetal. Common!
 b. HUMILIS Planch. (as *nanus*). Worm's Head, Hb. Motley. Probably this, A. Bennett, *in litt.*
- CYTISUS SCOPARIUS (L.) Link. Ericetal. Common!
- ONONIS RECLINATA L. Port Eynon, 1828, Hb. Jos. Woods; until 1910, *Sw. Sc. Soc. Procs.*, 1929.
- O. REPENS L. Glareal. Common!
 b. HORRIDA Lange. Kenfig, etc.!

- O. SPINOSA L. Pascual. Locally common!
 TRIGONELLA ORNITHOPODIODES DC. Pascual, etc. Scarce. Cogan!
 *M. MEDICAGO FALCATA L., b. TENUIFOLIOLATA Vuyck. Adventive. Scarce,
 Grangetown, etc.!
 c. MINOR Gaud. Barry Dock, B.E.C., 611, 1928.
 *M. SYLVESTRIS Fries. Adventive. Penarth Ferry, B.E.C., 110, 1929.
 *M. SATIVA L. Adventive. Local!
 *M. HISPIDA Gaertn., b. DENTICULATA (Willd.). Casual. Splott, etc.!
 M. ARABICA Huds. Viatical. Locally common. Grangetown!; etc.
 *M. MINIMA (L.) Desr. Established at Barry, B.E.C., 178, 1923.
 M. LUPULINA L. Agrestal, etc. Common!
 b. SCABRA S. F. Gray. Canton, J.B., 400, 1909.
 c. WILLDENOWIANA Koch. Radyr, B.E.C., 378, 1921.
 d. INTEGRISTIPULA (Rouy) Dr. Kenfig Dunes, B.E.C., 611, 1928.
 MELLILOTUS ALTISSIMA Thuill. Septal, Viatical. Locally common in
 hedges!
 *M. ALBA Desr. Adventive. Splott, etc.!
 *M. ARVENSIS Wallr. Adventive. Cardiff, etc.!
 *M. INDICA (L.) All. Casual. Splott, etc.!
 b. TOMMASINI (Jord.) Rouy. Barry, B.E.C., 732, 1928.
 c. EXALTATA Biv. Splott, B.E.C., 303, 1927.
 TRIFOLIUM MEDIUM (L.) Huds. Pratal. Locally common!
 b. PEDUNCULOSUM Ser. St Donats, B.E.C., 303, 1927.
 T. PRATENSE L. Pratal. Common!
 *b. SATIVUM Schreb. Ballast. J.B. Supp., 21, 1907.
 c. PARVIFLORUM Bab. Barry, B.E.C., 392, 1927.
 *T. OCHROLEUCON Huds. Casual. Ballast. Fl. J.S., 29.
 *T. INCARNATUM L. Agrestal, field borders!, etc. Local.
 *T. STELLATUM L. Casual, Fforest Fach, B.E.C., 378, 1921, etc.
 T. ARVENSE L. Glareal. Locally common. Kenfig, etc.!
 b. BRITTINGERI Weitenw. Cardiff, B.E.C., 303, 1927.
 c. PERPUSILLUM Ser. Aberafan, J.B. Supp., 22, 1907.
 T. MARITIMUM Huds. Littoral. Rare. Pengam Moors!
 T. SCABRUM L. Glareal. Locally common. Southerndown, etc.!
 T. STRIATUM L. Glareal. Locally common. Southerndown, etc.!
 T. SUBTERRANEUM L. Glareal. Rare. Port Eynon, etc.!
 T. FRAGIFERUM L. Pascual. Locally common. Gower, etc.!
 *T. HYBRIDUM L. Agrestal, etc. Common!
 b. ELEGANS (Savi). Barry, B.E.C., 392, 1927, etc.
 T. REPENS L. Pascual. Common!
 *T. GLOMERATUM L. Adventive. Radyr, B.E.C., 724, 1922, etc. Black-
 pill Links, Sw. Sc. Soc. Procs., 1929.
 T. SUFFOCATUM L. Glareal. Rhossili, B.E.C., 375, 1918, etc.
 *T. AGRARIUM L. Agrestal, etc. Near Caerphilly!, etc.
 T. PROCUMBENS L. Pascual. Common!
 T. DURIMUM Sibth. Pascual. Common!
 T. FILIFORME L. Pascual, local. Cogan, etc.!

- **T. RESUPINATUM* L. Casual. Splott, etc. (*B.E.C.*, 179, 1923).
- **T. MICHELIANUM* Savi. Established. Cardiff!
- ANTHYLLIS VULNERARIA* L. Rupestral, etc. Locally common!
- A. RUBRA* Gouan. Littoral. Rare. Porthcawl!
- LOTUS ULIGINOSUS* Schkuhr. Paludal. Locally common!
- b. *GLABER* Bréb. Mynydd-y-glew!
- L. CORNICULATUS* L. Pascual. Common!
- b. *CRASSIFOLIUS* Pers. Penard, etc., *J.B. Supp.*, 22, 1907.
- c. *INCANUS* Gray. Flat Holm!
- d. *ARVENSIS* (Schkuhr) Ser. Cardiff, *B.E.C.*, 304, 1927.
- L. TENUIS* W. & K. Pascual, local. Cardiff Marshes, *J.B. Supp.*, 22, 1907.
- **L. HISPIDUS* Desf. Barry, *B.E.C.*, 393, 1927.
(*L. ANGUSTISSIMUS* L. Porthcawl. Record doubtful).
- **DORYCNium RECTUM* DC. Adventive. Established. Barry Docks!,
B.E.C., 34, 1923.
- **GALEGA OFFICINALIS* L. Adventive. Cardiff Docks!, etc., *B.E.C.*, 179, 1923.
- ASTRAGALUS GLYCYPHYLLUS* L. Septal. Very rare. Cold Knap!
- **A. BOETIUS* L. Casual. Splott, *B.E.C.*, 257, 1926.
- **CORONILLA VARIA* L. Viatical. Cadoxton, etc.!
- ORNITHOPUS PERPUSILLUS* L. Glareal. Rare. Caerphilly, etc.!
- **O. PINNATUS* (Mill.) Dr. Casual. Splott, *B.E.C.*, 393, 1927.
- HIPPOCREPIS COMOSA* L. Pascual. Rare. Cwm Nash, etc.!
- ONOBRYCHIS VICIAEFOLIA* Scop. Agrestal. Locally common!
- VICIA SYLVATICA* L. Sylvestral. Scarce. Llandaff, etc.!
- V. CRACCA* L. Septal. Common!
- b. *INCANA* Thuill. Near Barry!, etc.
- V. OROBUS* DC. Rupestral, local. Brynamman, *B.E.C.*, 649, 1919, etc.
- **V. VILLOSA* Roth. Casual. Radyr, etc., *B.E.C.*, 724, 1922.
- b. *GLABRESCENS* Koch. Barry, etc., *J.B. Supp.*, 79, 1907.
- **V. DASYCARPA* Tenore. Casual. Barry!, etc., *B.E.C.*, 725, 1925, etc.
- V. BITHYNICA* L. Septal. Near Cardiff, Hook. *Br. Fl.*, Ed. 5. Extinct? Casual, Radyr, *B.E.C.*, 180, 1923.
- V. SEPIUM* L. Sylvestral. Common!
- **V. LUTEA* L. Casual. Fforest Fach, *B.E.C.*, 567, 1924.
- **V. HYBRIDA* L. Casual. Glam., Hb. Oxon.
- **V. SATIVA* L. Agrestal. Common!
- V. ANGUSTIFOLIA* (L.) Reichard. Glareal. Common!
- b. *BOBARTII* (Forst.). Llanishen, *J.B. Supp.*, 23, 1907.
- V. LATHYROIDES* L. Glareal. Rare. Near Porthcawl!
- **V. NARBONENSIS* L., S. & C., b. *SERRATIFOLIA* Koch. Casual. Barry, etc., *B.E.C.*, 180, 1923.
- V. HIRSUTA* (L.) S. & F. Gray. Septal, etc. Locally common!
- V. TETRASPERMA* (L.) Moench. Septal. Rare. St Fagans!
- **V. GRACILIS* Lois. Casual. Cardiff, etc., *Fl. J.S.*, 30.

- **LATHYRUS LATIFOLIUS* L. Septal. Established. St Donats, etc!,
B.E.C., 393, 1927.
L. *SYLVESTRIS* L. Septal, etc. Local. Swanbridge, etc.!
- *L. *TUBEROSUS* L. Adventive. Established. Barry Docks!
L. *MARITIMUS* Bigel. Rare. Coast of Glamorgan!, non-flowering.
L. *PALUSTRIS* L. Paludal. Very rare. Gower, *J.B.*, 251, 1891.
L. *PRATENSIS* L. Pratal. Common!
L. *NISSOLIA* L. Pascual. Scarce. Rhoose!, etc.
- *L. *APHACA* L. Casual. Scarce. Llandaff, etc.!
- *L. *SPHAERICUS* Retz. Barry, *B.E.C.*, 1012, 1925.
L. *MONTANUS* Bernh. Sylvestral. Locally common!
b. *TENUIFOLIUS* Garcke. Aberdare, *J.B. Supp.*, 23, 1907.
PRUNUS *PADUS* L. Sylvestral. Rare. Llanbradach, etc.!
- P. *AVIUM* L. Sylvestral. Scarce. Leckwith, etc.!
- P. *CERASUS* L. Sylvestral. Very rare. Llanishen, etc., *B.E.C.*, 263, 1915.
- *P. *DOMESTICA* L. Septal. Scarce. Sully!
P. *INSITITIA* L. Sylvestral. Scarce. Ely, *J.B. Supp.*, 24, 1907.
P. *SPINOSA* L. Sylvestral. Common!
b. *MACROCARPA* Wallr. Widely spread all over the Vale, *Fl. Glam.*, 57.
- SPIRAEA *ULMARIA* L. Pratal. Common!
b. *DENUDATA* Boenn. Peterston, *Fl. Glam.*, 58.
(S. *FILIPENDULA* L. Records doubtful).

The following list is made according to "The Handbook of British Rubi" by the Rev. W. M. Moyle Rogers:—

- RUBUS *IDAEOUS* L. Sylvestral, local. Morlais Castle!, etc.
b. *ASPERIMUS* Lees. Rudry, *J.B.*, 91, 1906.
- R. *FISSUS* Lindl. Radyr, *J.B.*, 400, etc., 1909.
- R. *SUBRECTUS* Anders. Rhydydefaid Woods, *B.E.C.*, 650, 1919.
- R. *ROGERSII* Linton. Aberdare, etc., *J.B.*, 92, 1906.
- R. *SULCATUS* Vest. Aberdare, etc., in plenty, *J.B.*, 92, 1906.
- R. *PLICATUS* Wh. & N. Rhossili Down, etc., *J.B.*, 92, 1906.
b. *BERTRAMII* G. Braun. Cwindare, *J.B.*, 92, 1906.
- R. *NITIDUS* Wh. & N., var. *OPACUS* Focke. Mynydd Garngoch, *J.B. Supp.*, 24, 1907.
- R. *AFFINIS* Wh. & N. Peterston Moor, *J.B.*, 92, 1906.
- R. *CARIENSIS* Génév. Blackpill, *B.E.C.*, 650, etc., 1919.
- [R. *CARPINIFOLIUS* Wh. & N. Glamorgan, Supp. Records Br. Rubi, *J.B.*, 313, 1909].
- R. *INCURVATUS* Bab. Near Pontardawe, etc., *J.B.*, 92, 1906.
- R. *LINDLEIANUS* Lees. Radyr, etc., *J.B.*, 401, 1909.
- R. *ARGENTUS* Wh. & N. Machen, etc., *J.B.*, 401, 1909.
- R. *RHAMNIFOLIUS* Wh. & N. Radyr, etc., *J.B.*, 401, 1909.
- R. *BAKERI* (F. A. Lees). Peterston, on the moor, *J.B.*, 93, 1906.

- R. *NEMORALIS* P. J. Muell. Pontardawe, most probably this. W.M.R. in *J.B.*, 93, 1906.
- b. *SILURUM* Ley. Aberdare, etc., *J.B.*, 93, 1906.
- R. *DUMNONIENSIS* Bab. Clyne Common, etc., *J.B.*, 93, 1906.
- R. *PULCHERRIMUS* Neum. Clyne Common, etc., *J.B.*, 93, 1906.
- R. *MERCICUS* Bagnall, b. *BRACTEATUS* Bagnall. Aberdare, etc., *J.B.*, 93, 1906.
- R. *VILICAULIS* Koehl. Glais, a small form, *J.B.*, 93, 1906.
- R. *SELMERI* Lindb. Whitchurch, etc., *J.B.*, 401, 1909.
- R. *GRATUS* Focke. Ystalyfera, *J.B. Supp.*, 24, 1907.
- R. *GODRONI* Lec. & Lam. Langland Bay, etc., *J.B.*, 94, 1906.
- b. *ROBUSTUS* (P. J. Muell.). Ystradowen, etc., *J.B.*, 94, 1906.
- c. *FOLIOLATUS* Rogers & Ley. Hill sides near Neath, etc., *J.B.*, 58, 1906.
- R. *RUSTICANUS* Merc. Common plant of mountain limestone and lias, Llandaff, etc., *J.B.*, 94, 1906.
- R. *PUBESCENS* Weihe. Neath, etc., *J.B.*, 94, 1906.
- R. *MACROPHYLLUS* Wh. & N. Radyr, etc., *J.B.*, 401, 1909.
- b. *SCHLECHTENDALII* (Weihe). Pontardawe, etc., *J.B.*, 94, 1906.
- c. *MACROPHYLLOIDES* (Génév.). Aberdare, etc., *J.B.*, 94, 1906.
- d. *AMPLIFICATUS* (Lees). Pontyclun, *J.B.*, 401, 1909.
- R. *SALTERI* Bab. Taffs Well, etc., *J.B.*, 94, 1906.
- R. *HYPOLEUCUS* Lefv. & Muell. Very common in Llandaff district, *J.B.*, 401, 1909.
- R. *HIRTIFOLIUS* Muell. & Wirtg. Welsh St Donats, *J.B.*, 95, 1906.
- b. *DANICUS* (Focke). Penyrheol, etc., *J.B. Supp.*, 25, 1907.
- c. *MOLLISSIMUS* Rogers. Lisvane, etc., *J.B.*, 95, 1906.
- R. *IRICUS* Rogers. Peterston Moor, etc., *J.B.*, 95, 1906.
- R. *PYRAMIDALIS* Kalt. Caswell Bay, etc., *J.B.*, 95, 1906.
- R. *LEUCOSTACHYS* Sm. Graig Llanishen, etc., in quantity, *J.B.*, 95, 1906.
- b. *GYMNOSTACHYS* (Génév.). Aberdare, etc., *J.B.*, 95, 1906.
- c. *LEUCANTHEMUS* P. J. Muell.? Ystalyfera, *J.B. Supp.*, 25, 1907.
- R. *LASIOCLADOS* Focke, b. *ANGUSTIFOLIUS* Rogers. Langland Bay, etc., *J.B.*, 95, 1906.
- c. *LONGUS* Rogers & Ley. Neath Valley, etc., *J.B.*, 58, 1907.
- R. *CRINIGER* Linton. Llanishen, *J.B.*, 401, 1909.
- R. *ADENANTHUS* Boul. & Gill. Aberdare, *J.B. Supp.*, 25, 1907.
- R. *CINEROSUS* Rogers. Near Aberdare, *J.B.*, 95, 1906.
- R. *MUCRONATOIDES* Ley, f. Pontyclun, *J.B.*, 401, 1909.
- R. *GELERTII* Frider. Aberdare, etc., *J.B. Supp.*, 25, 1907.
- R. *ANGLOSAXONICUS* Gelert., b. *VESTITIFORMIS* Rogers. Ystalyfera, *J.B. Supp.*, 25, 1907.
- c. *CURVIDENS* Ley. Pont Whalby, etc., *J.B. Supp.*, 25, 1907.
- d. *RADULOIDES* Rogers. Glamorgan, Supp. Records Br. Rubi, *J.B.*, 340, 1909.
- e. *SEPULOSUS* Rogers. Resolven, etc., *J.B.*, 95, 1906.

- R. MELANOXYLON Muell. & Wirtg. Taffs Well, *J.B.*, 95, 1906.
- R. INFESTUS Weihe. Near Neath, *J.B.*, 96, 1906.
- R. BORRERI Bell-Salt. Peterston Moor, etc., *J.B.*, 96, 1906.
b. DENTATIFOLIUS Briggs. Neath, etc., *J.B.*, 96, 1906.
- R. DREJERI G. Jensen. Taffs Well, etc., *J.B.*, 96, 1906.
b. LEYANUS Rogers. Glyn Neath, etc., *J.B.*, 96, 1906.
- R. ECHINATUS Lindl., f. Swansea, *J.B.*, 157, etc., 1890.
- R. OIGOCGLADUS Muell. & Lefv. Radyr, *J.B.*, 401, 1909.
b. NEWBOULDII Rogers. Ystradowen, etc., *J.B.*, 96, 1909.
c. BLOXAMIANUS Colem. Ystradowen, *J.B.*, 96, 1906.
- R. PODOPHYLLUS P. J. Muell. Aberdare, *J.B.*, 96, 1906.
- R. MELANODERMIS Focke. Caerphilly, but rare, *J.B.*, 96, etc., 1906.
- R. LEJEUNEI Wh. & N. Duffryn Clydach, *J.B.*, 96, 1906.
- R. ERICETORUM Lefv. Radyr, *J.B.*, 401, 1909.
b. CUNEATUS Rogers & Ley. Llandaff, etc., *J.B.*, 401, etc., 1909.
- R. MUTABILIS Génév. Aberdare, *J.B.*, 96, 1906.
- R. FUSCUS Wh. & N. Aberdare, *J.B.*, 97, 1906.
b. NUTANS Rogers. Near Aberdare, etc., *J.B. Supp.*, 25, etc., 1907.
- R. PALLIDUS Wh. & N. Aberdare, etc., *J.B.*, 97, 1906.
- R. SCABER Wh. & N. Llantrisant, etc., *J.B.*, 97, 1906.
- R. THEYSIGER Bab. Pontyclun, *B.E.C.*, 837, etc., 1922.
- R. FOLIOSUS Wh. & N. Aberdare, *J.B.*, 97, 1906.
- R. ROSACEUS Wh. & N. Caerphilly, *J.B.*, 402, etc., 1909.
b. HYSTRIX Wh. & N. Rudry, etc., *J.B.*, 97, 1906.
c. INFECUNDUS Rogers. Baglan, etc., *J.B.*, 97, 1906.
- R. HORRIDICAULIS (P. J. Muell.). Caerphilly, etc., *J.B.*, 60, 1906.
- R. KOEHLERI Wh. & N. Radyr, *J.B.*, 402, etc., 1909.
b. COGNATUS (N. E. Brown). Aberdare, etc., *J.B.*, 97, 1906.
- R. DASYPHYLLUS Rogers. Glyn Neath, etc., *J.B.*, 97, 1906.
- R. MARSHALLI Focke & Rogers. Aberdare, *J.B.*, 97, etc., 1906.
b. SEMIGLABER Rogers. Aberdare, etc., 97, etc., 1906.
- R. SERPENS Weihe. Glyn Neath, *J.B. Supp.*, 26, 1907.
- R. HIRTUS Waldst. & Kit. Lisvane (apparently form of this), *J.B.*, 97, 1906.
b. ROTUNDIFOLIUS Bab. Neddfechan Glen, *J.B.*, 98, 1906.
c. KALTENBACHII (Metsch.). Resolven, *J.B.*, 98, 1906.
- R. ACUTIFRONS Ley. Glyn Neath, *J.B.*, 98, 1906.
- R. TERETICAULIS (P. J. Muell.). Near Aberdare, *J.B. Supp.*, 26, 1907.
[R. VELATUS Lefv. Glamorgan, *Supp. Records of Br. Rubi, J.B.*, 345, 1909.]
- R. DUMETORUM Wh. & N. Neath, etc., *J.B.*, 98, 1906.
b. FEROX Weihe. Llantrisant Station, etc., *J.B.*, 98, 1906.
c. BRITANNICUS (Rogers). Pontneddfechan, *J.B.*, 402, 1909.
d. DIVERSIFOLIUS (Lindl.). Draethen, etc., *J.B.*, 98, 1906.
e. RADULIFORMIS Ley. In quantity, Coed Caesau Whips, *J.B. Supp.*, 98, etc., 1906.

