

UNIVERSITY OF  
BIRMINGHAM  
BIOSCIENCES  
THE GATEWAY  
SABREMOURRY

THE BOTANICAL SOCIETY  
AND EXCHANGE CLUB  
OF THE BRITISH ISLES.

(VOL. X. PART V).

Victoria Regina.



Floreat flora.

REPORT FOR 1934

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, 1935, to the Assistant Secretary, Mr JOHN F. G. CHAPPLE, Yardley Lodge, 9 Crick Road, Oxford.

Exchange Club Parcels for 1935 should be sent, post paid, on or before 2nd December 1935, to

A. B. JACKSON, Esq., A.L.S.,

THE HERBARIUM, BRITISH MUSEUM (NATURAL HISTORY),  
CROMWELL ROAD, LONDON, S.W.7.

who will act as Distributor and Editor of the Distributor's Report (Vol. XI. Part II.).

PRINTED BY T. BUNCLE & Co., ARBROATH.  
JUNE 1935.

PRICE, 10s.

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# THE BOTANICAL SOCIETY AND EXCHANGE CLUB OF THE BRITISH ISLES.

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VOL. X. 1932-34.

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*Distributors and Editors of Reports, as under :—*

1932	1933, Aug.,	...	THE SECRETARY.	Part i.
1932	1933, Aug.,	...	Dr W. A. SLEDGE.	Part ii.
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*Secretary :*

WILLIAM HARRISON PEARSALL,  
Green Gable, Matfield, Kent.

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**Price of 6 Parts, 42s ; to Members, 32s.**



THE  
BOTANICAL SOCIETY & EXCHANGE CLUB  
OF THE BRITISH ISLES.

BALANCE-SHEET FOR 1934.

Balance from Balance-Sheet for 1933, - -	£206	2	3	Printing Reports (and carriages, &c., connected),	£204	11	11
Less Subscriptions paid in advance, - - - - -	68	4	0	Expenses of Distribution, -	2	0	3
	£137	18	3	Postages and Petty Expenditure generally (Secy. and Ass. Secy.), -	2	6	9
Subscriptions for 1934, -	234	19	0	One Year's Allowance to Secretary, -	50	0	0
Subscriptions paid in advance in 1934, - - -	33	3	0	Honorarium to Ass. Secy.,	10	0	0
Sales of Reports, Reprints, and Advertisements, -	10	14	8	Insurance, -	-	0	6
	£416	14	11	Balance, - - - - -	125	10	0
	£416	14	11		£416	14	11

PUBLICATIONS ACCOUNT.

Balance from Balance Sheet for 1933, -	£91	17	6	Balance, - - - - -	£104	9	6
Sales of Comital Flora, -	10	13	6		£104	9	6
Sales of Flora Northants, -	0	18	6		£104	9	6
Sales of British Plant Lists, -	1	0	0		£104	9	6
	£104	9	6		£104	9	6

BALANCES OF FUNDS.

Balance from General A/c.,	£125	10	0	National Savings Certificates, at cost,	£256	16	0
Balance from Publications Account, - - - - -	104	9	6	National Savings Certificates, at cost, -	143	4	0
Balance from Life Members' Fund, - - -	116	8	0	Cash in hand, - - -	3	18	11
Balance from Miss Trower's Fund, - - - - -	16	7	11		£403	18	11
Balance from Benevolent Fund, -	41	3	6		£403	18	11
	£403	18	11		£403	18	11

(Signed) R. C. M. CURTIS, *Honorary Treasurer.*  
,, JOHN CHAPPLE, *Assistant Secretary.*

1st February 1935. — Examined and found correct.

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

## SECRETARY'S REPORT.

**T**HIS Report completes vol. x, and covers what may be termed a transitional period in the Society's history. It is gratifying to note that notwithstanding the widespread cutting down of expenses which the times demand we are still in a sound financial position and our membership is well maintained. The number of new members since the issue of the last Report is 15, which exceeds the number (9) lost from various causes. Further evidence of progress is afforded by the fact that the number of sheets sent in for the annual Distribution shows an increase on the numbers contributed during recent years.

The Society has suffered serious loss during the past year in the passing of such capable systematists as T. J. Foggitt, J. Fraser and J. E. Little. The pages of our past and present Reports afford ample evidence of the extent of our indebtedness to them, but equally valuable was their readiness at all times to render kindly service to others out of the fulness of their special knowledge. Among foreign botanists who have served the Society may be mentioned Prof. Dahlstedt—the eminent authority on *Hieracium* and *Taraxacum*—who died on October 2nd, 1934. We also greatly regret the decease of Earl Buxton, who presided at our Conversazione in 1932 and has given much support to our members in many other directions.

We are pleased to report that the series of botanical excursions arranged for members during 1934 was an unqualified success and afforded very great interest and enjoyment to those who were able to attend. In response to many requests for their continuance, we are pleased to say that Mrs Gertrude Foggitt has again kindly undertaken the arrangement of a further series for 1935. Dates and particulars of these may be obtained upon application to the Secretary.

The General Committee met four times during the year and the Publications' Sub-Committee twice. The results of the deliberations of the latter were embodied in a draft set of Rules submitted to the Annual General Meeting on 27th March 1935. These were separately and collectively considered, in some cases slightly amended, and finally unanimously adopted as herein set forth.

The Annual General Meeting was held in the rooms of the Linnean Society and was very well attended. The Rt. Hon. Harold T. Baker, P.C., was again re-elected Chairman; Sir Roger Curtis, Bart., as Treasurer, and Mr W. H. Pearsall as Secretary. All the members of the General Committee were re-elected but in future they will retire by rotation in accordance with Rule 3 (d). The meeting concluded with an expression of our indebtedness to the Linnean Society for the use of the room.

In order to facilitate an earlier publication of our Reports, we should be glad to receive all plant Records by December 31st. As each record has to be card-indexed, it would save much time and labour if members would use the ruled cards (12.5 × 7.5 cm.) sold by stationers for this purpose, and on each write (1) the Oxford List number, (2) the name of the plant, (3) the locality, giving the vice-county, (4) any additional note of Scientific interest, (5) the collector's name. (Rule *two* lines under the name of the plant and also under that of the collector.) As regards MS., the latest date upon which any can be received is March 31st in each year. Members are invited to submit original papers or articles upon subjects of botanical interest. 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.

As in previous years, 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 or who have given ready and kindly help in other directions. We tender our sincerest thanks to the authorities of the Royal Botanic Gardens at Kew and to those of the British Museum at Cromwell Road. Among foreign botanists we are indebted to Prof. O. E. Schulz, Dr Gunnar Samuelsson, Dr B. Lindquist, Dr G. E. Du Rietz, Dr K. H. Osvald, Dr Johannes Lid and Prof. M. L. Fernald. We are deeply appreciative of the kindly offices of the following British botanists:— Mr J. Ramsbottom, Mr A. J. Wilmott, Mr Geo. Taylor, Mr A. B. Jackson, Mr J. S. L. Gilmour, Dr W. B. Turrill, Dr T. A. Sprague, Mr A. D. Cotton, Mr N. Y. Sandwith, Lt.-Col. A. H. Wolley-Dod, Mr E. B. Bishop, Rev. H. J. Riddelsdell, Mr W. C. Barton, Mr H. W. Pugsley, Mr W. O. Howarth, Mr P. M. Hall, Dr W. A. Sledge, the late Mr J. Fraser, Mr A. E. Wade, Mr C. E. Britton, Dr R. W. Butcher, Dr F. W. Stansfield, Mrs H. Drabble, Mrs Gertrude Foggitt, Lady Davy, Miss E. Vachell, Miss M. S. Campbell, and Miss G. Wigglesworth.

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#### NEW MEMBERS.

- Mr A. H. G. Alston, M.A., F.L.S., Dept. of Botany, Brit. Mus. (Nat. Hist.), Cromwell Road, London, S.W.7.  
 Mr F. A. Brokenshire, 2 Rock Avenue, Barnstaple, N. Devon.  
 Major J. W. Cardew, 38 Earlsfield Road, Hythe, Kent.  
 Dr H. L. Gauntlett, F.R.E.S., F.L.S., F.R.H.S., 37 Howard Lane, Putney, London, S.W.15.  
 Dr B. Millard Griffiths, F.L.S., University Science Laboratories, South Road, Durham.  
 Mrs B. Hassall, Hithercroft, Goodworth Clatford, Andover, Hants.  
 Mrs C. Moore Kennedy, c/o Westminster Bank, Bromley, Kent.  
 Dr J. Axel Nannfeldt, Botaniska Institutionem, Uppsala, Sweden.  
 Miss Alice Perrins, 33 Inverness Terrace, Bayswater, London, W.2.

Mr N. Y. Sandwith, M.A., The Herbarium, Royal Botanic Gardens,  
Kew, Surrey.

Mr F. Smalley, 5 Almond Grove, New Earswick, York.

Mr J. J. Stuart Edwards, Imperial Hotel, Exmouth, Devon.

Mr W. P. Winter, B.Sc., F.G.S., 6 Grange Avenue, Saltaire, Yorks.

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#### LOCAL SECRETARIES.

Those given in 1933 *Report*, p. 467, and the following additions:—  
Monmouthshire. A. E. Wade, F.L.S., Dept. of Botany, National  
Museum of Wales, Cardiff.

Northumberland and Durham. Geo. W. Temperley, 4 Selborne Avenue,  
Low Fell, Gateshead.

Moray and Banff. Rev. Geo. Birnie, The Manse, Speymouth, Fochabers,  
Morayshire.

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#### CHANGE OF ADDRESS OR TITLE.

\*The Manchester Museum, the University of Manchester.

Rev. W. Keble Martin, M.A., F.L.S., The Vicarage, Torrington, N.  
Devon.

Francis Druce, M.A., F.L.S., 60 Burton Court, London, S.W.3.

RULES OF THE BOTANICAL SOCIETY AND EXCHANGE CLUB  
OF THE BRITISH ISLES.

Draft submitted by Publications' Sub-Committee—as Amended and  
Approved by the Annual General Meeting of 27th March 1935.

1. NAME.

The name of the Society shall be The Botanical Society and Exchange Club of the British Isles.

2. OBJECTS.

The objects of the Society are:—

- i. To stimulate the study of the Flowering Plants and Vascular Cryptogams of the British Isles.
- ii. To facilitate intercourse between British Botanists for the exchange both of ideas and of dried material of critical species.
- iii. To aid in the maintenance of adequate representative collections of British Plants in the National Herbaria.
- iv. To support the aims of the Wild Plant Conservation Board for the protection of the British Flora.
- v. To organise botanical excursions.

3. OFFICERS OF THE SOCIETY.

- (a) The management of the affairs of the Society shall be in the hands of a Committee.
- (b) *The Committee* shall consist of the Chairman, Vice-Chairman, Honorary Secretary, Honorary Treasurer, and sixteen elected members.
- (c) *The Chairman and Vice-Chairman* shall be elected annually at the Annual General Meeting, and shall be eligible for re-election.
- (d) *The elected members of the Committee* shall be elected at the Annual General Meeting; four of the elected members shall retire every year by rotation, and shall not be eligible for re-election until the expiration of a year.
- (e) *The Honorary Secretary and Honorary Treasurer* shall be elected annually at the Annual General Meeting, but shall be eligible for re-election.

4. MEMBERSHIP.

- (a) Membership of the Society is open to all botanists upon payment of ten shillings, which shall entitle them to the privileges of membership until the succeeding 31st day of December.
- (b) Candidates for membership shall obtain from the Honorary Secretary a copy of the Rules of the Society and sign a Form of Declaration of their willingness to support the objects of the Society and to accept the responsibilities and privileges of membership.

**5. HONORARY AND CORRESPONDING MEMBERS.**

Distinguished Foreign Botanists, who are not members of the Society, may be elected Honorary Members of the Society on the recommendation of the Committee at the Annual General Meeting. Distinguished British Botanists may, in the same way, be elected Corresponding Members. Such Honorary and Corresponding Members shall enjoy all the privileges of membership.

**6. ANNUAL SUBSCRIPTIONS.**

- (a) Annual subscriptions shall be Ten Shillings per annum for ordinary members and £1 per annum for exchange members.
- (b) Annual subscriptions shall become payable upon the first day of January in every year.
- (c) Notice shall be given to every member of his subscription being due.
- (d) Any member whose subscription shall be in arrear for two years on the first day of January in any year shall cease to be a member.

**7. LIFE MEMBERSHIP.**

Life membership may be compounded in one payment of £7 in the case of ordinary members and £12 in the case of exchange members.

**8. PRIVILEGES OF MEMBERSHIP.**

Each member of the Society shall enjoy the following privileges:—

- (a) To receive one copy of the Honorary Secretary's Report and one copy of the Distributor's Report every year.
- (b) To submit Plants for naming to the Honorary Secretary (return postages on parcels being prepaid by the sender).
- (c) To consult the Officers and Official Referees of the Society upon any question affecting British Botany.
- (d) To submit papers and notes for inclusion in the Annual Report.
- (e) To attend, and vote at, all meetings of the Society.

**9. PRIVILEGES OF EXCHANGE MEMBERS.**

In addition to all the privileges of ordinary members, exchange members shall also have the following privileges:—

- (a) To receive two additional (*i.e.*, 3 in all) copies of the Distributor's Report every year.
- (b) To contribute parcels of dried plants and participate in the annual Exchange Distribution, which will be conducted in accordance with such regulations as the Committee may from time to time direct.
- (c) Copies of the Regulations of the Exchange Distribution may be obtained free of charge from the Honorary Secretary.

**10. RESIGNATION.**

Any member wishing to resign from his membership shall give written notice to the Honorary Secretary before the first day of December in any year of his intention to resign, failing which he shall be liable for the payment of his subscription for the ensuing year.

**11. EXPULSION FROM MEMBERSHIP.**

If it be proved at any time to the satisfaction of the Committee that any member has acted in any way contrary to the objects or derogatory to the interests of the Society, the Committee shall make a report on the matter to the next Annual or Special General Meeting; on a vote of not less than two-thirds of the members present at such meeting in favour of expulsion, the member concerned shall cease to be a member of the Society and shall forfeit all claim upon the Society and its funds; he may, however, be subsequently reinstated, but only by ballot of the members present at an Annual General Meeting.

**12. HONORARY SECRETARY.**

- (a) The Honorary Secretary, in addition to his ordinary secretarial duties, shall act as the Editor of the Annual Report of the Society, under the supervision of an Editorial (Publications) Sub-Committee appointed by the Committee.
- (b) The Honorary Secretary shall be entitled to such honorarium for his services as may upon the recommendation of the Committee be voted at the Annual General Meeting.

**13. FINANCES OF THE SOCIETY.**

- (a) The funds of the Society shall be nominally vested in the Chairman and Honorary Treasurer for the time being.
- (b) The Committee shall have power to adopt such financial measures as may seem to them to be expedient in the interests of the Society.
- (c) A member of the Society shall act as Honorary Auditor, and the annual accounts, having been audited by him, shall be approved by the Committee before presentation to the Annual General Meeting.

**14. CHAIRMANSHIP.**

At all Committee and General Meetings the Chair shall be taken by the Chairman, or in his absence by the Vice-Chairman. In the absence of both, the Chair shall be taken by a member of Committee elected by the meeting.

**15. MEETINGS OF THE COMMITTEE.**

- (a) The Honorary Secretary shall be authorised to call a meeting of the Committee upon the written request of the Chairman or of not fewer than three members of the Committee.
- (b) A quorum at a meeting of the Committee shall consist of five members.
- (c) The Committee shall have power to add to their numbers not more than four co-opted members, who shall be members of the Society. Such members shall serve until the following Annual General Meeting, but shall then be eligible for election to the Committee.

## 16. ANNUAL GENERAL MEETING.

- (a) The Annual General Meeting of the Society shall be held in March in each year at such time and place as the Committee shall direct.
- (b) A quorum shall consist of seven members.
- (c) Voting shall be conducted by show of hands, but on the ruling of the Chairman, or on the demand of not fewer than five members present, voting shall be by ballot.

## 17. SPECIAL GENERAL MEETINGS.

- (a) The Honorary Secretary shall, by direction of the Committee, or at the written request of not fewer than seven members, call a Special General Meeting of the Society for the consideration of any business of interest to the Society.
- (b) A quorum shall consist of seven members.
- (c) Voting shall be conducted by show of hands, but on the ruling of the Chairman, or on the demand of five members present, voting shall be by ballot.

## 18. NOTICES OF MEETINGS AND EXCURSIONS.

Notice of the Annual and Special General Meetings, and the agenda of such meetings, shall be sent to every member by post at least 14 days before the date of the meeting. The programme of excursions shall be sent to all members at the beginning of each season. Notices to members shall be sent by post to their last known address.

## 19. CASTING VOTE OF CHAIRMAN.

When there is equality of votes at any Committee, Annual, or Special General Meeting, the Chairman shall have a second or casting vote.

## 20. ALTERATION OF RULES.

No rule shall be made or altered except at the Annual General Meeting, and then only after 28 days' notice has previously been given in writing to the Honorary Secretary, in order that he may give 14 days' notice to all members of the Society of the proposed addition or alteration to the Rules.

## 21. PROCEEDINGS OF MEETINGS.

The proceedings of all General Meetings shall be recorded in the Secretary's Annual Report.

## 22. CITATION OF ANNUAL REPORT.

The title of the Society's Annual Report shall be abbreviated for citation as follows:—B.E.C. 1932 Rep. 123 (1933), referring to p. 123 of the Report for 1932 published in 1933.

## 23. REFEREES.

The Committee shall prepare from time to time a list of Referees to whom it is recommended that critical groups of plants or special plants should be submitted for naming.

## PLANT NOTES FOR 1934.

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54/22. *BRASSICA ADPRESSA* Boiss. The abundance of this species in and around the village of Glynde, Sussex, has long been a puzzle to botanists, but casual conversation with an old inhabitant recently revealed the following facts. There is a large chalk pit near the station which seems to be the spot whence the plant has spread. In addition to burning and sending out lime as manure, the owners at one time imported from Russia and Germany blocks of lightly pressed Rape Cake which were ground and also sent out as manure. It was after a consignment had been dealt with about fifty years ago that the plant was first noticed, and it seems that the workmen afterwards knew it as "German Cress." On enquiry, the owner of the works vouches for these facts and adds that the late Mr J. H. A. Jenner—a well-known Sussex botanist—thought that they almost undoubtedly explained the original appearance of the plant.—K. PICKARD.

153/2. *MEDICAGO VARIA* Martyn in East Norfolk (v.-c. 27). This note supplements J. S. L. Gilmour's paper on *Medicago sativa* × *falcata* hybrids in *B.E.C.*, x, Pt. 1, 393-395. *M. falcata* has existed on the denes at Great Yarmouth for more than a century. In 1929 several hundred plants were examined on the north denes, all typical *falcata*; no trace of hybridism was found. In 1933 the colony, which had become reduced to about sixty plants through the encroachment of town building, produced one specimen of *M. varia*. In July 1934 several clumps of *falcata* and variously coloured forms intermediate between it and *sativa* were noticed on the south denes. At Eaton and Keswick, near Norwich, three patches of *M. varia* were thriving in 1932, the flowers being clear yellow, yellow fading green, purple or purple fading green; no typical *falcata* could be discovered in the neighbourhood. These flowers were immersed in weak acid and alkaline solutions in order to obtain some indication of anthocyanin or other pigment reaction, with the following result. Light purple flowers became red when placed in acid, but changed through blue and green to yellow in the alkali. Clear yellow flowers, on the other hand, showed no change when tested either way; but wherever there was a slight tinge of green or purple, response was forthcoming. Normally purple *sativa* was found to turn yellow with alkaline treatment, but *falcata*'s yellow remained unaltered. Therefore two types of colour factor must be present in the group, one an anthocyanin. *M. falcata* at Yarmouth was a much deeper yellow than any yellow forms of *varia*.—E. A. ELLIS.

185/40(3). ✕**RUBUS GLANDULIGER** spec. nov. *Turio* arcuatus sulcatus glaucescens subglaber, glandulis rarissimis obsitus; aculei inaequales mediocres e basi compressa recti vel declinati, secundum angulos plerique omnes dispositi. *Folia* quinata digitata; petiolus petiolulique canaliculati purpurei, aculeis parvis aduncis armati; stipulae latiusculae rubrae glandulosae. *Foliola* omnia convexa longe acuminata saepe deorsum angustata haud contigua, supra glabrescentia subtus primo appresse pilosa dein glabra; *terminale* ovale saepe in basin truncatam contractum, inaequaliter vix duplicato-dentatum; petioluli infimi 2-4 mm. longi. *Ramus* flexuosus angulatus laxe pilosus aculeis parvis deflexis armatus. *Panicula* brevis sat ampla, inferne interrupta superne efoliosa omni parte glandulis inconspicuis aspersa; ramuli superiores cymosi vel interdum hemicymosi, pedicelli longi divaricati. *Petala* alba obovata in flore expanso remota. *Sepala* canescenti-virentia laxe pilosa, appendiculata post anthesin patula vel parum erecta. *Stamina* stylos superantia demum conniventia. *Fructus* oblongi e drupeolis numerosis compositi. *Carpophorum* laxe pilosum.

Type specimen in Hb. Watson, West Lavington, W. Sussex, collected in August 1932.

Frequent on the commons and in the hedges and woods at and around Midhurst, Petworth and Bognor, W. Sussex.—WM. WATSON.

185/98(2). ✕**R. TARDUS** spec. nov. *Turio* arcuato-procumbens vel scandens obtusangulus striatus glabrescens inaequaliter glandulosus glanduloso-setosusque, aculeis interdum glanduliferis e basi tumida declinatis falcatisve confluentibus praeterea aculeolis tuberculatis armatus. *Folia* quinata, petioli longi villosi, stipulae lineari-lanceolatae; foliola parvula plicata margine undulata subduplicato-dentata, subtus cano-vel albo-tomentosa velutina ad nervos pilosa; *terminale* obovato-cuneatum basi integrum; infima 3-5 mm. petiolulata. *Ramus* angulatus inferne pilosus superne pubescenti-tomentosus. *Inflorescentia* subpyramidalis inferne interrupta superne angustata flore subsessili terminata, aculeis mediocribus rectis glandulisque inaequalibus in setis glanduliferis transeuntibus instructa. *Sepala* extus cano-virentia rubro-aculeata glandulosa vix appendiculata post anthesin patula. *Petala* roseola elliptica vel obovata, magna. *Stamina* alba, longa. *Styli* jam ante florem expansum rubentes. *Fructus* tarde et sero maturantur.

Type specimen in Hb. Watson, ex Hayes Common, W. Kent.

Synonym: *R. Griffithianus*, subsp. *tardus* Wm. Watson, in *London Naturalist*, 1932, p. 62, excluding the Mortimer Common specimens, which are *R. Lejeunei* Weihe type.

Distribution: Bostal Heath, Hayes Common, Farnborough Common, W. Kent; Putney Heath, Mitcham Common, Surrey.—WM. WATSON.

266/1. **AETHUSA CYNAPIUM** L. An interesting abnormal form of this species was gathered near Cheadle Hulme, Cheshire, by Mr J. W.

Hartley. Some of its umbellules had the normal 2-3 long linear undivided reflexed bracteoles at their bases but those on the shorter central rays of the umbel possessed large ternate foliaceous bracteoles 2.5-3.0 cm. in length and having pinnate lobed segments. Otherwise the flowers, fruits and foliage were quite of the usual type.

539/1b. ✱*LIMOSELLA SUBULATA* Ives. Dr Glück considers the plant known in England as *Limosella aquatica*, var. *tenuifolia*, to be a distinct species *L. subulata* Ives. It differs from *L. aquatica* in having all its leaves subulate or cylindrical and its style  $1\frac{1}{2}$ -2 times longer than the ovary. In *L. aquatica* the leaves are normally longly petiolate with a lamina distinct. They are only subulate in very young or submersed plants. The style is shorter than the ovary— $\frac{2}{3}$  to  $\frac{1}{2}$  its length.

558/3b. *MENTHA NEMOROSA* Willd. and sub-species. (Abstract from *Bot. Közlemenyek*, xxx, 1933, 1, R. Trautmann.) The author considers *M. nemorosa* Willd. to be a good species, ranking with *M. rotundifolia*, *M. longifolia*, and *M. spicata*. He bases his opinion on the collective importance of several characters:—

- (i) The obovate shape, sharp serratures, and long acuminate points of the uppermost pair of stem-leaves.
- (ii) The thin texture of the leaves, especially in dried specimens.
- (iii) The simple venation and absence of felting on the underside.
- (iv) The absolute fertility and readiness to hybridise with Mints from other groups.
- (v) The facts of distribution, *M. nemorosa* belonging mainly to Central and Northern Europe, while *M. rotundifolia* extends rather in a S. and W. direction and towards the coast. *M. nemorosa* may perhaps be regarded as replacing *M. rotundifolia* in the Northern regions.

The author attaches great importance to the shape of the uppermost pair of stem leaves. These are widest in the distal half, and are more deeply and sharply serrate than the lower leaves, with a long entire acuminate point. He agrees with Sagorski and Osswald (*Mittl. des Thuring. Bot. Verein.*, 1910) in rejecting the idea that *M. nemorosa* Willd. is a hybrid of *M. rotundifolia* with *M. longifolia* or *M. spicata*, on the ground that none of these Mints shows the constant characteristic shape of the leaves above referred to; and also on consideration of texture and venation.

#### *Author's Description.*

Plant 30-100 cm. high, more or less branched, middle stem leaves medium to large, rounded or oblong, often slightly obovate, acute to acuminate, narrowed to the base, rounded and cordate, sessile or shortly petiolate; bright or dull green above, sparsely and shortly hairy; glaucous or silvery-green below and more or less tomentose, veins not sunken nor reticulate, margins sharply and coarsely serrate. Upper stem-leaves definitely obovate, with long acute point, similar to the

with var. *pseudo-fluitans* Syme." The original descriptions of these three forms are: *P. oblongus*, f. *angustifolius* Fries, Novit. Fl. Suec., ed. ii, 30 (1828), "*foliis natantibus lanceolatis, nervis subtus immersis, quae fluviatilis.*" Fryer expresses a very general opinion when he says (*Pots. Brit. Isles*, 20) that he does not understand this description. It is so brief and vague as to be of little use in the determination of forms and is now commonly discarded. *P. oblongus*, f. *lancifolius* Chamisso & Schlechtendal, *Linnaea* ii, 215 (1827), "*Major, caulis bipedalis, folia coriacea, 4 poll. longa, 9 lin. lata, fluitantia immersa membranacea 4 poll. sunt longa, 6 lin. lata.—Minor, abbreviatus, folia sesquipollicaria, 5-8 lin. lata. In fossis aqua haud profunda. In aqua profundiore reperiuntur specimina circiter pedalia, petiolis inferioribus longissimis ad 9 poll. usque longis. Majora fluitantia specimina utriusque formae non vidimus fructifera, inde nonnihil dubia.*" A very free translation shows that the authors included two forms under their f. *lancifolius*—a larger, with a stem 2 ft. long, floating leaves coriaceous, 4 in.  $\times$   $\frac{3}{4}$  in. (10  $\times$  2 cm.) and submersed leaves of the same length but only  $\frac{1}{2}$  in. (12 mm.) wide; and a smaller, with fl. ls. half as long again, 6 in. (15 cm.) and from 10-16 mm. wide. Both are found in water by no means deep. In deeper water are found specimens about a foot long, having very long lower petioles up to 9 in. (22.8 cm.) in length. Fruiting examples had not been seen.