- R. CORYLIFOLIUS Sm. Gowerton, etc., *J.B. Supp.*, 26, etc., 1907.
 b. SUBLUSTRIS (Lees). Llanishen, etc., *J.B.*, 98, 1906.
 c. CYCLOPHYLLUS Lindeb. Bonvilstone, *J.B.*, 402, 1909.
- R. BALFOURIANUS Blox. Draethen, etc., *J.B.*, 98, 1906.
- R. CAESIUS L. Sylvestral, etc. Common!
- R. SAXATILIS L. Rupestral. Rare. Morlais Castle, etc.!
- Two additional records to above:—
- R. PERARMATUS W. Watson as SALTERI Bab. Caerphilly, *B.E.C.*, 260, 1930.
- R. VULNERIFICUS Lefv. as ROBUSTUS P. J. Muell. Aberdare, *B.E.C.*, 261, 1930.
- GEUM URBANUM L. Viatical, etc. Common!
- G. RIVALE L. Sylvestral, local. Morlais Castle, etc.!
- *FRAGARIA MOSCHATA Duchesne. Established. Near Bridgend, *B.E.C.*, 651, 1919.
- F. VESCA L. Sylvestral. Common!
 b. ALBESCENS Dr. Near Bridgend, *B.E.C.*, 114, 1929.
- *F. CHILOENSIS Duchesne. Established. Railway banks, Radyr, etc.!
- (POTENTILLA FRUTICOSA L. Castell Coch Woods, Fl. J.S., 33. Error).
- P. ANSERINA L. Viatical. Common!
- *P. ARGENTEA L. Viatical. Rare. Cadoxton!, etc.
- P. VERNA L. Rupestral. Glareal. Rare. Gower!
- P. REPTANS L. Viatical. Common!
- P. PROCUMBENS Sibth. Septal, etc. Locally common!
- P. ERECTA (L.) Hampe. Ericetal. Common!
- P. STERILIS (L.) Garcke. Sylvestral, etc. Common!
- *P. NORVEGICA L. Viatical. Scarce. Near Cardiff, etc.!
- *P. INTERMEDIA L. Adventive. Canton, *B.E.C.*, 569, 1924.
- P. PALUSTRIS (L.) Scop. Uliginal. Scarce. Mynydd-y-glew, etc.!
- ALCHEMILLA PRATENSIS Schmidt. Pratal. Scarce. Morlais Castle!
- A. MINOR Huds. Pratal. Common!
- A. ALPESTRIS Schmidt. Rupestral. Scarce. Morlais Castle!
- A. ARVENSIS (L.) Scop. Agrestal. Common!
- AGRIMONIA EUPATORIA L. Pascual. Common!
- A. ODORATA (Gouan) Mill. Septal, etc. Kenfig!
- POTERIUM SANGUISORBA L. Glareal. Common!
- *P. POLYGAMUM W. & K. Agrestal, etc. Aberthaw, etc., *Fl. Glam.*, 61.
- P. OFFICINALE (L.) A. Gray. Pratal. Scarce. Near Neath, etc.!

The following list of Roses is according to "A Revision of the British Roses" by Col. Wolley-Dod, who has seen specimens from v.-c. 41 of all the species and varieties named with the exception of those marked with a †.

- ROSA ARVENSIS Huds. Septal. Common!
 Var. VULGARIS Ser. Common. Near Nash, etc.!
 f. MAJOR Coste. Pengwern Common, etc., *J.B. Supp.*, 28, 1907.
- †Var. OVATA (Lej.) Desv. Llanbliddian, *J.B. Supp.*, 28, 1907.
 Var. BISERRATA Crép.

- Var. LAEVIPES Grem.
- R. STYLOSA Desv., var. SYSTYLA (Bast.) Baker. Septal. Locally common. Leckwith, etc.!
- f. LANCEOLATA Lindl.
- R. SPINOSISSIMA L., var. TYPICA W.-Dod. Littoral. Common!
- f. PIMPINELLIFOLIA W.-Dod.
- R. CANINA L., agg. Septal. Common!
- Var. LUTETIANA (Lem.) Baker. Swanbridge, etc.!
- Var. SPHAERICA (Gren.) Dum. Cwrt-yr-ala, Swanbridge!
- Var. SPURIA (Pug.) W.-Dod. ? Sully!
- Var. GLOBULARIS (Franch.) Dum.
- Var. RAMOSISSIMA Rau. Cwrt-yr-ala!
- Var. DUMALIS (Bechst.) Dum. Dinas Powis!
- f. CLADOLEIA (Rip.).
- Var. MEDIOXIMA (Déségl.) Rouy. Swanbridge!
- Var. BISERRATA (Mér.) Baker.
- f. ERIOSTYLA (Rip.) W.-Dod. ? Dinas Powis!
- Var. ANDEGAVENSIS (Bast.) Desp.
- f. AGRARIA (Rip.) W.-Dod. Leckwith!
- f. SURCULOSA (Woods) Hook. Penclawdd, *J.B. Supp.*, 28, 1907.
- R. DUMETORUM Thuill., agg. Septal. Common!
- f. URBICA (Lem.) W.-Dod. Glyn Neath, etc., *J.B.*, 403, 1909.
- f. SEMIGLABRA (Rip.) W.-Dod. Swanbridge!
- (Var. PLATYPHYLLA (Rau) W.-Dod).
- Var. SPHAEROCARPA (Pug.) W.-Dod.
- Var. HEMITRICHA (Rip.) W.-Dod.
- Var. INCERTA (Déségl.) W.-Dod. Dinas Powis!
- R. AFZELIANA Fr., agg. Septal. Rare. Oxwich, etc., *J.B.*, 403, 1909.
- Var. REUTERI (God.) Cott.
- Var. GLAUCOPHYLLA (Winch) W.-Dod. Oxwich, etc., *J.B. Supp.*, 28, 1907.
- R. OBTUSIFOLIA Desv., agg. Septal. Rare. Glyn Neath, etc., *J.B. Supp.*, 28, 1907.
- Var. TOMENTELLA (Lem.) Baker.
- R. VILLOSA L., agg. Septal. Rare.
- Var. MOLLIS Sm.
- f. CAERULEA Woods.
- R. SHERARDI Davies, agg. Septal. Locally common!
- Var. TYPICA W.-Dod. Swanbridge, Merthyr, etc.!
- f. SUBMOLLIS (Ley) W.-Dod. Hirwaun, etc., *J.B. Supp.*, 402, 1907.
- Var. OMISSA Déségl., f. RESINOIDES (Crép.), comb. nov.
- Var. SUBERECTA (Ley), comb. nov.
- R. TOMENTOSA Sm., agg. Septal. Locally common. Llanmadoc, etc. *J.B. Supp.*, 27, 1907.
- Var. PSEUDO-CUSPIDATA (Crép.) Rouy. Apparently this between Taffs Well and Caerphilly, *J.B.*, 402, 1909.

- Var. SCABRIUSCULA Sm. Aberdare, *J.B. Supp.*, 27, 1907.
 f. FORTIDA (Bast.) Ser.
- R. RUBIGINOSA L., var. TYPICA W.-Dod. Septal. Very rare. Margam Woods, *J.B.*, 402, 1909.
- R. MICRANTHA Sm., var. TYPICA Chr. Pascual. Rare. Flat Holm!
- †(R. SEPIUM Thuill. No recent records).
- PYRUS MALUS L. Septal, Sylvestral. Common!
 *b. PARADISIACA L. Common. Dinas Powis!
- *P. COMMUNIS L. Septal. Scarce. Llanishen, etc.!
 b. ACHRAS (Gaertn.). Singleton Burrows!, *B.E.C.*, 379, etc., 1918.
- P. AUCUPARIA (L.) Ehrh. Rupestral, Sylvestral. Common!
- P. PORRIGENS (Hedl.). Rupestral. Rare. Castell Coch!, teste A. J. Wilmott.
- P. RUPICOLA (Hedl.). Rupestral. Rare. Craig-y-llyn, etc., *Fl. Glam.*, 63.
- P. ARIA (L.) Ehrh. Rupestral. Very rare. Nicholston Wood!
- P. TORMINALIS (L.) Ehrh. Sylvestral. Very rare. Near Penrice!
- *P. GERMANICA Hook. "Planted"?, *Fl. J.S.*, 34.
- CRATAEGUS MONOGYNA Jacq. Septal. Common!
 b. FISSA Poiret. Blackpill, *B.E.C.*, 379, 1918.
 c. CUNEATA Dr. Rhigos, *B.E.C.*, 92, 1911.
 d. QUEROIFOLIA (Loud.). Cwm Nash, *B.E.C.*, 455, 1927.
- C. OXYACANTHOIDES Thuill. Pyle, etc., *B.E.C.*, 653, 1919.
- *C. CRUS-GALLI L. Established. Taibach, etc., *B.E.C.*, 379, 1918.
- *COTONEASTER MICROPHYLLUS Wallich. Established. Locally common. Gower, etc.!
- *C. SIMONSII Baker. Established. Scarce. Blackpill, *B.E.C.*, 379, 1918.
- (SAXIFRAGA AIZOIDES L. Maesteg, Hb. Motley, probable introduction. Extinct?).
- S. HYPNOIDES L. Rupestral. Scarce. Morlais Castle!, etc.
- S. GRANULATA L. Pascual. Rare. River banks near Cardiff, etc.!
- S. TRIDACTYLITES L. Rupestral. Common!
- *S. UMBROSA L. Established. Hengoed, *C.N.S. Procs.*, 1891-2, etc.
- CHRYSOSPLENIUM ALTERNIFOLIUM L. Uliginal. Rare. Draethen, etc.!
- C. OPPOSITIFOLIUM L. Uliginal. Common!
- PARNASSIA PALUSTRIS L. Paludal. Rhondda Valley, *Fl. Rhondda*.
- *RIBES UVA-CRISPA L., b. GROSSULARIA (L.). Septal. Common!
- *R. NIGRUM L. Paludal. Scarce. Banks of River Taff, etc.!
- R. RUBRUM L. Sylvestral. Scarce. Banks of River Taff, etc.!, woods, appearing native.
 (R. ALPINUM L. Records doubtful).
- *R. SANGUINEUM Pursh. Penrice, *B.E.C.*, 654, 1919.
- COTYLEDON UMBILICUS-VENERIS L. Rupestral. Common!
- SEDUM PURPUREUM Link. Septal, Rupestral. Scarce. Ilston, etc.!
- *S. REFLEXUM L. Rupestral. Scarce. Sant-y-nil, etc.!
 b. ALBESCENS (How.). Ystalyfera, *J.B. Supp.*, 80, 1907.
- *S. RUPESTRE L. Rupestral. St Mary Church, *C.N.S. Procs.*, 1882.

- S. FORSTERIANUM Sm. Rupestral. Very rare. Craig-y-llyn, *Fl. Glam.*, 66.
- *S. SEXANGULARE L. Rupestral. Rare. Ilston!, etc.
- S. ACRE L., b. DRUCEI (Graebn.). Rupestral, Glareal. Common. *B.E.C.*, 162, 1912.
- *S. ALBUM L. Rupestral. Gower, etc.!
- *S. MICRANTHUM Bast. Limestone rocks, Cwm Alum, *Fl. Glam.*, 66.
- *S. DASYPHYLLUM L. Adventive. Gower, *J.B. Supp.*, 80, 1907.
- S. ANGLICUM Huds. Rupestral. Scarce. Brombil, M. Thomas, etc. (S. VILLOSUM L. Doubtful record.).
- S. ROSEUM (L.). Rupestral. Rare. Craig-y-llyn, *B.E.C.*, 874, 1925.
- *SEMPERVIVUM TECTORUM L. Rupestral. Scarce. Cowbridge, etc.!
- DROSERA ANGLICA Huds. Uliginal. Crumlin Bog!, *B.G.* Extinct?
- D. LONGIFOLIA L. Uliginal. Local. Mynydd-y-glew, etc.!
- D. ROTUNDFOLIA L. Uliginal. Locally common. Mynydd-y-glew, etc.!
- HIPPURIS VULGARIS L. Lacustral. Local. Ogmore, etc.!
- MYRIOPHYLLUM SPICATUM L. Lacustral. Locally common. Oxwich, etc.!
- M. ALTERNIFLORUM DC. Lacustral. Locally common. Kenfig, etc.!
- (M. VERTICILLATUM L. Crumlin Bog, *Sw. Sc. Soc. Procs.*, 1891-2.).
- CALLITRICHE STAGNALIS Scop. Lacustral. Common!
- b. SERPYLLIFOLIA (Kuetz.) Lönnr. Oxwich, etc., *J.B. Supp.*, 30, 1907.
- C. OBTUSANGULA Le Gall. Lacustral. Local. Cwrt-yr-ala, etc.!
- C. PALUSTRIS L. Fairwater, *J.B.*, 113, 1920.
- C. INTERMEDIA G. F. Hoffm. Lacustral. Common!
- b. PEDUNCULATA (DC.) Dr. Leckwith Common!
- (C. AUTUMNALIS L. Several records all doubtless referring to *intermedia*. See *B.E.C.*, 124, 1920.).
- PEPLIS PORTULA L. Uliginal. Locally common. Mynydd-y-glew, etc.!
- LYTHRUM SALICARIA L. Paludal. Common!
- *L. HYSSOPIFOLIA L. Casual. Ballast. *Fl.*, J.S., 36.
- EPILOBIUM ANGUSTIFOLIUM L. Sylvestral, etc. Common!
- E. HIBSUTUM L. Paludal. Common!
- E. PARVIFLORUM Schreb. Paludal. Common!
- E. TETRAGONUM L. Paludal. Locally common. Nr. Cardiff, etc.!, teste G. M. Ash.
- E. OBSCURUM Schreber. Septal, etc. Scarce. Caerphilly, teste G. M. Ash.
- E. ROSEUM Schreber. Viatical, &c. Locally common. Cardiff, etc.!
- E. LANCEOLATUM Seb. & Maur. Viatical. Local. Cogan, etc.!
- E. MONTANUM L. Sylvestral, Viatical, etc. Common.
- E. PALUSTRE L. Paludal. Scarce. Sant-y-nil, etc.!
- *OENOTHERA BIENNIS L. Viatical. Common!
- b. PARVIFLORA (L.) Dr. Aberdare!, *B.E.C.*, 655, etc., 1919.
- *O. ODORATA Jacq. Established. Glyn Neath, *B.E.C.*, 572, etc., 1924.
- CIRCAEA LUTETIANA L. Sylvestral, etc. Common!
- BRYONIA DIOICA Jacq. Septal. Rare. Llandaff!

- *CARBOBOTUS EDULIS (L.) Barry, *B.E.C.*, 1013, 1925.
 HYDROCOOTYLE VULGARIS L. Uliginous. Common!
- *ERYNGIUM CAMPESTRE L. Adventive. Established. Barry Docks!,
B.E.C., 354, 1930.
 E. MARITIMUM L. Littoral. Locally common. The Leys!
 SANICULA EUROPAEA L. Sylvestral. Common!
 CONIUM MACULATUM L. Septal, etc. Common!
- *SMYENIUM OLUSATRUM L. Viatical. Locally common. Llandough, etc.!
- *BUPLEURUM ROTUNDIFOLIUM L. Casual. Aberdare, etc., *J.B. Supp.*, 80,
 1907.
 B. TENUISSIMUM L. Paludal. Rare. Aberthaw, etc.!, *Fl. Glam.*, 72.
 APIUM GRAEVOLENS L. Littoral, local. Aberthaw, etc.!
- A. NODIFLORUM (L.) H. G. Reichb. Paludal. Common!
 b. PSEUDOREPENS (H. C. Wats.) Dr. Clyne Common, *J.B.*, 188, 1906.
 A. INUNDATUM (L.) H. G. Reichb. Lacustral, local. Kenfig, etc.!
 (CICUTA VIROSA L. *Sw. Sc. Soc. Procs.*, 1891-2).
- *AMMI MAJUS L. Viatical. Cardiff, etc.
 *CARUM CARVI L. Adventive. Porthcawl, Lloyd, etc.
 C. VERTICILLATUM Koch. Pratal. Rare. Hirwaun, etc.!
- *C. PETROSELINUM (L.) B. & H. Viatical. Rare. Swanbridge, etc.!,
Fl. Glam., 73.
 C. SEGETUM B. & H. Septal. Rare. Dinas Powis, etc.!
- SISON AMOMUM L. Septal. Locally common. Cogan, etc.!
- *FALCARIA VULGARIS Bernh. Adventive. Barry Docks!, etc., *B.E.C.*,
 354, 1930.
 (SIUM LATIFOLIUM L. Swansea, L.W.D. Mat., 41, etc. Doubtful re-
 cords).
- S. ERECTUM Huds. Paludal. Locally common!
- *AEGOPIDIUM PODAGRARIA L. Viatical. Common!
 (PIMPINELLA MAJOR Huds. Record doubtful).
 P. SAXIFRAGA L. Pascual. Common!
 CONOPODIUM MAJUS (Gouan) Loret & Barr. Sylvestral, Pratal. Com-
 mon!
- *MYRRHIS ODORATA (L.) Scop. Viatical. Very rare. Near Cardiff!, etc.
 CHAEROPHYLLUM TEMULENTUM L. Septal. Common!
 SCANDIX PECTEN-VENERIS L. Agrestal. Locally common. Dinas
 Powis, etc.!
- CHAEREFOLIUM SYLVESTRE (L.) Schinz & Thell. Septal. Common!
 C. ANTHRISCUS (L.) Schinz & Thell. Viatical. Scarce. Gower, etc.!
- FOENICULUM VULGARE Mill. Rupestral, etc. Locally common. Sully,
 etc.!
- CRITHMUM MARITIMUM L. Littoral. Locally common. Barry Island,
 etc.!
- OENANTHE CROGATA L. Paludal. Common!
 (O. PIMPINELLOIDES L. Error ?).
 O. LACHENALII C. Gmel. Paludal. Locally common. Near coast!
 O. FISTULOSA L. Paludal. Locally common. Kenfig, etc.!

- AETHUSA CYNAPIUM L. Agrestal. Common!
- SILAUM SILAUS (L.) Schinz & Thell. Pratal. Locally common. Near Penarth, etc.!
- ANGELICA SYLVESTRIS L. Paludal, etc. Common!
- PEUCEDANUM SATIVUM (L.) B. & H. Viatical, etc. Locally common!
- *HERACLEUM MANTEGAZZIANUM S. & L. Adventive. Skewen, *B.E.C.*, 186, 1923.
- H. SPHONDYLIIUM L. Septal. Common!
- b. ANGUSTIFOLIUM Huds. Cardiff, etc.!
- *CORIANDRUM SATIVUM L. Casual. Waste ground!
- DAUCUS CAROTA L. Pascual. Common!
- D. GUMMIFER All. Littoral. Rare. Nash Point, *J.B.*, 404, 1909.
- *CAUCALIS DAUCOIDES L. Casual. Barry Docks, etc.!
- C. ANTHRISCUS Huds. Septal. Common!
- C. ARVENSIS Huds. Agrestal. Rare. Aberdare, *J.B. Supp.*, 33, 1907.
- C. NODOSA Scop. Glareal. Locally common. Gower, etc.!
- *C. LATIFOLIA L. Casual. Barry Docks!
- HEDERA HELIX L. Sylvestral. Common!
- b. SARNIENSIS Dr. Cwm Nash!, *B.E.C.*, 398, 1927.
- CORNUS SANGUINEA L. Septal. Common.
- ADOXA MOSCHATELLINA L. Sylvestral. Locally common. Draethen, etc.!
- SAMBUCUS NIGRA L. Sylvestral. Common!
- b. OVALIFRUCTU Dr. Garth Wood, *B.E.C.*, 23, 1929.
- *S. EBULUS L. Viatical, local. Cogan, etc.!
- VIBURNUM OPULUS L. Sylvestral. Common!
- V. LANTANA L. Septal. Locally common. Leckwith, etc.!
- *LONICERA CAPRIFOLIUM L. Newton, Lloyd.
- L. PERI-CLYMENUM L. Sylvestral. Common!
- *L. XYLOSTEUM L. Established. Loughor, *B.E.C.*, 657, 1919.
- *LEYCESTERIA FORMOSA Wallich. Adventive. Resolven, *B.E.C.*, 187, 1923.
- *SYMPHORICARPOS RACEMOSUS Michx. Ystradowen, etc., *J.B. Supp.*, 81, 1907.
- RUBIA PEREGRINA L. Sylvestral. Common on bushy sea cliffs!
- GALIUM BOREALE L. Rupestral. Craig-y-llyn, *J.B. Supp.*, 34, 1907.
- G. MOLLUGO L. Septal. Common!
- G. HERECTUM Huds. Viatical. Rare. Llanishen!
- G. HERCYNICUM Weig. Ericetal. Common. Southerndown, etc.!
- G. PUMILUM Murray. Rupestral. Rare. Limestone, Morlais Castle!
- G. ULIGINOSUM L. Locally common. Ystradowen!
- G. PALUSTRE L. Paludal. Common. Mynydd-y-glew, etc.!
- b. ELONGATUM (Presl). Near Ely, *J.B.*, 404, 1909.
- c. WITHERINGII (Sm.). Swansea, Flower & Lees, *Phyt.*, 1843.
- G. VERUM L. Pascual. Common!
- b. MARITIMUM DC. Kenfig Burrows!
- G. TRICORNE Stokes. Agrestal. Rare. Gileston!