It may be observed that the original authors described this plant as a "form." It cannot, therefore, be cited as var. *lancifolius* Cham. & Schlecht. (cf. *L.C.*, 1945b, and my paper, *Rep. B.E.C.*, 1930, 386). Ascherson and Graebner were the first authors to raise it to varietal rank (*Synops. Mitteleurop. Fl.*, i (1897), 306). It should therefore be amended to read var. *lancifolius* (Ch. & Schl.) Asch. & Gr.

The British forms now under discussion rarely possess floating leaves and these are not the normal coriaceous leaves of this species but of thin texture, only subcoriaceous, and having a cancellate venation suggesting that of *P. coloratus*. Moreover, their submersed leaves are normally only half the width (5-6 mm.) of the narrowest similar leaves of f. *lancifolius* here described. *P. polygonifolius*, var. *pseudo-fluitans* Syme, *Eng. Bot.*, ed. iii, 1869, vol. ix, 28, is thus described, "Lower leaves membranous, elliptical strap-shaped, attenuated at each end; floating leaves subcoriaceous, gradually attenuated into the petiole." This is a broad-leaved form of the var. *lancifolius* and was included under that in my former paper. It is therefore obvious that none of the existing descriptions of the varieties of *P. polygonifolius* is entirely applicable to the British forms now under notice. I propose, therefore, to describe them as a new form under the var. *lancifolius* (Ch. & Schl.) Asch. & Gr.

F. nov. *attenuatus* Pears. *Folia omnia lanceolata; natantia pauca subcoriacea cancellata, submersa numerosa tenuissima angustissime lanceolata, ca. 5-6 mm. lata, basi apiceque longe attenuata. Fructus non visus. In aqua stagnante. Typus in Herb. Mus. Brit.*

So far I have only seen examples of this form from some of the deeper English Lakes—e.g., Wastwater and Ullswater—and from Lundy Island collected by Dr F. R. Elliston Wright, 1934. Vouching specimens of the latter are distributed this year.

753/33. CAREX DIVERSICOLOR Crantz. Salmon, *Fl. Surrey*, p. 631, line 5, quotes a note by J. E. Smith giving for this species a record by Mr Abbot, 1799, for "Clapham between woods" as a Surrey station. Abbot, rector of Oakley Raynes, lived quite near Clapham between Woods—or Twin Woods, as they are now marked on the map of Bedfordshire. In *Fl. Bedfordshire*, 1798, p. 303, No. 1033, is given Wood Agaric, *Agaricus xylophilus*, "Clapham between Woods," and on p. 312, No. 1065, Azure Boletus, *B. cyanescens*, "Clapham between Woods"—both by C. Abbot. I think this "between Woods" (*Fl. Surrey*) was the Beds locality and not a Surrey station.—J. E. LITTLE.

754/. BEGINNING THE STUDY OF GRASSES. The answers to the following queries sent in by members may possibly be of more general interest.

I. "*Glumes*, in Babington. Does *lower* and *upper* correspond with *inner* and *outer* of other authors? If so, which is which?" It often requires some care to decide which glume is the lower—in position—but having once settled the question, the other glume becomes the upper. *The lower is the outer; the upper is the inner.* As a general rule the upper (or inner) is the larger, but in *Agrostis* the smaller. Often there is very little difference between them in size. In some species, however, as *Avena flavescens* L., the upper glume is often nearly twice as long and 3-4 times as broad as the lower.

II. "What are the *awns* referred to in your paper?" The awns are bristles or hairs attached to the pales or glumes of grasses. Often the boat-shaped outer pale tapers to a fine point terminating in a bristle or awn—short or long, straight or bent. These *terminal* awns are conspicuous and easily seen even without dissecting the spikelet, but sometimes the bristle or hair is attached to the bottom or middle of the back of the pale—a *basal* or *dorsal* awn, respectively. These are very often entirely overlooked or thought to be terminal and short when they are really basal and long, and a wrong determination results. This is due to the fact that they are hidden behind the glumes and their true character cannot be seen without first removing the glumes. It is well to remember that awns are as a general rule attached to the pales, and very rarely to the glumes.

III. "Apparently the spikelets of the enclosed grass possess no awns, or am I in error?" The enclosed grass is *Agrostis alba* L. Looking at a spikelet with the naked eye all you see are the 2 glumes! The "snag" here is that in this species—and also in *A. vulgaris*—the glumes are larger than the enclosed pales and therefore hide the latter from view. If you dissect a spikelet you will see this. The pales inside are smaller and much more delicate than the glumes enclosing them. When

you have separated them by cutting across their hinged base you will see this difference. With a lens you will notice that the *lower glume has its keel minutely toothed for the greater part of its length*. The outer pale is white, membranous and delicate, slightly notched at the apex but with no minute teeth on its back. The inner pale is very tiny. See also my reference to *Aira flexuosa*.—W.H.P.

824/14. THE POA ANNUA GROUP IN GREAT BRITAIN, by J. A. Nannfeldt (Uppsala Botanical Institute). Recently I made the interesting discovery that *Poa supina* Schrad., which is a very distinct species though closely allied to *P. annua* L., has a rather large distribution in Sweden, as I was able to detect specimens in our public Herbaria from over two dozen localities, from Skåne in the south to Jämtland in the north. It proved also that the said species had a much wider area of distribution than hitherto supposed, for I found specimens of it from Latvia and Siberia. Numerous Swedish specimens were labelled *P. annua*, var. (or f.) *supina*, but these belonged only exceptionally to the true *P. supina*. They were mostly only modifications of the common *P. annua* with their spikelets slightly darker than usual.

*P. supina* seems to be a truly native species of Sweden, growing preferably in moist meadows, along streams, in bogs, on moist forest-paths and roads, etc. It forms not rarely a totally sterile hybrid with *P. annua*, which up to date I have been able to identify from five Swedish localities.

I was then interested to see whether *P. supina* could also be found in other north-european countries. It could be strongly surmised to grow in Great Britain, and in the last (=2nd) edition of Druce's *British Plant List* (p. 131) *P. annua* is listed with six varieties, viz., *varia* Gaud. (*supina* Schrad. = ? *picta* Beck.); *aquatica* A. & G.; *reptans* Hausskn.; *villosa* Leight.; *perennis* Dr.; and *remotiflora* (Murb.). This last name would indicate a third distinct species of the *annua*-group (=sect. *Annuae* Fr. = *Vagantes* Nym. = *Ochlopoa* A. & Gr. = *Pilosae* v. Oett.), viz., *P. exilis* (Tomm.) Murb. = *P. remotiflora* (Hack.) Murb., which is a Mediterranean species and—as far as I am aware—not known with certainty outside that region.

Through the kindness of Mr John Chapple I was allowed to study the material of *P. annua* (incl. varieties) in the Druce herbarium, in all 45 sheets and many of them containing two or more gatherings. The examination gave a negative result—in other words, all gatherings (two totally misnamed excepted) belonged to *P. annua* s. str. It is of course too early to state definitely that *P. supina* and *P. exilis* do not occur in Britain, but they may be regarded as very doubtful members of the British flora. However, British botanists should keep their eyes on *P. annua*, and thus it may not be out of the way to call attention to some of the differences between the three species.

*P. exilis*: Strictly annual. Panicle oblong, rather narrow, 1 1/2-3 times as long as broad. Spikelets with no reddish tinge; flowers widely

separated, the (female) top-flower slightly longer than its pedicel. Anthers very small, only 0.22-0.33 mm. long.

*P. annua*: Annual or sometimes perennial. Panicle oblong-triangular, broader, 1.2-1.6 times as long as broad. Spikelets often tinged with red or violet; flowers closer together, the (female) top-flower at least twice as long as its pedicel. Anthers medium sized, 0.6-0.8 (-1.0) mm. long.

*P. supina*: Strictly perennial. Panicle broadly triangular, mostly about as long as broad. Spikelets mostly dark purple (only in deep shade green), shorter and broader than in *P. annua*; flowers still closer together; flowering glumes broader and obtuser than in *P. annua*, their intermediate nerves always glabrous (the hairiness of the glumes very variable in *P. annua*, but usually all nerves hairy, at least slightly). Anthers very large, 1.6-2 (-2.5) mm. long.

As seen from the above, *P. annua* takes an intermediate position in all particulars. The character which is most convenient to see is the length of the anthers. In *P. supina* they are almost as long as the glumes and thus very easy to notice.

A more detailed description (with drawing) of *P. exilis* is found in Sv. Murbeck, *Contrib. fl. nord-ouest de l'Afrique*, iii (*Act. Reg. Soc. Physiogr.*, Lund., 10), and the differences between *P. annua* and *P. supina* are treated more fully by me in an illustrated paper (in Swedish) to be published in the first number of *Botaniska Notiser* for this year. In my paper also the hybrid between *P. annua* and *P. supina* will be described and illustrated.

2/. THALICTRUM MINUS Linnaeus sensu latissimo in Britain, R. W. Butcher, *Journ. Bot.*, lxxii, 153-165, June 1934. Nos. 2/2, 2/3, and 2/4 of the *British Plant List* are replaced by the species enumerated below. The distribution figures given are incomplete and include authenticated records only.

2/2'2). ✕THALICTRUM ARENARIUM Butcher in Butch. & Strudw. *Further Illus. Brit. Pl.*, 1 (1930). Replaces 2/3 of the *British Plant List*. Distribution:—27, 49, 52, 58, 60, 62, 66, 68-70, 73, 82, 83, 88, 90, 91, 93, 94, 103, 105, 110, 111. H.—Lough Neagh.

2/2(3). ✕T. MONTANUM Wallr., *Pl. Sched. Crit.*, 258 (1822) = 2/2c. of *Br. Pl. List*.

With three varieties:—

✕Var. a. VIRENS Wallr.

✕Var. b. RORIDUM Wallr.

✕Var. c. GLANDULOSUM Wallr.

Distribution:—1, 45, 49-51, 57, 60, 65, 67, 69, 70, 73. H.—9, 28.

2/2(4). ✕T. COLLINUM Wallr., *loc. cit.*, 259 = 2/2 of *Br. Pl. List*. Distribution:—1, 6, 34, 42, 45, 49, 50, 57, 83. H.—9.

2/2(5). ✕T. BABINGTONII Butch., *loc. cit.*, 4. Distribution:—3, 19, 20, 26, 28, 29, 64.

2/2(6). T. CAPILLARE Reichb., *Fl. Germ. Excurs.*, 729 (1832) = 2/4b. of *Br. Pl. List*. Distribution:—Keltney Burn, Perthshire; possibly also Great Langdale and Coniston, Westmorland.

2/2(7). T. MAJUS Crantz, *Stirp. Austr. fasc.*, 2, 80 (1763) = 2/4 of *Br. Pl. List*. Distribution:—81, 85.

2/2(8). ✕T. UMBROSUM Butch., *loc. cit.*, 7. Distribution:—48, 49, 64-6, 69, 70, 88, 89.

2/2(9). ✕T. EXPANSUM Jord., *Obs. Pl. Crit.*, v, 6 (1847). Distribution:—Erwood, Brecon.

185/11. ✕RUBUS ALTIARCUATUS Barton and Riddelsdell, *Journ. Bot.*, lxxii, 144 (May 1934), replacing the name *carriensis*.

185/13(3). ✕R. STANNEUS Bart. et Ridd., *loc. cit.*, 231 (August 1934). A new species near *R. monensis* Bart. et Ridd. (= *latifolius* Bab.) from West and East Cornwall.

185/63. ✕R. GRISEOVIRIDIS Bart. et Ridd., *loc. cit.*, 144 (May 1934), replacing the name *micans* Rogers (= *adscitus* auct. non Genev.).

185/91. ✕R. MOYLEI Bart. et Ridd., *loc. cit.*, 144 (May 1934), replacing the name *ericetorum* Lefèv.

185/92(3). ✕R. SECTIRAMUS W. Watson, *Journ. Bot.*, lxxii, 23 (January 1934), emend. *loc. cit.*, 96 (March 1934) ex *London Naturalist*, 1932, 60-66.

185/98. R. GRIFFITHIANUS Rogers.

✕b. subspecies nova TARDUS W. Wats., *loc. cit.*, 23 (January 1934).

185/106. ✕R. WEDGWOODIAE Bart. et Ridd., *loc. cit.*, 145 (May 1934), replacing the name *mutabilis* Genev.

✕Var. e. SABBINAE Bart. et Ridd., var. nov.

185/110(2). ✕R. NUTICEPS Bart. et Ridd., *loc. cit.*, 145 (May 1934), replacing 185/110b. *fuscus* W. & N., var. *nutans* Rogers.

185/114. ✕R. MORGANWENSIS Bart. et Ridd., *loc. cit.*, 146 (May 1934), replacing the name *horridicaulis* P.J.M.

With ✕Var. b. DEVONIAE Bart. et Ridd., var. nov.

185/122(2). ✕[R. CORONATUS N. Boul.]

✕Var. b. CINERASCENS W. Wats., var. nov., *loc. cit.*, 23 (January 1934).

185/132. ✕*R. RILSTONEI* Bart. et Ridd., *loc. cit.*, 145 (May 1934), replacing the name *plinthostylus* Genev.

296/2. Varieties of *GALIUM MOLLUGO* L. in Britain, C. E. Britton, *Journ. Bot.*, lxxii, 243-51 (September 1934). The varietal names given in the *Br. Pl. List* are dropped with the exception of var. *dumetorum* (Jord.) and the following are enumerated as having been noted for Britain.

✕Var. a. *GENUINUM* H. Br. Glabrous, leaves oblong or elliptical-obovate, rounded at the apex, mucronate, venation apparent, panicle pyramidal.

✕Var. b. *PUBESCENS* Schrader. Pubescent stems, branches, lower and median leaves.

✕Var. c. *PYCNOTRICHUM* H. Br. Foliage yellowish-green, lower stem and lower leaves grey-felted, panicle-branches erect or ascending, flowers crowded, shortly-pedicelled, usually cream or ochraceous.

✕Var. d. *ANGUSTIFOLIUM* Roth. Stem erect, prostrate or ascending, glabrous. Leaves lanceolate or linear-lanceolate, gradually narrowing towards apex, with an abrupt point. Panicle broad, branches elongated, divaricate or deflexed, pedicels short, cymes crowded.

✕Var. e. *NEMOROSUM* (Wierzb.) H. Br. Stems very numerous, decumbent, glabrous. Leaves glabrous, lower reflexed, upper spreading, linear-oblong, acute or cuspidate, margins revolute. Midrib prominent, venation obscure. Panicle narrow, pedicels spreading, flowers crowded, white.

✕Var. f. *ELATUM* (Thuill.) H. Br. A large almost glabrous plant with short obovate leaves, broad panicles with spreading or erect-ascending branches and whitish flowers.

✕Var. g. *PRATICOLUM* H. Br. Leaves linear-lanceolate, narrowing towards acute apex, panicle well-developed, diffuse, cymes lax, pedicels 3-4 mm. long.

Var. h. *DUMETORUM* (Jord.) H. Br. Almost intermediate between *elatum* Thuill. and *erectum* Huds.; differing from the former by much narrower leaves and earlier period of flowering and from the latter by the much more numerous flowers, which are smaller and on shorter pedicels, and by the smaller fruit. Stems less erect, swollen at the nodes and branches more spreading.

The author points out that though enumerated as varieties, these plants may eventually prove to be subspecies or races.

320/2(2). ✕*ERIGERON PSEUDO-ELONGATUS* Rouy, *Fl. Fr.*, viii, 153. [Ref. No. 307], banks of R. Medway, Aylesford, W. Kent, v.-c. 16, August 24th, 1930, R. B. Ullman in Herb. P. M. Hall, determined by W. H. Pearsall. Plant 5-6 dm., lower leaves lanceolate-spathulate, obtuse, elongate, pubescent, "panicle ample."

396/1 × 2. ✕*CIRSIUM ERIOPHORUM* (L.) Scop. × *LANCEOLATUM* Scop. = × *C. GRANDIFLORUM* Kittel. Recorded from N. Essex, and probably

also from N. Somerset and Dorset by J. E. Lousley, *Journ. Bot.*, lxxii, 171-3 (June 1934). Rouy divides *C. grandiflorum* into three forms; the N. Essex plant approaches most nearly  $\times$  *C. Gerhardtii* (Sch. Bip.) Rouy. It is to be noted, however, that Petrak has distinguished three races of *C. eriophorum*, the British race being *britannicum* (Petrak). Since the hybrid of this race with *lanceolatum* has not been previously recorded, it is probable that none of the names hitherto published for this hybrid is strictly admissible for the form now recorded.

527/8. *VERBASCUM NIGRUM* L.

\*Var. c. *BRACTEOSUM* Pugsley, var. nov., *Journ. Bot.*, lxxii, 278-9 (October 1934). Stems crowded with spreading, long-cuspidate or acuminate leaves or bracts almost to the apex. Fowey, Cornwall.

669/6. *ORCHIS LATIFOLIA* L.

\*Var. b. *JUNIALIS* Vermeulen, *Journ. Bot.*, lxxii, 97-101 (April 1934).

669/7x. \*O. *INCARNATA* L.  $\times$  O. *PURPURELLA* Steph. See under New County and other Records.

669/11x. \*O. *FUCHSI* Dr.  $\times$  O. *PURPURELLA* Steph., var. *PULCHELLA* (Dr.) Pugsley. See under New County and other Records.

674/5. *NEOTINEA INTACTA* Reichb. fil.

\*Var. b. *STRAMINEA* Pugsley, var. nov., *Journ. Bot.*, lxxii, 55 (February 1934). This name is given to that form of the species which has greenish-white or straw-coloured flowers and unspotted leaves, the specific type being restricted to the form with pink-tinted flowers and purplish blotches on the leaves.

†689/2. \**RUSCUS HYPOGLOSSUM* L. Under an elder bush. ? Bird sown. Near Rochester, W. Kent, 1934. Det. J. E. Little. See *Countryside*, summer, 1934, p. 78, and fig. in Kerner *Nat. Hist. of Plants*, i, 332.—Mrs SHEPPERD.

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#### ABSTRACTS OF PAPERS BEARING ON THE STUDY OF THE BRITISH FLORA, 1934.

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

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The authors regret that, owing to pressure of work, it has not been found possible to complete these in time for publication in this *Report*. To ensure continuity, two years' (1934-35) abstracts will be included in the next *Report*.

## NOTES ON PUBLICATIONS, NEW BOOKS, ETC., 1934.

WELSH FLOWERING PLANTS: A HANDBOOK TO THE COLLECTION IN THE WELSH NATIONAL HERBARIUM. By H. A. Hyde, M.A., F.L.S., and A. E. Wade, F.L.S. Demy 8vo., pp. vii + 179 + 2 plates and 8 text figures. Cardiff: National Museum of Wales and the Press Board of the University of Wales, 1934; 5/-.

This well printed and admirably presented book supplies a long-felt need for a complete list of the flowering plants of Wales, and the authors are to be warmly congratulated on its publication. It should greatly stimulate interest in the plants of the Principality and be a valuable aid to additional knowledge of their distribution and characters. It is, however, far more than an annotated catalogue of Welsh flowering plants. It contains much additional information concerning the botany of each Welsh county, the habitats of plants, types of distribution, and an especially valuable chapter on the "Life-forms of Welsh Flowering Plants," with a brief but useful illustrated description of the chief characteristics of Professor C. Raunkiaer's various groups and sub-divisions of classification.

We are informed that "Our distributional data have been compiled entirely independently of the *Comital Flora*, and we have not regarded entries in that work as valid county records unless they have been corroborated by other evidence." If the authors had also adopted the same criterion in regard to the records of J. F. Robinson (in *Top. Bot.*) they would have been on far safer ground. On the whole the nomenclature is quite sound but we noticed two names that should not have been used. *Carex inflata* Huds. is a synonym of *C. versicaria* L., not of *C. rostrata* Stokes. The name *Potamogeton mucronatus* Schrad. has no legitimate status. It is given first in Roemer & Schultes *Syst.*, iii, 517 (1818), but its publication there is simply that of an unidentified *nomen nudum*. At the end of their treatment of *Potamogeton* the authors add two unknowns, one of them "Quid *P. mucronatus* Schrad." This publication of the name only, gives it no status. It is next cited from Reichenbach *Icon. Fl. Germ. Helv.*, vii, 15, t. xxiv (1845); but Reichenbach definitely maintained for this plant the name *P. compressus* and only gave *P. mucronatus* Schrad. as a synonym. A name taken up merely as a synonym fails of valid publication and should give way to the properly published *P. Friesii* Rupr. (1845).

THE FLOWERING PLANTS AND FERNS OF CARDIGANSHIRE. By J. H. Saltcr, D.Sc., formerly Professor of Botany at Aberystwith University College. Cardiff: University of Wales Press, 5/-.

The outstanding features of this volume are the excellence of paper, type and format: the rounded corners and liberal margins help to complete a most pleasing book.

Prof. Salter has rendered very valuable service by gathering into one volume all the existing scattered records of Cardiganshire plants. He admits that the present list makes no pretence to being a complete Flora of the county, but it will certainly be extremely useful as a basis for such, and will be greatly appreciated by visiting botanists. The members of this Society will be glad to assist in supplying authentic records of plants not included in this volume.

**THE GRAMINEAE: A STUDY OF CEREAL, BAMBOO, AND GRASS.** By Agnes Arber, M.A., D.Sc. Roy. 8vo., pp. xvii + 480, frontispiece + 212 text figures. Cambridge: at the University Press, 1934; 30/- net.

Dr Arber's scholarly treatise is an outstanding achievement which it is difficult to praise too highly. In the Preface we are reminded that "Man in his primitive state thought of plants merely in connection with himself and his needs, and it was only gradually that this egocentric interest matured into the objectivity of pure botany. This book follows a corresponding sequence, it begins with the study of the grasses in relation to man and the more strictly botanical aspect is treated as developing out of the humanistic." In the reviewer's judgment the chief charm of the book lies in its skilful blending of the literary and humanistic elements with the scientific in working out this original conception. It is of exceptional interest throughout, written in a fascinating manner and abounding in stimulating suggestion. The abundant and excellent illustrations are a special feature and the presentation is of the high standard we expect from the Cambridge University Press. We have seen no book which makes a stronger appeal to lovers of Nature and to those who are interested in man's growing knowledge of it.

**BOTANY: A SENIOR TEXT-BOOK FOR SCHOOLS.** By Prof. D. Thoday, M.A., Sc.D., fifth edition, 1935. Cambridge University Press, 7/6.

The fact that a fifth (thoroughly revised) edition of this book is called for, speaks well for its popularity and value. It has long enjoyed a high reputation in secondary schools and there is no book I can more warmly commend to the notice of adults desirous of having a reliable text-book of botany on their shelves. The text is written in language of excellent choice and combines scientific accuracy with commendable lucidity of expression. Nothing could be finer—for example—than the three chapters (xv-xvii) devoted to seeds and seedlings; chapter xvii on "the conditions of germination and growth" is especially good.

The general format of the book is extremely pleasing, the type is singularly clear, the spacing and margins generous and the illustrations admirably chosen. Any of our members in need of an authoritative and modern presentation of the fundamental facts in the life-history of a plant cannot do better than secure this excellent volume.

**FLORA OF MORAY, INCLUDING FLOWERING PLANTS, CONIFERS, FERNS, MOSSES, FUNGI AND ALGAE.** By James J. Burgess, M.A. At the "Courant and Courier" Office, Elgin, 1935; price 5/- (postage 6d).

This is a small, admirably arranged and well-printed Flora which will be in much demand by visitors to this most interesting county. At the same time, it will be valuable for reference to all those whose daily occupation demands considerable knowledge of nature—teachers, gardeners, foresters and farmers. There is a notable "Foreword" by the Prime Minister on "this fine achievement connected with my native county." Both in letter and spirit it is excellent. In the Flora itself the distribution of a species is indicated by capitals denoting the parishes in which it occurs. There is an interesting article entitled "Notes on some of the Rarer and More Interesting Species," by the Rev. Geo. Birnie. An extremely valuable paper on the "Coniferae in Morayshire," by Mr Peter Leslie, M.A., B.Sc., deals with Biology, Afforestation, Uses and General Notes—a scholarly and authoritative contribution. The same author is responsible for an admirable "Review of the Fungi" and brief "Notes on Freshwater Algae." A catalogue of the "Mosses of Moray" is given by the Rev. Geo. Birnie, B.D.

The members of the Moray Field Club are to be congratulated on the completion of so valuable and readable a record of their labours at so low a price.

ENGLISH NAMES OF OUR COMMONEST WILD FLOWERS. Part II. Arranged and Explained by Robert Fisher, M.A., late Canon of York. Demy 8vo., pp. viii + 344. Arbroath: T. Buncle & Co., 1934; 6/-. [Parts I and II bound in one volume (cloth), 14/6.]

This second and concluding part includes many well-known plants which, though not so frequent in every county as those in Part I, are yet quite common and widely distributed. Readers will discover much hidden treasure among these pages and be astonished at the number of popular names claimed by some of the species. Cuckoo-pint is only one of the 150 names given to *Arum maculatum* L., while *Stellaria Holostea* L., *Digitalis purpurea* L., and *Orchis mascula* L. claim over 130 respectively. It is most interesting to trace through these names—often singularly apt—the characters which have most appealed to the people and earned for the flowers their descriptive names. The book is a mine of information and represents an enormous amount of labour and critical research. We wish the second part unqualified success.

THE WILD FLOWER MAGAZINE. This admirable publication continues to afford abundant evidence of the widespread and growing interest in our native plants. The lists of wonderful finds of rare flowers by the members are surprising and in many cases of considerable scientific value in confirming or extending our records of the distribution of British plants. Even more remarkable than the records of plants seen is the testimony on every page to the great joy the flowers and their finding have afforded. "We old stagers" too can revel in the recollection of happy memories recalled by the names of persons, plants and places here set forth. We have the warmest commendation for the excellent work the Wild Flower Society is doing.

## OBITUARIES.

THOMAS JACKSON FOGGITT. The name of Foggitt has been a familiar one to three generations of field botanists, and very intimately associated with the long history of the B.E.C. Members will recall how the Report for 1932 contained a special article by the subject of this obituary on his own personal recollections, nearly seventy years before, of the time when the headquarters of the Society were in Thirsk, and its prime movers those famous friends John Gilbert Baker and the writer's father, William Foggitt, F.L.S. In this paper he recalled the wonderful energy of those early botanists to whom a ramble of forty miles was all in the day's work, and gave his own childhood's recollections of the great fire at the Baker's premises which destroyed all Gilbert's specimens and the copies of his just published "Flora of the North Riding," and was really responsible for the removal of himself and the Society to London.

Thomas Jackson, second bearer of this name, for he was called after his grandfather, himself a field botanist of no mean attainments, was born on March 2, 1858, in Thirsk, where he lived the whole of his life. The Foggitts were, and still are, hereditary chemists, tracing their origin to a certain Italian, native of Foggia, who came to Cleveland in Yorkshire during the 16th century in connection with the alum trade, and was excommunicated by the Pope, according to family legend, for so doing. For well-nigh a hundred years they have been chemists, both wholesale and retail, in this small but important Yorkshire town, and no name is better known or more widely respected in the North Riding than "Foggitts of Thirsk." Almost inevitable the calling of chemist leads to botany, and this was especially so in days when chemists themselves prepared many of their own drugs. Such times are now long past, but Thomas Jackson the second still belonged to them in his youth, and as a young man would go out to gather the dandelion roots and fox-glove leaves, etc., needed for the concoctions he made with his own hands for the medicines dispensed.

So in an atmosphere of systematic botany he was born and bred, and before he was nine years old he began to list, press and mount the specimens he found in the wonderfully fertile botanical neighbourhood that lay around him, and so laid the foundation of the Herbarium which was his absorbing hobby to the day he died. Educated at Wharfedale College, Boston Spa, he qualified as a chemist in Edinburgh in 1880, his work there being enlivened by long tramps over the Pentland Hills and the moors of Scotland that he ever afterwards loved so dearly. Then he entered the family firm as partner, and henceforth for many years his life was one of most strenuous business activity; for hours were long in those days, his father's health broke down, there was a large family of younger brothers and sisters to provide for, and early and late he laboured with the extreme conscientiousness, unsparing industry and self-

denial which were ever his strongest characteristics. Little enough leisure came his way, but one day, or part of it, a week he claimed, and this he spent in long, long botanical tramps over the Hambleton Hills, up the Yorkshire Dales, in Teesdale, and the Lakeland mountains when he could win as far, and soon there was not a floral corner of Yorkshire or Westmorland, and further, which he had not visited. Later, in summer holidays, he wandered further afield; on two occasions as far as the alps of Switzerland and the Tyrol. But mainly he explored the wild-flower haunts of his own country. Long before he possessed a motor car of his own he had covered each county of England; and because every moment of his time was filled with duties he would not neglect, he took the most extraordinary day and night journeys by train—to Cornwall or Devon or Kent or the Channel Isles and back again, often for a single flower. Ireland he knew well, from end to end, and Wales, and the treasures of the Kerry mountains and the Snowdon range were visited again and again. But always the hills of Scotland attracted him the most, and a year which did not see him upon them he counted almost as a year lost. His last ascent of Ben Lawers, only four years ago, he reckoned to be his thirtieth. The Clova glens and corries, Lochnagar, Ben Lui, Ben Nevis, Ben Wyvis, Skye, the Sutherland and Ross-shire mountains, he knew intimately, and, moreover, he found practically all their rarities for himself, a joy which the "spoon-fed" of the present day too rarely experience. Botanising off the beaten track entailed adventures, too, in those days, and to be lost for many hours in mist among the precipices or to sit up all night on a broken chair before a crofter's peat fire were events to dwell on with amused recollection—afterwards!

Foggitt was a splendid hunter and he never forgot a locality, and soon he became known to an ever widening circle of botanists for the knowledge he possessed and which he was ever ready to share, taking the most infinite pains in so doing. With the exception of Doctor Druce, it can fairly be claimed that he had more knowledge of wild-flower localities than any other man in Great Britain; while his friends comprised almost every well-known systematist of the last thirty years and more; all glad to claim his help and his friendship and to share his hospitality. "Ask Foggitt—he'll help you," was almost a by-word among them, and he *did* help, and no man knew, least of all himself, how much he did nor how many botanical letters he wrote and received every year. Modest and self-effacing to a fault, he kept his own attainments entirely in the background. If he made a County Record he never published it; if a discovery was his he smilingly allowed some other member of the party to claim it. Such matters were of no importance to him, but he loved the wild-flowers themselves and the haunts where they grow with a passion that only increased with his years, and he watched with delight his Herbarium (entirely of his own collecting) become ever more perfect and complete.

Thus it follows that proof is lacking of much he might have claimed. He always believed that he re-found Don's original locality for *Carex ustulata* on Ben Lawers itself, and that he discovered *Carex Sadleri* on

the Breadalbane Range when it had only been previously known in Aberdeenshire. Certainly he recognised the so-called "Mystery Orchis" (*Orchis latifolia*, var. *eborensis* var. nov.) in the Rievaulx woods many years before anybody else—to venture on but three instances, diffidently since he is not here now to confirm or, more likely, to deny lest he perchance took credit that another could claim.

Foggitt remained a bachelor until middle life and his first, devoted wife, Fanny Sophia Boddy, died six years only after their marriage. Four years later, in February 1929, he married again—Gertrude, daughter of the late Rev. J. M. Bacon, who survives him, and their few years together were very happy ones. They shared their botanical tastes and by Doctor Druce's special desire they were made, at his death, joint Treasurers of the B.E.C. A very severe illness at the end of 1931 left Foggitt an invalid for some while; but he recovered wonderfully, and enjoyed a last glorious summer of flower hunting, the end coming almost suddenly on October 30 of last year. Perhaps his epitaph cannot be more gracefully worded than in a letter Lady Victoria Russell wrote on November 9 to "The Times," which kindly allows the quotation:—

"May I add a word to your sympathetic notice of the late Mr T. J. Foggitt on some of the qualities that endeared him to his friends? His kindness to botanists was unflinching. He and his wife kept open house not only for learned and distinguished professors but also for the many amateur beginners who were lucky enough to know them. All delighted in the welcome they received on a few days' visit to see the rare plants of the neighbourhood, to look at the beautifully kept specimens in his great collection, and to receive advice and directions for further expeditions. Trivial questions and elementary observations were answered without a trace of condescension but always with sympathetic interest. Each one will remember him with affectionate gratitude, and the deepest sympathy for the companion who so whole-heartedly shared his tastes and prolonged his life by her devoted care."

Thomas Jackson Foggitt's name will last long on the thousands of the beautifully mounted specimens now in the Natural History Museum and elsewhere, and remain as a fragrant memory to the many friends who recall his gentle, helpful, lovable presence.

MAJOR ROBERT ORME, who died August 1934, was born in Dublin in 1865, son of Robert Orme, Barrister, of Bray, Co. Wicklow. His love of wild flowers he inherited from his mother, with whom, as a boy, he had many happy hunting days in holiday time, more particularly in Switzerland, where his knowledge of the alpine flora became considerable. Trained originally for an electrical engineer, he subsequently, following the wish of his parents, turned his attention to the Bar, took his degree of Bachelor of Law at Dublin University and practised at the Four Courts until he married and came to live in England. At the outbreak of war he joined the Royal Flying Corps, as it was then called, at Farnborough, and was the first Wireless Officer, having experimented with Wireless from its very inception. He created a large Wireless School

for the instruction of Flying Officers which, as a branch of the Royal Air Force, he commanded for a while, first at Brooklands and afterwards at Biggin Hill, Kent. For his services he was given the permanent rank of Major at the end of the War.

A keen sportsman, shooting, tennis, golf and billiards were his recreations; but his botanical bias was ever present, and as he grew older and had more leisure he gave more and more time to the pursuit he specially loved. Living latterly in the happy hunting ground of South Devon, and sharing with his wife his flower rambles and discoveries, he fast widened his knowledge and circle of botanical friends. Particularly quick-eyed, he noted many interesting records, and his name may often be found in the B.E.C. Reports. Dr Druce writes, in his survey of the last summer of his life, how in July 1931 "Major Orme kindly took us to the headland where *Campanula persicifolia* appears to be a native, and showed us the New Zealand adventive *Acaena anserinifolia* Dr. well naturalised."

But as in the case of his great friend W. D. Miller, whom he survived so short a time, it will be for his unflinching kindness and help to the botanists themselves that Major Orme's name will long be held in affectionate regard. To the tyros of the Wild Flower Society (for which he was long a Branch Secretary) as well as to the veterans of the B.E.C., he gave unsparingly of his time and wide knowledge. A man of much personal charm, he endeared himself to all, and many a member even among those who knew him but slightly, will have pleasant memories of happy instructive hours spent in his genial and inspiring company.

JOHN FRASER, V.M.H., F.L.S. On 24th January 1935, John Fraser died in Charing Cross Hospital from pneumonia following injuries received through being accidentally knocked down a week earlier by a cyclist, while he was crossing Kingsway.

Fraser was born on 31st January 1854, at Newdean, fifteen miles from Fraserburgh, Aberdeenshire, and was the eldest son of a family of seven. He commenced his horticultural and botanical career in Scotland in 1874. In February 1880 he joined the staff of the Royal Horticultural Society, at the latter's old gardens in Chiswick. In 1882 he entered Kew and was for a time in charge of the Rock Garden and afterwards of some of the glasshouses. In May 1885 he gave up his official connection with Kew and commenced work in the Jodrell Laboratory on behalf of Sir John Lubbock, afterwards Lord Avebury. It is known, although perhaps not so widely as it should be, that much, if not most, of the detailed research underlying Lord Avebury's classical publications on seedlings, seeds, buds, stipules, pollen, and other botanical subjects was done by Fraser, whose connection with Lord Avebury lasted for many years. He became Assistant Editor of the "Gardening World" in 1887 and was Editor of this paper from 1895 to 1909. He wrote or contributed to many horticultural works, including *Thompson's Gardeners' Assistant*, *Cassell's Popular Gardening*, *Cassell's Popular Science*, and the 1917 edition of *Johnson's Gardener's Dictionary*. He was

also a regular (and often anonymous) contributor to many horticultural and botanical journals. He had an intimate acquaintance with many groups of horticultural plants and especially with potatoes and the genus *Pelargonium*.

In addition to his extensive practical horticultural experience and his work for Lord Avebury, Fraser had a wide yet detailed knowledge of the British Flora, both as a field collector and observer and as a herbarium investigator. He was a great walker and tramped many hundreds of miles every year in search of botanical treasures, often going for the whole day with no more food than a piece of bread in his pocket. He explored many parts of Scotland, and knew the country to the south of London most intimately. In his later years he specialised on the taxonomically very difficult genera *Mentha* and *Salix*, and most recently returned to a study of seedlings. His published accounts of British mints and British willows are evidence of a clear logical mind and of considerable descriptive ability.

Fraser is buried in the Richmond, Surrey, cemetery. His fine herbarium collections of about nine thousand sheets, together with his manuscript notebooks, have been presented, at his written desire, to the Royal Botanic Gardens, Kew, by members of his family. There are many valuable Scottish gatherings amongst his specimens, and the flora of Surrey is particularly well represented. His collection of seedlings of British plants, numbering several hundred sheets, must be unique, and will be of great value in future investigations of life-histories. His horticultural services were recognised by the Royal Horticultural Society when the Victoria Medal of Horticulture was conferred on him by the Council in 1922, and the Veitch Memorial Medal in 1929. He was elected a fellow of the Linnean Society in 1889.

Our old friend was of a very modest and retiring character, and though willing and able to talk at length on a great variety of topics, especially those connected with plant-life, he was very reticent regarding his personal affairs. He enjoyed the freedom which his mode of life allowed him and with a happy, contented outlook found the most intense pleasure in his studies. Amongst his books were found three volumes of poems of varying length written in his small legible handwriting. These date from 1892 to 1924, and are obviously of varying merit. Though high authority has considered they should remain in manuscript at present, perhaps fifty or a hundred years hence a "new poet" will be unearthed amongst the documents housed at Kew! Certainly John Fraser had a poet's soul, unknown to and unsuspected by his botanical friends.—W. B. TURBILL.

EARL BUXTON, one of the last of the distinguished men who held parliamentary office under Gladstone, died at his home, Newtimber Place, Hassocks, Sussex, on October 15th, 1934, aged 80 years. He had a long record of public service. He entered Parliament more than 50 years ago and as Sydney Charles Buxton was Under-Secretary for the Colonies from 1892 to 1895. From 1905 until 1910 he was Postmaster.

General, with a seat in the Cabinet. In 1910 he became President of the Board of Trade and continued in that office till 1914, when he was made a Viscount and became High Commissioner and Governor-General of South Africa. He served in this position for six years and was thus in the dominion throughout the period of the Great War. It has been recorded of his term of office in South Africa that "he continued to add new lustre to the Imperial doctrine and to consolidate British interests without derogating from those of the Dutch." In 1920 in recognition of his services in South Africa he was created an Earl. During his remaining years in England he lived quietly but his health was not very good. A damaged bone in his leg never recovered completely and ultimately, when he was 77, necessitated amputation of the whole limb. Earl Buxton is survived by the Countess and his daughter, Lady Alethea Eliot, both of whom we are glad to still include as members of this Society. Earl Buxton has always shown a keen and intelligent interest in the study of natural history and it will be remembered that he presided at our *Conversazione* in 1932 and has upon many other occasions extended his kindly offices to our members.

JOSEPH EDWARD LITTLE, M.A. On Friday, 18th January 1935—a few minutes after revising an article on "The migratory habits of some British Orchids—this distinguished member of our Society collapsed and died. Mr Little was born in 1861, educated at Tonbridge and Lincoln College, Oxford, where he took his M.A. in 1885. He was appointed Headmaster of Hitchin Grammar School in 1889 and retired in 1897. Afterwards he did temporary work at Rugby and Haileybury, but the greater part of his time was devoted to botany, which he had made a lifetime study. He was a member of the Hitchin Natural History Club, and President in 1891; Recorder in Botany for the Hitchin and District Regional Survey Association, and assisted materially in the compilation of the Cambridge Natural History. He was a fine and fastidious classical scholar and frequently assisted us in obscure Latin constructions. He was also deeply interested in Philology, especially in the derivation and meaning of place names. He is survived by his wife and daughter, Miss Katharine Little, who was closely associated with him in his botanical work and is a member of the Council of the Hitchin and District Regional Survey Association.

Eloquent tributes to the variety and extent of his scholarship have been paid by many writers but we are more concerned to put on record our great indebtedness to him as a critical and field botanist of exceptional competence. It is to members of both Exchange Clubs in this country that Mr Little's name is most familiar. He was a great collector of representative and critical plants, and most herbaria—both public and private—contain sheets with his well-known labels. His own valuable herbarium has gone to the Cambridge University, where it will be consulted with profit by students for generations to come. Not only was his contribution of plants so extensive and valuable but his critical comments on the plants distributed by others are among the very best

of their kind, and fortunately are on permanent record in our reports. While his general knowledge of the British Flora was very great, it was particularly so in the case of certain genera of trees—*Salix*, *Populus*, *Pyrus*—and also in *Carex*. On these his determinations and notes carried great weight. In collaboration with the late Dr Drabble he contributed an article to the *Journal of Botany* in 1931 on "The British Veronicas of the *agrestis* group." Many of us who have been privileged to enjoy his correspondence for so long feel a personal sense of loss at his departure and are glad to have the opportunity of testifying to his generosity and self-sacrificing service for others.

GUSTAF ADOLF HUGO DAHLSTEDT, 1856-1934. Born February 8th at St Lars parish, Östergöthland, Sweden; died at Mörby, near Stockholm, on October 2nd, 1934, aged 80. He was educated at Uppsala, where he took his degree in 1875 and became doctor of honour in connection with the celebration of Linné in Uppsala University. He was made a Knight of the Vasa Order in 1925. He was also an honorary member of the Societas pro Fauna et Flora fennica, Hålsingfors.

## NEW COUNTY AND OTHER RECORDS.

2/2. *THALICTRUM MINUS* L. Kennack, v.-c. 1, J. D. GROSE.

3/2b. *ANEMONE NEMOROSA* L., var. *PURPUREA* DC. Very dark form of this in a wood near the High Rocks, Tunbridge Wells, v.-cs. 14 and 16, J. P. M. BRENNAN.

3/2c. *A. NEMOROSA* L., var. *CAERULEA* DC. Still in Hurst Wood, Tunbridge Wells, v.-c. 16, whence it was recorded by Whitwell and Reeves in 1870, J. P. M. BRENNAN.

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

6/3a. *RANUNCULUS ACER* L., var. *MULTIFIDUS* DC., f. *TOMOPHYLLUS* (Jord.). Wicken Fen, Cambs, Dr A. H. EVANS.

6/6. *R. LINGUA* L. Gunwalloe, v.-c. 1, the only locality, J. D. GROSE.

\*6/12. *R. OPHIOGLOSSIFOLIUS* Vill. Near Cheltenham, v.-c. 33, J. D. GROSE.

\*6/20b. *R. FLUTANS* Lam., var. *BACHII* Wirtgen. Blakeney, W. Gos., v.-c. 34. Teste PEARSALL. In full flower, 16th July 1934, petals narrower, non-contiguous. Submerged leaves sub-sessile; segments few, short, obviously tapering, Miss M. S. CAMPBELL, Lady DAVY, and Miss M. BROWN.

6/21. *R. CIRCINATUS* Sibthorp. Pond, Saunton sandhills, Braunton, N. Devon, 29th May 1915. Leg. W. P. HIERN. Three sheets in Hb. Hiern at the Museum, Exeter, W. H. PEARSALL.

6/22. *R. TRICHOPHYLLUS* Chaix. Winchfield, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

\*6/24. *R. HETEROPHYLLUS* Weber, var. *TRIFIDUS* Pears. Loch Ashie, Inverness, v.-c. 96, Miss E. S. TODD.

\*6/29. *R. TRIPARTITUS* DC. Pond at Belstone, near Okehampton, N. Devon, v.-c. 4, W. KEBLE MARTIN. A most interesting extension of the northward distribution of this species. The specimens sent were in good fruiting condition, W. H. PEARSALL. Predannack, Cornwall, v.-c. 1, J. D. GROSE.

6/31. *R. LENORMANDI* F. Schultz. Lundy Island, 1st September 1890 and 11th June 1884. Leg. W. P. HIERN, in Hb. Hiern at the Museum, Exeter, W. H. PEARSALL.

9/1. *HELLEBORUS VIRIDIS* L. Wroughton, v.-c. 7, probably wild here, J. D. GROSE.

9/2. *H. FOETIDUS* L. Old Park, Dover, v.-c. 15, J. P. M. BRENNAN; Sheepscombe, v.-c. 33, J. D. GROSE.

11/1. *AQUILEGIA VULGARIS* L. Near Lingfield, distr. ix, Surrey, W. H. WILDING.

17/1. *BERBERIS VULGARIS* L. Edge of Caldecote Fen, W. Norfolk, 1934, K. D. LITTLE; Merton, N. Devon, v.-c. 4, Miss CHING; \*near Achnacloich, Argyll, v.-c. 98, Miss M. MARTIN.

19/1. *NUPHAR LUTEA* Sm. Taff's Well, Glamorgan, v.-c. 41, E. VACHELL.

\*20/1. *CASTALIA ALBA* (L.) Link. In a quarry pool near Fort Le Marchand, Guernsey, J. P. M. BRENNAN.

21/2. *PAPAVER RHOEAS* L., var. *CAUDATIFOLIUM* Fedde. Hitchin, Herts, H. PHILLIPS.

21/3. *P. DUBIUM* L. Hitchin, Herts, H. PHILLIPS.

†28/1. *ESCHSCHOLZIA DOUGLASSII* Walp. Waste-heap, Letchworth, Herts, H. PHILLIPS.

32/5. *FUMARIA BORAEI* Jord. Campbeltown, Argyll, v.-c. 101, Mrs MACALISTER HALL.

32/5d. *F. BORAEI* Jord., var. *BRITANNICA* (Pugsley), det. H. W. PUGSLEY. Roadside hedge near Wareham, Dorset, v.-c. 9, P. M. HALL.

32/9. *F. BASTARDI* Boreau. Porchester, S. Hants, v.-c. 11 (det. H. W. PUGSLEY), P. M. HALL; Llangennith, Glam., v.-c. 41, A. L. STILL; \*Killean, Kintyre, Argyll, v.-c. 101, Mrs MACALISTER HALL.

32/9b. *F. BASTARDI* Bor., var. *HIBERNICA* Pugsley. Campbeltown, Kintyre, Argyll, Mrs MACALISTER HALL.

32/10d. *F. OFFICINALIS* L., var. *WIRTGENI* Hausskn. A rampant form, St Cross, Winchester, S. Hants, v.-c. 11 (det. H. W. PUGSLEY), P. M. HALL.

32/11. *F. MICRANTHA* Lag. Near Owslebury, S. Hants, v.-c. 11, P. M. HALL and H. W. PUGSLEY; near Greywell, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

- 33/1. *MATHIOLA INCANA* Br. Freshwater, v.-c. 10, J. D. GROSE.
- 33/2. *M. SINUATA* Br. Saunton Cliffs, N. Devon, v.-c. 4, H. S. REDGROVE.
- 36/3. *BARBAREA VULGARIS* Br. A shade form varying from type in the direction of *B. arcuata*, possibly var. *transiens* Dr.?: side of ditch, Chark Common, S. Hants, v.-c. 11, P. M. HALL.
- 39/1. *CARDAMINE PRATENSIS* L. Bradwell Dales (fen), East Suffolk, v.-c. 25. Ninety-seven plants bearing only "double" flowers, May 28th, 1934, E. A. ELLIS.
- \*39/3. *C. IMPATIENS* L. A few plants discovered by Miss M. E. Urton are growing in the crevices of an old roadside wall at Riding Mill in the Tyne valley, v.-c. 67. This is the first record for Northumberland where, at present, the plant can only be deemed adventive. Its nearest natural stations are among the limestone hills of West Yorkshire, G. W. TEMPERLEY.
- 39/4. *C. FLEXUOSA* With. Sallow-carrs at Clippesby, Hoveton and Surlingham, East Norfolk, v.-c. 27, E. A. ELLIS.
- †42/6. *ALYSSUM CALYCEINUM* L. Near Brandon, W. Norfolk, v.-c. 28, H. S. REDGROVE.
- †47/2. *HESPERIS MATRONALIS* L. West Wycombe, Bucks, v.-c. 24, Miss E. PUGH.
- †49/2. *SISYMBRIUM SOPHIA* L. Waste ground, Wotton, Surrey, v.-c. 17, J. G. LAWN.
- †49/4. *S. COLUMNAE* Jacq. Waste ground, Wotton, v.-c. 17, J. G. LAWN.
- †49/5. *S. IRIO* L. Portishead siding, v.-c. 6, A. L. STILL.
- \*52/1. *CAMELINA SATIVA* Crantz. Cultivated ground at Bromham, near Devizes, N. Wilts, v.-c. 7, Miss P. LEAKE.
- 60/1. *CORONOPUS DIDYMUS* Sm. North and South Denes, Gt. Yarmouth, v.-c. 27, spreading on waste ground on the outskirts of the town, E. A. ELLIS.
- 61/3. *LEPIDIUM DRABA* L. Near Folkestone, Viscountess GLADSTONE; shore at Worthing, W. Sussex, v.-c. 13, E. B. WILKINSON; Marazion, v.-c. 1, and Charney Bassett, v.-c. 22, J. D. GROSE.
- 61/4. *L. RUDERALE* L. Sea-coast at Brightlingsea, Essex, REGINALD A. SLADER.

61/7. *L. SMITHII* Hooker, var. *LEIOCARPUM* (Thell.) Dr. West Mount, St Helier's, Jersey, H. PHILLIPS.

†61/22. *L. DENSIFLORUM* Schrad. Waste heap, Royston, Herts, H. PHILLIPS.

\*64/2. *THLASPI PERFOLIATUM* L. Oaksey, Wilts, v.-c. 7. Removes the query in *Comit. Fl.*, J. D. GROSE.

†64/5. *T. ALLIACEUM* L. Piglesworth Hill, near Andoversford, v.-c. 33, Miss L. ABELL.

66/1. *TEESDALIA NUDICAULIS* L. Lyminge Wood, E. Kent, v.-c. 15, Viscountess GLADSTONE.

67/1. *HUTCHINSIA PETRAEA* Br. Pennard Castle, Gower, v.-c. 41. In sandy turf, and finer plants than those on the limestone above, A. L. STILL.

†70/1. *NESLIA PANICULATA* Desv. Casual near chicken-run, Glynde, E. Sussex, v.-c. 14, Miss K. PICKARD.

†74/2. *BUNIAS ORIENTALIS* L. Woldingham, Surrey, v.-c. 17, H. S. REDGROVE.

87/2. *HELIANTHEMUM CHAMAECISTUS* Mill. A single plant with pale rose-pink petals, Collingham Common, Mid-West Yorks, v.-c. 64, P. M. HALL.

87/4b. *H. CANUM* Baumg., var. *VINEALE* (Pers.). Cronkley Fell, Teesdale, v.-c. 65, H. S. REDGROVE.

All these Violet records have been seen by me, mostly in the fresh state.—P. M. HALL.

88/3. *VIOLA SILVESTRIS* Lam. West Grimstead, S. Wilts, v.-c. 8, Miss GULLICK and P. M. HALL; Mathon, Hereford, v.-c. 36, F. M. DAY; Tanworth in Arden, Warwick, v.-c. 38, comm. F. M. DAY.

88/3. *V. SILVESTRIS* Lamarck, f. *PALLIDA*. Brockwood, The Downs School, Colwall, Herefordshire. This record sent in last year should be cancelled. Mr P. M. Hall has come to the conclusion it is a very pale flowered form of *V. Riviniana*, F. M. DAY.

88/4. *V. RIVINIANA* Reichb., ± typical. West Grimstead, S. Wilts, v.-c. 8, Miss GULLICK and P. M. HALL.

88/4b. *V. RIVINIANA* Reichb., var. *DIVERSA* Greg. Landford, S. Wilts, v.-c. 8, Miss GULLICK; Bearswood Common, Cradley, Hereford, v.-c. 36, F. M. DAY.

88/4e. *V. RIVINIANA* Reichb., var. *NEMOROSA* N.W. & M. Wood near Hadlow Down and another form, probably this, near Mayfield, E. Sussex, v.-c. 14, A. H. WOLLEY-DOD.

88/4f. *V. RIVINIANA* Reichb., forma *VILLOSA* (N.W. & M.). Near Cork's Pond, Matfield, West Kent, v.-c. 16, W. H. PEARSALL; Bearswood Common, Cradley, Hereford, v.-c. 36, F. M. DAY.

88/5b. *V. RUPESTRIS* Schmidt, var. *ARENARIA* (DC.) Becker. Fruiting freely, Widdy Bank, Durham, v.-c. 66, P. M. HALL and W. A. SLEDGE.

88/6b. *V. CANINA* L., var. *ERICETORUM* Reichb. With white flowers, Shapwick, N. Somerset, v.-c. 6, Miss MILLER; Jevington Downs, E. Sussex, v.-c. 14, A. H. WOLLEY-DOD; on chalk down, Inkpen Hill above Riever Wood, Berkshire, v.-c. 22, P. M. HALL.

88/6b.× *V. CANINA* L., var. *ERICETORUM* Reichb. × *V. RIVINIANA* Reichb., var. *DIVERSA* Greg. West Grimstead, S. Wilts, v.-c. 8, Miss GULLICK and P. M. HALL; Jevington Downs, E. Sussex, v.-c. 14, A. H. WOLLEY-DOD; on chalk down, Inkpen Hill above Riever Wood, Berkshire, v.-c. 22, P. M. HALL.

88/7. *V. LACTEA* Sm. Hook Common, v.-c. 12, A. L. STILL.

88/7.× *V. LACTEA* Sm. × *RIVINIANA* Reichb. Landford, S. Wilts, v.-c. 8, Miss GULLICK; Stoborough Heath, near Wareham, Dorset. v.-c. 9, P. M. HALL and J. E. LOUSLEY.

88/8b. *V. ODORATA* L., f. *IMBERBIS* (Leight.). Crondall, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; Applegarth, Matfield, West Kent, v.-c. 16, W. H. PEARSALL.

88/8d. *V. ODORATA* L., var. *DUMETORUM* (Jord.), (f. *IMBERBIS*). Firle Plantation, E. Sussex, v.-c. 14, A. H. WOLLEY-DOD. A form received from Glamorganshire from Miss Vachell was almost pure white without the usual purple blotches on the reverse of the upper petals; this came from the locality from which the var. *IMMACULATA* Greg. was recorded. The latter is a very different plant and the record of its occurrence in Glamorgan is probably an error.

88/8g. *V. ODORATA* L., var. *SULPHUREA* (Car.) R. & F. Appeared spontaneously in a garden at Budleigh Salterton, S. Devon, v.-c. 3, Major R. ORME.

88/8h. *V. ODORATA* L., var. *SUBCARNEA* (Jord.). Near Marlborough, N. Wilts, v.-c. 7, Mrs WEDGWOOD; (f. *IMBERBIS*) Firle Beacon, E. Sussex, v.-c. 14, A. H. WOLLEY-DOD.

88/9.× *V. HIRTA* L. × *V. ODORATA* L. With white flowers, Cradley, Hereford, v.-c. 36, F. M. DAY.