- G. APARINE L. Septal. Common.
- *G. SPURIUM L., b. VAILANTII DC. Casual. Splott!
- G. CRUCIATA Scop. Septal. Common!
- ASPERULA ODORATA L. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- A. CYNANCHICA L. Glareal. Locally common, especially near coast!
- *A. ARVENSIS L. Port Talbot Dock, *J.B. Supp.*, 81, 1907.
- SHERARDIA ARVENSIS L. Glareal, Agrestal. Common!
- VALERIANA OFFICINALIS L. Sylvestral. Glyn Neath, *J.B. Supp.*, 35, 1907.
- V. SAMBUCIFOLIA Mikan. Paludal. Common!, *Phyt.*, 379, 1843.
- V. DIOICA L. Paludal. Common!
- *KENTRANTHUS RUBER (L.). Rupestral. Established. Locally common!
- VALERIANELLA OLITORIA Poll. Glareal, Agrestal. Locally common. Sutton, etc.!
- *V. ERIOCARPA Desv. Splott, *B.E.C.*, 118, 1929.
- V. DENTATA (L.) Poll. Agrestal. Rare. Kenfig, Hb. Motley, etc.
b. MIXTA (L.). Cornfield at Nash!
- V. CARINATA Loisel. Rupestral, Agrestal. Local. Ely, etc.!
- V. RIMOSA Bast. Agrestal. Porthkerry!, etc.
- DIPSACUS SYLVESTRIS Huds. Septal. Common!
- D. PILOSUS L. Sylvestral. Rare. Near Llandough Castle!
- SCABIOSA COLUMBARIA L. Pascual. Scarce. Gower!, etc.
- S. SUCCISA L. Pascual. Common!
- S. ARVENSIS L. Agrestal, etc. Common!
- EUPATORIUM CANNABINUM L. Paludal, etc. Common!
- SOLIDAGO VIRGAUREA L. Ericetal, etc. Common!
b. CAMBRICA Huds. Neath Valley, Gutch, *Phyt.*, 120, 1842.
- *S. LANCEOLATA L. Adventive. Cardiff, *B.E.C.*, 1014, 1925.
- BELLIS PERENNIS L. Pascual. Common!
- *ASTER SALIGNUS Willd. Established. Near Aberdare, etc., *J.B. Supp.*, 81, 1907.
- *A. PANICULATUS Lam. Established. Merthyr Mawr, *J.B. Supp.*, 81, 1907.
- *A. NOVI-BELGII L., b. FLORIBUNDUS. Established occasionally, *B.E.C.*, 715, 1931.
- A. TRIPOLIUM L. Littoral. Locally common. Salt marshes, etc.!
- b. DISCOIDEUS Reichb. Near Cardiff, etc.!
- (A. LINOSYRIS (L.). Records doubtful).
- ERIGERON ACER L. Glareal. Rare. Kenfig Dunes, etc.!
- *E. CANADENSIS L. Viatical, Glareal. Scarce. Kenfig Dunes, etc.!
- FILAGO GERMANICA (L.) Huds. Glareal. Locally common. Kenfig Dunes, etc.!
- F. MINIMA Pers. Glareal. Rare. Kenfig Dunes, etc.!
- ANTENNARIA DIOICA (L.) Gaertn. Ericetal. Rare. Mumbles Head!, etc.
- *ANAPHALIS MARGARITACEA C. B. Clarke, b. SUBALPINA A. Gray. Viatical. Locally common!
- *GNAPHALIUM LUTEO-ALBUM L. Casual. Barry Docks!, *B.E.C.*, 399, 1927.

- G. ULLIGINOSUM L. Inundatal. Common!
 G. SYLVATICUM L. Ericetal. Very rare. Sker!
 *INULA HELENIUM L. Septal, etc. Scarce. Llandough, etc.!
 I. SQUARROSA (L.) S. & T. Septal, Glareal, etc. Locally common!
 I. CRITHMOIDES L. Littoral, local. Gower, etc.!
 *I. VISCOSA Ait. Adventive. Established. Barry Docks, etc.!, *B.E.C.*, 188, 1923.
 PULICARIA DYSENTERICA Bernh. Pascual, Paludal. Common!
 *P. VULGARIS Gaertn. Adventive. Penarth, *B.E.C.*, 188, 1923.
 *AMBROSIA ARTEMISIFOLIA L. Adventive. Barry, etc.!, *B.E.C.*, 189, 1923.
 *XANTHIUM STRUMARIUM L. Casual. Waste ground!
 *X. SPINOSUM L. Casual. Waste ground!
 *GUIZOTIA ABYSSINICA Cass. Casual. Llandaff, etc.!, *B.E.C.*, 730, 1922.
 BIDENS CERNUA L. Paludal. Scarce. Gower, etc.!
 B. TRIPARTITA L. Paludal, Viatical. Locally common. Cardiff, etc.!
 *GALINSOGA PARVIFLORA Cav. Casual. Waste ground!
 *ANACYCLUS CLAVATUS Pers. Casual. Splott, etc.!
 *A. RADIATUS Lois. Casual. Splott, etc.!
 ACHILLEA MILLEFOLIUM L. Pascual. Common!
 A. PTARMICA L. Pratal. Locally common. Penylan, etc.!
 (DIOTIS MARITIMA Cass. Crumlin Burrows, *Sw. Sc. Soc. Procs.*, 1921 error?).
 *ANTHEMIS TINCTORIA L. Adventive. Rare. Cadoxton, etc.!
 b. DISCOIDEA (Willd.). Cadoxton!
 A. NOBILIS L. Pascual. Locally common. Aberthin Green, etc.!
 *A. ARVENSIS L. Viatical? Scarce. Barry Island, etc.!
 A. COTULA L. Agrestal. Locally common. Sully, etc.!
 CHRYSANTHEMUM SEGETUM L. Agrestal, etc. Locally common!
 C. LEUCANTHEMUM L. Pascual. Common!
 *C. PARTHENIUM (L.) Bernh. Viatical. Scarce. Nr. Merthyr!, etc.
 MATRICARIA INODORA L. Agrestal, etc. Common!
 b. SALINA Bab. The Leys, etc., *J.B. Supp.*, 37, 1907.
 M. CHAMOMILLA L. Agrestal, etc. Locally common. Sully, etc.!
 *M. SUAVEOLENS (Pursh) Buch. Viatical. Common!
 TANACETUM VULGARE L. Viatical. Common!
 ARTEMISIA ABSINTHIUM L. Viatical. Local. Monkash, etc.!
 *A. CAMPESTRIS L. Casual. Cardiff Docks, Fl. J.S., 54.
 A. VULGARIS L. Viatical, etc. Common!
 b. COARCTATA Fors. Llandaff, etc., *J.B.*, 404, 1909.
 A. MARITIMA L. Littoral. Locally common. Aberthaw, etc.!
 b. GALLICA (Willd.). Aberthaw!
 *A. BIENNIS Willd. Adventive. Radyr, *J.B.*, 491, etc., 1916.
 *A. LUDOVICIANA Nutt., b. GNAPHALODES (Nutt.). Adventive. Established. Radyr, etc., *B.E.C.*, 1016, 1925.
 TUSSILAGO FARFARA L. Agrestal, etc. Common!
 PETASITES OVATUS Hill. Pratal, Paludal. Locally common by rivers, etc.!

- **P. FRAGRANS* Presl. Viatical. Locally common. Llandough, &c.!
- **DORONICUM PARDALIANCHES* L. Established. Bridgend, Fl. J.S., 53.
- **D. PLANTAGINEUM* L. Established in a few places!
- SENECIO AQUATICUS* Hill. Inundatal. Common!
- S. ERRATICUS* Bert. Near Swansea, 1836, T. B. Flower.
- S. JACOBÆA* L. Glareal, Pascual, etc. Common!
- b. *DISCOIDEUS* L. Splott!
- S. ERUCIFOLIUS* L. Septal, Pascual, etc. Locally common. Cogan, etc.!
- **S. SQUALIDUS* L. Viatical. Locally common!
- S. SYLVATICUS* L. Glareal. Scarce. Rhiwbina!, etc.
- S. VISCOSUS* L. Viatical. Kenfig, etc.!
- S. VULGARIS* L. Agrestal. Common.
- b. *PRÆCOX* (Trow). Locally common. Penarth, etc., *Fl. Glam.*, 91.
- c. *ERECTUS* (Trow). Common. *Fl. Glam.*, 91.
- d. *MULTICAULIS* (Trow). Rare. Swanbridge, etc.!, *Fl. Glam.*, 91.
- **S. CINERARIA* DC. Established. Horton cliff, *B.E.C.*, 731, 1922.
(*S. PALUSTRIS* Hook. Aberafan, Ray, *Third Itinerary*. Error ?).
- **CALENDULA ARVENSIS* L. Casual. Splott!
- CARLINA VULGARIS* L. Glareal. Locally common!
- ARCTIUM LAPPÆ* L. Sylvestral, Viatical. Scarce. Monk-nash Cwm, etc.!
- A. NEMOROSUM* Lej. Viatical. Rare. Cardiff!, teste A. H. Evans.
- A. MINUS* (Hill) Bernh. Sylvestral, etc. Common!, teste A. H. Evans.
- CARDUUS NUTANS* L. Glareal. Common!
- C. ACANTHOIDES* L. Septal, etc. Locally common. Near Cogan, etc.!
- b. *CRISPUS*. Parkmill, etc., *J.B. Supp.*, 38, 1907.
- C. PYCNOCEPHALUS* L., b. *TENUIFLORUS* (Curt.). Viatical. Common near coast!
- CIRSIUM ERIOPHORUM* (L.) Scop., b. *BRITANNICUM* (Petrak). Pascual, local. Chiefly on lias. Nash, etc.!
- C. LANCEOLATUM* Scop. Pascual. Common!
- (*C. HETEROPHYLLUM* (L.) Hill. Between Llandaff and Cowbridge, *B.G.*, ? error).
- C. ACAULE* (L.) Weber. Glareal. Locally common. Cefn On, etc.!
- b. *CAULESCENS* (Pers.). Local. Heol-y-mynydd!
- C. PRATENSE* (Huds.) DC. Uliginal. Common!
- C. TUBEROSUM* (L.) Alf. (as *Woodwardi*, *T.B.*). Pascual. Rare. About Nash Point!, *Phyt.*, i; *J.B.*, 1906.
- C. ARVENSE* (L.) Scop. Agrestal. Common!
- b. *MITE* Koch. Locally common!
- c. *SETOSUM* C. A. Mey. Crumlin, *B.E.C.*, 663, etc., 1919.
- C. PALUSTRE* (L.) Scop. Pratal, etc. Common!
- b. *FEROX* Dr. Southerndown, *B.E.C.*, 455, 1927.
- **ONOPORDON ACANTHIUM* L. Viatical. Rare. Aberthaw!, etc.
- b. *VIRIDE* Michet. Canton, *J.B.*, 412, 1909.
- **SILYBUM MARIANUM* Gaertn. Viatical. Rare. Newton!, etc.
- SERRATULA TINCTORIA* L. Sylvestral, etc. Common.
- b. *ALPINA* Gren. & Godr. Near Maesteg, *B.E.C.*, 578, 1924.
- **CENTAUREA JACEA* L. Adventive. Port Talbot, *J.B.*, 384, 1918.

- C. *OBSCURA* Jord. Pascual. Common. Cardiff, teste C. E. Britton.
 C. *NEMORALIS* Jord. Pascual. Common. Penylan, etc., teste C. E. Britton.
- *C. *CYANUS* L. Casual. Locally common!
 C. *SCABIOSA* L. Septal, etc. Locally common. Thornhill, etc.
 b. *SUCCISIFOLIA* E. S. M. Gower cliffs, *J.B. Supp.*, 39, 1907.
- *C. *CALCITRAPA* L. Adventive. Barry, *B.E.C.*, 732, etc., 1922.
 *C. *ASPERA* Willd. Adventive. Established. Barry Docks!
 *C. *SOLSTITIALIS* L. Adventive. Newton!, etc.
 b. *ADAMI* (Willd.). Aberdare, *J.B. Supp.*, 82, 1907.
 C. *MELITENSIS* L. Adventive. Splott!, etc.
- **CARTHAMUS TINCTORIUS* L. Adventive. Dinas Powis!, etc.
CICHORIUM INTYBUS L. Viatical, etc. Locally common!
LAPSANA COMMUNIS L. Septal, Viatical. Common!
PICRIS ECHIOIDES L. Viatical, etc. Locally common. On lias near coast!
- P. *HIERACIOIDES* L. Septal, etc. Locally common. Gower, etc.
 b. *UMBELLATA* Schultz. Port Talbot, *J.B. Supp.*, 39, 1907.
CREPIS PALUDOSA (L.) Moench. Paludal, etc. Rare. Glyn Neath!
- *C. *BIENNIS* L. Viatical. Rare. Llandough!, etc.
 C. *CAPILLARIS* (L.) Wallr. Agrestal, etc. Cardiff Docks!, *B.E.C.*, 403, 1927.
 b. *AGRESTIS* (Willd.) Dr. Cadoxton, etc., *J.B. Supp.*, 40, 1907.
 c. *ANGLICA* Dr. & Thell. Splott, *B.E.C.*, 403, 1927.
 C. *TARAXACIFOLIA* Thuill. Agrestal, etc. Common!
- *C. *SETOSA* Haller f. Casual. Splott!
HIERACIUM PILOSELLA L. Glareal. Common!
 b. *CONCINNATUM* H. Lisvane, etc., *J.B.*, 405, 1909.
- *H. *COLLINIFORME* N. P. Established. Cardiff!, teste Bennett, extinct.
 Hb. Vachell.
- H. *BRUNNEO-CROCEUM* Pugsley. (*J.B.*, 296, 1892, and *B.E.C.*, 881, 1925).
 [H. *MELANOCEPHALUM*. Aberdare, *J.B.*, 118, 1904].
 H. *SCHMIDTII* Tausch. Craig-y-llyn, *J.B. Supp.*, 40, 1907.
 H. *EUSTOMON* Lint. Padell-y-Bwlch, *J.B.*, 405, 1909.
 H. *LASTOPHYLLUM* Koch, b. *EURYODON* H. Craig-y-llyn, etc., *J.B. Supp.*, 40, 1907.
- H. *ARGENTEUM* Fr. Craig-y-llyn, etc., *J.B. Supp.*, 40, 1907.
 H. *NITIDUM* B., b. *SILURIENSE* H. Craig-y-llyn, *J.B. Supp.*, 40, 1907.
 H. *HYPOCHAEROIDES* Gibs., b. *SAXORUM* H. Craig-y-llyn, *J.B. Supp.*, 40, 1907.
- H. *CAMBRICUM* H. Graig Fawr, etc., *J.B. Supp.*, 40, 1907.
 H. *PELLUCIDUM* Laest. Aberdare, *J.B.*, 312, 1902.
 H. *SUBLEPISTOIDES* (Z.). Near Llanishen!, *B.E.C.*, 568, 1921.
 H. *CRASSICEPS* Dahlst. Lisvane, etc., *J.B.*, 405, 1909.
 H. *GRANDIDENS* Dahlst. Llanedarne!, teste A. E. Wade.
 H. *CINDERELLA* Ley. Glyn Neath, etc., *J.B. Supp.*, 40, 1907.
 H. *LUCIDULUM* Ley. Glyn Neath, etc., *J.B. Supp.*, 40, 1907.

- H. SUBULATIDENS D. Cwrt Colman, Bridgend, *B.E.C.*, 234, 1920.
 b. CUNEIFRONS Ley. Craig-y-llyn Fach, *J.B.*, 15, 1909.
- H. LEYANUM Z. Darren Bwllfa, etc., *J.B. Supp.*, 40, 1907.
- H. DIAPHANOIDES Lindeb. Hendrefoilan, *B.E.C.*, 385, 1918.
- H. VULGATUM Fr. Gowerton, etc., *B.E.C.*, 385, 1918.
- H. LACHENALII Gamel. Glyn Neath, *J.B.*, 197, etc., 1893.
- H. MUTABILE Ley. Llwydcoed, *J.B.*, 312, 1902.
- H. SCANICUM D.? Cefn On, *B.E.C.*, 568, 1921.
- H. JACCARDII Z. Near Radyr, sp. H.J.R., National Museum of Wales.
- H. SUBAMPLIFOLIUM Z. Aberdare, etc., *J.B.*, 312, 1902.
- H. IRRIGUUM Fr. Hirwaun, *J.B. Supp.*, 40, 1907.
- H. SUBGLAUCOVIRENS Z. Aberdare, *J.B.*, 312, 1902.
- [H. PULCHRUS Ley. (W.R.L.)? Radyr, H.J.R.]
- H. CACUMINATUM D. Aberdare, etc., *J.B.*, 50, 1909.
- H. BARBARIIFOLIUM Lönnr. Radyr, etc., *J.B.*, 405, 1909.
- H. ACROLEUCUM Stenstr., b. DAEDALOLEPIUM D. Swansea, *J.B.*, 312, 1902.
- H. CAESIUM Fr. Craig-y-llyn, *J.B. Supp.*, 40, 1907.
- [H. ORARIUM Lindeb. Glamorgan, *J.B.*, 296, 1892.]
- H. AMPHIBOLOIDES Z. Glyn Neath, etc., *J.B. Supp.*, 40, 1907.
- H. BOREOPHILUM Z. Hills behind Port Talbot, *J.B.*, 405, 1909.
- H. TRIDENTATUM Fr. Fforest Newydd, *B.E.C.*, 385, 1918.
- H. STICOPHYLLUM D. Craig-y-llyn, *J.B. Supp.*, 41, 1907.
 b. SERPENTINUM (H.). Aberdare, very rare, *J.B.*, 312, 1902.
- H. SUBSTRIGOSUM Z. Rhondda Valley, *J.B. Supp.*, 41, 1907.
- H. TRICHOCAULON D. Treorchy, sp. H.J.R., National Museum of Wales.
- H. CALCARICOLUM (H.) Z. Near Aberdare, very rare, *J.B. Supp.*, 41, 1907.
- H. OBATRESCENS D. Aberdare, very rare, *J.B. Supp.*, 41, 1907.
- [H. SCABRESCENS D. Llwydcoed, *J.B.*, 312, 1902.]
- H. RIGIDUM Hartm. Clyne Valley, etc., *B.E.C.*, 385, 1918.
- H. FRIESII Hartm. Treorchy, etc., *J.B. Supp.*, 41, 1907.
- H. SCABRISETUM Z. Craig-y-llyn, etc., *J.B. Supp.*, 41, 1907.
- H. CANTIANUM H. In quantity about Aberdare, etc., *J.B.*, 312, 1902.
- H. CORYMBOSUM Fr. Aberdare, etc., *J.B. Supp.*, 41, 1907.
- H. OPSIANTHUM D. "Probably this," Aberdare, *J.B.*, 312, 1902.
- H. UMBELLATUM L. Llansannor, etc.!
 b. CORONIFOLIUM Bernh. "Approaching this variety," Peterston, *J.B.*, 405, 1909.
- H. OBLIQUUM Jord. Port Talbot, *J.B.*, 405, 1909.
- HYPOCHAERIS RADICATA L. Pascual. Common!
- H. GLABRA L. Glareal. Rare. Kenfig Burrows, etc.!
- LEONTODON HISPIDUS L. Pascual. Common!
- L. AUTUMNALIS L. Pascual. Pratal. Common!
- L. NUDICAULIS (L.) Banks. Pascual. Common!

TARAXACUM.

Sect. ERYTHROSPERMA.

- T. BRACHYGLOSSUM D. The Leys!, *B.E.C.*, 104, 1932.
 T. DECIPIENS Raunk. Penard, *B.E.C.*, 403, 1927.
 T. FULVIFORME D. Newton Dunes!
 T. FULVUM Raunk. Leckwith, *B.E.C.*, 404, 1927.
 T. LACISTOPHYLLUM D. Cardiff, etc!, *B.E.C.*, 404, 1927.
 T. LIMBATUM D. Kenfig, etc., *B.E.C.*, 31, 1926.

Sect. SPECTABILIA.

- T. CROCEIFLORUM D. (m). Cardiff, *B.E.C.*, 404, 1927.
 T. MACULIGERUM Lindb. f. Lavernock!, *B.E.C.*, 105, 1932.
 T. NAEVOSUM D. Barry, *B.E.C.*, 122, 1926.
 T. NORDSTEDTII D. Bridgend, *B.E.C.*, 736, etc., 1922.

Sect. VULGARIA D.

- T. ALIENUM D. (m). Swansea Bay, *B.E.C.*, 30, 1926.
 T. ANCISTROLOBUM D. (m). Cardiff, *B.E.C.*, 404, 1927.
 T. ANGLICIFORME D. (m). Taff Fechan Gorge!, *B.E.C.*, 26, 1932.
 T. CYANOLEPIS D. Swansea, *B.E.C.*, 404, 1927.
 T. DUPLIDENTIFORME Dahlst. (m). Radyr, *B.E.C.*, 308, 1927.
 T. EXPALLIDIFORME D. (f). Caerphilly, *B.E.C.*, 405, 1927.
 T. HAMATUM Raunk. Caerphilly, *B.E.C.*, 405, 1927.
 T. INTRICATUM Lindb. f. Radyr, *B.E.C.*, 405, 1927.
 T. KOEHLERI Dahlst. (m). Cardiff, *B.E.C.*, 309, 1927.
 T. PALLESCENS D. (a). Leckwith, *B.E.C.*, 405, 1927.
 T. PERLACINIATUM D. Penarth, *B.E.C.*, 309, 1927.
 T. POLYODON D. (m). Radyr, *B.E.C.*, 405, etc., 1927.
 T. PRERADIANS D. Radyr, *B.E.C.*, 309, 1927.
 T. PRIVUM D. (var.). Caerphilly, etc., *B.E.C.*, 405, 1927.
 T. SINUATUM D. Cardiff, *B.E.C.*, 309, 1927.
 T. SUBLACINIOSUM D. Swansea, *B.E.C.*, 122, 1926.
 T. SUBDILATATUM D. Barry, *B.E.C.*, 309, 1927.
 *LACTUCA VIROSA L. Viatical. Rare. Porthcawl, *J.B.*, 317, etc., 1902.
 *L. SERRIOLA L. Viatical. Locally common. Cardiff, etc!, *B.E.C.*, 196, 1923.
 b. INTEGRATA (G. & G.) Dr. Cardiff, *B.E.C.*, 406, 1927.
 *L. SALIGNA L. Viatical. Llandough!
 L. MURALIS Fres. Septal, Rupestral. Common!
 SONCHUS ARVENSIS L. Agrestal, etc. Common!
 b. LAEVIS (G. G. W.). Port Talbot Docks, *J.B. Supp.*, 42, 1907.
 c. ANGUSTIFOLIUS Meyer. Porthcawl, etc., *J.B. Supp.*, 42, 1907.
 S. ASPER Hill. Agrestal, etc. Common!
 b. INTEGRIFOLIUS Lej. Cardiff, *B.E.C.*, 133, 1920.
 c. PUNGENS Bisch. Nash, *B.E.C.*, 455, 1927.
 S. OLERACEUS L. Agrestal, etc. Common!
 b. GLANDULOSUS (Coss.) Dr. Cardiff Docks, *J.B. Supp.*, 42, 1907.
 c. CILIATUS (Lam.) Dr. Barry, *B.E.C.*, 883, 1925.
 *TRAGOPOGON PORRIFOLIUS L. Adventive. Barry Docks!, etc.