88/9j. *V. HIRTA* L., var. *VARIEGATA* Greg. Near Newton Abbot, S. Devon, v.-c. 3, F. M. DAY. One plant bore peloriate flowers, each of the five petals being spurred; Crondall, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

88/11. *V. PALUSTRIS* L. West Grimstead, S. Wilts, v.-c. 8, Miss GULLICK and P. M. HALL.

All the gatherings of Pansies recorded here have been seen by Mrs Drabble and the names have been agreed by her and P.M.H.

88/15c. *V. VARIATA* Jord., var. *VECTENSIS* (F. N. Williams). Calbourne, Isle of Wight, v.-c. 10, P. M. HALL. The discovery of a pansy with large yellow flowers in the Isle of Wight this year was of particular interest in view of the late Dr Drabble's remark (*Rep. B.E.C.*, 1931, 738) that the only *tricolor* pansy seen in the Island since the original gathering on which Williams based his description of *vectensis* was one specimen of *V. Lejeunei*. Mrs Drabble has seen my gathering and says: "I should think it is *vectensis*," and referring to one particular specimen says: "This specimen resembles very closely a plant sent by Mr J. E. Little from \*White Hill, Hitchin, Herts, May 15th 1931." Dr Drabble wrote of this plant: "*V. vectensis*, I think." This would appear to be a new record for v.-c. 20, P. M. HALL.

\*88/17. *V. MONTICOLA* Jord. Near Westbourne, West Sussex, v.-c. 13, P. M. HALL.

88/19. *V. LEJEUNEI* Jord. Longcoombe, near Polperro, East Cornwall, v.-c. 2, F. RILSTONE; \*Culloden Moor, East Inverness, v.-c. 96, Miss E. S. TODD; \*Killean, Kintyre, Argyll, v.-c. 101, Mrs E. M. MACALISTER HALL.

88/21. *V. ORCADENSIS* Drabble. \*Gillock, Caithness, v.-c. 109, Miss E. S. TODD. Not determined with certainty but Mrs Drabble suggests that this gathering is a slender updrawn form of this species.

88/22. *V. AGRESTIS* Jord. Station sidings, Marazion, West Cornwall, v.-c. 1, Miss E. S. TODD; \*Killean, Kintyre, Argyll, v.-c. 101, Mrs E. M. MACALISTER HALL.

88/23. *V. SEGETALIS* Jord. \*Killean, Kintyre, Argyll, v.-c. 101, Mrs E. M. MACALISTER HALL.

88/24. *V. OBTUSIFOLIA* Jord. \*Killean, Kintyre, Argyll, v.-c. 101, Mrs E. M. MACALISTER HALL; \*near Wareham, Dorset, v.-c. 9, P. M. HALL.

88/27. *V. ANGLICA* Drabble. \*Bere Farm, Wickham, and between Exton and Beacon Hill, S. Hants, v.-c. 11, P. M. HALL; \*Harewood, near Andover, N. Hants, v.-c. 12, P. M. HALL.

88/28. *V. DESEGLISEI* Jord. \*Near Longwood Dean, S. Hants, v.-c. 11, P. M. HALL; N.C.R. for the type, but the var. *subtilis* (Jord.) has been previously recorded.

88/28b. *V. SUBTILIS* Jord. Near Longwood Dean, S. Hants, v.-c. 11, P. M. HALL; Harewood, near Andover, N. Hants, v.-c. 12, P. M. HALL.

88/29. *V. ARVATICA* Jord. \*Milton Brodie, near Alves, Elgin, v.-c. 95, Miss E. S. TODD. Probably this species but not quite typical; \*Wiggonholt, West Sussex, v.-c. 13, E. C. WALLACE; \*near Hardwick, Cambridgeshire, v.-c. 29, E. C. WALLACE.

88/30. *V. DERELICTA* Jord. \*North Kessock, East Ross, v.-c. 106, Miss E. S. TODD; \*Dornaway, near Forres, Elgin, v.-c. 95, Miss E. S. TODD.

88/31. *V. LEPIDA* Jord. Near Ribbleshead, Mid-West Yorks, v.-c. 64, W. A. SLEDGE and P. M. HALL; \*Achnacloch, Argyll, v.-c. 98, Miss MARTIN.

88/35. *V. MACKAI* H. C. Watson (= *V. PESNEAU* Lloyd & Fouc.). Sandhills, Castletown, Caithness, v.-c. 109, Miss E. S. TODD.

92/3. *DIANTHUS ARMERIA* L. Hort. Hitchin. Seeds of a plant from a copse near Maidenhead, Berks, J. E. LITTLE; garden weed, Budleigh Salterton, S. Devon, v.-c. 3, H. S. REDGROVE.

93/1. *D. PROLIFER* L. Richborough, E. Kent, v.-c. 15, JOSHUA LAMB.

95/1. *SAPONARIA OFFICINALIS* L. Hamstead Marshall, v.-c. 22, J. D. GROSE.

98/3. *LYCHNIS ALBA* × *DIOICA* = *INTERMEDIA* (Schur). Broome, N. Wilts, J. D. GROSE.

100/2. *CERASTIUM ARVENSE* L. Seeds sought for many years. Seldom more than a capsule or two to be found. Hitchin, 1932, J. E. LITTLE.

100/7. *C. PUMILUM* Curt. Banstead Downs, Surrey, v.-c. 17, H. S. REDGROVE.

100/11. *C. CERASTOIDES* Britton. Grassy slopes, Beinn a' Bhuird and Cairntoul, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

\*101/4. *STELLARIA NEGLECTA* Weihe. Oaksey, v.-c. 7, J. D. GROSE.

- 154/3. *MELLOLOTUS ARVENSIS* Wallr. St Catherine's, Guildford, Surrey, F. CLARKE.
- 155/5. *TRIFOLIUM MOLINERII* Balb. Lizard, v.-c. 1, J. D. GROSE.
- 155/9. *T. BOCCONEI* Savi. Gunwalloe, v.-c. 1, J. D. GROSE.
- 155/10. *T. SCABRUM* L. Lizard, v.-c. 1, J. D. GROSE.
- 155/11. *T. STRIATUM* L. Oxted, distr. ix, Surrey, W. H. WILDING; Lizard, v.-c. 1, J. D. GROSE.
- 155/12. *T. SUBTERRANEUM* L. Mullion, v.-c. 1, J. D. GROSE.
- \*155/15. *T. HYBRIDUM* L. Lamplash, Arran, v.-c. 100, R. MACKECHNIE.
- \*156/2. *ANTHYLLIS COCCINEA* L. Darrynane, Co. Kerry. New to Ireland, det. Dr SCHINZ, J. CHAPPLE and T. GAMBIER PARRY.
- 160/4b. *LOTUS ULIGINOSUS* Schkuhr, var. *GLABER* Bréb. Gunwalloe, v.-c. 1, J. D. GROSE.
- \*+170/1. *CORONILLA VARIA* L. Merrow Common, near Guildford, v.-c. 17, J. G. LAWN.
- \*176/1. *VICIA SYLVATICA* L. Near Fair oak Lane, Chessington, Surrey, 30th September 1934. New record for v.-c. 17, M. L. WEDGWOOD.
- +176/2. *V. TENUIFOLIA* Roth. Introduced into garden with *Arborvitae*, 20 The Avenue, Hitchin, Herts, July 1934. The pod has a stipe of 2.0 mm. Leaflets very acute, J. E. LITTLE.
- 176/3. *V. CRACCA* L., var. *ARGENTEA* Coss. & Germ. (*incana* Thuill.). Oxmoor Lane, Sowerby, Thirsk, in quantity, July 10, 1934, T. J. FOGGITT.
- +176/5. *V. VILLOSA* Roth. Portishead Dock, v.-c. 6, A. L. STILL.
- 176/7. *V. BITHYNICA* L. Richborough, E. Kent, JOSHUA LAMB; \*on waste ground in Norwich, v.-c. 27, 25th May 1934, E. A. ELLIS.
- 176/9. *V. LUTEA* L. Richborough, E. Kent, JOSHUA LAMB.
- \*+178/1. *LATHYRUS LATIFOLIUS* L. Blunsdon, v.-c. 7, well established, J. D. GROSE.
- 178/3. *L. TUBEROSUS* L. Portishead Dock, v.-c. 6, A. L. STILL.
- 178/8. *L. NISSOLIA* L. Richborough, E. Kent, JOSHUA LAMB.
- 178/9. *L. APHACA* L. Portishead siding, v.-c. 6, A. L. STILL.

178/25. *L. MONTANA* Bernh. Savernacke Forest, near Marlborough, N. Wilts, v.-c. 7, Miss L. ABELL.

183/3. *PRUNUS AVIUM* L. In copses near Forestside, W. Sussex, v.-c. 13. Not, of course, a N.C.R. but an addition to the *Comital Flora*, which following *Top. Bot.* and its *Supplements* omits v.-c. 13 for this species. It was recorded in Arnold's *Flora of Sussex*. Mr Wallace's record of *O. maculata* L. (*O. ericetorum* Linton) in last year's *Report* was an exactly parallel case.

†183/6e. *P. INSITITIA* L., var. *LATIFOLIA* (Jord. & Fourr.). Torrington, N. Devon, v.-c. 4. It is known locally as "French ails" (some corruption of *Fr. alisier*?), H. H. HARVEY.

189/4. *POTENTILLA ARGENTEA* L. Headley, N. Hants, v.-c. 12, P. M. HALL.

†189/11. *P. NORVEGICA* L. Portishead Dock, v.-c. 6, A. L. STILL; near Leyland, v.-c. 59, H. E. BUNKER.

190/1. *ALCHEMILLA HYBRIDA* Mill. (*A. pubescens* Lam.). Grassy ground near Aviemore, Inverness, v.c. 96, Miss E. S. TODD.

190/4. *A. MINOR* Huds. Loch an Eilean, Aviemore, Inverness, v.-c. 96, Miss E. S. TODD.

190/8. *A. ALPESTRIS* Schmidt. Kincaig Bridge, Inverness, v.-c. 96, Miss E. S. Todd; near Wynch Bridge, v.-c. 65, H. S. REDGROVE.

191/2. *AGRIMONIA ODORATA* (Gouan) Mill. Coxmoor Wood, Cron-dall, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; Bennan Head, Arran, v.-c. 100, R. MACKECHNIE.

193/4. *POTERIUM OFFICINALE* (L.) A. Gray. (*Sanguisorba officinalis* L.). Coryton, N. Devon, v.-c. 4, H. H. HARVEY.

\*195/10. *SORBUS FORRIGENS* Hedlung. Garryland, Gort, Co. Clare, v.-c. H.9, H. W. PUGSLEY, *Journ. Bot.*, lxxii, 58 (February 1934).

195/13. *PYRUS ARIA* (L.) Ehrh. Jervaulx Park, N. Riding, Yorks, v.-c. 65 (1933), (? planted). Det. F. J. Chittenden, K. D. LITTLE; Hazlehead Woods, S. Aberdeen, v.-c. 92, Mrs MACALISTER HALL.

195/13c. *P. ARIA* (L.) Ehrh., var. *INCISA* Reichb. Wroughton, v.-c. 7, J. D. GROSE.

195/15. *P. TORMINALIS* (L.) Ehrh. Lane near Shilley Green, Herts. The only wild tree known to me in the Ivel District. In 1918 it was a tree 15 ft. high; now cut down with hedge, but shooting again, 1934, J. E. LITTLE.

†197/2. *COTONEASTER MICROPHYLLUS* Wallich. Cliffs E. of Dover, some very old bushes, v.-c. 15, R. A. F. BRENNAN.

†197/3. *C. SIMONSII* Baker. Fleet, N. Hants, v.-c. 12, Lt.-Col G. WATTS.

199/15. *SAXIFRAGA CESPITOSA* L. Not rare on Beinn a' Bhuid, but mostly inaccessible. S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

199/19. *S. RIVULARIS* L. Cairn Toul, alt. 4000 ft., S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

\*199/24. *S. UMBROSA* L. Quite wild in Ridgewood, Meopham Parish, S.W. of Rochester, W. Kent, v.-c. 16, C. M. BAKER.

203/1. *CHRYSOSPLENIUM ALTERNIFOLIUM* L. Tockenham, Wilts. Not recorded for this section of v.-c. 7 in *Fl. Wilts.*, J. D. GROSE.

210/1. *COTYLEDON UMBILICUS-VENERIS* L. Headley, N. Hants, v.-c. 12, see note in Distributor's Report, P. M. HALL.

\*211/4. *SEDUM FORSTERIANUM* Sm. Cheddar, N. Somerset, J. D. GROSE.

211/22. *S. ROSEUM* Scop. ♀ plant. Isle of Skye, 1933, Mrs E. T. MUSTARD.

213/2. *DROSERA LONGIFOLIA* L. Linwood, v.-c. 11, J. D. GROSE.

213/2b. *D. LONGIFOLIA* L., var. *CAULESCENS* Hind. Pond on Stoborough Heath, Wareham, Dorset, P. M. HALL.

\*217/2. *CALLITRICHE OBTUSANGULA* Le Gall. Pond near Sandhead, Wigtown, v.-c. 74; ditches at Loch Shiel, Inverness, v.-c. 97, G. TAYLOR.

\*217/3. *C. VERNA* L., em. Lönnr. Hillside between Middleton and St John's Chapel, v.-c. 66, G. TAYLOR.

217/5. *C. INTERMEDIA* Hoffm. Loch Kandor, Glen Callater, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

217/5d. *C. INTERMEDIA* Hoffm., var. *HOMIOPHYLLA* G. & G. Loch Callater, S. Aberdeen, v.-c. 92, E. C. WALLACE.

220/13. *EPILOBIUM ANAGALLIDIFOLIUM* Lam. Greenhow, W. Riding, Yorks, alt. circ. 1200 ft., K. D. LITTLE.

†220/15. *E. NUMMULARIFOLIUM* R. Cunn. Garden weed, Rhiwbina, Glamorgan, v.-c. 41, 1931, H. A. HYDE, seeding freely; roadside near

Pen-y-gwryd Hotel, Nantgwynant, Caern., v.-c. 49, 1934, Mrs C. M. LE LACHEUR; comm. A. E. WADE.

223/1c. *OENOTHERA BIENNIS* L., var. *PARVIFLORA* (L.) Dr. Nantgarw, Glamorgan, H. PHILLIPS.

223/3. *O. ODORATA* Jacq. In abundance on the sandhills in one area E. of Sandwich, v.-c. 15, J. P. M. BRENAN; \*Bel Royal and St Ouen's Bay, Jersey, H. PHILLIPS.

†234/1. *CARPOBROTUS EDULIS* (L.) N.E.Br. Bel Royal, Jersey, H. PHILLIPS.

\*239/1. *ERYNGIUM CAMPESTRE* L. In a pasture field near the railway line at Hermitage, Berks, v.-c. 22, confirmed W.H.P., Miss A. M. NEILD.

†240/1. *ASTRANTIA MAJOR* L. By Castle Semple Loch, Renfrew, v.-c. 70, R. MACKECHNIE.

244/1. *SMYRNIUM OLUSATRUM* L. Near Folkestone, E. Kent, v.-c. 15, Viscountess GLADSTONE.

245/5. *BUPLEURUM TENUISSIMUM* L. Gunnard Bay, v.-c. 10, J. D. GROSE.

†245/6. *B. LANCEFOLIUM* Hornem. Spontaneous garden weed at Tonbridge, v.-c. 16, J. P. M. BRENAN; Gerard's Cross, Bucks, Mrs PEMBERTON PIGOTT.

†245/12. *B. PETRAEUM* L. Alien, Europe. Waste heap, Hitchin, Herts, H. PHILLIPS.

247/1. *APIUM GRAVEOLENS* L. Between Worth and Sandwich, v.-c. 15, Miss C. F. CLOKE.

250/2. *CARUM VERTICILLATUM* Koch. Abundant at Langtree and Shebbear, N. Devon, v.-c. 4, H. H. HARVEY.

250/4. *C. SEGETUM* B. & H. In great abundance near High Down, Pirton, Herts; sea banks, Sutton-on-Sea, Lincs, A. LINDSELL.

\*263/1. *FOENICULUM VULGARE* Mill. Norton Spit, v.-c. 10, J. D. GROSE.

264/1. *CRITHMUM MARITIMUM* L. Beach shingle, Kessingland, East Suffolk, v.-c. 25, four plants, 1933, E. A. ELLIS.

265/3. *OENANTHE CROCATA* L. Near Achnacloich, Argyll, v.-c. 98, Miss M. MARTIN.

- 265/6. *O. LACHENALII* C. Gmel. Oughton Head, Hitchin, Herts, 1934, JOSHUA LAMB. Carrying on previous records, but the plant is vanishing, J. E. LITTLE.
- \*271/1. *LIGUSTICUM SCOTICUM* L. Near Connel, Argyll, v.-c. 98, Miss M. MARTIN.
- †277/1. *HERACLEUM MANTEGAZZIANUM* S. & L. Tockenham, v.-c. 7, naturalised, J. D. GROSE.
- †283/2. *CAUCALIS DAUCOIDES* L. Casual at Lockerley Mill, S. Hants, v.-c. 11, Miss B. GULLICK.
- 283/5. *C. NODOSA* Scop., b. *PEDUNCULATA* (R. & F.) Dr. Cardiff, Glamorgan, v.-c. 41, E. VACHELL.
- †283/8. *C. LATIFOLIA* L. Casual at Lockerley Mill, S. Hants, v.-c. 11, Miss B. GULLICK.
- 287/3. *SAMBUCUS EBULUS* L. Sevenhampton, v.-c. 7, J. D. GROSE.
- 306/2. *DIPSACUS PILOSUS* L. Hodson, v.-c. 7, J. D. GROSE.
- 312/2. *SOLIDAGO VIRGAUREA* L. A form or var. near to var. *cambrica* (Huds.). Near Wynch Bridge, Teesdale, v.-c. 65, H. S. REDGROVE.
- †312/3. *S. LANCEOLATA* L. On both sides of a road dividing the parishes of Tawstock and Fremington, N. Devon, v.-c. 4, in some quantity, R. TAYLOR.
- 318/19b. *ASTER TRIPOLIUM* L., var. *DISCOIDEUS* Reichb. Newtown, v.-c. 10, J. D. GROSE.
- 318/20. *A. LINOSYRIS* Bernh. Near Berry Head, S. Devon, v.-c. 3, H. S. REDGROVE.
- 320/2. *ERIGERON ACER* L., var. *PSEUDO-ELONGATA* (Rouy). Banks of R. Medway, Aylesford, W. Kent, R. B. ULLMAN.
- †320/3. *E. CANADENSIS* L. Near Lingfield, distr. ix, Surrey, W. H. WILDING.
- 324/4. *FILAGO GALLICA* L. Shalford Common, Surrey, J. G. LAWN.
- †324/6. *F. ARVENSIS* L. Laughton, Lincs, v.-c. 54, Dr H. B. WILLOUGHBY SMITH.
- 328/5b. *GNAPHALIUM SUPINUM* L., var. *FUSCUM* Hartm. Tolmount, S. Aberdeen, v.-c. 92, E. C. WALLACE.
- 333/1. *INULA HELENIUM* L. Bank of River Yare, Brundall, East Norfolk, v.-c. 27, E. A. ELLIS.

333/5. *I. CRITHMOIDES* L. Damp spot beneath the cliffs between Dover and Folkestone, v.-c. 15, Dr A. R. M. BRENNAN; Newtown, I. of Wight, v.-c. 10, J. D. GROSE.

334/2. *PULICARIA VULGARIS* Gaertn. Woodstreet, 3 miles W. of Guildford, Surrey, W. E. WARREN.

†339/4. *AMBROSIA TRIFIDA* L. Casual near chicken-run, Glynde, E. Sussex, v.-c. 14, Miss K. PICKARD.

†339/4b. *A. TRIFIDA* L., var. *INTEGRIFOLIA* (Willd.) Torr. & Gray. Differs from the more frequent *A. artemisiifolia* L. by having its upper leaves (or all of them) undivided, ovate or oval. Waste ground, Burton-on-Trent, R. C. L. BURGESS; garden ground, Ickleford, Herts (1934), J. E. LITTLE.

†341/3. *XANTHIUM SPINOSUM* L. In two places between Sandwich and Worth, v.-c. 15, Miss C. F. CLOKE.

†354/1. *GALINSOGA PARVIFLORA* Cav. Well established by the roadside between Cranbrook and Goudhurst, E. Kent, v.-c. 15, Dr LANGMEAD; waste ground, Fleet, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†356/1. *HEMIZONIA PUNGENS* Torrey & Gray. Waste ground, Burton-on-Trent, R. C. L. BURGESS.

378/2. *ARTEMISIA CAMPESTRIS* L. Near Holt, E. Norfolk, v.-c. 27, Miss GARNER-RICHARDS.

378/3. *A. VULGARIS* L., var. *MAJOR* Rouy. Field edge at Hadleigh, W. Suffolk, v.-c. 26, det. W. H. PEARSALL, R. BROWN.

380/1. *PETASITES OFFICINALIS* Moench. (*P. ovatus* Hill). Only male-functioning flowers, producing no seeds, at Stalham, Brampton, Oxnead, Costessey, Keswick, Cantley and Earsham, East Norfolk, v.-c. 27, E. A. ELLIS.

†381/1. *DORONICUM PARDALIANCHES* L. Ayot St Peter, Herts, 1934, J. E. LITTLE.

\*†383/7. *SENECIO SQUALIDUS* L. Railway embankment near Taunton, S. Somerset, v.-c. 5, W. WATSON, *Journ. Bot.*, lxxii, 351 (December 1934).

\*†383/8. *S. VISCOSUS* L. Railway embankment near Taunton, S. Somerset, v.-c. 5, W. WATSON, *Journ. Bot.*, lxxii, 351 (December 1934); new by-pass road W. of Guildford, Surrey, W. E. WARREN.

†383/31. *S. CINERARIA* DC. Cliffs E. of Dover, v.-c. 15, R. A. F. BRENNAN.

- 396/2. *CIRSIUM LANCROLATUM* Scop. Waste heap, Welwyn, Herts, H. PHILLIPS.
- 396/8e. *C. SETOSUM* M.B. Pitmilly, Fife, v.-c. 85, M. S. CAMPBELL.
- 397/1b. *ONOPORDON ACANTHIUM* L., var. *VIRIDE* Michet. Watchfield, v.-c. 22, J. D. GROSE.
- 405/2. *CENTAUREA JUNGENS* Gugl. St Ouen's Bay, Jersey, H. PHILLIPS.
- 405/3. *C. ANGUSTIFOLIA* Gugl. Don Bridge, Jersey, H. PHILLIPS.
- 405/7. *C. PRATENSIS* Thuill. Grave de Lecq and St Ouen's, Jersey, H. PHILLIPS.
- 405/8. *C. OBSCURA* Jord. Langtree, N. Devon, v.-c. 4, H. H. HARVEY.
- \*405/9. *C. DRUCEI* C.E.B., f. *SUBTERNUDA*. Hitchin, Herts, H. PHILLIPS.
- 405/11. *C. NEMORALIS* Jord. Railway-bank, Llanishen, Glamorgan, H. PHILLIPS.
- 405/11b. *C. NEMORALIS* Jord., var. *DIVERSIFOLIA* C.E.B., f. *RADIATA*. Near Cowbridge, Glamorgan, H. PHILLIPS.
- 405/12. *C. CYANUS* L. In great abundance, tingeing a cornfield. Bedwell Plash, Stevenage, Herts, 1934, A. BYGRAVE.
- +405/25. *C. DIFFUSA* Lam. Splott, Cardiff, Glamorgan, v.-c. 41, 1933, Miss E. VACHELL, comm. A. E. WADE.
- +405/31. *C. SOLSTITIALIS* L. Upper Axford, v.-c. 7, J. D. GROSE.
- +407/1. *CARTHAMUS LANATUS* L. Chicken-run, Barcombe Mills railway station, E. Sussex, v.-c. 14, Miss K. PICKARD and W. H. PEARSALL.
- 416/10. *CREPIS TARAXACIFOLIA* Thuill. Near Fort. Regent, Jersey, H. PHILLIPS.
- 419/56. *HIERACIUM LEYI* F.J.H. Near Wynch Bridge, Teesdale, v.-c. 65, H. S. REDGROVE.
- 419/83. *H. PELLUCIDUM* Laest. High Force, Teesdale, v.-c. 66, H. S. REDGROVE.
- 419/207. *H. TRIDENTATUM* Fr. Byfleet, Surrey, v.-c. 17, H. S. REDGROVE.

419/218. *H. TRICHOCAULON* D. Near Frensham, N. Hants, v.-c. 12, P. M. HALL [det. H. W. PUGSLEY as *H. rigidum*, var. *trichocaulon*].

419/223. *H. SCABRESCENS* D. Boarhunt, S. Hants, v.-c. 11, P. M. HALL [det. H. W. PUGSLEY as *H. rigidum*, var. *scabrescens*].

422/3. *LEONTODON HIRTUS* L. (*Thrinicia hirta* Roth). Cheadle Hulme, Cheshire, v.-c. 58, J. W. HARTLEY.

425/1. *LACTUCA VIROSA* L. Former dump of London rubbish, Gault Pit, Shefford, Beds, F. RANSOM and J. E. LITTLE.

425/3. *L. SALIGNA* L. Near Earith Bridge, Cambs, v.-c. 29, E. C. WALLACE.

425/6. *L. ALPINA* Hook. With reference to the record of this in last year's *Report*, p. 532, we have now heard from Mr G. W. Temperley that the Swiss form of this species is in cultivation in a garden about  $\frac{3}{4}$  mile from Lake Ullswater on the western shore opposite the middle reach. No doubt the seeds were wind-blown from there to the locality given in *Report*, 1933.

427/4f. *SONCHUS OLERACEUS* L., var. *CILIATUS* (Lam.) Dr. Letchworth, Herts, H. PHILLIPS.

†428/1. *TRAGOPOGON PORRIFOLIUS* L. Waste place near Ramsgate Station, v.-c. 15, A. R. M. BRENNAN.

434/1. *PHYTEUMA ORBICULARE* L. Avebury, v.-c. 7, J. D. GROSE.

435/3. *CAMPANULA TRACHELIUM* L. Near High Down, Pirton, Herts, 1934, a diminishing species, JOSHUA LAMB.

439/1. *OXYCOCCUS QUADRIPETALA* Gilib. Beside Loch Phadruig, alt. 2200 ft., S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

446/7b. *ERICA VAGANS* L., var. *KEVERNENSIS* Turill. Coverack, v.-c. 1, J. D. GROSE.

456/1. *MONOTROPA HYPOPITYS* L. Pegsdon, Beds, 1934, A. LONG.

457/1. *LIMONIUM VULGARE* Mill. Has recently colonised the south shore of Breydon, after its recorded absence from the estuary for 150 years, v.-c. 25, E. A. ELLIS.

457/2. *L. HUMILE* Mill. Newtown, I. of Wight, v.-c. 10, J. D. GROSE.

459/1. *HOTTONIA PALUSTRIS* L. Oxford, v.-c. 23, J. D. GROSE.

460/1. *PRIMULA ELATIOR* Jacq. Polton, Beds, on boulder clay, 1934, H. and D. MEYER. This confirms its occurrence in Beds for which it was rejected by Miller Christy and Jas. Saunders, J. E. LITTLE.

460/1. *P. ELATIOR* × *VULGARIS* Huds. Polton, Beds (1934), with the above (!J. E. Little), H. and D. MEYER.

460/3. *P. VERIS* × *VULGARIS* Huds. Hatley Cockayne, Beds, 1932, J. E. LITTLE and M. BROWN.

463/1. *LYSIMACHIA THYRSIFLORA* L. South Wraxall, v.-c. 7. The Rev. T. A. Preston in *The Flowering Plants of Wilts*, 1888, states: "There is reason to believe that this plant has been introduced in the above station, probably by the late Mr William Sole, of Bath." The plant is now, 1934, fairly plentiful, J. D. GROSE.