- T. PRATENSIS L. Pratal. Scarce. Penarth, etc., *Fl. Glam.*, 102.
 b. MINOR (Mill.). Cardiff, etc.!
- LOBELIA DORTMANNIA L. Lacustral. Very rare. Llynfach, etc., *B.G.*, etc.
- JASIONE MONTANA L. Glareal. Common!
 b. LITTORALIS Fries. Sker, etc., *J.B. Supp.*, 42, 1907.
- WAHLENBERGIA HEDERACEA Reichb. Uliginal. Locally common. Caerphilly, etc.!
- (PHYTEUMA ORBICULARE L. Cowbridge, *Fl. J.S.*, 43).
- CAMPANULA GLOMERATA L. Pascual. Rare. St Donats to Dunraven!
- C. LATIFOLIA L. Sylvestral. Rare. Hendrefoilan, etc.!, *B.E.C.*, 388, 1921.
- C. TRACHELIUM L. Sylvestral. Scarce. Near St Hilary, etc.!
- *(C. RAPUNCULOIDES L. Sylvestral. Merthyr Mawr, *J.B.*, 317, 1902).
- C. ROTUNDFOLIA L. Glareal. Common. In hilly districts!
- (C. PATULA L. Vale of Glamorgan?, *L.W.D. Mat.*, 29).
- LEGOUSIA HYBRIDA (L.) Del. Near Porthcawl, Lloyd, etc.
- VACCINIUM MYRTILLUS L. Ericetal. Locally common!
- V. VITIS-IDAEA L. Ericetal. Rare. Craig-y-llyn!
- OXYCOCCUS QUADRIPETALA Gilib. Uliginal. Rare. Mynydd-y-glew, etc.!
- ANDROMEDA POLIFOLIA L. Uliginal. Crumlin Bog, *Hb. Brit. Mus.*
- CALLUNA VULGARIS (L.). Ericetal. Common!
- ERICA CINEREA L. Ericetal. Locally common. Mynydd-y-glew, etc.!
- E. TETRALIX L. Ericetal. Locally common. Mynydd-y-glew, etc.!
- (E. CILIARIS L. Llantwit Fardre, *J.B. Supp.*, 43, 1907).
- (E. VAGANS L. Near Newton, etc., *B.G.*).
- (E. MEDITERRANEA L., b. HIBERNICA Hook. & Arn. Pontardulais, *B.G.*).
- *RHODODENDRON PONTICUM L. Established. Langland, seeding freely, *B.E.C.*, 134, 1920.
- PYROLA MINOR L. Sylvestral. Ysgwd Eynon Gam, above the Fall, *L.W.D. Mat.*, 38. (Glamorgan?).
- P. SECUNDA L. Ericetal. Craig-y-llyn, two localities, *Fl. Glam.*, 105.
- MONOTROPA HYPOPIITYS L., b. GLABRA Roth. Sylvestral, Uliginal. Rare. Kenfig Dunes, etc.!, *B.E.C.*, 407, 1927.
- STATICE LIMONIUM L. emend. Littoral. Locally common. Penarth Ferry, etc.!
- b. PYRAMIDALE (Dr.). Port Eynon, *Hb. A. Bennett, J.B.*, 13, 1905.
- S. BINERVOSA G. E. Sm. Littoral. Locally common. Dunraven!
- S. PUBESCENS (Sm.). Littoral, Rupestral. Locally common!
- PRIMULA VULGARIS Huds. Sylvestral. Common!
- b. CAULESCENS (Koch). Scarce!
- P. VARIABILIS Goupil. Pratal. Scarce. Dinas Powis, etc.!
- P. VERIS L. Pratal. Locally common!
- *CYCLAMEN HEDERIFOLIUM Ait. Coedryglan, "no doubt planted," *Fl. J.S.*, 69, etc.
- LYSIMACHIA VULGARIS L. Paludal. Locally common. Kenfig, etc.!
- *L. PUNCTATA L. Paludal. Established. Cwrt-yr-ala!, *B.E.C.*, 126, 1929.

- L. NUMMULARIA L. Pratal. Locally common. Cwrt-yr-ala, etc.!
- L. NEMORUM L. Sylvestral. Common!
- GLAUX MARITIMA L. Littoral. Locally common. Salt marshes, etc.!
- ANAGALLIS TENELLA Murr. Uliginal. Locally common. Kenfig Burrows, etc.!
- A. ARVENSIS L. Glareal, Agrestal. Common!
- b. CARNEA Schrank. Ogmores Castle, E.S.M., *J.B. Supp.*, 44, 1907.
- c. PALLIDA Hook. f. Penylan!
- d. VERTICILLATA Diard. Splott!
- A. FOEMINA Mill. Agrestal, Viatical. Lavernock, etc.!
- CENTUNCULUS MINIMUS L. Ericetal. Rare. Sker, etc.!
- SAMOLUS VALERANDI L. Paludal, etc. Locally common. Sker, etc.!
- FRAXINUS EXCELSIOR L. Sylvestral, etc. Common!
- LIGUSTRUM VULGARE L. Sylvestral, etc. Common!
- *VINCIA MAJOR L. Established. Swanbridge, etc.!
- *V. MINOR L. Sylvestral. Established. Lisvane, etc.!
- BLACKSTONIA PERFOLIATA Huds. Pascual. Locally common. Dunes, etc.!
- ERYTHRAEA CENTAURIUM Pers. Glareal. Common!
- b. CAPITATA Koch. Kenfig Pool, *J.B.*, 248, 1902.
- c. ELLIPTICUM Dr. Kenfig, *B.E.C.*, 569, 1919 (as *Centaureium*).
- d. CONFERTA Wh. & S. Kenfig Dunes!, sp. Hb. Vachell, teste C. E. Salmon.
- e. SUBLITORALIS Wh. & S. Kenfig Dunes!
- CENTAURIUM VULGARE Rafn. Many records: all, including *T.B.* and *B.E.C.*, 1923, doubtless refer to var. *sublitoralis* Wh. & S.
- C. PULCHELLUM (Sw.) Dr. Glareal. Locally common. Kenfig Dunes, etc.!
- b. SIMPLICISSIMUM (Schmidt). Kenfig Dunes!, teste J. S. L. Gilmour.
- C. CAPITATUM (Willd.) Dr. Glareal. Rare. Gower, *B.E.C.*, 361, etc., 1930.
- (GENTIANA PNEUMONANTHE L. Oystermouth to Newton, *J.B. Supp.*, 45, 1907).
- G. AMARELLA L. Glareal. Dinas Powis, etc.!
- G. SEPTENTRIONALIS Dr.? Glareal. Scarce. Kenfig Dunes, *B.E.C.*, 311, 1927.
- G. CAMPESTRIS L. Pascual. Rare. Pendoylan!, etc.
- b. BALTICA (Murb.). Sker Dunes!
- MENYANTHES TRIFOLIATA L. Paludal, local. Gower, etc.!
- *NYMPHOIDES PELTATUM Rend. & Br. Introduced. Clyne Ponds, *B.E.C.*, 885, 1925.
- *POLEMONIUM CAERULEUM L. Adventive. Aberdare, *J.B. Supp.*, 83, etc., 1907.
- *HELIOTROPIMUM EUROPAEUM L. Casual. Splott!
- CYNOGLOSSUM OFFICINALE L. Viatical, etc. Locally common. Dunes, etc.!
- b. SUBGLABRUM Mérat. Kenfig, etc., *J.B. Supp.*, 45, 1907.

- *C. GERMANICUM Jacq. Casual. Near Cardiff, Fl. J.S., 113.
 *LAPPULA ECHINATA Gilib. Casual. Llandaff Mill, etc.!
 *ASPERUGO PROCUMBENS L. Casual. Splott!, etc.
 SYMPHYTUM OFFICINALE L. Paludal. Common. Dinas Powis, etc.!
 (b. PATENS Sibth. Port Talbot, *J.B. Supp.*, 45, 1907).
 *S. PEREGRINUM Ledeb. Pencisely, etc., teste A. E. Wade.
 *BORAGO OFFICINALIS L. Adventive. Marcross, etc.!
 *ANCHUSA SEMPERVIRENS L. Viatical. Locally common! Dunes, native?
 *A. OFFICINALIS L. Aberavon, *B.E.C.*, 388, etc., 1918.
 LYCOPSIS ARVENSIS L. Agrestal, etc. Locally common. Dunes, etc.!
 *PULMONARIA OFFICINALIS L. Established. Penllergaer, *B.E.C.*, 388,
 etc., 1918.
 *P. LONGIFOLIA Bor. Near Swansea, *Sw. Sc. Soc. Procs.*, 1891-2.
 MYOSOTIS PALUSTRIS Hill. Paludal. Locally common. Sant-y-nil,
 etc.!
 b. STRIGULOSA (Reichb.). Near Aberdare, *J.B. Supp.*, 45, 1907.
 M. REPENS G. & D. Don. Uliginal. Scarce. Penard!, etc.
 M. CAESPITOSA K. F. Schultz. Paludal. Sant-y-nil, etc.!
 *M. ALPESTRIS Schmidt. Introduced in an orchard, Mayals, *B.E.C.*,
 584, 1924.
 M. SYLVATICA (Ehrh.) Hoffm. Sylvestral. Pendoylan, native?! Estab-
 lished. Locally common.
 M. ARVENSIS (L.) Hill. Agrestal, Glareal, etc. Common!
 b. SYLVESTRIS (Schlecht.). Sully Island, *J.B. Supp.*, 45, 1907.
 M. COLLINA Hoffm. Glareal. Locally common. Near coast, etc.!
 b. MITTENII Baker. Penard Dunes, etc., *J.B. Supp.*, 46, 1907.
 M. VERSICOLOR Sm. Glareal. Locally common. Southerndown, etc.!
 LITHOSPERMUM OFFICINALE L. Sylvestral. Scarce. Gower, etc.!
 L. PURPUREO-CAERULEUM L. Local. Copses, etc., near coast. Dun-
 raven, etc.!
 *L. ARVENSE L. Casual. Near Docks!
 ECHIUM VULGARE L. Littoral. Locally common. Dunes, etc.!
 b. PUSTULATUM S. & S. Barry Docks!, *B.E.C.*, 276, 1930.
 *(E. PLANTAGINEUM L. Casual. Barry, *B.E.C.*, 201, 1923. Error?)
 CALYSTEGIA SEPIUM Br. Septal. Common!
 C. SOLDANELLA Br. Glareal, local. Dunes along coast!
 CONVULVULUS ARVENSIS L. Agrestal, etc. Common!
 CUSCUTA EUROPAEA L. Septal. Newton sands, non-flowering!?, *J.B.*
Supp., 46, 1907.
 C. EPITHYMIUM (L.) Murray. Ericetal. Rare. Dunraven!, etc.
 *C. TRIFOLII Bab. Agrestal. Pontcanna. On *Trifolium pratense*, etc.,
Fl. Glam., 115.
 *LYCOPERSICON LYCOPERSICUM (L.). Outcast. Locally common. Waste
 ground!
 SOLANUM DULCAMARA L. Septal, etc. Common!
 b. MARINUM Bab. Oxwich, etc., *J.B. Supp.*, 46, 1907.
 S. NIGRUM L. Agrestal. Viatical. Locally common!

- *LYCIUM CHINENSE Mill. Established, chiefly near coast. Swanbridge, etc.!
- ATROPA BELLADONNA L. Sylvestral, etc. Rare. Boverton!, etc.
- *DATURA STRAMONIUM L. Casual. Waste ground and dunes!
- HYOSCYAMUS NIGER L. Viatical. Locally common. Southerndown, etc.!
- *H. ALBUS L. Near Shrimphouse; Barry, *B.E.C.*, 201, 1923.
- VERBASCUM THAPSUS L. Viatical, etc. Locally common. Gower, etc.!
- *V. VIRGATUM Stokes. Established. Railway, Cardiff to Penarth!
- *V. BLATTARIA L. Adventive. Rare. Splott!, etc.
- *V. PULVERULENTUM Vill. Adventive. Barry, *B.E.C.*, 201, 1923.
- *V. LYCHNITIS L. Casual. "Ballast," Cardiff, *Fl. J.S.*, 61.
- V. NIGRUM L. Viatical. Rare. Near Cardiff!, etc.
- LINARIA VULGARIS Mill. Septal. Glareal. Common!
- b. PELORIA. Penarth Ferry, 1898, *Fl. Glam.*, 118.
- *L. PURPUREA Mill. Adventive. Swansea, Gutch, etc.
- *L. REPENS (L.) Mill. Viatical. Scarce. Railway banks, etc.!
- *L. PELISSERIANA Mill. Casual. Swansea Dock, *B.E.C.*, 669, 1919.
- *L. SUPINA Desf. Casual. "Ballast," Cardiff, *Fl. J.S.*, 60.
- L. MINOR (L.) Desf. Agrestal. Viatical. Locally common. Railway lines, etc.!
- b. PRAETERMISSA (Delast.). Cardiff, *B.E.C.*, 312, 1927.
- L. SPURIA (L.) Mill. Agrestal. Scarce. St Hilary, etc.!
- L. ELATINE (L.) Mill. Agrestal, etc. Scarce. Southerndown, etc.!
- L. CYMBALARIA (L.) Mill. Rupestral, Littoral. Common, apparently native on pebble ridges!
- *ANTIRRHINUM MAJUS L. Adventive on walls. Cogan!, etc.
- A. ORONTIUM L. Agrestal. Rare. Horton!; Casual. Waste ground!
- b. CALYCIUM (Lam.). Casual. Splott!
- SCROPHULARIA AQUATICA L. Paludal. Common!
- b. CINEREA (Dum.). Gowerton, etc., *J.B. Supp.*, 47, 1907.
- S. NODOSA L. Sylvestral. Common!
- b. BOBARTII Pryor. Sully Island!, *B.E.C.*, 496, 1916.
- c. BRACTEATA Dr. Cardiff, *J.B.*, 406, 1909.
- S. SCORODONIA L. Septal. Rare. Porthcawl sandhills, *J.B.*, 317, 1902.
- *S. CANINA L. Established. Cardiff Docks, *B.E.C.*, 202, 1923.
- b. PINNATIFIDA (Brot.). Established. Cardiff Docks, *B.E.C.*, 1020, 1925.
- *MIMULUS GUTTATUS DC. Lacustral. Locally common. Established recently in many places!
- *M. MOSCHATUS Dougl. Uliginal. Established. Caerphilly mountain!, etc.
- LIMOSELLA AQUATICA L. Lacustral. Very rare. Kenfig!
- b. TENUIFOLIA Lej. Rare. Kenfig Burrows!
- SIBTHORPIA EUROPAEA L. Uliginal. Very rare. Garth mountain at 800 ft.!
- DIGITALIS PURPUREA L. Septal, etc. Common!

- (*VERONICA HYBRIDA* L., as *spicata* (?), *T.B.*, 287. "Sides of mountains," L.W.D. Mat., etc.).
- V. OFFICINALIS* L. Ericetal, etc. Common!
- V. CHAMAEDRYS* L. Sylvestral. Common!
- V. MONTANA* L. Sylvestral. Locally common. Sant-y-nil, etc.!
- V. SCUTELLATA* L. Uliginal. Locally common. Gower, etc.!
- b. *VILLOSA* Schum. Blackpill, *B.E.C.*, 390, 1918.
- V. BECCABUNGA* L. Paludal. Common!
- V. ANAGALLIS* L. Paludal. Scarce. Kenfig!, teste N. Y. Sandwith.
- V. AQUATICA* Benq. Paludal. Locally common. Oxwich!, etc., teste N. Y. Sandwith.
- V. SERPYLLIFOLIA* L. Agrestal, etc. Common!
- V. ARVENSIS* L. Glareal, etc. Common!
- **V. TOURNEFORTII* Gmel. Agrestal. Common!
- b. *KOCHIANA* Godr. Llandaff!, teste E. Drabble.
- c. *ASCHERSONIANA* (Lehm.). Near Cardiff!, teste E. Drabble.
- V. AGRESTIS* L. Agrestal. Common!
- V. DIDYMA* Ten. Agrestal. Common!
- V. HEDERIFOLIA* L. Agrestal. Common!; Sylvestral. Rare. Cwrt-yr-ala!
- b. *TRILoba* (Opiz) Beck. Dinas Powis, *B.E.C.*, 519, 1930.

Euphrasias, according to "A Revision of the British Euphrasias" by Mr H. W. Pugsley, who gives the following list which cancels all former erroneous records for Glamorgan:—

- EUPHRASIA BOREALIS* Wettst. Ericetal. Llwydcoed, H.J.R., teste H. W. Pugsley.
- E. BREVIPILA* Burnat & Greml. Ericetal. Pontneddvaughan, H.J.R., teste H. W. Pugsley.
- E. NEMOROSA* Pers. Ericetal. Dinas Powis!, etc., teste H. W. Pugsley.
- E. CURTA* (Fr.) Wettst., f. *LITTORALIS*. Ericetal. Welsh St Donats, *J.B. Supp.*, 48, 1907.
- E. OCCIDENTALIS* Wettst. Ericetal. Porthcawl!, etc., teste H. W. Pugsley.
- E. ANGLICA* Pugsl. Ericetal. St Donats.
- BARTSIA VISCOSA* L. Paludal. Rare. Gower, etc.!
- B. ODONTITES* Huds. Pascual, etc. Agg., common!
- b. *VERNA* (Reichb.). Rhossili, etc., *J.B. Supp.*, 48, 1907.
- c. *SEROTINA* (Bertol.). Southerndown!
- PEDICULARIS PALUSTRIS* L. Paludal. Locally common. Kenfig, etc.!
- P. SYLVATICA* L. Ericetal. Common!
- RHINANTHUS CRISTA-GALLI* L. Pratal. Common!
- MELAMPYRUM PRATENSE* L. Sylvestral. Common!
- b. *MONTANUM* (Johnston). Rhigos, etc., *J.B. Supp.*, 49, 1907.
- c. *HIANS* (Dr.). Aberdare, etc., *J.B. Supp.*, 49, 1907.
- OROBANCHE RAPUM-GENISTAE* Thuill. Parasitic on broom, etc. Scarce. Radyr!, etc.
- (*O. VULGARIS* Poir. Gower, Lloyd).

- (O. ALBA Steph. No locality given, Gutch).
- O. MAJOR L. Agrestal. Very rare. Port Talbot, *J.B. Supp.*, 49, etc., 1907.
- O. HEDERAE Duby. Sylvestral. Locally common. Parasitic on Ivy. Cardiff, etc.!
- O. MINOR Sm. Agrestal. Parasitic on clover. Near Cottrel, etc.!
- b. CONCOLOR Duby. (as *flavescens* ? Reut.) on *Volwulus sepium*. Port Eynon, *B.E.C.*, 392, 1921.
- (O PURPUREA Jacq. (as *caerulea*). "Hilly pastures," Swansea Guide).
- LATHRAEA SQUAMARIA L. Sylvestral. Saprophytic on elms, etc. Locally common. Cardiff, etc.!
- UTRICULARIA VULGARIS L. Lacustral. Neath, etc., Flower and Lees.
- U. MAJOR Schmidel. Lacustral. Rare. Oxwich Marsh!, *B.E.C.*, 365, 1930.
- U. MINOR L. Lacustral. Very rare. Penclun Marsh!, *B.E.C.*, 392, 1918.
- PINGUICULA VULGARIS L. Uliginal. Locally common. Margam Burrows!, etc.
- (P. LUSITANICA L. Llangynwyd, Fl. J.S., 68).
- VERBENA OFFICINALIS L. Viatical. Locally common. About old villages!
- MENTHA ROTUNDIFOLIA (L.) Huds. Pratal. Locally common. Whitchurch, etc.!
- b. BAUHINI (Tenore). Parkmill, *J.B.*, 407, 1909.
- M. ALOPECUROIDES Hull. Llanmadoc, etc., *Sw. Sc. Soc. Procs.*, 63, 1929.
- M. LONGIFOLIA (L.) Huds. Paludal. Scarce. Glyn Neath, *J.B.*, 297, 1892.
- b. NEMOROSA (Willd.). Peterstone-super-Ely, sp. Hb. Vachell, teste J. Fraser.
- c. MOLLISSIMA (Borckh.). Peterstone-super-Ely, teste J. Fraser.
- d. NICHOLSONIANA (Strail) Dr. Canton, *B.E.C.*, 741, 1922.
- e. VILLOSA (Huds.). Peterstone-super-Ely, H.J.R., teste J. Fraser.
- *M. SPICATA Huds. Viatical. Scarce. Aberthin, etc.!
- *M. CRISPA (L.). Llwydcoed, H.J.R., teste J. Fraser.
- *X PIPERITA L. Paludal. Scarce. Dinas Powis, *B.E.C.*, 443, 1932.
- b. VULGARIS Sole. Oxwich, etc., *J.B. Supp.*, 50, 1907.
- c. SUBCORDATA Fraser. Caerphilly!, teste J. Fraser.
- M. AQUATICA L. Paludal. Common!
- b. SUBGLABRA (Baker). Aberthin!, *B.E.C.*, 412, 1927.
- c. MAJOR Sole. Aberthin!, *B.E.C.*, 128, 1926.
- X VERTICILLATA (L.), b. PALUDOSA (Sole) Dr. Paludal. Locally common. Gower, etc.!
- c. PARVIFLORA (H. Braun). Gower!, teste J. Fraser.
- d. OVALIFOLIA (Opiz) Briq. Aberthin, etc., *B.E.C.*, 412, 1927.
- e. ADULTERINA Briq. Aberthin, *B.E.C.*, 128, 1926.
- f. ACUTIFOLIA Sm. Aberthin!, *B.E.C.*, 128, 1926.
- g. RIVALIS Briq. Near Hirwaun!, teste J. Fraser.

- × GENTILIS L. Paludal. Blackhills, Gower, *B.E.C.*, 673, 1919.
 b. PAULIANA (Schultz). Penard Castle, 1894, E. F. Linton.
- × RUBRA Huds. Paludal, etc. Rare. Hirwaun, *J.B. Supp.*, 50, 1907.
 b. RARIPILO Briq. Glam., J. R. Shepherd, 1911.
- M. ARVENSIS L. Agrestal, etc. Common!
 b. OBTUSIFOLIA Lej. & Court. Aberthin!, teste J. Fraser.
 c. AGRESTIS (Sole) Sm. Aberdare, *J.B. Supp.*, 50, 1907.
 d. AUSTRIACA (Jacq.) Briq. Barry, *B.E.C.*, 128, 1926.
 e. PARIETARIIFOLIA Beck. Llwydcoed, H.J.R., teste J. Fraser.
 f. DENSIFOLIOLATA Briq. Gower!
- M. PULEGIUM L. Inundatal. Local. Aberthin!
- *M. REQUIENI Benth. Adventive. Penllergaer, *J.B. Supp.*, 84, 1907.
- LYCOPUS EUROPAEUS L. Paludal, etc. Common!
- ORIGANUM VULGARE L. Pascual. Locally common. Dry calcareous banks, etc.!
- b. ALBIFLORUM Lej. Gower, *B.E.C.*, 393, 1921.
- THYMUS PULEGIOIDES L. (as CHAMAEDRYS Fr.). Glyn Neath, *B.E.C.*, 510, 1927. *Com. Fl.*
- T. SERPYLLUM L. Pascual. Common. Barry, etc. *B.E.C.*, 512, 1927.
- T. PYCNOTRICHUS (Uechtr.) Ronn. Pascual. Barry Island, *B.E.C.*, 513, 1927.
- T. ZETLANDICUS Ronn. & Dr. Pascual. Cold Knap, *B.E.C.*, 514, 1927.
- T. NEGLECTUS Ronn. Pascual. Barry, *B.E.C.*, 515, 1927.
- T. BRITANNICUS Ronn. Pascual. Caerphilly, *B.E.C.*, 516, 1927.
- SATUREIA ASCENDENS (Jord.) Dr. Glareal, etc. Locally common. St Fagans!
 b. BRIGGSII (Syme). St Andrews!
- *S. NEPETA (L.) Scheele. Adventive. Cardiff Docks, *B.E.C.*, 742, 1922.
 S. ACINOS (L.) Scheele. Rupestral, etc. Local. Gower, etc.!
- CLINOPODIUM VULGARE L. Septal, etc. Locally common. Cwrt-yr-ala.
- *MELISSA OFFICINALIS L. Outcast. Newton, etc.!, *B.E.C.*, 498, 1916.
- *SALVIA PRATENSIS L. Adventive. Merthyr Mawr, *J.B. Supp.*, 85, 1907.
- S. VERBENACA L. Pascual. Common. Gower, etc.!
- *S. VERTICILLATA L. (as PRATENSIS, Swansea Guide). Adventive. Port Eynon, etc.!
- NEPETA CATARIA L. Septal. Rare. Kenfig, etc.!
- N. HEDERACEA (L.) Trev. Sylvestral. Common!
 b. PARVIFLORA (Benth.). Morlais Castle, *J.B. Supp.*, 51, 1907.
- SCUTELLARIA GALERICULATA L. Paludal. Locally common. Gower, etc.!
- b. LITTORALIS Dr. Kenfig Dunes, etc., *B.E.C.*, 315, 1927.
- S. MINOR Huds. Uliginal. Locally common. Kenfig, etc.!
- PRUNELLA VULGARIS L. Pascual. Common!
 b. DUNENSIS Dr. Whitford Point, *B.E.C.*, 48, 1917.
- *MELITTIS MELISSOPHYLLUM L. Adventive. About Swansea, Dillwyn, etc.

- MARRUBIUM VULGARE L. Viatical, Uliginal. Scarce. Near coast, Sker, etc.!
- STACHYS SYLVATICA L. Sylvestral. Common!
 × AMBIGUA Sm. Septal. Rare. Aberthin!, etc.
- S. PALUSTRIS L. Paludal, etc.!
- S. ARVENSIS L. Agrestal. Locally common. St Donats!
- *S. ANNUA L. Adventive. Cardiff, etc!, *B.E.C.*, 207, 1923.
- *S. RECTA L. Established. Barry Docks!, *B.E.C.*, 207, 1923.
- S. OFFICINALIS (L.) Trevis. Sylvestral. Locally common. Llansannor, etc.!
- b. HIRTA (Leys.) Rouy. Monknash Cwm!, *B.E.C.*, 315, 1927.
- GALEOPSIS SPECIOSA Mill. Agrestal. Rare. Gowerton to Penclawdd, *J.B.*, 316, 1892.
- G. TETRAHIT L. Sylvestral, Agrestal. Common!
 b. BIFIDA (Boenn.) Lej. & Court. Radyr, etc., *J.B.*, 407, 1909.
 c. NIGRESCENS Bréb. Wenvoe, *B.E.C.*, 207, 1923.
- G. LADANUM L., b. ANGUSTIFOLIA Pers. Scarce. Agrestal, and pebble beaches!
 c. CANESCENS Schultz? Barry!, *B.E.C.*, 132, 1929.
- *LEONURUS CARDIACA L. Viatical. Rare. Aberthin, etc.!
- LAMIUM ALBUM L. Viatical. Common!
- *L. MACULATUM L. Outcast. Scarce. Pentyrch, etc.!, (*B.E.C.*, 207, 1923.)
- L. PURPUREUM L. Agrestal, etc. Common!
- L. HYBRIDUM Vill. Viatical. Scarce. Kenfig, etc!, *B.E.C.*, 413, 1927.
 b. DECIPIENS Sond. Gower, *J.B.*, 297, 1892.
 (L. MOLUCCCELLIFOLIUM Fr. Llandaff, etc., Fl. J.S., 64. Error).
- L. AMPLEXICAULE L. Agrestal. Scarce. Kenfig, etc.!
- L. GALEODOLON (L.) Crantz. Sylvestral. Common!
- BALLOTA NIGRA L. Viatical. Locally common. Dinas Powis, etc.!
- b. MOLLISSIMA Dr. Kenfig!, *B.E.C.*, 414, 1927.
- TEUCRIUM SCORODONIA L. Sylvestral. Common!
 b. DENTATUM Bab. Killay, *B.E.C.*, 395, 1918.
- *T. CHAMAEDRYIS L. Rupestral. Rare. Penrheolgerrig, *Cardiff Nat. Soc. Procs.*, 1891-2.
- AJUGA REPTANS L. Sylvestral. Common!
- *PLANTAGO INDICA L. Adventive. Established?. Cardiff!, *B.E.C.*, 743, 1922.
- P. CORONOPUS L. Glareal. Wenvoe. Littoral, along coast!
 b. CERATOPHYLLON Rapin. Grangetown, etc.!
 c. MARITIMA Gren. & Godr. Blackpill, *B.E.C.*, 395, 1918.
 d. PYGMAEA Lange. Merthyr Mawr Dunes, *B.E.C.*, 393, etc., 1921.
 e. TENUIFOLIA Wirtg. Cardiff, *B.E.C.*, 207, 1923.
- P. MARITIMA L. Littoral. Locally common along coast!
 b. SCORZONERIFOLIA (Lam.). Grangetown!, etc.
- P. LANCEOLATA L. Pascual, etc. Common!
 *b. TIMBALI (Jord.). Port Talbot, *J.B.*, 408, 1909.

- c. *ALTISSIMA* (L.). Barry, *B.E.C.*, 129, 1926.
d. *SPHAEROSTACHYA* Roche. Ewenny Down, etc., *J.B. Supp.*, 52, 1907.
- P. MEDIA* L. Pascual. Locally common. On lias near coast!
P. MAJOR L. Pascual, etc. Common!
b. *INTERMEDIA* (Gilib.) Syme. Kenfig, etc., *J.B. Supp.*, 52, 1907.
- **P. PSYLLIUM* L. Casual. Cardiff, Fl. J.S. (notes).
**P. LAGOPUS* L. Adventive. Splott!
LITTORELLA UNIFLORA (L.) Asch. Lacustral. Locally common!
**HERNIARIA GLABRA* L. Casual. Cardiff, Fl. J.S., 36.
**H. CILIATA* Bab. Established. Barry, *B.E.C.*, 1021, 1925.
**H. HIRSUTA* L. Casual. Cardiff, *B.E.C.*, 1021, 1925.
**CORRIGIOLA LITTORALIS* L. Casual. Barry Docks!, *B.E.C.*, 414, 1927.
**SCLERANTHUS PERENNIS* L. Casual. Cardiff Docks, Fl. J.S., 74.
S. ANNUUS L. Agrestal. Scarce. Near Cardiff!
**AMARANTUS CHLOROSTACHYS* (Willd.) Thell. Adventive. Appearing yearly, Cardiff, etc.!
- **A. RETROFLEXUS* L. Adventive. Barry, appearing yearly!
b. *DELLEYI* Thell. Cardiff, *B.E.C.*, 591, 1924.
- **A. ALBUS* L. Adventive. Cardiff, appearing yearly!, *B.E.C.*, 129, 1926.
**A. BLITUM* L. Penarth, etc., Fl. J.S., 70, etc.
CHENOPODIUM RUBRUM L. Viatical. Common!
b. *BLITOIDES* Wallr. Cardiff, *B.E.C.*, 891, 1925.
c. *PSEUDO-BOTRYOIDES* Wats. Pond sides, etc. Kenfig Burrows!
- **C. BONUS-HENRICUS* L. Viatical. Locally common. Rhiwbina, etc.!
**C. HYBRIDUM* L. Adventive. Splott!
**C. URBICUM* L. Viatical. Aberthaw, *B.E.C.*, 367, 1930.
b. *INTERMEDIUM* (M. & K.) Moq. Aberthaw!, *B.E.C.*, 208, 1923.
**C. MURALE* L. Viatical, local. Cardiff, etc.!
- **C. OPULIFOLIUM* Schrad. Adventive. Cardiff!, *B.E.C.*, 754, 1928.
b. *MUCRONULATUM* G. Beck. Barry, *B.E.C.*, 130, 1926.
C. ALBUM L. Agrestal, etc. Common!
b. *VIRIDE* (L.). Aberdare, *J.B. Supp.*, 53, 1907.
c. *GLOMERULOSUM* (Reichb.). Leckwith, *B.E.C.*, 744, etc., 1922.
d. *PAUCIDENS* (Murr) Dr. Radyr, *B.E.C.*, 394, etc., 1921.
e. *VIRIDESCENS* St Amans. Cardiff, *B.E.C.*, 143, etc., 1920.
f. *PSEUDO-BORBASHII* (Murr) Dr. Grangetown, *B.E.C.*, 744, 1922.
g. *PSEUDOSTRIATUM* (Zschacke). Barry, *B.E.C.*, 130, 1926.
h. *SUBSTRIATUM* (Murr). Cardiff Dock, *B.E.C.*, 593, 1924.
- **C. LEPTOPHYLLUM* (Nutt.) Britt. & Br. Adventive. Splott, etc.!, *B.E.C.*, 395, 1921.
- **C. FICIFOLIUM* Sm. Adventive. Cardiff, Fl. J.S., 72.
**C. GLAUCUM* L. Viatical, local. Near Llandough, etc.!
- **C. VULVARIA* L. Adventive. Splott!, etc.
C. POLYSPERMUM L. Agrestal, Viatical, etc. St Nicholas, etc.!
b. *OBTUSIFOLIUM* Gaud. Cardiff, *J.B.*, 412, 1909.
- **ROUBIEVA MULTIFIDA* Moq. Adventive. Established. Barry!, etc. (*B.E.C.*, 1022, 1925).

- BETA MARITIMA L. Littoral. Locally common. Sully, etc.!
- ATRIPLEX LITTORALIS L. Littoral. Locally common. Penarth Ferry, etc.!
- b. SERRATA Gray. Port Talbot, *J.B. Supp.*, 53, etc., 1907.
- A. PATULA L. Agrestal, Viatical. Common!
- b. ERECTA Lange. Llandaff, etc., *J.B.*, 408, 1909.
- c. BRACTEATA Westerlund. Cardiff, *B.E.C.*, 145, 1920.
- d. ELONGATA Dr. Cardiff, *B.E.C.*, 873, 1928.
- A. HASTATA L. Agrestal, Viatical. Common!
- A. DELTOIDEA Bab. Viatical. Locally common. Penarth Ferry, etc.!
- b. PROSTRATA Bab. Penarth Ferry!
- A. GLABRIUSCULA Edmondst., b. BABINGTONII (Woods) Dr. Littoral. Locally common!
- A. MARITIMA Hallier. Littoral. Rare. Jersey Marine, etc., *J.B. Supp.*, 53, 1907.
- *A. TATARICA L. Adventive. Cardiff!, etc., *B.E.C.*, 745, 1922.
- A. PORTULACOIDES L. Littoral. Locally common. Aberthaw, etc.!
- *A. PEDUNCULATA L. Casual. Aberafan, Hb. Motley.
- Salicornias arranged according to the revision by C. E. Moss and E. J. Salisbury, D.Sc., F.L.S., in the *Cambridge British Flora*.
- (SALICORNIA PERENNIS, a. RADIANIS Moss & Salisb. Swansea, *B.G., Cambridge Br. Flora*).
- (b. LIGNOSA Moss. Near Cardiff!, *B.E.C.*, 396, 1921. Error, A. J. Wilmott).
- S. DOLICHOSTACHYA Moss. Grangetown!, *B.E.C.*, 368, 1930, teste Dr Salisbury.
- S. HERBACEA, a. STRICTA Moss. & Salisb. Grangetown!, teste Dr Salisbury.
- b. PATULA Moss. & Salisb. Oxwich, Hb. Watson.
- S. RAMOSISSIMA Woods. The Leys!, teste Dr Salisbury.
- S. PROSTRATA, a. SMITHIANA Moss. & Salisb. The Leys!, teste A. J. Wilmott.
- S. DISARTICULATA Moss. The Leys!, teste Dr Salisbury, *B.E.C.*, 368, 1930.
- SUAEDA FRUCTICOSA Forsk. Littoral. Very rare. Penarth Ferry, *B.E.C.*, 368, 1930.
- S. MARITIMA Dum. Littoral. Locally common. Cogan, etc.!
- b. PROCUMBENS Syme. Gower, *J.B. Supp.*, 54, 1907.
- SALSOLA KALI L. Littoral. Locally common. Sands!
- b. TENUIFOLIA Tausch. Cardiff, *B.E.C.*, 892, 1925.
- *PHYTOLACCA AMERICANA L. Adventive. Cardiff Docks!
- POLYGONUM DUMETORUM L. "Garden weed." Sully, *Fl. Glam.*, 136.
- P. CONVULVULUS L. Agrestal. Common!
- b. SUBALATUM Lej. & Court. Swambridge, *Fl. Glam.*, 136.
- P. BISTORTA L. Pratal. Scarce. Schwyll!, etc.
- P. AMPHIBIUM L. Lacustral, etc. Kenfig, etc.!
- b. TERRESTRE Leers. Lavernock!

- P. SCABRUM Moench. Agrestal, etc. Common. Cardiff, etc.!
- b. INCANUM (Lej. & Court.). Near Gorseinon, *J.B. Supp.*, 55, 1907.
- P. PERSICARIA L. Agrestal, etc. Common!
- b. ELATUM Gren. & Godr. Fairwater, etc.!
- c. AGRESTE Meisn. Near Cardiff!
- *P. PETECTICALE (Stokes) Dr. Agrestal, etc. Common. Taff River, etc.!
- P. HYDROPIPER L. Paludal. Common!
- (P. MITE Schrank. Swansea, Gutch, etc.).
- P. MINUS Huds. Inundatal. Swansea, *Phyt.*, 144, etc., 1842.
- (P. MARITIMUM L. Littoral. Cardiff, etc., *Fl. J.S.*, 73).
- P. RARI Bab. Littoral. Locally common. Aberthaw, etc.!
- P. AVICULARE L. Agrestal, etc. Common!
- b. AGRESTINUM (Jord.). Porthcawl, etc., *J.B. Supp.*, 54, 1907.
- c. BREVIFOLIUM S. F. Gray. Oxwich, etc., *J.B. Supp.*, 54, 1907.
- d. ANGUSTIFOLIUM S. F. Gray. Cardiff, etc., *J.B. Supp.*, 54, 1907.
- e. MARINUM S. F. Gray. Port Talbot, etc., *J.B. Supp.*, 54, 1907.
- f. DEPRESSUM Meisn. Port Talbot, *B.E.C.*, 30, 1911.
- P. EQUALE Lind. Agrestal. Scarce. Cardiff!
- *P. PATULUM M. Bieb. (BELLARDI auct.). Casual. Splott, etc., *B.E.C.*, 594, 1924.
- *P. CUSPIDATUM Sieb. & Zucc. Outcast, often established!, *B.E.C.*, 594, 1924.
- *FAGOPYRUM SAGITTATUM Gilib. Casual. About Cardiff!
- RUMEX HYDROLAPATHUM Huds. Paludal. Locally common. Hensol, etc.!
- R. CRISPUS L. Agrestal, etc. Common!
- b. TRIGRANULATUS Syme. Cadoxton Moors, etc.!
- R. OBTUSIFOLIUS L. Pratal, etc. Common!
- *R. SANGUINEUS L. Viatical. Swansea Valley, *B.E.C.*, 397, 1918.
- R. VIRIDIS (Sibth.). Sylvestral. Common!
- R. CONGLOMERATUS Murr. Viatical. Common!
- R. RUPESTRIS Le Gall. Littoral. Rare. Kenfig Dunes!, *J.B.*, 16, 1933.
- R. PULCHER L. Viatical. Newton, etc.!
- R. MARITIMUS L. Swansea foreshore, *B.E.C.*, 416, 1927.
- R. ACETOSA L. Pratal. Common!
- R. ACETOSELLA L. Ericetal. Common!
- b. M'LEANII Dr. Near Taffs Well, *B.E.C.*, 60, 1923.
- *R. SCUTATUS L. Adventive. Cornely, Gutch.
- *R. SALICIFOLIUS Weinm. Adventive. Splott, etc.!
- *(ASARUM EUROPAEUM L. Cardiff Castle gardens, *Fl. J.S.*, 109).
- DAPHNE LAUREOLA L. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- D. MEZEREUM L. Sylvestral. Draethen, *J.B.*, 408, etc., 1909.
- *HIPPOPHAE RHAMNOIDES L. Established. Sand dunes in several places, *B.E.C.*, 746, 1922.
- VISCIUM ALBUM L. Sylvestral. Very rare. On *Robinia Pseudacacia*, Singleton, *B.E.C.*, 894, 1925.
- *THESIUM HUMIFUSUM DC. Established. Barry Docks!, etc., *B.E.C.*, 368, 1930.