\*463/2. *L. VULGARIS* L. Connel, Argyll, v.-c. 98, Miss M. MARTIN.

467/3. *ANAGALLIS CAERULEA* Schreb. Hort. Stevenage, Herts, July 1934. Leg. Rev. C. P. H. REYNOLDS. Has appeared for several years with *A. phoenicea* Lamk. Comm. J. E. LITTLE.

476/1. *MICROCALA FILIFORMIS* H. & L. Ruan Lanihorne, v.-c. 2, J. D. GROSE; Ridge, Dorset, v.-c. 9, H. S. REDGROVE.

478/1. *CENTAURIUM UMBELLATUM* Gilib., var. *CAPITATUM* (Koch) Dr. Grosnez Castle, Jersey, H. PHILLIPS.

478/4. *C. PULCHELLUM* Dr., f. *SCHWARTZIANA* Wittr. Ridge, Dorset, v.-c. 9, H. S. REDGROVE.

480/1. *GENTIANA PNEUMONANTHE* L. Hartland Moor, Dorset, v.-c. 9, H. S. REDGROVE.

480/6b. *G. LINGULATA* Ag., var. *PRAECOX* Towns. Cheesefoot Head, near Winchester, S. Hants, v.-c. 11; new to this district of Hampshire and in very small quantity, P. M. HALL and H. W. PUGSLEY.

\*480/8. *G. GERMANICA* Willd. On turfy rocky ground on the shores of Loch Keilisport, near Kilberry, v.-c. 101, Mrs MACALISTER HALL. This is the first record for Scotland for this species, which hitherto has not been known farther north than Flint and Derbyshire.

\*482/1. *LIMNANTHEMUM NYMPHAEOIDES* Hoffm. & Link. River Yare, Keswick, East Norfolk, v.-c. 27, E. A. ELLIS.

†490/2. *OMPHALODES VERNA* Moench. Dolton, N. Devon, v.-c. 4, Rev. R. HOLMES; Great Barton, Suffolk, v.-c. 26, obviously originally planted but now quite established, H. S. REDGROVE.

491/1. *CYNOGLOSSUM OFFICINALE* L. Radwell, Beds, Mrs HAYES.

- †493/2. *LAPPULA ECHINATA* Gilib. In the dry bed of the R. Mole between Leatherhead and Mickleham, Surrey, P. H. COOKE.
- 501/1. *LYCOPSIS ARVENSIS* L. Near Oxted, distr. ix, Surrey, W. H. WILDING.
- 506/4. *MYOSOTIS CAESPITOSA* K. F. Schultz. Fleet Pond, N. Hants, v.-c. 12, P. M. HALL.
- 506/6. *M. ALPESTRIS* Schmidt. Rocks at head of Caenlochan Glen, Angus, v.-c. 90. Seen again after many years by R. MACKECHNIE and E. C. WALLACE.
- 506/7. *M. SYLVATICA* (Ehrh.) Hoffm. Woodland near Vernham's Dean and at Hampshire Gate, near Andover, N. Hants, v.-c. 12; the former station at least undoubtedly native and not far from the well-known Berkshire locality at Riever Wood, P. M. HALL; \*in a wood near Henley, Oxon., v.-c. 23, and appearing truly native, N. Y. SANDWICH and E. MILNE-REDHEAD.
- \*515/3. *CUSCUTA EPITHYMUM* (L.) Murr. By Lady's Island Lake, Rosslare, Co. Wexford, J. CHAPPLE and T. GAMBIER-PARRY.
- 515/4. *C. TRIFOLI* Bab. Near East Clandon, Surrey, v.-c. 17. Not given for this division (iv) in *Fl. Surrey*, p. 472, Lady DAVY.
- †518/7. *PHYSALIS PERUVIANA* L. Waste ground, Burton-on-Trent, R. C. L. BURGESS.
- 524/1. *HYOSCYAMUS NIGER* L. Hamstead Marshall and Watchfield, v.-c. 22, over 100 plants in this locality, J. D. GROSE.
- †524/2. *H. ALBUS* L. Dormant seeds brought to surface by road widening, or recently introduced? Pirton Road, Hitchin, Herts, 1934, det. J. E. LITTLE, JOSHUA LAMB.
- †527/1. *VERBASCUM PHLOMOIDES* L. Waste heap, Welwyn, Herts, H. PHILLIPS.
- 527/5. *V. BLATTARIA* L. Wood in N. Lincs, v.-c. 54, det. W.H.P., F. T. BAKER.
- \*†527/6. *V. PULVERULENTUM* Vill. Railway embankment, near Taunton, S. Somerset, v.-c. 5, W. WATSON, *Journ. Bot.*, lxxii, 351 (December 1934); \*railway embankment, near Colchester, N. Essex, v.-c. 19, A. W. GRAVESON, comm. J. E. LOUSLEY, *loc. cit.*, 173 (June 1934).
- †532/2. *LINARIA PURPUREA* Mill. Norton Spit, v.-c. 10. Stated in *Rep. B.E.C.*, 1931, 749, to be gone from this locality, but there are still (1934) several plants there, J. D. GROSE.

532/3. *L. REPENS* (L.) Mill. On the downs near Streatley-on-Thames, Berks, DOROTHY A. CADBURY; well established by a roadside near Sutton Park, Birmingham, R. C. L. BURGESS; and in abundance on a disused railway line near \*Upper Stonar, Sandwich, v.-c. 15, J. P. M. BRENNAN.

532/4. *L. PELISSERIANA* Mill. Adventive on newly-made ground, near Birmingham, v.-c. 38, R. C. L. BURGESS.

\*532/5. *L. SUPINA* Desf. Tower Hill Station, N. Devon, v.-c. 4, Rev. H. N. SMITH PEARSE.

532/24. *L. SPURIA* (L.) Mill. Oxted, distr. ix, Surrey, W. H. WILDING.

539/1. *LIMOSELLA AQUATICA* L. Breamore Common, S. Hants, v.-c. 11, Miss GULLICK and P. M. HALL.

540/1. *SIBTHORPIA EUROPAEA* L. Mullion, v.-c. 1, J. D. GROSE; Torrington, v.-c. 4, H. S. REDGROVE.

†542/1. *ERINUS ALPINUS* L. Near Hawes, N.W. Yorks, v.-c. 65, Miss OXLEE.

543/6b. *VERONICA SCUTELLATA* L., var. *VILLOSA* Schum. Fen at Hockham Mere, West Norfolk, v.-c. 28, E. A. ELLIS.

543/9b. *V. AQUATICA* Benquerel, var. *ANAGALLIFORMIS* (Boreau). Winchfield, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

543/14. *V. VERNA* L. Near Mildenhall, Suffolk, v.-c. 26, H. S. REDGROVE.

543/19. *V. AGRESTIS* L. Lamlash, Arran, v.-c. 100, R. MACKECHNIE.

545/3. *EUPHRASIA BREVIPILO* Burn. & Gr. Chapel Brae, Halcro, S. Ronaldsay, Orkney, v.-c. 111 (Ref. 4918 and 4995), H. H. JOHNSTON; Woodford, Galway, v.-c. 15; Windy Gap and Waterville, Co. Kerry, J. CHAPPLE and T. GAMBIER-PARRY.

545/3. *E. BREVIPILO* × *NEMOROSA*, var. *COLLINA* Pugsl. Gentian Hill, Galway, v.-c. 16, J. CHAPPLE and T. GAMBIER-PARRY.

545/3. *E. BREVIPILO* B. & G., var. *NOTATA* Pugsl. Near Cruden Bay, N. Aberdeen, v.-c. 93, Mrs MACALISTER HALL.

\*545/5. *E. NEMOROSA* Löhr. Banks of River Ythan, N. Aberdeen, v.-c. 93, Mrs MACALISTER HALL.

545/5. *E. NEMOROSA* Löhr., var. *COLLINA* Pugsl. Langdon Common, Durham, H. PHILLIPS; Darrynane, Co. Kerry, v.-c. 1; Gentian Hill,

Galway, v.-c. 16; Rosslare, Co. Wexford, v.-c. 12; Glen Cahir, Co. Clare, v.-c. 9, J. CHAPPLE and T. GAMBIER-PARRY.

545/10. *E. OCCIDENTALIS* Wettst. (Det. H. W. PUGSLEY). Winspit, Worth Matravers, Dorset, v.-c. 9, P. M. HALL.

545/13. *E. FOULAENSIS* Towns. Chapel Brae, Halcro, S. Ronaldshay, Orkney, v.-c. 111 (Ref. 4916 and 4994), H. H. JOHNSTON.

545/16. *E. SCOTICA* Wettst. Ben Laoigh, Argyll, v.-c. 98, Mrs MACALISTER HALL.

545/18. *E. CONFUSA* Pugs. f. *ALBIDA* Pugs. Fitty Hill, Westray, Orkney, v.-c. 111 (Ref. 4949), H. H. JOHNSTON; \*Kenfig Pool, Glamorgan, J. CHAPPLE.

545/18. *E. CONFUSA* Pugs. f. *GRANDIFLORA* Pugs. North-east side of Ward Hill, Hoy, Orkney, v.-c. 111 (Ref. 4989), H. H. JOHNSTON.

545/18×. *E. CONFUSA* Pugs. × *FOULAENSIS* Towns. About 100 yards N. of Halcro Farm Steading, S. Ronaldshay, Orkney, v.-c. 111 (Ref. 4919 and 4996), H. H. JOHNSTON.

545/19(4). *E. ANGLICA* Pugs. Matley, S. Hants, v.-c. 11, P. M. HALL and W. A. SLEDGE.

545/21(2). *E. PSEUDO-KERNERI* Pugs. Edge of Cheriton Wood, near Bramdean, N. Hants, P. M. HALL; Apesdown, I. of Wight, v.-c. 10, J. D. GROSE.

546/1. *BARTSIA ALPINA* L. Widdybank Fell, Teesdale, v.-c. 66, H. S. REDGROVE.

546/4. *B. VISCOSA* L. Fairwood Common, Gower, Glam., v.-c. 41, A. L. STILL; Ridge, Dorset, v.-c. 9, and Braunton Burrows, N. Devon, v.-c. 4, H. S. REDGROVE.

\*549/2. *MELAMPYRUM ARVENSE* L. In wheat, on loam with clay subsoil, Newton Blossomville, Bucks, v.-c. 24, det. J. E. LITTLE, A. W. PREVITE.

550/3. *OROBANCHE RUBRA* Sm. \*Near Winchester, v.-c. 11, Rt. Hon. H. T. BAKER; Kynance, Cornwall, v.-c. 1, J. D. GROSE.

550/7. *O. HEDERAE* Duby. Ventnor, v.-c. 10, J. D. GROSE.

550/10. *O. MINOR* Sm. Near Winchester, S. Hants, v.-c. 11, Hon. G. CHARTERIS; Portslade, W. Sussex, v.-c. 13, Miss L. ABELL.

550/12. *O. PURPUREA* Jacq. Trimmingham cliff, East Norfolk, v.-c. 27, five plants on *Achillea Millefolium*, July 12th, 1934, E. A. ELLIS.

552/4. *UTRICULARIA OCHROLEUCA* Hartm. Loch Callater, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE; Hartland Moor, Dorset, H. S. REDGROVE; \*in Kerry, v.-c. H.2, R. W. SCULLY, *Journ. Bot.*, lxxii, 209 (July 1934). The note also refers to a previous record for W. Donegal, v.-c. H.35 (*Journ. Bot.*, 1912, 287), which is omitted in *Comital Flora*.

553/2. *PINGUICULA VULGARIS* L. Cothill, v.-c. 22, J. D. GROSE.

553/4. *P. LUSITANICA* L. Kennack, v.-c. 1, J. D. GROSE; Bridestowe, v.-c. 4, H. H. HARVEY.

558/1. *MENTHA ROTUNDIFOLIA* Huds. Waste ground, Weybridge, Surrey, J. G. LAWN; Llangennith, Gower, v.-c. 41, A. L. STILL.

558/1x. ×*M. SPICATA* = *CORDIFOLIA* (Opiz) Fraser. Blackbrook, Dorking, v.-c. 17; Rushett Green, Grafham, v.-c. 17, with purple flowers, A. L. STILL.

558/2. *M. ALOPECUROIDES* Hull. Hurst Green and Rushett Green, Grafham, v.-c. 17, A. L. STILL.

558/3g. *M. LONGIFOLIA* Huds., var. *PULVERULENTA* (Strail). R. Darent, near Farningham, W. Kent, v.-c. 16. Still flourishing in this locality where it was recorded by Rev. E. S. MARSHALL in 1894, A. L. STILL.

558/3x. ×*M. SPICATA* = *VILLOSO-NERVATA* (Opiz) Fraser. Near Reigate Heath, v.-c. 17, det. J. FRASER, A. L. STILL.

558/4. *M. SPICATA* Huds. In a derelict cottage garden, near Bramdean, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; Llangennith, Llanrhidian (sparingly), Burry Green and Blackhills, in Gower, v.-c. 41, A. L. STILL; \*Lamlash, Arran, v.-c. 100, R. MACKECHNIE.

558/6d. *M. PIPERITA* L., var. *SUBCORDATA* Fraser. Llangennith and Llanrhidian, Gower, v.-c. 41, A. L. STILL.

558/7f. *M. AQUATICA* L., var. *INCISO-SERRATA* Briq. Gwernfrwyd, Gower, v.-c. 41, W. R. SHERRIN.

558/9. *M. VERTICILLATA* L. Llangennith, Gower, v.-c. 41. Mr Fraser says this is the same as the type in the Linnean Herb. It is a slender, much branched plant, full of flowers and resembles plants in the Druce collection labelled var. *ELATA*, A. L. STILL.

558/9e. *M. VERTICILLATA* L., var. *BENESCHIANA* Opiz. Dunsfold Green, Surrey, v.-c. 17, det. J. FRASER, A. L. STILL.

558/9f. ×*M. VERTICILLATA* (L.), var. *ADULTERINA* Briq. Aberthin, Glamorgan, H. PHILLIPS.

558/9p. *M. VERTICILLATA* L., var. *TRICHODES* Briq. Park Mill and Bishopston Valley, Gower, v.-c. 41. Identified by comparison with Druce's sheet from Hereford, so named by Briquet (*Rep. B.E.C.*, 1924), A. L. STILL.

558/9q. × *M. VERTICILLATA* (L.), var. *RIVALIS* Briq. Langdon Beck, Durham, H. PHILLIPS.

558/10. *M. GENTILIS* L. Blashford, S. Hants, v.-c. 11, P. M. HALL and E. C. WALLACE; \*in a derelict cottage garden, near Bramdean, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; Llangennith and Bishopston Valley, Gower, v.-c. 41, A. L. STILL; Brixham, S. Devon, v.-c. 3, F. M. DAY; \*Lamlash, Arran, v.-c. 100, R. MACKECHNIE.

\*558/11. *M. CARDIACA* Baker. Llangennith, Glamorgan, v.-c. 41, A. L. STILL.

558/12. *M. RUBRA* Sm. Llangennith, Overton and Park Mill, Gower, v.-c. 41, A. L. STILL; Colwall, Hereford, v.-c. 36, F. M. DAY; Greywell, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

558/12d. *M. RUBRA* Huds., var. *RARIPILA* Briq. Near Crookham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS (det. J. FRASER and A. L. STILL).

558/13j. *M. ARVENSIS* L., var. *DENSIFOLIATA* Briq. Dunsfold, Surrey, v.-c. 17, det. J. FRASER, A. L. STILL.

558/14. *M. PULEGIUM* L. Breamore Common, S. Hants, v.-c. 11, Miss GULLICK and P. M. HALL.

562/4. *CALAMINTHA SYLVATICA* Bromf. Apesdown, v.-c. 10, J. D. GROSE.

562/6. *C. VILLOSA* Boiss. Corfe Castle, Dorset, H. S. REDGROVE.

562/8. *C. ACINOS* Clairv. Souston Quarry, N. Devon, v.-c. 4, H. H. HARVEY.

†566/13. *SALVIA NEMOROSA* L. Portishead Docks, v.-c. 6, det. Herb. Mus. Brit., A. L. STILL.

†566/17. *S. VERTICILLATA* L. Portishead Docks, v.-c. 6, A. L. STILL.

569/1. *NEPETA CATARIA* L. Watchfield, v.-c. 22, J. D. GROSE.

569/1b. *N. CATARIA*, var. *SUBINCISA* Asch. Ashbury, v.-c. 22, J. D. GROSE.

572/1. *SCUTELLARIA GALERICULATA* L., var. *PUBESCENS* Benth. Near Achnacloch, Argyll, v.-c. 98, Miss M. MARTIN.

572/2. *S. MINOR* Huds. Buxton Heath, Hevingham, East Norfolk, v.-c. 27, E. A. ELLIS.

\*573/2 *PRUNELLA LACINIATA* L. One plant growing in a cart track in Mill Field, Boxted Hall Farm, North Essex, v.-c. 19. First noticed, 20th July 1933; flowering again, 22nd July 1934, Miss G. M. R. HEELEY.

574/1. *MELITTIS MELISSOPHYLLUM* L. Coverack, W. Cornwall, v.-c. 1, J. D. GROSE; Kelly, v.-c. 3, and Bradstone, v.-c. 4, H. H. HARVEY.

576/1. *MARRUBIUM VULGARE* L. Old Swindon, v.-c. 7. Waste ground. Stated in *Wilts Flora* to be no recent record for the county, J. D. GROSE.

578/4. *GALEOPSIS LADANUM* L. (agg.). Oxted, distr. ix, Surrey, W. H. WILDING.

578/4c. *G. ANGUSTIFOLIA* Ehrh. Pirton, Herts. Many of the plants are small-flowered. They vary much as to the glandular hairs on the calyx, K. D. LITTLE.

†579/1. *LEONURUS CARDIACA* L. Northcott hamlet, N. Devon, v.-c. 4, H. H. HARVEY.

581/3. *LAMIUM PURPUREUM* L., f. *ALBUM*. Ainderby, near Northallerton, Yorks, v.-c. 65, Miss C. M. ROB. Growing in masses with the ordinary red-flowered type from which it differs in its pure white flowers without any spots or markings, and the uppermost leaves pale green, as are also the calyx-teeth.

581/4. *L. HYBRIDUM* Vill. Winchfield, N. Hants, v.-c. 12, Lt.-Col. G. WATTS; Rhossili, Glamorgan, v.-c. 41, E. C. WALLACE.

587/4. *AJUGA CHAMAEPITYS* (L.) Schreb. Between Alresford and Bramdean, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

†588/1. *PLANTAGO INDICA* L. Alresford, N. Essex, v.-c. 19. One plant in a field of roots, M. S. CAMPBELL; (as *P. ramosa* Asch.) shown to me by Mr L. B. Hall at Parkstone, Dorset, v.-c. 9, H. S. REDGROVE.

593/2. *HERNIARIA CILIATA* Bab. Kynance, v.-c. 1, J. D. GROSE.

†596/6. *AMARANTHUS RETROFLEXUS* L. On a rubbish heap at Cliffe, W. Kent, v.-c. 16, M. S. CAMPBELL.

600/1. *CHENOPODIUM RUBRUM* L. Breamore Common, S. Hants, v.-c. 11, Miss GULLICK and P. M. HALL; waste field, Weybridge, Surrey, J. G. LAWN.

600/4. *C. HYBRIDUM* L. Rubbish heap on right bank of the Medway, near Aylesford, v.-c. 15, J. P. M. BRENNAN; gardens in Salisbury, v.-c. 8, Miss B. GULLICK; waste ground, Wotton, Surrey, J. G. LAWN.

600/5. *C. URBICUM* L. Langney Point, Eastbourne, Sussex, J. G. LAWN.

600/7. *C. OPULIFOLIUM* Schrad. Waste ground, Wotton, Surrey, J. G. LAWN.

600/12. *C. FIGIFOLIUM* Sm. Brickfield, Albury, Surrey, J. G. LAWN.

600/13. *C. GLAUCUM* L. A few plants near Aldborough, v.-c. 16, J. P. M. BRENNAN.

600/15. *C. POLYSPERMUM* L. Waste field, Wotton, Surrey, J. G. LAWN.

600/15b. *C. POLYSPERMUM* L., var. *CYMOsum* Moq. Odiham, N. Hants, v.-c. 12, Lt.-Col. G. WATTS.

606/3b. *ATRIPLEX PATULA* L., var. *ANGUSTISSIMA* Gr. & Godr. Near N. Kessock, Beaulieu Firth, East Ross, v.-c. 106, M. S. CAMPBELL.

†606/10. *A. HORTENSIS* L. Waste, Hitchin, Herts, 1934, JOSHUA LAMB.

613/1. *SALSOLA KALI* L. St Ouen's, Jersey, H. PHILLIPS.

615/6x. *POLYGONUM LAPATHIFOLIUM* × *PERSICARIA*. Merrow Common, Surrey, v.-c. 17, E. C. WALLACE. Det. C. E. BRITTON.

615/8. *P. NODOSUM* Pers. Breamore Common, S. Hants, v.-c. 11, P. M. HALL and E. C. WALLACE. Det. C. E. BRITTON.

615/8d. *P. NODOSUM* Pers., var. *ERECTUM* Rouy. Breamore Common, S. Hants, v.-c. 11, P. M. HALL and E. C. WALLACE. Det. C. E. BRITTON.

615/10. *P. MITE* Schrank. Angley Wood, near Cranbrook, v.-c. 16, J. P. M. BRENNAN.

615/11a. *P. MINUS* Huds., var. *COMMUNE* A. Br. Breamore Common, S. Hants, v.-c. 11, P. M. HALL and E. C. WALLACE. Det. C. E. BRITTON.

615/13. *P. RARI* Bab. Very sparingly at Portland, Dorset, v.-c. 9, H. S. REDGROVE.

615/15. *P. AEQUALE* Lindm. Yarmouth, E. Suffolk, v.-c. 25, H. PHILLIPS.

†616/1. *FAGOPYRUM SAGITTATUM* Gil. Wootton Bassett, v.-c. 7, J. D. GROSE.

618/13. *RUMEX MARITIMUS* L. Pondsides near Godstone, Surrey, v.-c. 17, E. C. WALLACE.

626/1. *VISCUM ALBUM* L. Upon hawthorn, Offley, Herts, L. MALES; upon apple, Hitchin, Herts, 1933, J. E. LITTLE; on Acacia at Sutton, near Bignor, W. Sussex, v.-c. 13, E. C. WALLACE.

†628/9. *EUPHORBIA VIRGATA* W. & K. Hove, Sussex, v.-c. 14, L. A. W. BURDER; \*near Dumpton Gap, v.-c. 15, A. R. M. BRENNAN.

628/10. *E. ESULA* L. \*Near Owslebury, S. Hants, v.-c. 11, P. M. HALL and H. W. PUGSLEY.

†628/10b. *E. ESULA* L., var. *PINIFOLIA* (Lam.) Dr. (*pseudo-cyparissias* Jord.). Near the Dyke, Brighton, Sussex, v.-c. 14, det. FRASER, L. A. W. BURDER.

\*628/11. *E. CYPARISSIAS* L. Pembrey Burrows, Carm., v.-c. 44, G. B. RYLE. Comm. A. E. WADE.

628/12. *E. PARALIAS* L. Common near the Prince's Golf Club, Sandwick, v.-c. 15, J. P. M. BRENNAN.

628/13. *E. PORTLANDICA* L. Loe Bar, v.-c. 1, J. D. GROSE.

628/15. *E. EXIGUA* L. Near Lewes, Sussex, J. G. LAWN.

628/15b. *E. EXIGUA* L., var. *RETUSA* DC. Kennack, v.-c. 1, J. D. GROSE.

633/6. *ULMUS MINOR* Mill. Blunsdon, v.-c. 7, J. D. GROSE.

646/2b. *QUERCUS SESSILIFLORA* Salisb., var. *PUBESCENS* Loudon. Planted, Benslow, Hitchin, Herts, 1933. Det. J. E. LITTLE, R. WATSON.

650/15. *SALIX LANATA* L. Rocks at head of Glen Callater and in Corrie Kandor, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

650/15×. *S. LANATA* × *LAPPONUM*. Glen Callater, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

650/15×. *S. LANATA* × *RETICULATA*. Glen Callater, S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

650/18×. *S. HERBACEA* × *LAPPONUM*. Lochnagar, S. Aberdeen, v.-c. 92, E. C. WALLACE.

652/1. *EMPETRUM NIGRUM* L. Rumbold's Moor, Ilkley, W. Riding, Yorks. On millstone grit, 1934, K. D. LITTLE.

664/2. *SPIRANTHES SPIRALIS* C. Koch, em. Asch. Pewley Downs, Guildford, Surrey, F. CLARKE.

667/2. *CEPHALANTHERA GRANDIFLORA* (L.) Bab. Lyminge Wood, E. Kent, v.-c. 15, Viscountess GLADSTONE; woods near Wye, W. H. PEAR-SALL and H. D. STANLEY.

669/6. *ORCHIS LATIFOLIA* L. (= *O. PARDALINA* Pugsl.). Eldroth, Mid-West Yorks, v.-c. 64, P. M. HALL and W. A. SLEDGE.

669/7. *O. INCARNATA* L. Water meadows, near Wareham, Dorset, v.-c. 9, P. M. HALL; Chark Common, near Lee-on-the-Solent, S. Hants, v.-c. 11, P. M. HALL; Kilnsey, Mid-West Yorks, v.-c. 64, P. M. HALL and W. A. SLEDGE; Langdon Beck, Durham, v.-c. 66, a deep red form, P. M. HALL and W. A. SLEDGE.

669/7×. *O. INCARNATA* L. × *O. PURPURELLA* Steph. This hybrid has not been previously recorded but single specimens were found at Kilnsey and at Austwick Moss, both v.-c. 64, growing with both putative parents, which could be thus identified with reasonable certainty. Other specimens were also seen at Wharfe Wood, near Austwick, where the *incarnata* hybrid would be var. *pulchella* Dr., P. M. HALL and W. A. SLEDGE.

669/8. *O. PRAETERMISSA* Dr. Near Steeple, Dorset, v.-c. 9, a very early-flowering and untypical colony, in good flower on May 20th, P. M. HALL; \*near Oban, Argyll, v.-c. 98, Miss M. MARTIN.

669/9. *O. PURPURELLA* Steph. Arncliffe, Kilnsey, Ribbleshead, Wharfe Wood, Eldroth and Austwick Moss, Mid-West Yorks, v.-c. 64; \*Upper Cronkley pastures, North-West Yorks, v.-c. 65, Langdon Beck, Durham, v.-c. 66, P. M. HALL and W. A. SLEDGE.

669/9b. *O. PURPURELLA* Steph., var. *PULCHELLA* (Dr.) Pugsl. Eldroth, Mid-West Yorks, v.-c. 64; \*near Colwall, S. Northumberland, v.-c. 67; Newham Bob, Cheviotland, v.-c. 68, P. M. HALL and W. A. SLEDGE.

669/10×. *O. MACULATA* L. (= *ERICETORUM* Linton) × *O. PURPURELLA* Steph. Wharfe Wood, Austwick, Mid-West Yorks, v.-c. 64; Upper Cronkley pastures, North-West Yorks, v.-c. 65; near Langdon Beck, Durham, v.-c. 66, P. M. HALL and W. A. SLEDGE.

669/11×. *O. FUCHSII* Dr., × *O. PURPURELLA* Steph. Ribbleshead and Kilnsey, Mid-West Yorks, v.-c. 64, P. M. HALL and W. A. SLEDGE.

669/11×. *O. FUCHSII* Dr., × *O. PURPURELLA* Steph., var. *PULCHELLA* (Dr.) Pugsl. Eldroth, Mid-West Yorks, v.-c. 64. The hybrid *O. maculata* L. (= *ericetorum* Linton) × *O. praetermissa* Dr., var. *pulchella* Dr.

(now better treated as a var. of *purpurella* Steph.) has been recorded as *O. scotica* Dr., but this appears to be the first time the hybrid  $\times$  *Fuchsii* Dr. has been recorded, P. M. HALL and W. A. SLEDGE.

669/18. *HIMANTOGLOSSUM HIRCINUM* Koch. South Harting, near Petersfield, W. Sussex, v.-c. 13, Mrs FITZROY BALDERS.

\*672/4. *OPHRYS TROLLII* Heg. An isolated plant at the edge of a wheat-field near Notton, south of Chippenham, N. Wilts, v.-c. 7, O. & E. MILNE-REDHEAD.

674/1. *HABENARIA GYMNADENIA* Dr. Very common on dry grassy banks, Achnacloch, Argyll, v.-c. 98, Miss M. MARTIN.

674/6. *H. VIRESCENS* (Zollik) Dr. Connel, Argyll, v.-c. 98, Miss M. MARTIN.

\*678/1. *CROCUS NUDIFLORUS* Sm. Between Stockton and Newnham Bridge, Worcs., v.-c. 37, Miss AGNES GREEN.

680/1. *SISYRINCHIUM ANGSTIFOLIUM* Mill. Several strong clumps in a derelict arable field, Little Park Farm, Swanwick, S. Hants, v.-c. 11, P. M. HALL; in a remote valley on the N. Cornish coast, W. of Bude, one plant growing in a marsh (July 1932) associated with *Eleocharis*. Flowers sent to Herb. Mus. Brit., Dr A. R. M. BRENNAN. [This is an additional Cornish station. The record given in *Rep.* 1933, p. 557, referred to that previously published in *Rep.* 1912, p. 217—from heathland, Hon. N. C. Rothschild].

684/4. *NARCISSUS POETICUS* L. Quite common on both sides of the stream below the High Rocks, Tunbridge Wells, v.-cs. 14 and 16, J. P. M. BRENNAN.

\*690/1. *ASPARAGUS MARITIMUS* Mill. Norton Spit, v.-c. 10. Not in flower, apparently now represented here by two plants only, J. D. GROSE.

+690/2. *A. OFFICINALIS* L. In great abundance over the sandhills E. of Sandwich, v.-c. 15, J. P. M. BRENNAN; St Ouen's Bay, Jersey, H. PHILLIPS.

702/10. *ALLIUM SIBIRICUM* L. Kynance, v.-c. 1, J. D. GROSE.

706/2. *SCILLA AUTUMNALIS* L. St Helen's, v.-c. 10, J. D. GROSE.

707/1. *ORNITHOGALUM PYRENAICUM* L. Wroughton, v.-c. 7, J. D. GROSE.

\*711/1. *GAGEA LUTEA* Gawler. Wexcombe, S. Wilts, v.-c. 8, J. D. GROSE.

713/1. *COLCHICUM AUTUMNALE* L. Woodland near Vernham's Dean, N. Hants, v.-c. 12, P. M. HALL.

715/1. *TOFIELDIA BOREALIS* Wahl. Near Cauldron Snout, Upper Teesdale, v.-c. 66, July 2, 1934, Miss JANE PARKIN.

718/6. *JUNCUS BALTICUS* Willd. Carnoustie, Forfar, R. C. L. BURGESS.

718/15. *J. GERARDI* Lois. Saltmarsh, near Carlisle, v.-c. 70, R. C. L. BURGESS.

718/16. *J. MACER* S. F. Gray. Virginia Water, Berks, Mrs PEMBERTON FIGOTT.

\*719/3. *LUZULA FORSTERI* (Sm.) DC. Cranham Woods, E. Gloster, v.-c. 33, Lady DAVY, J. CHAPPLE, and R. KNOWLING.

719/8. *L. SPICATA* DC. Near the summit of Ben Lawers, v.-c. 88, R. C. L. BURGESS.

721/1b. *TYPHA LATIFOLIA* L., var. *MEDIA* Syme. Pond near Harlington, Beds, 1925. Det. J. E. LITTLE, H. PHILLIPS.

727/1. *LEMNA MINOR* L. Excellent examples of this species in flower were sent to me in August by W. G. Travis. They had been found by Mr H. S. Marsh in a shallow ditch near Stoak, Wirral, Cheshire, v.-c. 58, and were subsequently shown by him to the members of the Liverpool Botanical Society at a field meeting on August 11, 1934. All the Duckweeds propagate their species so rapidly by division that flowers would seem to be unnecessary and are very seldom produced. In *L. minor* they spring from clefts on the edges of the fronds and each usually consists of 2 stamens and a pistil enclosed in a tiny bract. This species probably flowers more frequently than any other Duckweed, but even so, few botanists have been privileged to find it. Mr Travis says there is a note in De Tabley's *Fl. Cheshire* to the effect that *L. minor* had previously been found in flower by F. M. Webb in the Liverpool district. [Ed.]

\*727/4. *L. GIBBA* L. The Lake Hamworthy, west of Poole, Dorset, v.-c. 9. This removes the ? in *Comital Flora*, P. H. COOKE.

\*734/1. *BUTOMUS UMBELLATUS* L. Apparently native in R. Wampool, N. Cumberland; also in R. Eden—both v.-c. 70, JOHN PARKIN and Miss JANE PARKIN.

737/5. *POTAMOGETON ALPINUS* Balb. Ditch near Byfleet Old Church and ditch near Newark Mill, Surrey, H. W. KEW.

737/9. *P. GRAMINEUS* L., var. *FLUVIALIS* Fries. Auchenreoch Loch, v.-c. 73, Glenbuck, v.-c. 77, Lochnaw, v.-c. 74, G. TAYLOR; Loch Ashie,

Inverness, v.-c. 96, Miss E. S. TODD; var. *LACUSTRIS* Fries in canal, Woking, Surrey, H. W. KEW; Loch Fad, Bute, v.-c. 100, J. B. DUNCAN.

737/11f. *P. NITENS* Weber, var. *SUBINTERMEDIUS* Hagstr. Lough Creghduff, Roundstone, W. Galway, v.-c. 16, J. CHAPPEL and T. GAMBIER-PARRY.

737/11g. *P. NITENS* Weber, var. *SUPERFOLIATUS* (Raunkiaer) Hagstr. Near Eamont Bridge, Penrith, v.-c. 70, Mrs G. FOGGITT; Auchencroch Loch, Kirkcudbright, v.-c. 73, G. TAYLOR.

737/13. *P. LUCENS* L. Dyke on Mepal Fen, Cambs, v.-c. 29, E. C. WALLACE; Symond's Yat, Hereford, J. CHAPPEL, Mr and Mrs FOGGITT.

737/13c. *P. LUCENS* L., var. *LONGIFOLIUS* DC. R. Frome, Wool, Dorset, v.-c. 9; R. Avon, near Sopley, S. Hants, v.-c. 11, P. M. HALL and W. H. PEARSALL; Symond's Yat, Hereford, J. CHAPPEL and Mr and Mrs FOGGITT.

737/14d. *P. DECIPIENS* Nolte, var. *LONGIFOLIUS* Hagstr. (= *UPSALIENSIS* Tis.). R. Avon, near Sopley, S. Hants, v.-c. 11, P. M. HALL and W. H. PEARSALL.

737/15b. *P. PRAELONGUS* Wulf., var. *ANGUSTIFOLIUS* Graebner. Loch Callater, S. Aberdeen, v.-c. 92, E. C. WALLACE and R. MACKECHNIE.

737/15c. *P. PRAELONGUS* Wulf., var. *BREVI-FOLIUS* Celak. Wickenlodee, Wicken, Cambs, v.-c. 29, E. C. WALLACE.

737/16c. *P. PERFOLIATUS* L., var. *OVATIFOLIUS* Wallr. R. Frome, Wool, Dorset, v.-c. 9, P. M. HALL and W. H. PEARSALL.

737/17. *P. CRISPUS* L. Loch Ashie, Inverness, v.-c. 96, Miss E. S. TODD; Loch of the Lowes, Selkirk, v.-c. 79, G. TAYLOR.

737/17x. *P. UNDULATUS* Wolfgang non Fryer (*P. CRISPUS* × *PRAELONGUS*). Union Canal, near Falkirk, Stirling, v.-c. 86, G. TAYLOR.

737/18. *P. ZOSTERIFOLIUS* Schum. Canal, Market Harborough, Leicester, v.-c. 55, Mrs G. FOGGITT.

737/22. *P. FRIESII* Rupr. Canal, Market Harborough, Leicester, v.-c. 55, Mrs G. FOGGITT; Union Canal, Falkirk, v.-c. 86, G. TAYLOR; ditch by road across Mepal Fen, Cambs, v.-c. 29, E. C. WALLACE.

737/23. *P. PUSILLUS* L. Pond in claypit near Ridge, Dorset, v.-c. 9; canal near Odiham, N. Hants, v.-c. 12, P. M. HALL (det. W. H. PEARSALL).

737/23b. *P. PUSILLUS* L., var. *TENUISSIMUS* M. & K. Pond, Botley Grange, Botley, S. Hants. Ref. 1248, P. M. HALL. This variety is not

given in the *L.C.* probably because much of the material so labelled is *panormitanus*. These examples, however, are not that species but *pusillus*. The characteristic lacunae are always present—at least in the lower half of the leaves, W. H. PEARSALL.

\*737/24. *P. RUTILUS* Wolfg. Grangemouth, Stirling, v.-c. 86; Glenbuck, Lanark, v.-c. 77, G. TAYLOR.

737/25. *P. PANORMITANUS* Biv.-Bern. Fleet Pond, N. Hants, Ref. 1218, P. M. HALL.

\*737/27. *P. TRICHOIDES* Ch. et Schl. Near Weston-super-Mare, North Somerset, v.-c. 6, per Lady DAVY.

739/1. *ZANNICHELLIA PALUSTRIS* L., a. *GENUINA* Asch. Grangemouth, Stirling, v.-c. 86, G. TAYLOR; Austwick Moss, Mid-West York, v.-c. 64, P. M. HALL.

739/2b. *Z. PEDICELLATA* Fries, var. *REPTANS* (Wallm.) Fries. Fleet Pond, N. Hants, v.-c. 12. Creeping on sand near the margin in about a foot of water, a very slender plant. Probably the first certain record for this species for v.-c. 12, P. M. HALL. Naming confirmed by W. H. PEARSALL.

740/1. *ZOSTERA MARINA* L. Washed up on shore at Lilliput, Poole Harbour, Dorset, v.-c. 9; in very small quantity in Ports Creek, near Cosham, more plentiful off Porchester, in Portsmouth Harbour, S. Hants, v.-c. 11, P. M. HALL.

740/1c. *Z. MARINA* L., var. *ANGUSTIFOLIA* Hornem. Brand's Bay, Poole Harbour, Dorset, v.-c. 9; Porchester; Sinah, S. Hayling, S. Hants, v.-c. 11; Prinstead, W. Sussex, v.-c. 13, P. M. HALL.

740/2. *Z. NANA* Roth. Brand's Bay, Poole Harbour, Dorset, v.-c. 9; Porchester; Sinah, S. Hayling, S. Hants, v.-c. 11; Prinstead, W. Sussex, v.-c. 13, P. M. HALL; \*Ferry-side, Carmarthen, v.-c. 44, Lt.-Com. E. K. CROCKETT, R.N.; comm. H. A. HYDE, *Journ. Bot.*, lxxii, 58 (February 1934).

744/2. *CYPERUS FUSCUS* L. In great abundance on Breamore Common, S. Hants, v.-c. 11, Miss GULLICK; only once previously recorded for the county, by W. R. Linton in 1893 from Blashford. 1893 was another exceptionally dry summer. Distributed this year, P. M. HALL.

745/4. *ELEOCHARIS ACICULARIS* R. & S. Knipe Moor, near Shap, v.-c. 69a, A. WILSON.

746/2e. *SCIRPUS MARITIMUS* L., var. *MONOSTACHYS* Meyer. Kildonan, Arran, v.-c. 100, R. MACKECHNIE; Broadsands, Churston Ferrers, S. Devon, v.-c. 3; Estuary of R. Teign, Kingsteignton, S. Devon, v.-c. 3, F. M. DAY.

746/5. *S. TRIQUETER* L. Still on the right-hand bank of the Medway, near Aylesford Bridge, v.-c. 15, J. P. M. BRENNAN.

747/1. *ERIPHORUM LATIFOLIUM* Hoppe. Very sparingly near Budleigh Salterton, S. Devon, v.-c. 3, H. S. REDGROVE.

747/2. *E. ANGUSTIFOLIUM* Roth. Snelsmore, Berks, v.-c. 22, J. D. GROSE.

747/2c. *E. ANGUSTIFOLIUM* Roth, var. *BREVISETUM* Dr. Wilderness, I. of Wight, v.-c. 10, J. D. GROSE.

748/1. *RYNCHOSPORA FUSCA* Ait. Slepe Heath, Dorset, v.-c. 9, H. S. REDGROVE.

749/1. *SCHOENUS NIGRICANS* L. Slepe Heath, Dorset, v.-c. 9, H. S. REDGROVE.

\*750/1. *CLADIUM MARISCUS* (Pohl.). Near Achnacloich, Argyll, v.-c. 98, Miss M. MARTIN.

751/1. *KOBRESIA CARICINA* Willd. Cronkley Fell, Teesdale, v.-c. 65, and Widdybank Fell, v.-c. 66, H. S. REDGROVE.

753/3. *CAREX ACUTIFORMIS* Ehrh. Canal-side between W. Hyde and Rickmansworth, Herts, Mrs PEMBERTON PIGOTT.

753/6. *C. SAXATILIS* L. Above 2000 ft. on Ben Lawers, v.-c. 88, R. C. L. BURGESS.

753/8. *C. LASIOCARPA* Ehrh. Austwick Moss, Mid-West Yorks, v.-c. 64, in very poor state, apparently being killed by drought; Newham Bog, Cheviotland, v.-c. 68, P. M. HALL and W. A. SLEDGE.

753/13. *C. HELODES* Link. Awbridge, S. Hants, v.-c. 11. Possibly new to Townsend's "district vi (2)"—see his *Flora*, 1904, p. 471, Miss B. GULLICK.

753/15b. *C. BINERVIS* Sm., var. *ALPINA* Drejer. (*C. Sadleri* Linton). Wet grassy slope in Corrie Kandor, Glen Callater, S. Aberdeen, v.-c. 92, at 2500-2800 ft., R. MACKECHNIE. Det. W. H. PEARSALL.

753/19. *C. HOSTIANA* DC. Water meadow, near Droxford, S. Hants, v.-c. 11; Killington Common, Westmorland, v.-c. 69, P. M. HALL and W. A. SLEDGE.

753/21. *C. LEPIDOCARPA* Tausch. Salt Lake, Ribbleshead, Mid-West Yorks, v.-c. 64, P. M. HALL; High Force, Durham, v.-c. 66, R. C. L. BURGESS.

\*753/22. *C. OEDERI* Retz. Chudleigh Knighton, Heathfield, S. Devon, v.-c. 3, teste W. H. PEARSALL, F. M. DAY.

\*753/34. *C. PALLESCENS* L. High Force, Durham, v.-c. 66, R. C. L. BURGESS.

753/49c. *C. GOODENOWII* Gay, var. *FULIGINOSA* (A. Br.). Killington Common, Westmorland, v.-c. 69, P. M. HALL and W. A. SLEDGE.

753/51. *C. RIGIDA* Good. Near the summit of Ben Lawers, v.-c. 88, R. C. L. BURGESS.

753/52. *C. ELONGATA* L. Near the mouth of the R. Rawthay at the head of Windermere, A. WILSON.

\*753/57.  $\times$  *C. AXILLARIS* Good. Between Workhouse Green and Cudworth, Surrey, v.-c. 17. Not included in the *Comital Flora* although given in the *Fl. Surrey*, A. L. STILL; near Kenn, v.-c. 6, A. L. STILL.

753/58. *C. CANESCENS* L. Near Lowestoft, E. Suffolk, v.-c. 25, E. R. LONG; pond edge, near Liphook, Hants, 1934, G. M. ASH; Killington Common, Westmorland, v.-c. 69, P. M. HALL and W. A. SLEDGE.

753/58b. *C. CANESCENS* L., var. *FALLAX* F. Kurtz. Boggy slopes on Tolmount, c. 3000 ft., S. Aberdeen, v.-c. 92, R. MACKECHNIE and E. C. WALLACE.

753/62. *C. DIVULSA* Stokes. Hassocks, E. Sussex, v.-c. 14, Miss L. ABELL; locally common, near Lowestoft, E. Suffolk, v.-c. 25, E. R. LONG.

753/63.  $\times$  *C. BOENNINGHAUSIANA* Weihe. (*C. paniculata*  $\times$  *remota*). By a pond in Castle Howard Park, N.E. Yorks, v.-c. 6, Mr and Mrs T. J. FOGGITT, and H. W. PUGSLEY.

753/65. *C. DIANDRA* Schrank. Austwick Moss, Mid-West Yorks, v.-c. 64; Newham Bog, Cheviotland, v.-c. 68; Killington Common, Westmorland, v.-c. 69, P. M. HALL and W. A. SLEDGE.

753/67. *C. ARENARIA* L. Sandy roadside near Hurn, S. Hants, v.-c. 11, an inland locality, P. M. HALL.

\*753/68. *C. DIVISA* Huds. Marshy ground, near Clarkston, Renfrew, v.-c. 76, R. MACKECHNIE.

\*753/75. *C. DIOICA* L. Tathwell, near Louth, N. Lincoln, v.-c. 54. Teste W. H. PEARSALL. This species was noticed here by the late Dr F. Arnold Lees and Mr C. S. Carter (deceased) long ago as being unusual, but not definitely recorded as *dioica* by either of them. May 22, 1934, Miss C. D. MARSDEN.

754/8. *PANICUM CRUS-GALLI* L. Roadside ballast, Ovington, N. Hants, v.-c. 12, Dr R. W. BUTCHER.

756/2. *SETARIA VIRIDIS* (L.) Beauv. Roadside ballast, Ovington, N. Hants, v.-c. 12, Dr R. W. BUTCHER.

756/3. *S. GLAUCA* Beauv. Gerard's Cross, Bucks, Mrs PEMBERTON PIGOTT.

758/3. *SPARTINA TOWNSENDII* H. & J. Groves. Near the mouth of the Stour, on the right bank about three miles from Sandwich toward the sea, v.-c. 15, perhaps introduced, J. P. M. BRENNAN; Sandlands, v.-c. 9, J. D. GROSE; \*Heybridge, N. Essex, v.-c. 19, E. C. WALLACE.

765/5. *PHALARIS CANARIENSIS* L. Welsh Harp, Hendon, Middlesex, v.-c. 21, W. J. L. PALMER.

770/2b. *ALOPECURUS ALPINUS* Sm., var. *WATSONI* Syme. Caenlochan Glen, v.-c. 90; Glas Maol, S. Aberdeen, v.-c. 92, E. C. WALLACE.

770/6. *A. FULVUS* Sm. Shillinglee Park, W. Sussex, v.-c. 13, E. C. WALLACE.

777/4. *PHELEUM ARENARIUM* L. St Ouen's Bay, Jersey, H. PHILLIPS.

780/4. *A. SETACEA* Curt. Near Corfe Castle, Dorset, v.-c. 9, Miss B. GULLICK; heaths on Purbeck Isle, Dorset, in enormous quantities, H. S. REDGROVE.

783/1. *CALAMAGROSTIS EPIGÆIOS* Roth. Border of Withington Woods, Andoversford, v.-c. 33, L. ABELL.

784/1. *GASTRIDIVM LENDIGERUM* Gaud. In two places near Polstead, W. Suffolk, v.-c. 26, R. BURN.

791/3. *DESCHAMPSIA SETACEA* Hack. Two places on Purbeck Isle, one of which was shown me by Mr L. B. Hall, H. S. REDGROVE.

\*797/1. *CYNODON DACTYLON* Pers. Apparently well established at one locality in S.W. Essex, v.-c. 18. Vouching specimens sent to Secretary, P. H. COOKE; \*very flourishing on garden path at Salisbury, v.-c. 8, Miss B. GULLICK; shown me by Mr L. B. Hall at Sandbanks, Dorset, H. S. REDGROVE.

809/4. *KOELERIA ALBESCENS* DC. Chesil Beach, near Portland, Dorset, H. S. REDGROVE.

824/3. *POA SUBCAERULEA* Sm. Boughrood, Radnor, Lady DAVY, J. CHAPPLE and R. KNOWLING.

824/10. *P. COMPRESSA* L. Billingshurst, W. Sussex, v.-c. 13, E. C. WALLACE.

824/10c. *P. COMPRESSA* L., var. *POLYNODA* (Parn.), teste W. O. Howarth. Near Ribbleshead, Mid-West Yorks, v.-c. 64, P. M. HALL and W. A. SLEDGE.

827/18. *BROMUS RACEMOSUS* L., teste W. O. Howarth. Water meadow, near Droxford, S. Hants, v.-c. 11, P. M. HALL and H. W. PUGSLEY.

826/18. *FESTUCA MYRUS* L. Near Downton Church, S. Wilts, v.-c. 8, Miss B. GULLICK.

830/1. *TRITICUM REPENS* × *JUNCEUM* = *HACKELII* Dr. St Ouen's Bay, Jersey, H. PHILLIPS.

†835/7. *HORDEUM JUBATUM* L. Chicken run, Wallington, Surrey, v.-c. 17, A. L. STILL.

†835/11. *H. HEXASTICHON* L. Waste heap, Welwyn, Herts, H. PHILLIPS.

844/9d. *EQUISETUM VARIEGATUM* Schleich, var. *ARENARIUM* Newm. Southern end of Braunton Burrows, N. Devon, v.-c. 4, Lady DAVY.

864/1. *OSMUNDA REGALIS* L. I saw this growing wild in Surrey this year, and also in Ashdown Forest, East Sussex a year or two ago, E. C. WALLACE; Tremethick Moor, v.-c. 1, J. D. GROSE.

866/1. *OPHIOGLOSSUM VULGATUM* L. Grassy shingle, Dungeness, East Kent, v.-c. 15, E. C. WALLACE.

†868/1. *AZOLLA FILICULOIDES* Lam. Pool in Norton Hall Park, near Worcester, Miss L. ABELL.

\*869/2. *ISOETES ECHINOSPORA* Dur. Bodmin Moor, E. Cornwall, v.-c. 2, C. OLDHAM, *Journ. Bot.* lxxii, 177 (June 1934); \*also recorded from Tavistock district, S. Devon, v.-c. 3, by W. P. HIERN in 1909, F. A. BROKENSHIRE, *loc. cit.*, 259 (September 1934).

872/2. *NITELLA OPACA* Agardh. Loch Callater, S. Aberdeen, v.-c. 92, E. C. WALLACE.

872/5. *N. TRANSLUCENS* Ag. Pond in claypit near Ridge, Dorset, v.-c. 9; Botley, S. Hants, v.-c. 11, P. M. HALL.

876/3. *CHARA VULGARIS* L., var. *LONGIBRACTEATA* Kütz. Canal, near Odiham, N. Hants, P. M. HALL.

## NOTES ON THE UMBELLIFERÆ.

W. H. PEARSALL.

Many amateur botanists confess to finding it difficult to distinguish between the various species of this Order and therefore pass it by. It is commonly assumed that ripe fruits are absolutely necessary before most species can be named, but this is by no means the case, or most of the plants sent in for determination would never be named. They are usually gathered on holiday or at other times when no fruits are available, and this paper is an attempt to indicate various lines of approach to their determination and also to a fuller knowledge of these plants for those desirous of acquiring it.

## A.

The easiest method of study is to begin with the umbellate species earliest in flower. A walk down any country lane in Spring (April or May) will afford abundant examples of our commonest species—(i) the WILD CHERVIL (Pig's Parsley, Keck, Wild Beaked Parsley), *Chaerophyllum sylvestre* L. (*Anthriscus sylvestris* Hoffm.), a plant up to 5 feet in height. You can motor for miles during May along lanes bordered with the white flowers of this species and as no other common umbelliferous plant is in flower its identity is easy and certain. Its tiny flowers are borne in umbels of 8-10 smooth rays, suggesting the ribs of an open umbrella (Lat. *umbella*, a sunshade). These umbels are compound, a smaller one (umbellule) at the end of each ray of the main larger umbel. The number of rays in an umbel is often a most useful character (see C), varying from 3-4 in *Caucalis dauricoïdes* to as many as 30-40 in *Angelica sylvestris*. At the base of the main umbels of Wild Chervil there is no general involucre of bracts, but there are partial involucre of five lanceolate densely ciliate bracteoles at the bases of the small terminal umbellules. These often afford valuable aids to the identification of species and should be carefully noted. They are often very small and so closely pressed against the rays that they are overlooked and a wrong determination may result. Long after its flowers are over, this species is a very conspicuous feature of waysides and hedgerows. After the middle of May its fruits may be readily examined. They are about  $\frac{1}{4}$  in. long, narrowed at the top, very smooth and shining, and without ribs. No other umbelliferous plant has exactly similar fruits, so it is well to retain an accurate visual impression of these, and as you will see them so often this is easily acquired. With a sharp penknife cut horizontally across the middle of one of the fruits, throw the top half away and with a lens look down on the cut face of the lower half. Note the two circles having greens rims, white interiors

with small black circles where they join. Compare your mental picture of these with fig. 445 of Fitch's Illustrations when you get home. On the left you will see the fruit (in front view) and on the right one (only) of the two circles—the other one should be shown below that and joined to it. All these figures of sections are enlarged and should be shown as in fig. 407 or fig. 410. The two halves are really hinged together and finally split as shown in fig. 428.

The leaves are pinnate, much dissected and fern-like in shape, but as those of many other species are very similar they are not easy to identify, but their general appearance should be contrasted with that of the next species. Following quickly upon the Wild Chervil (*Chaerophyllum sylvestre*) comes (ii) GOUTWEED (Bishopsweed, Herb Gerard), *Aegopodium Podagraria* L. This flowers in June and can be readily distinguished at a glance. It is a smaller plant—seldom over 2 ft. in height—and its flowers are very neatly arranged in small, compact, rounded heads nearly touching, and together forming a larger rounded head which may be  $2\frac{1}{2}$  in. across and contain 12-20 of the smaller heads, one at the end of each ray of the umbel. This, therefore, possesses more rays (12-20) than that of *C. sylvestre* (8-10) but resembles it in having no general involucre. A marked difference, however, is noted in the absence of a partial involucre to any of the umbellules. These possess no bracteoles corresponding to the five of *C. sylvestre*. The fruits are distinguished at once, being much smaller and strongly ribbed. Cut one across and compare each half of the section with fig. 409 of Fitch; the ribs stick out as tiny prominences on the margin. The difference in the shape of the leaves is very marked and affords a ready means of determination even at a distance. Those of Goutweed are ternate—divided into three broad leaflets at the end—and therefore totally different from those of (i). The radical leaves are on very long stalks and twice ternate. A careful examination and study of the leaves of (i) and (ii) gives valuable aid in understanding the terms 2-3 pinnate and 2-3 ternate respectively, both of which are frequently used in this Order. When Goutweed is in flower (May-June) we may expect to find by the wayside—and especially in woods—the well-known (iii) PIGNUT or Earthnut, *Conopodium denudatum* Koch (*Carum majus* Rendle & Brit., *C. flexuosum* Fries, *Bunium flexuosum* With.). It is a much smaller and more slender species than either of the preceding and can be distinguished from both by its very few stem leaves having linear segments—mere threads—and the root being a small edible tuber. (This species is given as *Conopodium majus* Loret in the *Lond. Cat.* and *Oxford List* but as *C. denudatum* Koch in the *Comit. Fl.*)

During the same months (May-June) another common species (iv) SWEET CICELY (*Myrrhis Odorata* Scop.) may be found blooming, especially in the North and usually near buildings. Its leaves resemble those of Wild Chervil but are larger, often blotched with white, and when bruised smell strongly of aniseed. Its fruits are twice as large as those of (i)—often nearly an inch long—and with very prominent ribs. The plant very much resembles (i) and is often passed by botanists from

southern counties (where it is unknown) as being that species. The next common umbelliferous species to flower is (v) **ROUGH CHERVIL** (*Chaerophyllum temulum* L.), which is found along hedgerows in June and July. It, again, is very similar to (i) but can be readily known by the following characters:—It is at its best a month later; its leaf-segments are not long and pointed as in *C. sylvestre* but short and obtuse; its stem is rough below, hairy near the top, purple-spotted and swollen below the joints; the umbel rays are unequal and the fruits have obtuse ribs and styles short, curved and spreading. Later still (July-September) appears (vi) **UPRIGHT HEDGE PARSLEY** (*Caucalis Anthriscus* Lam., *Anthriscus vulgaris* Bernh., *Torilis Anthriscus* Gmel.). This is easily recognised by its fruits,  $\frac{1}{2}$  in. long, covered with short curved reddish prickles—not hooked at the tip as in *Caucalis arvensis*—its general involucre of small subulate bracts one under each ray and closely pressed against it. The whole plant is very rough to the touch. *C. arvensis* is a smaller plant, much less widely distributed and has usually no general involucre but occasionally shows one bract only.