- EUPHORBIA PLATYPHYLLOS L. Agrestal. Very rare. Llandough, etc.,
Fl. Glam., 140.
- (E. STRICTA L. Penarth, *Fl. J.S.*, 75).
- E. HELIOSCOPIA L. Agrestal. Common!
- E. AMYGDALOIDES L. Sylvestral. Common!
- *E. VIRGATA W. & K. Adventive. Established. Barry Docks!, etc.
- *E. ESULA L., var. PINIFOLIA (Lam.) Dr. Adventive. Cardiff Docks (as
type, *J.B. Supp.*, 86, 1907).
- *E. CYPARISSIAS L. Adventive. Aberavon, *B.E.C.*, 398, etc., 1918.
- E. PARALIAS L. Littoral. Locally common. Kenfig, etc.
- E. PORTLANDICA L. Littoral. Locally common. Kenfig, etc.
- E. PEPLUS L. Agrestal. Common!
- E. EXIGUA L. Agrestal. Common. Also on cliffs!
- E. LATHYRIS L. Sylvestral. Nicholaston Woods!, *B.E.C.*, 127, 1917.
- E. PEPLIS L. Littoral. Porthcawl, etc., extinct?, *L.W.D. Mat.*, 32,
etc.
- *BUXUS SEMPERVIRENS L. Sylvestral. Frequent. Not native!
- MERCURIALIS PERENNIS L. Sylvestral. Common!
- *M. ANNUA L. Agrestal. Locally common. Cardiff, etc.!
- b. AMBIGUA (L.). Port Talbot Docks, *J.B. Supp.*, 86, 1907.
- ULMUS MONTANA Stokes. Sylvestral. Common. Native in uplands!
- U. PLOTII Dr. Septal. Very rare. Sketty, *B.E.C.*, 746, 1922.
- *U. SATIVA Mill. Septal. Probably always planted!
- *U. MINOR Mill. Planted. Self sown seedlings occur!
- HUMULUS LUPULUS L. Septal. Locally common. Llandaff, etc.!
- *CANNABIS SATIVA L. Casual. Waste places!
- *FICUS CARICA L. Established on cliffs at Mumbles, etc.!, *B.E.C.*, 417,
1927.
- URTICA DIOICA L. Viatical. Locally common. Sand burrows, etc.!
- b. ANGUSTIFOLIA Wimm. & Grab. Laleston, *J.B. Supp.*, 56, 1907.
- U. URENS L. Viatical. Common!
- *U. PILULIFERA L. Casual. Cardiff, Penarth, *Fl. J.S.*, 76.
- PARIETARIA RAMIFLORA Moench. Rupestral. Common!
- b. SIMPLEX (Bach.). Cardiff, etc., *J.B. Supp.*, 56, 1907.
- MYRICA GALE L. Uliginal. Cefn Bryn, *Fl. Glam.*, 142, etc.
- BETULA ALBA L. Sylvestral. Common!
- b. PENDULA Ait. Often planted!
- B. PUBESCENS Ehrh. Sylvestral. Locally common, in uplands!
- ALNUS ROTUNDIFOLIA Mill. Sylvestral. Common. River and stream
sides, etc.!
- CARPINUS BETULUS L. Sylvestral. Scarce. Possibly native in lime-
stone woods!
- CORYLUS AVELLANA L. Sylvestral. Common!
- QUERCUS ROBUR L. Sylvestral. Locally common!
- Q. SESSILIFLORA Salisb. Sylvestral. Locally common. Oxwich, etc.,
J.B. Supp., 57, 1907.
- *Q. CERRIS L. Sylvestral. Aberdulais, Gutch, etc.!

- **Q. ILEX* L. Naturalised. Seedlings on Caswell cliffs!, *B.E.C.*, 397, etc., 1921.
- **CASTANEA SATIVA* Mill. Naturalised banks of River Taff, etc.!
- **JUGLANS REGIA* L. Limestone cliff, Widegate, *B.E.C.*, 895, 1925.
- FAGUS SYLVATICA* L. Sylvestral, native. Scarce. Near Rudry, etc.!
- **SALIX PENTANDRA* L. Aberdare, etc., native?, *J.B. Supp.*, 86, 1907.
- S. FRAGILIS* L. Septal, etc. Locally common. River Taff, etc.!, teste J. Fraser.
- b. *DECIPiens* (Hoffm.). Aberdare, *J.B. Supp.*, 56, 1907.
 (c. *BRITANNICA* F. B. White. "Frequent," *J.B. Supp.*, 57, 1907).
- S. ALBA* L. Septal, etc. Locally common. Pontcanna, etc.!, teste J. Fraser.
- b. *VITELLINA* (L.). Swansea, Gutch, etc.
- c. *STENOPHYLLA* Fraser. Banks of River Taff, Cardiff, teste J. Fraser.
- ×*FRAGILIS* = *VIRIDIS* Fr. Scarce. River Taff, Cardiff!, teste J. Fraser.
- S. TRIANDRA* L. Near Pyle, *J.B.*, 250, 1902.
- b. *HOFFMANNIANA* (Sm.). Kenfig Pool, Hb. Motley, etc.
- c. *AMYGDALINA* (L.) Bab. Near Rumney at Llwynygrnant, A. A. Pettigrew.
- S. PURPUREA* L., var. *HELIX* Sm. Rare. Penylan Brook!, etc., teste J. Fraser.
- ×*VIMINALIS* = *RUBRA* Huds. Leckwith Wood, etc., *J.B.*, 57, 1907.
- S. VIMINALIS* L. River sides, etc. Common!
- [×] *STIPULARIS* (Sm.). Crumlin Burrows, *J.B.*, 376, 1886.
- b. *LINEARIFOLIA* Wimm. & Gr. Cardiff!, teste J. Fraser.
- ×*SMITHIANA* Willd. Cowbridge, etc., *J.B. Supp.*, 57, 1907.
- S. CAPREA* L. Septal, Sylvestral. Common! Several forms, teste J. Fraser.
- S. AURITA* L. Scarce in Vale of Glamorgan, less so in hilly districts!
- S. ATROCINEREA* Brot. Septal. Common!
- S. REPENS* L. Ericetal, etc. Common!
- b. *ARGENTEA* (Sm.). Kenfig Burrows!
- c. *ASCENDENS* (Sm.). Crumlin Burrows, Dillwyn, L.W.D. Mat.
- d. *FUSCA* (L.). Scarce. Swansea, W. R. Linton, *B.E.C.*, 133, 1926.
- e. *INCUBACEA* (L.). Aberdare, *J.B. Supp.*, 57, 1907.
- f. *PARVIFLORA* (Sm.). Swansea, *B.E.C.*, 1892.
- g. *PROSTRATA* (Sm.). Swansea, *B.E.C.*, 1886.
- **S. ANDERSONIANA* Sm. Aberdare, planted?, *J.B. Supp.*, 86, etc., 1907.
- **POPULUS CANESCENS* Sm. Frequently planted!
- P. TREMULA* L. Sylvestral. Scarce. Sant-y-nil, etc.!
- **P. NIGRA* L. Occasionally planted.
- **P. DELTOIDES* Marsh. × *NIGRA* = *SEROTINA* (Hartig). Often planted!
- **P. TACAMAHACCA* Mill. Self-sown ? on Kenfig Dunes!
- **P. ALBA*. Occasionally planted!
- EMPETRUM NIGRUM* L. Ericetal. Hills between Aberdare & Merthyr, *J.B. Supp.*, 57, etc., 1907.

- CERATOPHYLLUM DEMERSUM L. Lacustral. Hensol!, *B.E.C.*, 133, 1926.
Accidentally introduced?
- HYDROCHARIS MORSUS-RANAE L. Margam Marshes, *J.B.*, 299, etc., 1903.
- *ELODEA CANADENSIS Michx. Lacustral. Locally common!
- LIPARIS LOESELII Rich., b. OVATA Riddels. Uliginal. Rare. Kenfig!, etc., *B.E.C.*, 418, 1927.
- NEOTTIA NIDUS-AVIS (L.) Rich. Sylvestral. Rare. Cwrt-yr-ala, etc.!
- LISTERA OVATA (L.) Br. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- SPIRANTHES SPIRALIS (L.) C. Koch. Pascual. Locally common. The Leys, etc.!
- HELLEBORINE PALUSTRIS (Mill.) Schrank. Uliginal. Locally common. Ystradowen!, etc.
f. FLORIBIS ALBIS. Kenfig, *B.E.C.*, 418, 1927.
- b. ERICETORUM (A. & G.). Whitford Point, *B.E.C.*, 128, 1917.
- H. LATIFOLIA Dr. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- (H. ATROPURPUREA (Rafn.). Near Cardiff, *B.E.C.*, 669, 1931. Error).
- ORCHIS MORIO L. Pascual. Locally common. Pwll-y-pant, etc.!
- O. INCARNATA L. Paludal. Scarce. Cog Rises, *Fl. Glam.*, 149.
b. DUNENSIS Dr. Kenfig!, *B.E.C.*, 419, 1927.
- O. PRAETERMISSA Dr. Paludal. Locally common. Kenfig, etc.!
- O. PURPURELLA Steph. Llangennith, *B.E.C.*, 399, 1921, ?.
- O. MACULATA L. Ericetal. Locally common. Rhiwbina, etc.!, *B.E.C.*, 669, 1931.
b. MACROGLOSSA Dr. Cardiff!, *B.E.C.*, 669, 1931.
- O. FUCHSII Dr. Sylvestral. Locally common. Dunraven, etc.!, sp. Hb. Vachell, teste Dr Druce.
- O. MASCULA L. Sylvestral, etc. Common!
- O. PYRAMIDALIS L. Pascual. Scarce. Monk-nash, etc.!
- OPHYS APIFERA Huds. Pascual. Scarce. Llansannor, etc.!
- O. MUSCIFERA Huds. Sylvestral. St Nicholas, 1883 ?, *Fl. J.S.*, 82.
(HERMINIUM MONORCHIS (L.) Br. Beaupre, *C.N.S. Procs.*, 1882).
- HABENARIA GYMNADENIA Dr. Glareal, Uliginal. Scarce. Kenfig, etc.!
- *H. ALBIDA (L.) Br. Pascual. Cwmdu Fall, Swansea Valley, *B.E.C.*, 749, etc.!, 1922.
- H. VIRIDIS (L.) Br. Pratal, Uliginal. Rare. St Brides Major!, etc.
b. VAILLANTII (Ten.) Fern. Rhossili, *J.B. Supp.*, 59, 1907.
- PLATANATHERA VIRESCENS (Zollig) Dr. Sylvestral. Scarce. Rhiwbina!, teste P. M. Hall.
- P. BIFOLIA (L.) Br. Sylvestral. Gower, etc., *J.B.*, 312, 1904.
- IRIS PSEUDACORUS L. Paludal. Common!
b. ACORIFORMIS (Bor.) Baker. Oxwich Marsh!, teste Dr Druce.
c. PALLIDIFLAVA Sims. Parkmill, *B.E.C.*, 681, 1919.
- I. FOETIDISSIMA L. Sylvestral. Locally common. Shrubby places near coast!
- *CROCUS VERNUS (L.). Established. Fairy Hill, etc.!, *B.E.C.*, 598, 1924.
- *C. BIFLORUS Mill. Penrice Green, *B.E.C.*, 216, 1923.
- *SISYRINCHIUM ANGSTIFOLIUM Mill. Pratal. Whitechurch, introduced with crops!

- *TRITONIA CROCOSMIFLORA Nich. Blackpill, *B.E.C.*, 400, 1921.
 NARCISSUS PSEUDO-NARCISSUS L. Sylvestral, etc. Locally common.
 Pencoed, etc.!
- *N. MAJOR Curtis. Scarce. Established. Penylan, etc. (*B.E.C.*, 216, 1923).
- *N. BIFLORUS Curtis. Pratal. Established. Kenfig!, *B.E.C.*, 420, etc., 1927.
- *N. POETICUS L. In a wood near Pwllypant!, etc.
- *N. INCOMPARABILIS Mill. Established by River Taff, Pontcanna!
 GALANTHUS NIVALIS L. Sylvestral. Scarce. Stream sides, Draethen, etc.!
- *LEUCOJUM VERNUM L. Established. Caswell, *B.E.C.*, 898, 1925.
- *L. AESTIVUM L. Paludal. Kenfig, Hb. Motley, etc.
 TAMUS COMMUNIS L. Septal. Common!
 RUSCUS ACULEATUS L. Native and locally common. In woods and on cliffs, Gower, etc.!
- ASPARAGUS MARITIMUS Mill. Littoral. Rare. Gower!, etc.
- *A. OFFICINALIS L. Established. Oxwich Bay, etc.
 POLYGONATUM MULTIFLORUM (L.) All. Sylvestral. Rare. Castell Coch, etc.!
- CONVALLARIA MAJALIS L. Sylvestral. Very rare. Little Garth, 1910. Extinct?, etc.
- *YUCCA GLORIOSA L. Am. Glamorgan, *British Plant List*, Edition 2.
- *ALLIUM AMPELOPRASUM L., b. HOLMENSE Mill. Flat Holm, Hb. Brit. Mus.
 A. VINEALE L. Pascual. Locally common!
 b. BULBIFERUM Syme. Porthcawl, etc., *J.B. Supp.*, 60, 1907.
 c. COMPACTUM (Thuill.). Cogan!, etc.
 A. URSINUM L. Sylvestral. Common!
 A. OLERACEUM L. Pratal. Llanishen!, etc.
- *A. SCHOENOPRASUM L. Adventive? Aberdare, etc.!
- *A. ROSEUM L. Adventive. Marcross, sp. Hb. Vachell!
 SOILLA VERNA Huds. Pascual, local. Porthcawl, etc.!
- S. AUTUMNALIS L. (Glareal. Marcross, *Fl. Glam.*, 154, etc.). Adventive? Barry, *B.E.C.*, 217, 1923.
 S. NON-SCRIPTA (L.) H. & L. Sylvestral. Common!
- *S. HISPANICA Mill. Oxwich Dunes, *B.E.C.*, 898, 1925.
- *ORNITHOGALUM PYRENAICUM L. Porthkerry Woods, *Fl. J.S.*, 83).
 O. UMBELLATUM L. Pascual. Merthyr Mawr!, etc.
 (GAGEA LUTEA (L.) Ker-Gawler. Castell Coch Woods, 1843, extinct, *Fl. J.S.*, 83).
- COLCHICUM AUTUMNALE L. Pratal. Rare. Newton!, *J.B.*, 317, etc., 1902.
- NARTHECIUM OSSIFRAGUM (L.) Huds. Uliginal. Locally common. Ystradowen, etc.!
- PARIS QUADRIFOLIA L. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- JUNCUS SPINOSUS Forsk. Littoral. Locally common. The Leys, etc.!
- J. ACUTUS L. Littoral, local. Kenfig Burrows, etc.!

- J. CONGLOMERATUS L. Paludal. Common. Sant-y-nil, etc.!
- J. EFFUSUS L. Paludal. Common. Sant-y-nil, etc.!
- b. COMPACTUS Lej. & Court. Pengam Moors!
- J. INFLEXUS L. Paludal. Common. Sully Moors, etc.!
- J. SUBNODULOSUS Schrank. Paludal. Locally common. Kenfig Burrows, etc.!
- J. ACUTIFLORUS Ehrh. Sylvestral, Paludal. Common!
- b. MULTIFLORUS (Weihe) Dr. Craig-y-llyn, *J.B. Supp.*, 61, 1907.
- J. ARTICULATUS L. Paludal. Locally common. Hirwaun!, etc.
- (J. ALPINUS Villars. Glamorgan, *T.B. Supp.*, sp. Hb. A. Bennett. Error).
- J. BULBOSUS L. Paludal. Common!
- b. KOCHII (F. Schultz) Dr. Fairwood Common, *J.B.*, 61, 1886.
- J. SQUARROSUS L. Ericetal. Common. On heathy moorlands!
- (J. COMPRESSUS Jacq. Glamorgan, *T.B. Supp.* 11. Error?, record probably erroneous).
- J. GERARDI Lois. Littoral. Common along coast!
- *J. TENUIS Willd. Adventive. Taffs Well, etc., *J.B. Supp.*, 87, 1907.
- J. BUFONIUS L. Paludal. Common!
- b. FASCICULARIS Koch. Porthcawl, etc., *J.B. Supp.*, 60, 1907.
- LUZULA SYLVATICA (Huds.) Gaud. Sylvestral. Locally common. Penllergaer, etc.!
- L. PILOSA (L.) Willd. Sylvestral. Locally common. Draethen, etc.!
- b. [? ×] BORRERI (Bromf.). Lisvano, *vide* A. Bennett?, *J.B. Supp.*, 61, 1907.
- [L. FORSTERI (Sm.) DC. Several references, including *Comital Flora*, all doubtful].
- L. MULTIFLORA (Retz.) DC. Ericetal. Locally common. Pendoylan, etc.!
- b. CONGESTA (DC.). Aberdare, etc., *J.B. Supp.*, 61, 1907.
- L. CAMPESTRIS (L.) DC. Pascual. Common!
- *PHOENIX DACTYLIFERA L. (Seedlings). Frequently introduced with town refuse!
- TYPHA LATIFOLIA L. Paludal. Locally common!
- T. ANGUSTIFOLIA L. Paludal. Rare. Oxwich Marsh, etc.!
- SPARGANIUM NEGLECTUM Beeby. Paludal. Locally common. Cadoxton Moors, etc.!
- S. RAMOSUM Huds. Paludal. Common. Cadoxton Moors, etc.!
- b. MICROCARPUM (Neum.). Flemingstone Moor, *J.B.*, 409, 1909.
- S. SIMPLEX Huds. Lacustral. Locally common!
- b. LONGISSIMUM Fr. Crumlin Bog, *J.B. Supp.*, 62, 1907.
- S. ANGUSTIFOLIUM Michx. Lacustral. Rare. Llyn Fach, etc.!
- S. MINIMUM Fries. Lacustral. Singleton Marsh, Gutch, etc. (?).
- ARUM MACULATUM L. Septal. Common!
- *ACORUS CALAMUS L. Briton Ferry, Flower, etc.
- LEMNA MINOR L. Lacustral. Common. Sker, etc.!
- L. POLYRRHIZA L. Lacustral. Rare. Sker, etc.!
- L. TRISULCA L. Lacustral. Locally common. Pengam, etc.!

- L. GIBBA L. Lacustral. Scarce. Aberdare Valley, *J.B. Supp.*, 62, etc., 1907.
- WOLFFIA ARRHIZA (L.) Wimm. Lacustral. Rare. Ponds, Penarth Road, Cardiff (*Fl. Glam.*, 160, 1899).
- ALISMA PLANTAGO-AQUATICA L. Paludal. Common!
- ECHINODORUS RANUNCULOIDES (L.) Engelm. Paludal. Locally common. Kenfig, etc.!
- ELISMA NATANS (L.) Buch. Crumlin Bog; Singleton, Gutch, *Phyt.*, 180, 1842.
- SAGITTARIA SAGITTFOLIA L. Lacustral. Rare. Near Cardiff, etc.!
- BUTOMUS UMBELLATUS L. Paludal. Locally common. Gower, etc.!
- TRIGLOCHIN MARITIMA L. Littoral. Locally common. In salt marshes!
- T. PALUSTRIS L. Paludal. Locally common. Llanishen, etc.!
- POTAMOGETON NATANS L. Lacustral. Common. Llansannor, etc.!
- P. OBLONGUS Viv. Lacustral. Common. Caerphilly, etc.!
- (P. COLORATUS Hornem. East Moors, etc., *Fl. J.S.*, 86).
- (P. ALPINUS Balb. Cardiff, etc., *Fl. J.S.*, 86).
- P. GRAMINEUS L. Lacustral. Rare. Kenfig Burrows!, etc., teste W. H. Pearsall.
- P. VARIANS Fryer. Lacustral. Glamorgan, *T.B. Supp.*, sp. Armitage.
- P. LUCENS L. Lacustral. Rare. Kenfig Pool!, teste W. H. Pearsall.
- (P. PRAELONGUS Wulfen. River Ely near St George's, etc., *Fl. J.S.*, 86).
- P. PERFOLIATUS L. Lacustral. Scarce. Kenfig Pool, etc.!, teste A. Bennett.
- b. OBLONGIFOLIUS M. & K. Canal at Cardiff!, teste A. Bennett.
- P. CRISPUS L. Lacustral. Locally common. Roath Lake, etc.!
- P. OBTUSIFOLIUS M. & K. Lacustral. Rare. Mynydd-y-glew!, *B.E.C.*, 506, 1916.
- P. FRIESII Rupr. Rare. Canal near Cardiff!, teste W. H. Pearsall.
- P. PUSILLUS L. Lacustral. Locally common. Canal near Cardiff, etc.!, teste W. H. Pearsall.
- b. TENUISSIMUS M. & K. Kenfig Pool!, teste W. H. Pearsall.
- P. PECTINATUS L. Lacustral. Locally common. Kenfig Pool, etc.!, teste W. H. Pearsall.
- b. DIFFUSUS (Hagstr.). Near Merthyr!, teste W. H. Pearsall.
- f. LONGIPEDUNCULATUS Tisel. Kenfig Pool!, teste W. H. Pearsall.
- P. INTERRUPTUS Kit. Lacustral. Canal, Neath, *B.E.C.*, 900, etc., 1925.
- b. SCOPARIUS Fryer. Oxwich, etc., *J.B. Supp.*, 63, 1907.
- P. DENSUS L. Lacustral. Locally common. Dunraven, etc.!
- RUPPIA MARITIMA L. Swansea, Hb. Geldart, *vide H.J.R.*, *J.B. Supp.*, 63, 1907.
- R. ROSTELLATA Koch. Littoral. Scarce. The Leys!, etc.
- ZANNICHELLIA PALUSTRIS L. Lacustral. Scarce. Near Aberdare, etc.!
- Z. MARITIMA Nolte. Littoral, Lacustral. Locally common. Salt marshes!
- Z. GIBBEROSA Reichb. Welsh St Donats, *J.B.*, 113, 1920.

- ZOSTERA MARINA L. Littoral. Locally common. Oxwich Bay!, etc.
 b. ANGSTIFOLIA Hornem. Oxwich Bay, Prof. McLean.
- Z. NANA Roth. Littoral. Llanmorlais mud flats, *B.E.C.*, 404, 1918.
- *CYPERUS LONGUS L. Margam Lake, probably planted, *B.E.C.*, 900, etc., 1925.
- ELEOCHARIS PALUSTRIS (L.) Br. Paludal. Common!
- E. UNIGLUMIS Schultes. Paludal. Rare. Llanmadoc, sp. Hb. Vachell.
 C. I. and N. Y. Sandwith, 1933.
- E. MULTICAULIS Sm. Paludal. Locally common. Mynydd-y-glew, etc.!
 (E. ACICULARIS (L.) Br. Graigafan, Hb. Motley, etc.).
- SCRIPUS SYLVATICUS L. Paludal. Scarce. St Fagans, etc.!
- S. MARITIMUS L. Littoral. Locally common!
 b. COMPACTUS Hoffm. Gileston!
 c. MONOSTACHYS Meyer. Oxwich, etc., *B.E.C.*, 375, 1930.
- S. LACUSTRIS L. Lacustral. Locally common. Aberthaw, etc.!
- S. TABERNAEMONTANI Gmel. Lacustral. Locally common. Oxwich, etc.!
- S. CAESPITOSUS L. Ericetal. Locally common. Talygarn, etc.!
- S. PAUCIFLORUS Lightf. Locally common. Bogs and moorlands!
- S. HOLOSCHOENUS L. Littoral. Rare. East Moors, extinct; Barry!,
B.E.C., 375, 1930.
- S. SETACEUS L. Paludal. Common. Gower, etc.!
- S. FILIFORMIS Savi. Paludal. Locally common, mostly if not entirely the following variety.
 b. MONOSTACHYS Clarke & Marshall. Penard, etc.!, teste A. Bennett.
- S. FLUITANS L. Lacustral. Locally common. Gower, etc.!
- S. RUFUS (Huds.) Schrad. Littoral. Very rare. Llanmadoc!, sp. Hb. Vachell, teste A. Bennett.
- ERIOPHORUM PANICULATUM (Lam.) Dr. Uliginal. Rare. Cefn Bryn, etc., *Fl. Glam.*, 166.
- E. ANGSTIFOLIUM Roth. Uliginal. Common!
 b. LONGIFOLIUM Roth. Fairwood Common, *J.B. Supp.*, 64, 1907.
- E. VAGINATUM L. Uliginal. Locally common!
- RYNCHOSPORA FUSCA (L.) Ait. Uliginal. Crumlin Bog, *J.B.*, 296, 1913.
- R. ALBA (L.) Vahl. Uliginal. Rare. Cefn Bryn!
- SCHOENUS NIGRICANS L. Uliginal. Crumlin Bog, *Phyt.*, 780, 1844.
- CLADIUM MARISCUS (Br.). Paludal. Crumlin Bog, Mogggridge sp., *T.B.*
- CAREX PSEUDO-CYPERUS L. Paludal. Rare. Sant-y-nil, etc.!
- C. RIPARIA Curtis. Paludal. Common. Sant-y-nil, etc.!
- C. ACUTIFORMIS Ehrh. Paludal. Locally common. Lavernock, etc.!
 b. SPADICEA (Roth). Sant-y-nil!, etc., *B.E.C.*, 591, 1916.
- C. VESIGARIA L. Paludal. Locally common. Mynydd-y-glew!, etc.,
B.E.C., 421, 1927.
- C. INFLATA Huds. Paludal. Locally common. Mynydd-y-glew, etc.!
 b. INVOLUTA (Bab.). Mynydd-y-glew, *B.E.C.*, 421, 1927.
 c. ROBUSTA (Sond.) Dr. Llancaiach, *J.B.*, 410, 1909.

- C. *HIRTA* L. Paludal. Common!
 b. *HIRTIFORMIS* Pers. Sant-y-nil, etc.!
- C. *PENDULA* Huds. Sylvestral. Locally common. Leckwith, etc.!
- C. *SYLVATICA* Huds. Sylvestral. Common!
- C. *STRIGOSA* Huds. Sylvestral. Rare. Cwrt-yr-ala!, etc.
- C. *HELODES* Link. Paludal. Locally common. Mynydd-y-glew!, etc.
- C. *BINERVIS* Sm. Ericetal. Common on upland moors!
- C. *DISTANS* L. Littoral, etc. Locally common. Near Cogan, etc.!
- C. *FULVA* Host. Paludal. Scarce. Mynydd-y-glew, etc.!
- C. *FLAVA* L. Paludal. Common!
 b. *OEDOCARPA* And. Ystradowen!, etc.
- C. *LEPIDOCARPA* Tausch. Paludal. Rare. Ystradowen!
- C. *OEDERI* Retz. Paludal. Locally common. Kenfig Burrows, etc.!
 b. *CYPEROIDES* Marss. Oxwich, *J.B.*, 410, 1909.
 c. *ELATIOR* Anderson. Whitchurch, *J.B.*, 410, 1909.
- C. *EXTENSA* Good. Littoral. Locally common. Gower!, etc., *B.E.C.*, 421, 1927.
- C. *CARYOPHYLLEA* Latour. Pascual. Common!
- C. *MONTANA* L. Ericetal. Rare. On limestone, Ewenny Downs, etc.!
- C. *PILULIFERA* L. Ericetal. Locally common. Mynydd-y-glew, etc.!
- C. *DIVERSICOLORE* Crantz. Pascual. Common!
- C. *PALLESCENS* L. Sylvestral. Scarce. Mynydd-y-glew!, etc.
- C. *PANICEA* L. Uliginal. Common. Mynydd-y-glew, etc.!
- C. *LIMOSA* L. Uliginal. Rare. Crumlin Bog, Hb. Brit. Mus., etc.
- C. *ELATA* All. Paludal. Rare. Kenfig Pool, L.W.D. Mat., 29, etc.
- C. *GRACILIS* Curt. Paludal. Scarce. Near Ely, *J.B.*, 410, 1909.
 b. *GRACILESCENS* Ahmq. Ewenny River!
 c. *PROLIXA* Fr.? Fairwater, *B.E.C.*, 592, 1916.
- C. *GOODENOWII* Gay. Paludal. Common!
 b. *CHLOROSTACHYA* (Reichb.) Asch. Blackpill, *B.E.C.*, 406, 1918.
 c. *JUNCBA* (Fr.) Asch. Merthyr Tydfil!, sp. Hb. Vachell; teste A. Bennett.
 d. *MELAENA* Wimm. Merthyr Tydfil!, sp. Hb. Vachell, teste A. Bennett.
 e. *RECTA* (Fleisch.) A. & G. Port Talbot, *B.E.C.*, 28, 1903.
- C. *LEPORINA* L. Ericetal. Common. Ystradowen, etc.!
- C. *STELLULATA* Good. Uliginal. Common. Mynydd-y-glew, etc.!
- C. *REMOTA* L. Sylvestral. Common. Cwrt-yr-ala, etc.!
 X *VULPINA* = *AXILLARIS* Good. Rare. Swanbridge!, sp. Hb. Vachell, teste A. Bennett.
- C. *CANBESCENS* L. Uliginal. Rare. Mynydd-y-glew!, etc., *B.E.C.*, 422, 1927.
- C. *VULPINA* L. Paludal. Common!
- C. *MURICATA* L. Septal, etc. Locally common. Sant-y-nil, etc.!
- C. *PAIRABI* F. Schultz. Septal. Scarce. Llandaff!, etc.
 b. *LEERSII* (F. Schultz). Flat Holm!, teste A. J. Wilmott, etc.
- C. *DIVULSA* Stokes. Septal. Locally common. Pendoylan, etc.

- C. PANICULATA L. Uliginal. Locally common. Ystradowen Bog, etc. !
 X REMOTA = BOENNINGHAUSENIANA Weihe. Rare. Moors near Cwm-
 parc, *Fl. Glam.*, p. 168.
- C. DIANDRA Schrank. Uliginal. Sketty Bog, Hb. Brit. Mus.
 C. DISTICHA Huds. Paludal. Scarce. Ystradowen!, etc.
 C. ARENARIA L. Littoral. Locally common. Sand hills along coast!
 C. PULICARIS L. Ericetal. Common. Pendoylan, etc. !
 C. DIOICA L. Uliginal. Rare. Near Aberdulais Waterfall, L.W.D.
 Mat., 29, etc.
- *PANICUM MILLIACEUM L. Casual. Splott!, etc.
 *P. CRUS-GALLI L. Viatical. About Cardiff, etc. !
 b. LONGISETUM Döll. Cardiff !
 *P. SANGUINALE L. Viatical. Persisting, Cardiff !
 *P. ISCHAEMUM Schreb. Casual. Cardiff, etc., *Fl. J.S.*, 93.
 *SETARIA VIRIDIS (L.) Beauv. Viatical. Locally common. Waste
 ground, Cardiff, etc. !
 *S. GLAUCA Beauv. Casual. Splott, etc. !
 *S. VERTICILLATA (L.) Beauv., b. BREVISETUM Godr. Casual. Splott,
 etc. !
 *SPARTINA TOWNSENDII H. & J. Groves. Introduced, 1921. Mouth,
 River Kenfig !
 *PHALARIS MINOR Retz. Casual. Splott, etc. !, *B.E.C.*, 220, 1923.
 *P. CANARIENSIS L. Viatical. Waste ground about Cardiff, etc. !
 *P. PARADOXA L. Casual. Splott!, etc.
 P. ARUNDINACEA L. Paludal. Locally common. Llandaff, etc. !
 ANTHOXANTHUM ODORATUM L. Pratal, etc. Common !
 b. VILLOSUM Lois. Mynydd-y-glew !
 *A. PUELLI Lec. & Lam. Casual. Barry!, *B.E.C.*, 422, 1927.
 ALOPECURUS PRATENSIS L. Pratal. Common !
 A. MYOSUROIDES Huds. Agrestal. About Cardiff, etc. !
 A. BULBOSUS Gouan. Littoral. Locally common. Porthkerry, etc. !
 A. GENICULATUS L. Paludal. Common !
 (A. ARQUALIS Sobol. Paludal. Grangetown, etc., *Fl. J.S.*, 94).
 *PIPTATHERUM MULTIFLORUM (Desf.) Beauv. Casual. Barry Dock!,
B.E.C., 457, 1924.
 MILIUM EFFUSUM L. Sylvestral. Locally common. Margam, etc. !
 PHELIUM PRATENSE L. Pratal, etc.
 b. STOLONIFERUM Bab. Port Eynon, *J.B.*, 410, 1909.
 c. NODOSUM L. Port Eynon, *J.B. Supp.*, 66, 1907.
 d. PRÆCOX (Jord.). Penylan !
 **[P. PHELOIDES (L.) Simonk. "Ballast, Cardiff," Fl. J.S., 94].*
 P. ARENARIUM L. Littoral, Glareal. Locally common. Sand dunes !
 *AGROSTIS VERTICILLATA Vill. Adventive. Barry Dock!, *B.E.C.*, 602,
 1924.
 A. ALBA L. Pratal, etc. Common !
 b. MAJOR Gaud. Port Talbot, *J.B. Supp.*, 67, 1907.
 c. MARITIMA Meyer. Oxwich, etc., *J.B. Supp.*, 67, 1907.
 d. STOLONIFERA (L.). Barry Island !

- e. SYLVATICA (Host) non Poll. Port Talbot, *J.B. Supp.*, 67, 1907.
 f. CONDENSATA Hack. Oxwich Bay, etc., *J.B. Supp.*, 67, 1907.
- A. CAPILLARIS L. Glareal, etc. Common!
 b. PUMILA (L.) Dr. Frequent. *J.B. Supp.*, 67, 1907.
 c. NIGRA (With.). Splott!
- A. SETACEA Curt. Ericetal, local. Mynydd-y-glew, etc.!
- A. CANINA L. Ericetal, etc. Scarce. Mynydd-y-glew!, etc.
 b. MUTICA Gaud. Llandough-juxta-Cowbridge, *J.B. Supp.*, 67, 1907.
- *POLYPOGON MONSPELIENSIS (L.) Desf. Littoral. Cardiff!, *B.E.C.*, 602, 1924.
- P. LUTOSUS (Poiret) Hitchcock. Littoral. Cardiff!, *B.E.C.*, 602, 1924.
 CALAMAGROSTIS EPIGEIOS (L.) Roth. Sylvestral. Locally common.
 Penylan, etc.!
- (C. CALAMAGROSTIS (L.) Dr. Swansea, Gutch. Probably error).
 GASTRIDUM VENTRICOSUM (Gouan) S. & T. Native on limestone cliffs;
 rare, Cwm Nash, etc.!, *B.E.C.*, 765, 1923, and *B.E.C.*, 602, 1924.
- *APERA SPICA-VENTI (L.) Beauv. Casual. Grangetown!, etc.
- *A. INTERRUPTA (L.) Reichb. Casual. Cardiff Docks, etc., Fl. J.S., 96, etc.
- AMMOPHILA ARENARIA (L.) Link. Littoral. Locally common. Sand dunes!
- *LAGURUS OVATUS L. Casual. Splott, etc.!
- AIRA CARYOPHYLLEA L. Glareal. Locally common. Marcross, etc.!
- A. PRÆCOX L. Glareal. Garth Mountain, etc.!
- WEINGARTNERIA CANESCENS (L.) Bernh. Littoral. Port Talbot, *J.B. Supp.*, 67, 1907.
- DESCHAMPسيا CAESPITOSA (L.) Beauv. Pratal. Common!
 b. BREVIFOLIA (Parn.) Dr. Ystalyfera, etc., *J.B. Supp.*, 67, 1907.
 c. PARVIFLORA (Thuill.) Dum. Llandough!
- D. FLEXUOSA (L.) Trin. Ericetal. Common. On heaths!
- HOLCUS MOLLIS L. Sylvestral. Locally common. Pwllpant, etc.!
- H. LANATUS L. Pratal. Common!
- TRISETUM FLAVESCENS (L.) Beauv. Pascual. Common!
- *AVENA FATUA L. Agrestal, Viatical. Scarce. Barry Docks!, etc.
 b. PILOSA Syme. Cardiff!, *B.E.C.*, 221, 1923.
 c. GLABRATA (Peterm.). Cardiff, *B.E.C.*, 602, 1924.
 d. PILOSISSIMA S. F. Gray. Graigafan, Hb. Motley.
- A. PUBESCENS Huds. Pascual. Locally common. Barry Island, etc.!
- A. PRATENSIS L. Pascual. Rare. Porthkerry, etc., *J.B. Supp.*, 67, 1907.
- *A. STRIGOSA Schreb., b. ORCADENSIS (Marq.). Casual. Cardiff!
- *A. SATIVA L. Casual. Cardiff!, *B.E.C.*, 221, 1923.
- ARRHENATHERUM ELATIUS (L.) Mert. & Koch. Septal. Common!
 A. TUBEROSUM (Gilib.) Dr. Agrestal. Pendoylan!, *B.E.C.*, 423, etc., 1927.
- *CYNODON DACTYLON (L.) Pers. Glareal. Established. Banks of River Taff, etc.!

- SIEGLINGIA DECUMBENS (L.) Bernh. Pascual. Locally common. Moors, etc.
- PERAGMITES COMMUNIS Trin. Paludal. Common!
- *CYNOSURUS ECHINATUS L. Viatical. Scarce. About Cardiff, etc.!
- C. CRISTATUS L. Pascual. Common!
- KOELERIA GRACILIS Pers. Pascual. Scarce. Gileston, etc.! (*B.E.C.*, 689, 1919).
- K. BRITANNICA (Domin). Porthkerry!, sp. Hb. Vachell, teste W. O. Howarth (*B.E.C.*, 40, 1932).
- MOLINIA CAERULEA (L.) Moench. Ericetal. Locally common. Moors and marshes!
- (CATABROSA AQUATICA (L.) Beauv. Pengam Moors, etc., extinct, *Fl. J.S.*, 98).
- MELICA NUTANS L. Sylvestral. Very rare. Morlais Castle!, *B.E.C.*, 115, 1932.
- M. UNIFLORA Retz. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- DACTYLIS GLOMERATA L. Pascual, etc. Common!
- b. ABBREVIATA Drej. Oxwich, etc., *J.B. Supp.*, 68, 1907.
- DESMAZERIA LOLIACEA (Huds.) Nym. Littoral. Locally common. Penard, etc.!
- BRIZA MEDIA L. Pratal. Common!
- *B. MINOR L. Casual. Splott, *B.E.C.*, 182, 1926.
- *B. MAXIMA L. Casual. Radyr, etc., *B.E.C.*, 1026, 1925.
- *POA CHAIXII Vill. Casual. Aberdare, *J.B. Supp.*, 88, 1907.
- P. PRATENSIS L. Pascual. Common!
- b. ANGUSTIFOLIA (L.). Hirwaun, etc., *J.B.*, 410, 1909.
- P. SUBCAERULEA Sm. Glareal, etc. Locally common. Monkash, etc.!
- *P. PALUSTRIS L. Casual. Splott!, etc., *B.E.C.*, 905, 1925.
- P. TRIVIALIS L. Pratal, etc. Common!
- b. GLABRA Döll. Whitford Burrows, *J.B.*, 410, 1909.
- c. PARVIFLORA Parn. Aberdare, *J.B. Supp.*, 68, 1907.
- P. NEMORALIS L. Sylvestral. Locally common. Llandaff, etc.!
- b. COARCTATA Gaud. Penarth, *Fl. Glam.*, 179.
- P. COMPRESSA L. Rupestral. Scarce. Barry, etc.!
- b. POLYNODA (Parn.). Oxwich, etc., *J.B. Supp.*, 68, 1907.
- P. BULBOSA L., b. VIVIPARA. Littoral. Very rare. Cold Knap!
- P. ANNUA L. Agrestal, etc. Common!
- b. REPTANS Haussk. Cold Knap., *B.E.C.*, 185, 1912.
- GLYCERIA AQUATICA (L.) Wahl. Paludal. Locally common. East Aberthaw, etc.
- G. FLUITANS (L.) Br. Paludal. Locally common. Leckwith Moors, etc.!
- b. TRITICEA (Fr.) M. T. Lange. Reynoldstone, *J.B.*, 411, 1909.
- G. PLICATA Fr. Paludal. Locally common. Whitchurch, etc.!
- b. DECLINATA (Bréb.). Rhigos Mountain!, sp. Hb. Vachell, teste Dr Druce.
- G. DISTANS (L.) Wahl. Littoral. Locally common. Pengam Marsh, etc.!

- G. MARITIMA (L.) Mert. & Koch. Littoral. Locally common. East Aberthaw, etc.!
- G. BORBERI Bab. Littoral. Cardiff Dock, *B.E.C.*, 378, 1930.
- G. PROCUMBENS Dum. Littoral. Locally common. Pengam Marshes, etc.!
- b. ERECTA Dr. Cardiff Docks, *B.E.C.*, 322, 1927.
- FESTUCA RIGIDA (L.) Kunth. Glareal. Locally common. Penard, etc.!
- F. GIGANTEA (L.) Vill. Sylvestral. Locally common. St Nicholas, etc.!
- F. ARUNDINACEA Schreb. Pratal, etc. Locally common. Lias cliffs, etc.!, sp. Hb. Vachell, teste W. O. Howarth.
- F. ELATIOR L., sub-sp., a. PRATENSIS Huds. Pratal. Common.
- b. PSEUDO-LOLIACEA (Hack.). Aberdare, etc., *J.B.*, 70, 1906.
- F. SYLVATICA Vill. Sylvestral. Rare. Eynon Gam and Gwladys Falls, *B.E.C.*, 905, 1925.
- F. RUBRA L. Pratal, etc. Common! (*Journ. Linn. Soc.*, 317, 1924.)
- b. COMMUTATA Gaud. Taffs Well, etc.!, sp. Hb. Vachell, teste W. O. Howarth.
- c. BARBATA (Hack.). Swansea, etc., H.J.R., teste W. O. Howarth.
- d. MEGASTACHYA Gaud. Cliffs near Penarth! (*Journ. Linn. Soc.*, 317, 1924.)
- e. PRUINOSA (Hack.). Sully Island, *B.E.C.*, 906, 1925.
- f. ARENARIA (Osb.) Fr. Llantwit Major, *B.E.C.*, 905, 1925.
- g. TENUIFOLIA Howarth. Tidal mud by River Ely!, sp. Hb. Vachell, teste W. O. Howarth.
- F. OVINA L., var. GENUIANA. Pascual. Common! (*Journ. Linn. Soc.*, 32, 1925.)
- b. HISPIDULA Hack. Llyn Fawr, *B.E.C.*, 906, 1925.
- F. CAPILLATA Lam. Penard!, sp. Hb. Vachell, teste W. O. Howarth. (*Journ. Linn. Soc.*, 30, 1925.)
- F. MEMBRANACEA (L.) Dr. Littoral. Locally common. Sand dunes, Kenfig, etc.!
- *F. DANTHONII A. & G., b. AMBIGUA (Le Gall.). Casual. Cardiff, *B.E.C.*, 603, 1924.
- F. BROMOIDES L. Glareal. Locally common. Leckwith, etc.!
- F. MYURUS L. Glareal. Scarce. Leckwith, etc.!
- *BROMUS RIGENS L. Casual. Barry, etc., *B.E.C.*, 1027, 1925.
- *B. RIGIDUS Roth. Casual. Cardiff, etc., *J.B. Supp.*, 87, 1907.
- B. STERILIS L. Glareal. Common!
- *B. TECTORUM L. Casual. Cardiff, etc., *J.B. Supp.*, 87, 1907.
- B. MADRITENSIS L. Adventive, Splott; native? on red marl, Penarth, *Fl. Glam.*, 182.
- B. RAMOSUS Huds. Sylvestral. Locally common. Cwrt-yr-ala, etc.!
- B. ERECTUS Huds. Pascual. Glareal. Locally common. St Nicholas, etc.!
- *B. UNIOLOIDES H.B.K. Viatical. Waste ground!, *B.E.C.*, 116, 1932.
- *B. SEGALINUS L. Agrestal, etc. Cadoxton!, etc.
- b. VELUTINUS (Schrad.) Koch. Penard Castle, Bot. Gaz., Vol. 1.
- c. SUBMUTICUS (Reichb.). Splott, *B.E.C.*, 767, 1928.