By the time you have identified the foregoing six species the (vii) **COW PARSNIP** or **Hogweed** (*Heracleum Spondylium*) will be in evidence everywhere. This is a very large, rough and coarse plant, with extremely large pinnate leaves having very broad acute segments. Its large umbels have about twenty rays and dirty-white, cream-coloured or reddish flowers. Its most striking character—the leaf-sheath—is rarely mentioned in descriptions but is one of the first things to strike an observer. A mature radical leaf may be from 1-3 ft. long and have leaflets 9 inches broad. At its base the stalk widens out into a broad and long sheath which passes entirely round the stem and when this is in bud completely encloses it, the edges overlapping and the whole forming a conspicuous knob as large as an egg. Another noticeable feature is that the flowers in the centre of the ring are smaller and regular, those on the outside are irregular, the outermost being much larger than any of the others. It is clear that where there was room for them to increase they did so. These enlarged flowers—"flags" as Lubbock calls them—are to attract insects to the plant, and at the same time they do not unduly interfere with the normal functions of the other flowers.

So far we have dealt only with seven of the most common species in the order of their appearance in flower. There is nothing like out-of-door observation of the living plants to enable you to detect small differences not found in book descriptions but of the greatest help in determination. A blind botanist could tell in an instant the difference between Wild Chervil and Goutweed by fingering the stems—one is round and nearly smooth, the other deeply furrowed and ribbed, as are also the rays of the umbel. If by the end of the season you are able to distinguish the seven species here briefly described you will have made a good start, as each species identified and easily recognised leaves one less to puzzle and confuse.

## B. COLOUR.

While the great majority of the species of this Order have white flowers, many have flowers of another colour, and even the white-flowered species often show flowers which are pink. We will therefore proceed to eliminate these.

## BLUE.

- (viii) *Eryngium maritimum* L. Sea Holly. Sandy and shingly seashores. Leaves spinous.
- (ix) *E. campestre* L. Very rare. Dry grassy places. Flowers bluish-white or purplish.

## YELLOW.

- (x) *Bupleurum rotundifolium* L. Hare's-ear. Cornfields on chalk. Leaves oval, perfoliate. Rays 4-8. Bracts 0.
- (xi) *B. falcatum* L. 1½-4 ft. Leaves linear, grass-like, recurved. Very rare. Hedges and roadsides in Surrey and Sussex only. Rays 4-10. Bracts 1-4. August-September.
- (xii) *B. aristatum* Bartl. 2-8 in. Very rare, dry places near the sea, S. Devon and E. Sussex only. July.
- (xiii) *B. tenuissimum* L. 6-12 in. Very slender and wiry. Umbels minute, with 2-5 very short and unequal rays. Saltmarshes, August-September.
- (xiv) *Carum Petroselinum* L. Common Parsley. Often appears as a garden escape in waste places and on walls, rocks and railway banks, and is a constant source of difficulty to many.
- (xv) *Smyrniolum Olusatrum* L. Alexanders. Waste places, and on rocks or ruins, especially near the sea. Plant shining. Leaves bright yellow-green, ternate with very large broadly ovate segments, totally different from the pinnate leaves of (xiv).
- (xvi) *Foeniculum vulgare* Mill. Fennel. Cliffs, rocks and walls near the sea. Leaves dark green with narrow hair-like segments and swollen leaf-sheaths. Involucre 0. Flowers dark yellow.
- (xvii) *Peucedanum officinale* L. Hog's Fennel. Very rare. Saltmarshes in Kent and Essex only. Leaves with very long linear segments. Umbels large, of 20-30 rays. Flowers pale yellow.
- (xviii) *Pastinaca sativa* L. (= *Peucedanum sativum* B. & H.). Wild Parsnip. Roadsides, railway banks, quarries, hedgebanks on chalk. Flowers bright yellow. Leaves shining, with 2-5 pairs of ovate leaflets. Bracts and bracteoles 0. July-August.
- (xix) *Silene flavescens* Bernh. Pepper Saxifrage. Damp pastures. 1-2 ft. Flowers pale yellow. Leaflets few, lanceolate, entire or 3-lobed. Umbel of 6-8 rays, incurved. July-September.
- (xx) *Meum athamanticum* Jacq. Bald-money. Spignel. Dry mountain pasture in N. Eng., Wales and Scotland. Flowers whitish-yellow, white or purplish. Leaf-segments bristle-like, very numerous, short and spreading in all directions.

## PINKISH.

Many species of the Umbelliferæ produce flowers which may be either white or pinkish. In case you meet with any of these the following list may be helpful:—

- (xxi) *Astrantia major* L. An alien completely naturalised in the woods of some hilly districts. Very rare. Leaves with 3-7 ovate-lanceolate, serrate lobes. Involucre straw-coloured.
- (xxii) *Tordylium maximum* L. Another very rare alien, only recorded for five southern counties. Umbels small, of 6-8 short, stout, hispid rays. Fruit ± round, much flattened from back to front and with a very prominent thickened margin. Petals small, reddish or pink, the outer larger.  
*Caucalis.* All species of this genus can be distinguished easily by their prickly fruits, and even when in flower the young ovaries show this character. The umbels, too, have fewer rays than those of any other genus.
- (xxiii) *Caucalis daucooides* L. Cornfields on chalk and waste places generally. Umbels of only 3-4 rays. Fruits larger than in the following species, often more than  $\frac{1}{4}$  in. long with long stout prickles. General involucre of 0-1 bract. A decreasing species. June.
- (xxiv) *C. arvensis* Huds. Hedges, roadsides and fields. Umbel rays 2-8. Fruits very small ( $\frac{1}{8}$  in.), prickles hooked at the tip.
- (xxv) *C. nodosa* Scop. (*Torilis nodosa* L.). Dry sunny banks and waste places; more common than any other species of *Caucalis* except *C. Anthriscus* (see vi). Umbels (of only 2-3 rays) contracted into little sub-globular heads. Fruits as in (xxiv).
- (xxvi) *C. latifolia* L. Cornfields on chalk in the Southern counties. Very rare. Flowers large, pink or purplish, outer petals larger. Leaves simply pinnate, much less divided than in other species. Fruit larger than in the two preceding species, prickles long, nearly equal, rough. Umbel rays 2-4.
- (xxvii) *Carum verticillatum* L. Grassy places chiefly in the Western counties. Leaves with very short linear segments and apparently in whorls. Flowers sometimes pink.
- (xxviii) *Pimpinella major* Huds. Woods and waysides on basic soils. Much larger than *P. Saxifraga*, which prefers chalk. Flowers often rose-coloured.
- (xxix) *Ligusticum scoticum* L. Scottish Lovage. Rocks and grassy places near the coast of Scotland. Leaves ternate. Umbel of 12-20 rays.

## GREEN.

- (xxx) *Archangelica officinalis* Hoffm. Occasionally on river banks and in waste places. Leaves and flowers bright green. Not native.

## C. RAYS OF THE UMBEL.

The following list is one of many ways of limiting one's area of search for a name, and, used in conjunction with a Flora and the other sections of this paper, will often result in the unknown plant being identified. The species are arranged in the order of their increasing average number of rays. The figures in brackets denote the number only occasionally and rarely found.

- Apium inundatum*, 2-3.  
*Scandix Pecten-venetis*, 2-3.  
*Caucalis nodosa*, 2-3.  
*C. latifolia*, 2-4.  
*Bupleurum tenuissimum*, 2-5.  
*Caucalis daucooides*, 3-4 (5).  
*Bupleurum aristatum*, 2-6.  
*B. rotundifolium*, 3-5 (6).  
*Ænanthe fistulosa*, 3-5 (7).  
*Anthriscus cerefolium*, 3-5.  
*Astrantia major*, 3-5.  
*Sison amomum*, 3-5.  
*Carum segetum*, 3-6.  
*Apium graveolens*, 3-6.  
*Caucalis Anthriscus*, 3-7.  
*C. arvensis*, 2-8.  
*Chaerophyllum Anthriscus*, 3-7.  
 =(Anthriscus vulgaris).  
*Apium nodiflorum*, 4-8.  
*Trinia glauca*, 4-8.  
*Bupleurum falcatum*, 4-8 (10).  
*Coriandrum sativum*, (3) 5-8.  
*Silaus flavescens*, 6-8.  
*Tordylium maximum*, 6-8 (10).  
*Caucalis Anthriscus*, 5-12.  
*Chaerophyllum temulum*, 6-12.  
*Ænanthe Phellandrium*, 6-12 (14).  
*Carum Carvi*, (6) 8-10 (12).  
*Chaerophyllum sylvestre*, 8-10.  
*Carum verticillatum*, 8-10 (15).  
*Myrrhis Odorata*, (6) 8-10 (15).
- Ænanthe pimpinelloides*, 7-12.  
*Æ. Lachenalii*, 7-12 (20).  
*Conopodium denudatum*, 7-12.  
*Smyrniolum Olusatrum*, 8-12 (15).  
*Pastinaca sativa*, 8-12.  
*Æthusa Cynapium*, (5) 8-12.  
*Sium angustifolium*, 8-12 (20).  
*Pimpinella major*, 8-16.  
*P. Saxifraga*, 10-15.  
*Selinum Carvifolia*, 10-15 (20).  
*Meum Athamanticum*, 10-15.  
*Falcaria vulgaris*, 10-15 (20).  
*Conium maculatum*, 10-15 (20).  
*Cicuta virosa*, 10-15 (25).  
*Carum Bulbocastanum*, 8-20.  
*Danae cornubiensis*, 10-20.  
*Ægopodium Podagraria*, 12-20.  
*Ligusticum scoticum*, 12-20.  
*Crithmum maritimum*, 15-20.  
*Carum Petroselinum*, 15-20.  
*Foeniculum vulgare*, 15-20 (30).  
*Ænanthe crocata*, 15-20 (40).  
*Heracleum Sphondylium*, 15-20 (30).  
*Peucedanum palustre*, 15-30.  
*P. officinale*, 20-30.  
*Seseli Libanotis*, 20-30 (40).  
*Sium latifolium*, 20-35.  
*Peucedanum Ostruthium*, 20-40 (50).  
*Daucus Carota*, 20-40.  
*Angelica sylvestris*, 30-40.

## D. INVOLUCRES.

It may happen that the plant found possesses either (i) no general involucre of bracts or (ii) no partial involucre of bracteoles. In rare cases it may possess (iii) neither bracts nor bracteoles. In any of these cases its name will probably be found in the appropriate list below.

## (i) NO BRACTS.

- Apium inundatum*.  
*A. graveolens*.  
*Ægopodium Podagraria*.  
*Trinia glauca*.  
*Carum Carvi*.  
*Cicuta virosa*.  
*Myrrhis Odorata*.  
*Ænanthe fistulosa*.  
*Æ. Phellandrium*.  
*Pimpinella Saxifraga*.
- P. major*.  
*Foeniculum vulgare*.  
*Coriandrum sativum*.  
*Caucalis arvensis*.  
*C. daucooides*.  
*Chaerophyllum temulum*.  
*C. sylvestris*.  
*C. Anthriscus*.  
*Æthusa Cynapium*.  
*Heracleum Sphondylium*.

*Eupleurum rotundifolium.*  
*Scandia Pecten-veneris.*  
*Silaus pratensis.*

*Smyrniium Olusatrum.*  
*Pastinaca sativa.*  
*Conopodium denudatum.*

## (ii) NO BRACTEOLES.

*Conopodium denudatum.*  
*Pimpinella Saxifraga.*  
*P. major.*  
*Ægopodium Podagraria.*  
*Smyrniium Olusatrum.*

*Pastinaca sativa.*  
*Apium graveolens.*  
*Trinia glauca.*  
*Foeniculum vulgare.*

(iii) NEITHER BRACTS NOR  
BRACTEOLES.

*Conopodium denudatum.*  
*Pimpinella Saxifraga.*  
*P. major.*  
*Ægopodium Podagraria.*  
*Smyrniium Olusatrum.*

*Pastinaca sativa.*  
*Apium graveolens.*  
*Trinia glauca.*  
*Foeniculum vulgare.*

It must, however, always be remembered that in any of the above cases a species may produce 1 or 2 small bracts or bracteoles—on occasion—and these are apt to puzzle those who expect plants always to conform to the book descriptions. To give but one example: *Caucalis daucoides*—Babington gives "gen. inv. 0"; Benth. & Hook. "one bract"; Hooker's *Stud. Fl.* "few or 0"; Coste *Fl. Fr.* ii, 162, "0-1-2," but there are occasionally 3, and that number occurred on the umbels of this species recorded in the present Report.

## E. HABITATS.

While the majority of umbelliferous species are usually found on roadsides, hedgebanks, and in waste places generally, there are certain species which have a decided preference for particular habitats. So much is this the case that the study of the influence of the habitat upon its plants has become one of the most valuable and fascinating branches of botanical science. In the following short list of habitats are given the names of species you may expect to find in each. Make a more exhaustive list from your own experiences and correct it from time to time. When you find a plant you have always associated with bogs or marshes growing freely on dry chalk downs or among sandhills, try and ferret out the reason.

## (i) NEAR (or in) WATER. River-banks, margins of ponds, pools, lakes or broads; ditches.

*Apium* species.  
*Sium latifolium.*  
*S. angustifolium.*  
*Foeniculum vulgare.*  
*Angelica sylvestris.*  
*Peucedanum palustre.*  
*Smyrniium Olusatrum.*

*Œnanthe crocata.*  
*Œ. Phellandrium.*  
*Œ. fistulosa.*  
*Œ. Lachenalii.*  
*Œ. fluviatilis.*  
*Cicuta virosa.* (v.r.)

(ii) BOGS AND MARSHES.

<i>Hydrocotyle vulgaris.</i>	<i>Ænanthe crocata.</i>
<i>Apium graveolens.</i>	<i>Æ. Lachenalii.</i>
<i>Sium erectum.</i>	<i>Æ. Phellandrium.</i>
<i>Chærophyltum sylvestre.</i>	<i>Peucedanum officinale.</i>
<i>Angelica sylvestris.</i>	<i>P. palustre. (r.)</i>
<i>Selinum Carvifolia.</i>	<i>Carum verticillatum. (v.r.)</i>

(iii) CHIEFLY NEAR THE COAST. Sandy and shingly shores; sea-cliffs, rocks, ruins and waste places; dunes and dry grassy places.

<i>Eryngium maritimum.</i>	<i>Bupleurum aristatum. (v.r.)</i>
<i>E. campestre. (v.r.)</i>	<i>Ligusticum scoticum.</i>
<i>Faniculum vulgare.</i>	<i>Caucalis arvensis.</i>
<i>Smyrniolum Olusatrum.</i>	<i>Daucus gummifer.</i>
<i>Crithmum maritimum.</i>	

(iv) SALT MARSHES.

<i>Bupleurum tenuissimum.</i>	<i>Peucedanum officinale. (v.r.)</i>
<i>Ænanthe Lachenalii.</i>	Kent and Essex only.

(v) WOODS AND COPSES.

<i>Sanicula europæa.</i>	<i>Pimpinella major.</i>
<i>Angelica sylvestris.</i>	<i>Conopodium denudatum.</i>
<i>Heracleum Sphondylium.</i>	<i>Astrantia major. (v.r.)</i>
<i>Conium maculatum.</i>	<i>Danaa Cornubiensis. (v.r.)</i>

(vi) HEDGE BANKS AND SHADY PLACES.

Many species, but especially the following:

<i>Ægopodium Podagraria.</i>	<i>Carum segetum.</i>
<i>Chærophyltum sylvestre.</i>	<i>C. Petroselinum.</i>
<i>C. Anthriscus</i>	<i>Heracleum Sphondylium.</i>
<i>C. temulum.</i>	<i>Sison Amomum.</i>
<i>Conium maculatum.</i>	<i>Bupleurum falcatum. (v.r.)</i>

(vii) DRY GRASSLAND.

<i>Conopodium denudatum.</i>	<i>Anthriscus sylvestris.</i>
<i>Pimpinella Saxifraga.</i>	<i>Silaus flavescens.</i>
<i>Daucus Carota.</i>	<i>Heracleum Sphondylium.</i>
<i>Eryngium campestre.</i>	<i>Meum athamanticum.</i>

(viii) CHALK DOWNS, CORNFIELDS AND PITS.

<i>Pimpinella Saxifraga.</i>	<i>Caucalis daucoides.</i>
<i>Seseli Libanotis.</i>	<i>Scandix Pecten-veneris.</i>
<i>Daucus Carota.</i>	<i>Carum Petroselinum.</i>
<i>Peucedanum sativum.</i>	<i>C. Bulbocastanum.</i>
<i>Conopodium denudatum.</i>	<i>Bupleurum rotundifolium.</i>
<i>Caucalis latifolia.</i>	<i>Trinia glauca.</i>
<i>Pastinaca sativa.</i>	<i>Sison Amomum.</i>

F. KEY TO THE UMBELLIFERÆ.

1. Ls. entire or merely crenate .....	2
Ls. pinnate or ternate or fern-like .....	3
2. Ls. entire, roundish-oval, embracing the stem ( <i>rotundifolium</i> ), or narrow-linear (3 other species). Flowers yellow .....	<i>Bupleurum</i>
Ls. suborbicular, peltate. Creeping marsh plant. Minute white flowers .....	<i>Hydrocotyle</i>

- |   |                               |
|---|-------------------------------|
| 3. Ls. very prickly. Flowers <i>pale blue</i> (Sea Holly) .....   | <i>Eryngium</i>               |
| Ls. and stems very thick and fleshy. Flowers minute, <i>greenish-white</i> (Samphire) .....   | <i>Cerithium</i>              |
| Ls. neither prickly nor fleshy .....  | 4                             |
| 4. Fruits hairy or covered with prickles .....  | 5                             |
| Fruits glabrous and smooth .....  | 11                            |
| Fruits with crumpled ribs. V.R. (See B xxi) .....   | <i>Astrantia</i>              |
| 5. Ls. ternate or palmate, with 3-5 ovate serrate lobes. Flowers in small heads. No involucre. Fruits prickly (Wood Sanicle) .....  | <i>Sanicula</i>               |
| Ls. pinnate or fern-like .....  | 6                             |
| 6. Fruits covered with prickles or hairs .....  | 7                             |
| Fruits glabrous, with wavy crenate ribs. Tall plant (3-5 ft.) with purple-spotted stem .....  | <i>Conium</i>                 |
| 7. Fruits much flattened, with a very prominent thickened margin. V.R. (5 southern counties) .....  | <i>Tordylium</i>              |
| Fruits ovoid; no thick margin .....   | 8                             |
| 8. Bracts of the involucre mostly divided; common in fields and near the sea .....  | <i>Daucus</i>                 |
| Bracts entire, or none present .....  | 9                             |
| 9. Umbels of more than 20 rays, with many bracts. Fruits hairy. (On the chalk, 4 counties only) .....   | <i>Seseli</i>                 |
| Umbels of fewer rays (usually less than 10, never more than 12). Bracts few or 0 .....  | 10                            |
| 10. All the fruit very smooth and shining .....   | <i>Chærophyllum sylvestre</i> |
| Most of the fruit covered with short hooked bristles but the top is narrowed into a very short smooth beak .....  | <i>Ch. Anthriscus</i>         |
| All the fruit covered with straight, curved or hooked bristles ...  | <i>Caucalis</i>               |
| 11. Fruits much flattened .....   | 12                            |
| Fruits round, oval or oblong—never much longer than broad .....   | 16                            |
| Fruits at least 4 times as long as broad .....  | 42                            |
| 12. Fruit surrounded by a <i>double</i> wing, even before it is ripe .....  | <i>Angelica</i>               |
| Very common; found in every vice-county .....   | 13                            |
| Fruit with a <i>single</i> wing before the carpels ripen and separate .....   | 14                            |
| 13. Flowers <i>yellow</i> .....   | 15                            |
| Flowers <i>white, cream-coloured</i> or <i>reddish</i> .....  |                               |
| 14. Flowers bright yellow. Ls. shining, with 2-5 pairs of ovate leaflets. Bracts and bracteoles 0. Railway banks, quarries, hedgebanks on chalk .....   | <i>Pastinaca</i>              |
| Flowers pale yellow, minute. Ls. with very long linear segments. Bracts few or 0; bracteoles short, filiform. V.R. Saltmarshes, Kent and Essex .....  | <i>Peucedanum officinale</i>  |
| 15. Outer petals much larger than the others. Large coarse plant with very large pinnate ls. having very large acute segments and very broad basal sheaths. Very common, found in every v.-c. (Hogweed) ..... | <i>Heracleum</i>              |
| Ls. with milky juice and segments rarely over $\frac{1}{2}$ in. long, linear, with a hard point. Umbels of 15-30 rays. Marshes and fens; rare .....   | <i>Peucedanum palustre</i>    |
| Ls. large, twice ternate. Umbels of 30-50 rays. Rare. Moist meadows in N. Brit. .....   | <i>Peucedanum Ostruthium</i>  |
| 16. Flowers <i>yellow</i> .....   | 17                            |
| Flowers <i>white</i> .....  | 20                            |
| 17. Ls. bright yellow-green, 2-3 times ternate with very large broadly-ovate segments. Fruits dark brown or black; aromatic; section shows 2 circular carpels each with 3 acute ribs .....                    | <i>Smyrniium</i>              |
| Ls. pinnate or much dissected. Fruits ovoid or oblong .....   | 18                            |

18. Lf.-segments round and thread-like. Fruit oval. Bracts and bracteoles 0 .....	<i>Foeniculum</i>	
Lf.-segments flat, narrow-lanc., or 3-lobed .....		19
19. Ribs of fruit (4 mm.) acute, prominent. Rays of umbel 6-8, incurved. Bracts 0 .....	<i>Silaus</i>	
Ribs of fruit (2.5 mm.) rounded, not prominent. Rays of umbel 15-20. Bracts 2-5 .....	<i>Carum Petroselinum</i>	
20. Only the central nearly sessile flowers fertile (producing fruits), outer flowers stalked and barren .....	<i>Enanthe</i>	
Fertile flowers stalked .....		21
21. Ls. 2-3 times ternate, with very large segments .....		22
Ls. simply pinnate. Segments sessile, ovate, lanceolate or cut .....		24
Ls. much dissected. Segments small or narrow, the lower pedicellate .....		28
22. Umbels all terminal and stalked .....		23
Umbels mostly lateral and sessile .....	<i>Apium</i>	
23. Bracts and bracteoles 0 .....	<i>Ægopodium</i>	
Bracts few or 0; bracteoles many (Scotland) .....	<i>Ligusticum</i>	
24. Bracts and bracteoles 0 .....	<i>Pimpinella</i>	
Bracteoles several .....		25
25. Umbels terminal .....		26
Umbels mostly lateral .....		27
26. Ripe fruits longer than broad, at least 4 mm. long, often 10-14 mm. ....		42
Ripe fruits less than 4 mm. long (usually 2-3 mm.). Rays of umbel 8-35 .....	<i>Stium</i>	
Ripe fruits nearly round, rather broader than long (2 mm.). Rays of umbel 3-5 .....	<i>Sison</i>	
27. Involucres of several bracts .....	<i>Stium</i>	
Bracts 0 or 1 .....	<i>Apium</i>	
28. Umbels mostly lateral and almost sessile .....		29
Umbels all terminal or pedunculate .....		30
29. Rays usually not exceeding 6. Ls. with few, ovate segments ...	<i>Apium</i>	
Rays usually 6-12. Ls. 2-3 times pinnate with many small segments .....	<i>Enanthe Phellandrium</i>	
30. Plants under 1 ft. in height. Very rare .....	<i>Trinia</i>	
Plants between 1-2 ft. in height .....		31
Tall plants, usually over 2 ft. in height .....		32
31. No bracts nor bracteoles. Flowers white or pinkish .....	<i>Pimpinella</i>	
Bracteoles 3-5, long, linear (often bifid or trifid), <i>pointing downward</i> . No other Umbellifer possesses this character.		
Flowers white (Fool's Parsley) .....	<i>Aethusa</i>	
No bracts. Flowers pale yellow. Umbel of 6-8 incurved rays	<i>Silaus</i>	
Uppermost ls. with few slender linear segments. Foetid odour when bruised. Umbels terminal of 5-8 rays. Flowers white.		
No bracts, a few small bracteoles. Fruits globular, 4 mm. diam., carpels not separating. Stem nearly leafless .....	<i>Coriandrum</i>	
Umbels long-peduncled and terminal of 10-12 rays. Flowers white. Radical ls. long-stalked, 2-3 times trifoliate. Fruit broader than long, of 2 tiny smooth bladders each containing a loose seed. V.R. Cornwall, Devon and Bucks only .....	<i>Physospermum</i>	
32. Fruits nearly globular or broader than long .....		33
Fruits longer than broad .....		37
33. Plants with general and partial involucres. Fruits very small (2 mm.), globular, rather broader than long, carpels separating into 2 (cf. <i>Coriandrum</i> ) .....	<i>Sison</i>	
Partial involucres of several bracteoles—bracts few or 0 .....		34
No involucres—(bracts and bracteoles 0) .....		36

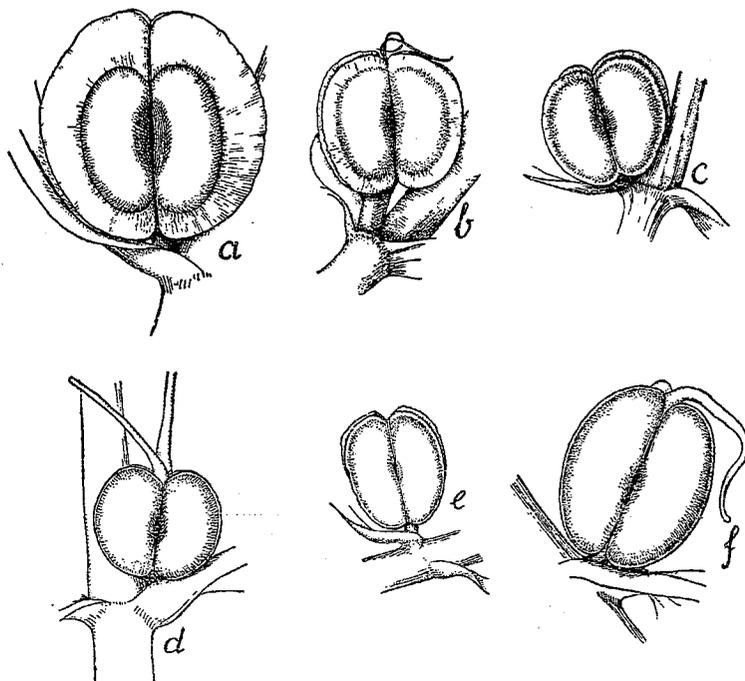
34. Flowers pale yellow or yellowish-green. Ribs of fruit acute (See 31) ..... *Silaus*  
Flowers white. Ribs of fruit obtuse ..... 35
35. Fruit very small (2 mm.), with prominent calyx-teeth. Bracts 0, bracteoles several. Lf.-segments narrow ..... *Cicuta*  
Fruit 4 mm. Calyx-teeth inconspicuous or absent. Bracts variable, bracteoles usually 3, turned to the outside. Stem purple-spotted (See 6) ..... *Conium*
36. Plants often over 2 ft. high (cf. 31) ..... *Pimpinella*
37. Lf.-segments hair-like and apparently whorled ..... 38  
Lf.-segments flat, narrowly lanceolate or linear, not whorled ... 39
38. Leaf-stalk simple. Fruits 4 mm. Flowers white or pinkish *Carum verticillatum*  
Leaf-stalk branched. Fruits 6-8 mm. Flowers white, whitish-yellow or purplish. Dry mountain pastures (Wales and N. Brit.) ..... *Meum*
39. Rootstock a round tuber ..... 40  
Rootstock not tuberous ..... 41
40. (Two plants known as Pignut).  
(a) Plant very common. Styles erect. No bracts nor bracteoles. Ribs of fruit obscure ..... *Conopodium*  
(b) Plant very rare., 4 vice-counties only, on chalk. Styles closely reflexed. Involucres always present. Ribs of fruit prominent ..... *Carum Bulbocastanum*
41. Umbels of 3-5 very unequal rays ..... *Carum segetum*  
Umbels of 7-10 very unequal rays. Calyx teeth not conspicuous *Carum Carvi*  
Umbels of 10-20 rays. Calyx-teeth prominent ..... *Ænanthe*
42. Fruits  $\frac{3}{4}$  in. to over an inch long ..... 43  
Fruits not  $\frac{1}{2}$  in. long ..... 44
43. Fruits with conspicuous ribs along their entire length (See A iv) *Myrrhis*  
Fruits 1-3 inches long. Beak very long (3-4 times the carpel), flattened and smooth. Base of fruit only, slightly ribbed ... *Scandix*
44. All fruits stalked (See also 10) ..... *Chærophyllum*  
Most of the fruits sessile (See also 20) ..... *Ænanthe*

## THE BRITISH SPECIES OF CALLITRICHE.

W. H. PEARSALL.

This genus has for long been in an unsatisfactory condition owing to a variety of causes. Probably the most potent is the fact that the earliest descriptions of many of the species are too brief and indefinite for the certain determination of plants. As a result subsequent authors have held divergent views as to the plants intended and have amplified or modified the original description in accordance with their own varying conceptions. The cumulative effect of this will be gathered from a study of the synonymy of the several species.