- B. PRATENSIS Ehrh. Pratal. Locally common. Pengam Marshes, etc., *J.B. Supp.*, 69, 1907.
- b. PUBESCENS (Wats.). Penylan!, teste W. O. Howarth.
- B. RACEMOSUS L. Pratal, etc. Rare. Caerau, *J.B.*, 411, 1909.
- B. HORDACEUS L. Pratal, etc. Common. Aberthaw, etc., teste W. O. Howarth.
- b. GLABRATUS (Döll) Dr. Porthkerry!, teste W. O. Howarth.
- c. LEPTOSTACHYS (Pers.) Beck. Barry!, teste W. O. Howarth.
- d. NANUS (Weig.). Coast burrows, *B.E.C.*, 691, 1919.
- B. THOMINII (Bréb.). Aberdare, *J.B. Supp.*, 69, 1907.
- B. LEPIDUS A. R. Holmberg. Cardiff, *B.E.C.*, 679, etc., 1931.
- B. MOLLIFORMIS Lloyd. Near Penard, etc., *J.B. Supp.*, 69, 1907.
- *B. ARVENSIS L. Casual. Splott!
- BRACHYPODIUM SYLVATICUM (Huds.) R. & S. Septal, Sylvestral. Common!
- b. GLABRESCENS Coss. & Germ. Pyle, Hb. Motley.
- B. PINNATUM (L.) Beauv., f. LOLIACEUM Asch. & Graeb. Pascual. Rare. Nash Cwm, etc!, teste W. O. Howarth.
- b. PUBESCENS S. F. Gray. Tresillian Bay!, teste W. O. Howarth.
- LOLIUM PERENNE L. Pascual, etc.!
- b. SPHAEROSTACHYUM Masters. Pengam Marshes, etc., *J.B. Supp.*, 70, 1907.
- c. CRISTATUM Döll. Cardiff!, teste W. O. Howarth.
- d. ARISTATUM Schum. Aberdare, etc., *J.B. Supp.*, 69, 1907.
- e. ORGYALE Döll. Splott, *B.E.C.*, 767, 1928.
- *L. TEMULENTUM L. Casual. Splott, etc.!
- b. ARVENSE (With.). Splott, etc.!
- *L. MULTIFLORUM Lam. Adventive. Barry Docks!, teste W. O. Howarth.
- AGROPYRON JUNCEUM (L.) Beauv. Littoral. Locally common. The Leys, etc.!
- b. MEGASTACHYUM (Fr.) Dr. Crumlin Burrows, *J.B. Supp.*, 70, 1907.
- A. PUNGENS R. & S. Littoral. Locally common. Ely estuary, etc.!
- A. REPENS L. Agrestal. Common!
- A. CANINUM Beauv. Sylvestral. Locally common. Banks of River Taff, etc.!
- LEPTURUS FILIFORMIS Trin. Littoral. Locally common. Aberthaw, etc.!
- *L. INCURVUS (L.) Dr. Splott, *B.E.C.*, 116, 1932.
- NARDUS STRICTA L. Ericetal. Common. On moors!
- HORDEUM NODOSUM L. Pratal. Locally common. Cogan Moors!
- H. MURINUM L. Glareal. Locally common. About Cardiff!
- H. MARINUM L. Littoral. Rare. The Leys!
- *H. JUBATUM L. Adventive. Appearing yearly, waste ground and marshes near Splott!
- ELYMUS ARENARIUS L. Littoral. Swansea, Moggridge, etc.
- JUNIPERUS COMMUNIS L. Ericetal, local. Sea cliffs, etc, Gower!

- TAXUS BACCATA L. Sylvestral. Locally common. Limestone at Cwrt-yr-ala, etc.!
- PINUS SYLVESTRIS L. Ericetal. Native on hills near Aberdare, *J.B. Supp.*, 58, 1907; perhaps Cwrt-yr-ala!
- *P. PINASTER Ait. Planted, Blackpill, etc., *J.B. Supp.*, 86, 1907.
- *LARIX DECIDUA Mill. Planted in wood near Merthyr Mawr!, *J.B. Supp.*, 86, 1907.
- EQUISETUM MAXIMUM Lam. Uliginal, etc. Locally common. Llandough!, etc.
- b. SEROTINUM Braun. Llandough!, *B.E.C.*, 755, 1922.
- E. ARVENSE L. Agrestal, etc. Common!
- b. NEMOROSUM Braun. Parkmill, etc., *J.B. Supp.*, 72, 1907.
- E. SYLVATICUM L. Sylvestral. Scarce. Pendoylan, etc.!
- b. CAPILLARE Hoffm. Cefn On, *Fl. Glam.*, 192.
- E. LIMOSUM L. Paludal. Locally common. Sant-y-nil, etc.!
- b. FLUVIATILE (L.). "Thinly scattered throughout county," *J.B. Supp.*, 72, 1907.
- E. PALUSTRE L. Paludal. Common. Kenfig Dunes, etc.!
- b. POLYSTACHYUM Weig. Crumlin Burrows, *J.B. Supp.*, 72, 1907.
- c. NUDUM Duby. Crumlin Burrows, *J.B. Supp.*, 72, 1907.
- E. HYEMALE L. Rare. Railway bank, Llanishen!, *B.E.C.*, 425, 1927.
- E. VARIEGATUM (Schleich.) Weber. Paludal, local. Crumlin Burrows, etc.!
- CRYPTOGRAMMA CRISPA Br. Rupestral. Rare. Mynydd Mayo!, etc.
- EUPTERIS AQUILINA (L.) Newm. Ericetal. Common!
- ADIANTUM CAPILLUS-VENERIS L. Rare. Damp lias cliffs by the sea!
- BLECHNUM SPICANT (L.) With. Ericetal, etc. Common!
- PHYLLITIS SCOLOPENDRIUM (L.) Newm. Rupestral, Sylvestral. Common!
- ASPLENIUM MARINUM L. Maritime rocks, Gower, etc.!
- A. TRICHOMANES L. Rupestral. Common!
- A. VIRIDE Huds. Rupestral. Rare. Morlais Castle, etc.!
- A. LANCEOLATUM Huds. Rupestral. Rare. Near Pontypridd, Hb. U.C., *Fl. Glam.*, 187, etc.
- A. ADIANTUM-NIGRUM L. Rupestral. Locally common. Caerphilly, etc.!
- A. RUTA-MURARIA L. Rupestral. Common!
- ATHYRIUM FILIX-FOEMINA (L.) Roth. Sylvestral. Common!
- b. ERECTUM Syme. Crumlin Bog, etc., *J.B. Supp.*, 71, 1907.
- c. INCISUM Newm. Aberpergwm, *J.B. Supp.*, 71, 1907.
- POLYSTICHUM SETIFERUM (Forsk.) Woynar. Sylvestral. Locally common. Thornhill!, etc.
- P. LOBATUM (Huds.) Woynar. Sylvestral. Locally common. Castell Coch, etc.!
- b. CAMBRICUM (S. F. Gray). Vale of Neath, etc.!
- (P. LONCHITIS (L.) Roth. Records, *T.B.*, etc., doubtless refer to b. *cambricum*).

- DRYOPTERIS FILIX-MAS (L.) Schott. Sylvestral. Common!
 b. AFFINIS NEWM. Garth Wood, etc., *J.B. Supp.*, 71, 1907.
 c. PALEACEA (Don) Dr. Morlais Castle!, etc.
- D. SPINULOSA Kuntze. Sylvestral. Rare. Ystradowen, etc.!
 b. DECIPIENS (Syne) Dr. Radyr, *J.B.*, 411, 1909.
- D. ARISTATA (Vill.) Dr. Sylvestral. Common!
 b. TANACETIFOLIA (Lam. & DC.) Dr. Radyr, *J.B.*, 411, 1909.
 c. ALPINA (Moore) Dr. Mountain above Nantymoel!, teste Alston.
- D. AEMULA Kuntze. Sylvestral. Dimbath Valley!
- D. OREOPTERIS (Ehrh.) Maxon. Ericetal. Locally common. Mynydd-y-glew, etc.
- D. THELYPTERIS (L.) A. Gray. Uliginal. Rare. Singleton Bog!, etc.
- D. PHEGPTERIS (L.) Christ. Rupestral, local. Draethen, etc.
- D. ROBERTIANA (Hoffm.) Christ. Limestone rocks, rare. Morlais Castle!, etc.
- PHEGPTERIS DRYOPTERIS Fée. Sylvestral, local. Craig-y-Llyn, *Fl. Glam.*, 190.
- CYSTOPTERIS FILIX-FRAGILIS (L.) Bernh. Rupestral, local. Morlais Castle, etc.
- b. DENTATA (Hook.). Kilvey Hill, Gutch, etc.
- POLYPODIUM VULGARE L. Rupestral. Common!
- b. SERRATUM Milde. Leckwith wood, etc.
- c. CAMBRICUM Lightf. Near Dinas Powis!
- CETERACH OFFICINARUM DC., em. Willd. Rupestral. Common!
- b. CRENATUM Milde. Aberdare, etc., *J.B. Supp.*, 71, 1907.
- HYMENOPHYLLUM TUNBRIGENSE (L.) Sm. Rupestral. Rare. Dimbath Valley!, etc.
- H. PELTATUM Desv. Rupestral. Scarce. Dimbath Valley!, etc.
- OSMUNDA REGALIS L. Paludal, local. Gower, etc.
- BOTRYCHIUM LUNARIA (L.) Sw. Ericetal. Scarce. Newton Burrows, etc.
- OPHIOGLOSSUM VULGATUM L. Pratal. Locally common. Southern-down, etc.
- b. POLYPHYLLUM Braun. Whitford Burrows, fide E. F. Linton.
- PILULARIA GLOBULIFERA L. Uliginal. Rare. Mynydd-y-glew!
- ISOETES LACUSTRIS L. Lacustral. Rare. Llynfach, etc., *Fl. Glam.*, 193, etc.
- I. ECHINOSPORA Durieu. Lacustral. Rare. Llynfawr!
 (LYCOPIDIUM ALPINUM L. Near Swansea, Moggridge, etc., Glam.?)
- L. CLAVATUM L. Ericetal. Near Swansea, Dillwyn.
- L. SELAGO L. Ericetal. Rare. Hills above Nantymoel!, etc.
 (SELAGINELLA SELAGINOIDES (L.) Link. Mountains near Glyn Corrwg, etc., *Fl. J.S.*, 103).
- NITELLA OPACA Ag. Lacustral. Rare. Clyne Common, *J.B.*, 377, etc., 1886.
- N. FLEXILIS Ag. Lacustral. Rare. Mynydd-y-glew!, *B.E.C.*, 144, 1926.

- TOLYPELLA GLOMERATA Leonh. Lacustral. Rare. Crumlin Burrows, *J.B.*, 377, 1886.
- CHARA VULGARIS L. Lacustral. Locally common. Cogan marshes, etc.!
- b. LONGIBRACTEATA Kuetz. Porthcawl sands, *J.B. Supp.*, 73, 1907.
- c. PAPILLATA Wallr. Porthcawl sands, *J.B. Supp.*, 73, 1907.
- (C. HISPIDA L. Lacustral. Crumlin Bog, *B.G.*.)
- C. CONTRARIA Kuetz. Lacustral. Oxwich, H. & J. Groves, etc.
- C. ASPERA Willd. Lacustral. Locally common. Kenfig Pool!, etc., teste W. H. Pearsall.
- b. LACUSTRIS H. & J. Gr. Kenfig Pool!, teste W. H. Pearsall.
- C. FRAGILIS Desv. Lacustral. Locally common. Oxwich, etc.!
- C. DELICATULA Ag. Lacustral. Rare. Welsh St Donats, etc., *J.B. Supp.*, 73, 1907.

HYBRIDS.

- RANUNCULUS LENORMANDI F. Schultz × LUTARIUS? Rhossili, *J.B. Supp.*, 5, 1907.
- VIOLA SILVESTRIS Lam. × RIVINIANA = INTERMEDIA Reichb. Taffs Well, etc., *J.B. Supp.*, 13, 1907.
- V. CANINA L., b. ERICETORUM Reichb. × LACTEA = PUMILIFORMIS R. & F. Gower!, teste Mrs Gregory.
- V. CANINA L. × RIVINIANA. Llanharry!, teste P. M. Hall.
- V. EPIPSILA Ledeb. × PALUSTRIS. Caerphilly!, teste Mrs Gregory.
- LYCHNIS ALBA Mill. × DIOICA = INTERMEDIA (Schur). Grangetown!, teste Dr Druce, *B.E.C.*, 567, 1927.
- L. DIOICA L. × PRESLIi = TROWERIAE Dr. Natural hybrid in garden at Ely Garden City.
- RUBUS CAESIUS L. × RUSTICANUS. Probably frequent. Whitford Burrows, etc., *J.B.*, 94, 1906.
- R. VESTITUS W. & N. × RUSTICANUS. Langland Bay, etc., *J.B.*, 94, 1906.
- POTENTILLA PROCUMBENS × REPTANS = MIXTA Nolte. Penarth, *Fl. Glam.*, 60.
- P. ERECTA (L.) Hampe × PROCUMBENS = SUBERECTA Zimm. Llanharry, *Fl. Glam.*, 60.
- P. ERECTA (L.) Hampe × REPTANS = ITALICA Lehm. Caerphilly Mountain!
- GEUM RIVALE L. × URBANUM = INTERMEDIUM Ehrh. Near Coedryglan, etc., *Fl. Glam.*, 59.
- EPILOBIUM HIRSUTUM L. × MONTANUM = ANGLICUM E. S. Marshall. Cathays, Cardiff!, teste Dr Druce.
- E. HIRSUTUM L. × PARVIFLORUM = INTERMEDIUM Reichb. Cardiff!, *Fl. Glam.*, 69.
- E. PARVIFLORUM Schreb. × ROSEUM = GORZII Rubn. Aberdare, *J.B. Supp.*, 31, 1907.
- E. OBSCURUM Schreb. × PALUSTRE = SCHMIDTIANUM Rostk. Probably this, Oxwich, *J.B. Supp.*, 31, 1907.

- E. OBSCURUM Schreb. × TETRAGONUM = THURINGIACUM Haussk. Aberdare, *J.B. Supp.*, 31, 1907.
- E. MONTANUM L. × OBSCURUM = AGGREGATUM Celak. Swansea, *J.B.*, 297, 1892.
- E. MONTANUM L. × PARVIFLORUM = LIMOSUM Schur. Near Cardiff!, teste G. M. Ash.
- E. MONTANUM L. × ROSEUM = HETEROCAULE Borbas. Swansea, *J.B.*, 297, 1892.
- SENECIO SQUALIDUS L. × VULGARIS, c. ERECTUS. Cathays Park, Cardiff, *Fl. Glam.*, 93.
- CARDUS ACANTHODES L., b. CRISPUS (L.) × NUTANS = NEWBOULDII (Wats.). Llantwit Major, *J.B. Supp.*, 39, 1907.
- CIRSIUM ACAULE (L.) Weber × PRATENSE = WOODWARDII (Wats.). Cardiff Docks, *J.B. Supp.*, 39, 1907.
- C. ARVENSE (L.) Scop. × PALUSTRE. Penylan!, *B.E.C.*, 118, 1926.
- C. TUBEROSUM (L.) All. × PALUSTRE. Nash, *J.B.*, 16, 1933.
- LINARIA VULGARIS Mill. × REPENS = SEPTIUM (Allm.). Grangetown, persisting.
- THYMUS PULEGIODES L. × PYCNOTRICHUS = HENRYI Ronn. Glyn Neath, *B.E.C.*, 510, 1927.
- CHENOPODIUM ALBUM L. × OPULIFOLIUM = PREISMANNI Murr. Barry, *B.E.C.*, 415, 1927.
- SALICORNIA HERBACEA × RAMOSISSIMA Moss & Salisb. Llanmadoc, *J.B. Supp.*, 54, 1907.
- (S. HERBACEA × PUSILLA Moss & Salisb. = INTERMEDIA. Apparently this, Wood, Llanmadoc, *J.B. Supp.*, 54, 1907).
- RUMEX CRISPUS L. × OBTUSIFOLIUS = ACUTUS L. Llandough, *Fl. Glam.*, 138.
- EUPHORBIA PARALIAS L. × PORTLANDICA. Apparently this, Margam Moors, *J.B. Supp.*, 56, 1907.
- SALIX TRIANDRA L. × VIMINALIS = HIPPOPHAEFOLIA Thuill. Near Pyle, *J.B.*, 250, 1902.
- S. TRIANDRA L. × VIMINALIS, b. TREVIRANI (Sprengel). Ely Bridge!, teste J. Fraser.
- S. CAPREA L. × ATROCINEREA = REICHARDTII A. Kern. Aberdare, *J.B. Supp.*, 57, 1907.
- S. CAPREA L. × REPENS = LASCHIANA Reisl. & Brand. Whitford Burrows, *Fl. Glam.*, 144.
- S. AURITA L. × CAPREA = CAPREOLA J. Kern. Whitchurch, *J.B.*, 408, 1909.
- S. ATROCINEREA Brot. × AURITA = LUTESCENS A. Kern. Penylan!, teste J. Fraser.
- S. AURITA L. × REPENS = AMBIGUA (Ehrh.). Cwmbach, Aberdare, *B.E.C.*, 124, 1911.
- S. AURITA L. × VIMINALIS = FRUTICOSA Döll. Aberdare, *B.E.C.*, 124, 1911.
- S. ATROCINEREA Brot. × PURPUREA = SORDIDA Kern. Taffs Well, *J.B. Supp.*, 57, 1907.

- S. ANDERSONIANA Sm. × ATROCINEREA = STREPIDA Forbes. Aberdare,
J.B. Supp., 57, 1907.
- JUNCUS EFFUSUS L. × INELEXUS = DIFFUSUS Hoppe. Crumlin Bog, *J.B.*,
297, 1892.
- CAREX ACUTIFORMIS Ehrh. × RIPARIA. Fairwater, *J.B.*, 410, 1909.
- C. FLAVA L. × FULVA = XANTHOCARPA Dégl. Ystradowen!, teste A. Ben-
nett.
- C. ELATA All. × GOODENOWII. Flemingstone Moors, *J.B. Supp.*, 65,
1907.
- C. ELATA All. × GRACILIS. Flemingstone Moors, *J.B. Supp.*, 65, 1907.
- C. GOODENOWII Gay × GRACILIS. Crumlin Bog, *J.B. Supp.*, 65, 1907.
- GLYCERIA FLUITANS × Plicata = PEDICILLATA. Whitchurch!, teste Dr
Butcher.
- TRITICUM JUNCEUM Beauv. × REPENS = HACKELLII Dr. Margam Moors!,
teste Dr Druce.
- LOLIUM TEMULENTUM L. × PERENNE. Cardiff, teste W. O. Howarth.

CORRECTIONS AND ADDITIONS—REPORT 1932.

- p. 89. 55/1. Fresh should be French.
- p. 131. 600/12. For *dolicophyllum* read *dolichophyllum*.
- p. 208. Bottom. Miss E. M. Harding should be Harting.
- p. 400. GUERNSEY. Correct figures as follow:—Five Maps, Flowering Plants 828, Ferns and allies 29, Mosses 156, Hepaticæ 41, Fungi 624, Lichens 334, Algæ 641.
SUPPLEMENT to above, M. A. McCrae, 1923, published in Transactions of the Guernsey Society.
- LESSER CHANNEL ISLES.
Delete lines 2 and 3 (Alderney. Brechou, etc.). These are included in the above Supplement, 1923.
- p. 401. DEVONSHIRE.
Amend first line; "No recent Flora. One is contemplated by The Devonshire Association."
Line 17 from bottom of page. Amend, "Rep. Devon Ass., 1917 et seq." From 1926-1932 edited by Mr G. T. Harris.
Add to list—The Botany chapter in the Victoria History of Devon, vol. i, pp. 55-130, 1906.
Devon Botany—Presidential Address by Mr W. P. Hiern, Trans. Devon Association, 1917.
A New List of the flowering plants and ferns growing wild in the county of Devon by T. F. Ravenshaw, 1860, and second ed. with suppl., 1872.
Handbook of the Torquay Flora, Robert Stewart, 1860.
Manual of the Flora of Torquay, Miss C. E. Larter, 1900.
Flora Sidostiensis, Cullen, 1849.
Braunton, Dr F. R. Elliston Wright, revised edition, 1932.
- p. 415. NORTHUMBERLAND.
(Add) Notes on plants found in the district worked by the Berwickshire Naturalists' Club. By A. H. Evans, M.A. Vol. xxiii, 217-235. Neill & Co., Edinburgh, 1917. (See Berwickshire, p. 418, line 3.)

MEMBERS' NAMES OR ADDRESSES.

- p. 5. G. Goode, M.A. Should have been under CORRESPONDING MEMBERS.

- p. 7. R. W. Butcher, B.Sc., Ph.D., F.L.S., 12 St James' Terrace,
Winchester.
- p. 7. H. N. Chamberlaine-Brothers, Batchcote Hall, Leebotwood,
Shropshire.
- p. 8. A. E. Ellis, M.A., F.L.S., Epsom College, Surrey.
- p. 11. E. Milne-Redhead, M.A., The Herbarium, Kew.
- p. 13. G. R. A. Short, 36 Parkside Drive, Edgware, Middlesex.
- p. 14. National Museum of Wales, Cardiff (H. A. Hyde, M.A., F.L.S.,
Keeper of the Department of Botany).