Another reason for much of the existing confusion is the slovenly manner in which these plants are usually presented. In their native element many of the species are extremely beautiful—as their name sug-



a. *Callitriche autumnalis* L., em. Wahlenb. b. *C. stagnalis* Scop. c. *C. hamulata* Kütz. d. *C. polymorpha* Lönnr. e. *C. verna* L., em. Lönnr. f. *C. obtusangula* Le Gall. (All  $\times 13$ ).

(By permission of Prof. Gunnar Samuelsson.)

gests—but few collectors succeed in transferring this quality of the plant to the mounted sheet. We might, perhaps, overlook this defect if the plants were, nevertheless, carefully chosen and complete. In the case of most species mature fruits are absolutely essential—as Hegelmaier insists—and the lowest leaves also, are invaluable aids to determination. Far too often, however, herbarium sheets show only sterile plants or a matted mass of plant tops—sometimes of more than one species—showing neither flowers nor fruits, and, of course, destitute of the lowest leaves. Even when fruits are present it frequently happens that they have been so heavily pressed that it is quite impossible to decide whether their lobes were divergent or convergent when growing. Three or four complete fruiting examples carefully chosen and separately displayed on one sheet are of infinitely more value than a whole gathering of tangled “tops.” To ensure perfect mounted specimens it is necessary to take the plants out of the water and put them at once into a wire press. Failing this, they should be kept moist in the vasculum, later immersed in water and subsequently floated out. In either case care is essential so that the bracts and styles may be retained. Brief notes on the evidence afforded by a transverse section of the fruit, the disposition and length of the styles and the persistence (or otherwise) of the bracts would greatly add to the value of the mounted specimens.

This paper is an attempt to more clearly and fully describe the British species, with a view to stimulation of interest in their collection and ultimately to lead to a revision of their published records of distribution. I am indebted to the authorities of the British Museum, the Royal Botanic Gardens at Kew, the Manchester Museum, and Yardley Lodge, Oxford, for the examination of their herbarium specimens, for literary references and valuable suggestion.

#### KEY TO BRITISH SPECIES.

##### A. All leaves similar in shape.

- |   |   |
|---|---|
| 1. <i>Broadly obovate and large</i> : lower leaves not linear but smaller examples of the upper leaves. Fruits large. Largest leaves 5-7 veined ..... | 6 |
| 2. <i>All leaves linear</i> .....   | 7 |

##### B. All leaves *not* similar in shape.

- |  |  |
|--|--|
| 3. Upper leaves <i>broadly</i> obovate, but lower leaves linear and fruits with parallel lobes .....   | var. <i>platycarpa</i> Kütz.                           |
| 4. Upper leaves <i>narrowly</i> obovate. <i>Most leaves of this shape</i> but lower become narrower and longer. A few of the lowest may be linear or sub-linear. Fruits small (1 mm.) .....                                  | 9  |
| 5. Upper leaves <i>narrow, spathulate</i> and few in number. <i>Most of the leaves are linear</i> .....  | 10   |
| 6. Fruits with the 4 free edges <i>winged</i> .....  | <i>C. stagnalis</i> Scop.                              |
| Fruits with the 4 free edges <i>bluntly rounded</i> , but <i>not winged</i> .....  | <i>C. obtusangula</i> Le Gall.                         |
| 7. As seen from above, the 4 lobes of the fruit are in 2 parallel pairs : leaves long, very narrow, slender, yellowish-green in colour, with pincer-shaped apex. (cf. Some running water forms of <i>C. polymorpha</i> ) ... | <i>C. intermedia</i> , var. <i>homiophylla</i> G. & G. |

- As seen from above, the 4 lobes of the fruit are diverging and easily separable: leaves dark green, relatively shorter and broader, apex  $\pm$  truncate, emarginate ..... 8
8. Plant *fruits freely: fruits large, conspicuous, numerous*.  
Leaves distinctly tapering above. Stems straw-coloured.  
Northern lakes, frequent ..... *C. autumnalis* L. em. Wahl.  
Plant *rarely fruiting* in Britain: *fruits very small, few or none*. Leaves not distinctly tapering above. Stems reddish.  
Pools in southern counties and Channel Isles ..... *C. truncata*,  
var. *occidentalis* (Rouy).
9. Fruit obovate, longer than broad and narrowed in the lower half. *Styles erect, short* (1-2 mm.) and *deciduous* ... *C. verna* L. em. Lönnr.  
Fruit round, broader than long. *Styles long* (4-6 mm), *persistent and reflexed* ..... *C. polymorpha* Lönnr.
10. Upper rosette of narrow spatulate leaves inconspicuous or absent. Most of the leaves very narrow linear with a wider pincer-shaped apex. As seen from above, the 4 lobes of the fruit are in 2 parallel pairs ..... *C. intermedia* Hoffm.

After using this Key the plant must be carefully checked with the appropriate description in the following list.

1. *C. VERNA* L. em. Lönnr.

It is not certain to what plant Linnaeus intended to apply the name *C. verna*. His meagre diagnosis is "*foliis superioribus ovalibus, floribus androgynis*," which is so vague that it might equally apply to several species. The first British author to use this specific name in a more restricted sense seems to be Withering (*Bot. Arrang. Veg. Brit.*, 1776, 2). His description of it is "Upper leaves oval; the chive and pointals in separate flowers. Stems feeble, numerous. Blossoms small, white. Upper leaves growing near together in form of a star. Lower leaves in pairs." However, his subsequent statement that "it sometimes grows so thickly matted together as to allow one to walk upon it without sinking" cannot possibly apply to our restricted plant. Much later (1855) in Hooker & Arnott's *British Flora*, p. 381, the description of *C. verna*, and the references cited, make it quite clear that *C. stagnalis* is the plant intended.

As a result of this ambiguity all old records of *C. verna* are extremely doubtful. In many cases they probably referred either to *C. stagnalis* or to *C. intermedia*. The adoption of the name *C. verna* L. in a restricted sense began with Kützing (in *Linnaea*, vii, 1832, and Reichb. *Icon. Bot. Cent.*, ix, 1831, tab. 881). However, after the publication in 1854 of Lönnroth's paper, Kützing erred in including the new species *C. polymorpha* Lönnr. under *C. verna* Kütz. (see Fries in *Botaniska Notiser*, 1858, 132). Lönnroth's emendation of *C. verna* Kütz. is given herewith under *C. polymorpha*. It has been adopted by Glück (1924), Beger (1924) and Samuelsson (1925). The published records of the distribution of *C. verna* need complete revision. In the *Comital Flora* 38 vice-counties are given, but we agree with Dr Druce that "the identification of many of the above is doubtful and its earliest record uncertain." The *Lond. Cat.* gives 31 as the number of vice-comital records, but many of these,

too, are doubtful. Twenty years ago the late Mr Arth. Bennett made an attempt to verify the published records of this species but found that in the majority of cases he was unable to do so. Among the records was one for Low Water (1786 ft.) on the shoulder of Coniston Old Man, N. Lancs. I dredged this tarn in 1913 but found the dominant species to be *C. intermedia*, with some *C. stagnalis* in the shallower margins. Subsequent examination of other mountain tarns in the Lake District yielded negative results and confirmed our opinion that the species is relatively rare or possibly overlooked.

*C. verna* L. em. Lönnr. Upper leaves oblong, narrowly spathulate; smaller, narrower and more gradually tapering below than in *C. stagnalis*. The leaves become narrower and longer the lower they are situated and the lowest are linear or sub-linear and 1-veined. Fruits small—Hegelmaier states that this species has the smallest fruits among European species—obovate, nearly black when ripe, 1 mm. long, slightly longer than broad and perceptibly narrowed from the middle to the base (in front view). Good figures of the fruit are those of Hegelmaier (*Monogr. Gattung Callitriche*, Stuttgart, 1864, Taf. iii, fig. 10); Lindman (*Svenske Fanerogamflora*, Stockholm, 1918, 404, fig. 2); and Samuelsson (*Der Callitriche Arten der Sweiz*, 1925, 609, fig. 1e). When mature the keels are acute and in side view the lobes are not quite parallel (as in *C. intermedia*) but slightly converging above. The styles are short, always erect-patulous, early deciduous, or the erect base only persistent. Bracts straight or only slightly curved, deciduous.

2. *C. STAGNALIS* Scopoli, Fl. Carniolica, ed. 2, 251, 1772. The original description is "*folia ovata; flores polygami; fructus tetragonus*," but Kützing in Reichb.  *Ic. Plant. Crit. cent.*, ix, 36-38, figg. 1184-1186 (1831), more fully describes the plant:—"*Bracteolis persistentibus, medio incrassatis acutiusculis con-niventibus; filamentis bracteolas multoties excedentibus; stylis persistentibus, post anthesin extrorsum arcuatis; fructibus (maximis) parum longioribus quam latioribus, carpellis extus cartilagineo-alatis, marginibus acutiusculis divergentibus; foliis omnibus ovalibus.*"

Syme (*Eng. Bot.*, viii, 128) declares that the plant having fruits with divergent lobes does not occur in Britain. We have, however, seen fresh British specimens with fruits agreeing with Kützing's description. In herbarium examples this character is not so evident, for reasons given above, but a transverse section of a carefully selected mature fruit will frequently reveal it. It is to be regretted that both figures and descriptions sometimes exaggerate the divergence as being cruciate and cause needless confusion. Looking down on the transverse section it is obvious that the degree of divergence of the lobes depends entirely upon the extent of the swelling of the carpels near their point of union—the increasing turgidity of each pair of carpels at that point inevitably forces the wings apart. The maximum divergence therefore is only to

be seen in fully mature fruits. This species is so often sterile that these are by no means easy to secure. With them, however, this species is easy to determine. In one or other of its forms it is widely distributed and probably occurs in every vice-county.

*C. stagnalis*. Leaves all similar in shape, light green, large (much larger than those of *C. verna* L. em. Lönnr. and with shorter shafts), rounded obovate or broadly spathulate, usually forming well-marked rosettes less regular than those of *C. obtusangula*. In deep or running water often sterile with larger leaves 5-7 nerved (Guernsey, Barton, 1912!). On mud usually very small, with somewhat narrow 3-nerved leaves or having a rounded lamina. Lower flowers usually ♀, upper perfect or ♂. Fruit large, suborbicular or (more often) slightly broader than long, sessile or distinctly stalked (Striber's Moss, N. Lancs!). Keels of each pair of lobes slightly but appreciably divergent. When mature, conspicuously winged on each of the four free edges now at their maximum divergence, the furrows between them wide and deep. Styles (3 mm.) erect in flower, arcuate-recurved to the fruit, persistent. Bracts falcate and persisting.

Var. *platycarpa* (Kütz.). This differs from the preceding in having its lower leaves linear and the lobes of its equally large fruits sub-parallel—"fructibus (magnis) orbicularibus, carpellis marginatis, marginibus cartilagineis crassiusculis obtusiusculis subdivergentibus; foliis ramulorum junioribus (caulinorumque inferioribus) linearibus." The *Lond. Cat.* does not include this variety, but as the name is still found in many British floras and occurs upon numerous herbarium labels we have briefly indicated the distinctive characters of the plant and its provisional status.

Var. *serpyllifolia* Lönnroth, *Obs. Crit. pl. Suec.*, 16, 1854. This is normally a very small subterrestrial form creeping on mud or on ground over which water has long stood. Its axils bear fascicles of small narrower thyme-like leaves, 3-veined, or broader and having a rounded lamina.

### 3. *C. INTERMEDIA* Hoffmann, *Fl. Germ.*, 2, 1791. (*C. hamulata* Kütz.).

This species is widely distributed in lowland ponds and slow streams but is seen as its best in large bodies of still water—reservoirs, mountain tarns, and lakes. It is the dominant species in such situations among the mountains of Wales, the Lake District, and Scotland, ascending to 2910 ft. on Carnedd Llewelyn and 3250 ft. on Ben Lawers.

Hoffmann's original description is brief and indefinite—"foliis superioribus ovatis, caulinis linearibus apice bifidis." The following description has been drawn up after long experience of fresh material from many vice-counties and the examination of all available herbarium examples.

*C. intermedia*. Upper leaves narrowly spathulate forming a weak rosette, changing gradually into the lowest which are linear with an emarginate apex often swollen like the end of a bicycle spanner. Very frequently all the leaves are narrowly linear. Lower and median flowers

usually ♀ and upper ♂. The bracts to these are insensibly attenuate, falcate and caducous, falling off so early that some authors have described the flowers as being without bracts. Fruits usually sub-orbicular, sometimes rather broader than long, the L/B often nearly or quite 3:4. When described as having "almost straight sides," the end view is intended, the lobes being parallel and the blunt keels almost straight. The styles are of medium length, reflexed close to the fruit, and soon falling. Fruits much smaller than in 2, slightly larger than in 1.

Var. *homoiophylla* Grenier & Godron, *Fl. Fr.*, i, 591, 1848. Leaves all alike, slender, delicate, linear and often extremely narrow, 2 or more cm. long and 0.5 mm. wide, markedly pincer-like at the apex. This is the *C. angustifolia* Hoppe in *Bot. Taschenb.*, 160, 1792. Koch refers this to *C. hamulata* Kütz.—as do most modern authors—but Beck, Rouy and Vollmann put it under *C. verna*. Godron (*Fl. Lorraine*, i, 244) gives the name *C. autumnalis* Godron to these plants. Some herbarium specimens have been labelled *C. angustifolia* Hoppe, var. *tenuifolia* (Persoon). *C. tenuifolia* Persoon (*Synopsis Plantarum*, i, 6, 1805) is thus described "foliis omnibus linearibus apice integris acutis, fructa 4-gono." So far we have seen no British examples having the leaf-apex entire and acute.

Var. *pedunculata* DC., *Fl. Fr.*, iv, 415, 1805. This is similar to the type but its lower fruits are ± longly pedunculate. The original description gives the upper leaves as oblong, the lower as linear, all obtuse and not hollowed out at the apex. Fruit pedicels elongating after flowering, the upper fruits being almost sessile but the lower having stalks up to 1 cm. long. This variety occurs in a few vice-counties and is interesting as forming its fruits in early summer. All herbarium specimens labelled *C. verna* L., var. *pedunculata* Hooker, or old records of the same, belong to *C. intermedia* Hoffm., var. *pedunculata* DC., but there are also specimens labelled "*C. pedunculata* Auct. Ang. plur. & Syme, *E.B.*, v, 8, t. 1274 (non DC.)." These belong to *C. truncata* Gruss. See later, under that species, and also under *C. autumnalis* L. em. Wahl.

#### 4. *C. obtusangula* Le Gall., *Fl. Morbihan*, 202, 1852.

This species bears a superficial resemblance to *C. stagnalis* and possibly on that account is often overlooked. It is, however, much less frequent but occurs locally in ponds, ditches, fen dykes and lakes in England, becoming rare in the North and in Scotland. It is one of the most distinctive species of the genus and when in fruit should not be mistaken for any other species. When no fruits are present it cannot be separated from *C. stagnalis* by its leaf-nerve alone—as is sometimes supposed—as both species may have their uppermost leaves 3-, 5-, or 7-nerved. All leaves are obovate-spathulate, patent, obtuse or slightly retuse, ± attenuate into the petiole. The uppermost usually form large well-marked rosettes more symmetrical and paler than in *C. stagnalis*. The lower leaves are more remote, narrower and more

translucent than the upper. The lowest leaves may be ligulate. The fruit is large (1.5-2.0 mm. long), suborbicular, slightly longer than broad (c. 9:8) with parallel lobes *not winged but having very blunt rounded edges, the furrows between them barely discernible* (in *stagnalis* these are wide and deep). The styles are slightly longer than in that species and, moreover, are *erect or spreading, and persistent*. The bracts are falcate and persistent.

Var. *Lachii* (Warren) of the *Lond. Cat.* is apparently a hybrid between *C. obtusangula* and *C. intermedia*. It possesses a rosette of narrower leaves similar in shape to those of *C. obtusangula* but the lower leaves are narrowly linear with truncate emarginate tips as in *C. intermedia*.

5. *C. AUTUMNALIS* L. em. Wahl., Fl. Suecica, ed. ii, 2 (October 1755), em. Wahlenb., Fl. Lapp. (1812). *Stellaria foliis omnibus angustis, apice resecta* Haller, Enum. Meth. Stirp. Helvet., 158 (1742). *C. hermaphroditica* Justenius, Cent. Plant., n. 89 (February 1755)—“*foliis omnibus linearibus, apice bifidis.*”

This is a plant of lakes in Northern England and Scotland, but it has been much confused with *C. intermedia* and sometimes with *C. truncata*. The name *autumnalis* has been used for the following other species:—*C. autumnalis* Hooker (in *E.B. Supp.*, 2606) is *C. truncata* Gussone: *C. autumnalis* Godr. (*Fl. Lorr.*, i, 244) is *C. intermedia*, var. *homoiophylla* Gr. & Godr. *C. autumnalis* Kützing in Rehb. *Icon. Cent.*, ix (1831) and *Linnæa*, vii (1832) is *C. intermedia*. In England the true *C. autumnalis* L., em. Wahl., has not been found south of Lat. 53° N. All records for vice-counties south of this line refer to one or other of the species given above—in most cases to *C. intermedia*. The plant is partial to peaty water and ascends to 1250 ft. at Malham Tarn, Yorkshire, and to over 1400 ft. in Perthshire. The whole plant is of a light green colour, drying olive or nearly black. It is entirely submerged and possesses no floating rosette of leaves. All leaves are alike in shape, linear-lanceolate, widest at the base and slightly but distinctly tapering in the upper half to an emarginate apex. Uppermost and lowest leaves shorter than the intermediate which are mostly over 1 cm. in length (12-18 mm.). The plant fruits more freely than any other British species, the olive fruits being large (2 × 2 mm.) and conspicuous, of 4 easily separable lobes broadly and acutely winged. There are no bracts and the styles are long, spreading or reflexed, and caducous. The considerable divergence in the descriptions of this species is mainly due to their being based upon fresh or dried material—the latter being much darker in colour. The stems of fresh plants are usually straw-coloured.

6. *C. POLYMORPHA* Lönnroth, “*Observationes criticae plantas suecicas illustrantes,*” Upsala, May 1854, and later in *Botaniska Notiser*, 1867.

This species has a wide European distribution, being frequent or common in Sweden—from Skane to Lapland—and less so in Norway.

It is found also in most of the countries of Middle Europe, e.g., Switzerland, Germany, Bohemia, Transsylvania, and Bosnia. Its occurrence in Britain has been definitely authenticated but some of its records for this country are open to considerable doubt. In attempting any revision of its British distribution we are met at the outset by the fact that there are in our herbaria very few authentic continental examples of this species and in our floras we find the same scarcity of adequate descriptions upon which to base an opinion. The species is not mentioned in Hooker's *Students' Flora* nor in Bentham and Hooker. Babington gives a brief description which is in several respects faulty and Salmon (*Fl. Surrey*, 322) has written a somewhat fuller account, but it, also, is in some particulars unsatisfactory. In view of the foregoing facts it will be agreed that if we are to obtain reliable data it will be advisable to disregard either British examples of this species or descriptions and figures based upon them and confine our attention to those of Scandinavia and other Continental countries where the species is common and well known.

The fullest and most reliable account of the history, characters, and distribution of this species is contained in Festschrift Carl Schröter "Die Callitriche—Arten der Schweiz" by Prof. Gunnar Samuelsson, the eminent Swedish authority on aquatic plants; Zurich, 1925, pp. 603-628. I am very greatly indebted to him and to Dr Johannes Lid, of the University of Oslo, Norway, for recent excellent authentic examples of this species and *C. verna*. It is clear that not without reason was this species named *C. polymorpha* for one of its most prominent characters is the diversity in the shapes of its leaves. Judging mainly by these, different forms of *C. polymorpha* might easily be mistaken for *C. verna*, *C. stagnalis*, or *C. intermedia* respectively. Moreover, fully submerged forms of *C. polymorpha* are sterile and for that reason (at least in herbaria) indeterminate. As a result herbarium examples afford abundant evidence of wrongful or doubtful determination of these species.

*C. polymorpha* occupies to a certain extent an intermediate position between *C. stagnalis* and *C. verna*, and the majority of European authors from Kützing (1831) to Hegelmaier (1864) have included it under one or other of these two species. Some later writers have conceived of *C. polymorpha* as being of hybrid origin—e.g., F. N. Williams (*Prodrromus Fl. Brit.*, ix, 515, 1912) suggests *C. platycarpa* × *intermedia*. Lönnroth's paper (cited above) is almost unknown outside Scandinavia but we give herewith his descriptions of *C. polymorpha* and *C. verna* Kütz.

*C. polymorpha* n. sp., foliis caulinis et rameis infimis linearibus, uninerviis, apice emarginatis, supremis spathulatis l. oblongis, bracteis et stylis persistentibus, his ante anthesin incurvato-patulis, in anthesi divergentibus, ad fructus latera planiora vergentes, fructibus rotundis, convexis, marginibus binis approximatis, parallelis, obtusis, vix alatis. *C. verna* Kütz., foliis caulinis et rameis infimis linearibus, univerviis,

*apice truncatis vel subretusis, summis rotundis petiolatisque—sublineari-bus, stylis fugacibus, erecto-patulis, fructus subovatis, convexis, marginibus binis adpresso-approximatis, parallelis, obtusis, tenuissime subalatis.*

These descriptions are of great value from their exactness and completeness but especially from the fact that in their application to fresh or herbarium specimens they are found to be singularly reliable. I have ventured somewhat to expand them and tabulate their differences in the following.

TABLE I.

	<i>C. polymorpha.</i>	<i>C. verna</i> (sens. str.).
Lower ls.	Apex <i>emarginate</i> —usually swollen and spanner-shaped.	<i>Truncate</i> or <i>sub-retuse</i> —usually narrowed and slightly notched.
Upper ls.	<i>Spathulate</i> , linear, or oblong.	<i>Rounded</i> (more suddenly petiolate) to sub-linear.
Styles.	<i>Persistent and longer</i> , 4-6 mm., finally strongly divergent.	<i>Fugacious and shorter</i> , 1-2 mm., erect-patulous.
Fruit.	<i>Roundish</i> , slightly broader than long. Lighter in colour.	<i>Obovate</i> , slightly narrowed below, longer than broad. Much darker in colour.
Bracts.	More <i>persistent</i> , spreading-falcate.	<i>Deciduous</i> .
Anthers.	Larger.	Smaller.

*C. polymorpha* is distinguished from *C. platycarpa* by its much smaller, not or very feebly winged fruits. From a prolonged study of the various species of the genus *Callitriche*, both in the field and from herbarium examples, the following facts emerge. Probably the commonest form of *C. polymorpha* has the majority of the leaves *narrowly spathulate* and *very gradually tapering below*; another form has a few of the uppermost weakly rosulate leaves possessing a small oval lamina and rather short petiole, the lower leaves being linear or sublinear; occasionally we meet with a form having the upper leaves all linear and pincer-shaped at the apex (as in *C. intermedia*), the lower leaves very *small and short* but much *swollen in the middle, boat-shaped*, and wider than the upper leaves—a reversal of the normal width-gradation in this genus. In none of the forms is the lamina of the uppermost leaves as wide as in those of *C. stagnalis*, and, moreover, a well-marked rosette is rarely seen. Sub-terrestrial (mud) forms are much more rare in *C. polymorpha* than in either *C. stagnalis* or *C. verna*, and have all leaves narrowly linear, of uniform width and one-nerved. Compared with most of the species with which we are more familiar the leaves are of thinner texture and paler colour.

The fruits of *C. polymorpha* are its most reliable diagnostic character and quite distinct from those of other species. They are *roundish, rather broader than long*, 1.25-1.5 mm. broad, and as a result of this slightly greater breadth have more turgid lateral margins than usual. This feature is of the greatest value in comparing the fruits of this species with those of *C. verna*, which are *longer than broad*, slightly *smaller*, and quite obviously *narrower and obovate*. The styles are per-

sistent, 4-6 mm. long, incurved-patulous at first, finally much divergent but with the basal part still erect. Those of *C. verna* are fugacious and short (1-2 mm.) but erect. The fruits of *C. intermedia* are most often of the same size as those of *C. polymorpha* but isodiametric, and their styles differ from those of most other species in having the *basal part reflexed close to the fruit*. The styles of most species are so slender, and brittle when dried, that they are frequently broken off. It is therefore imperative to examine all the styles of a plant before forming an estimate of their length and position. In my judgment the length of those of *C. polymorpha* has been over-emphasised by some British writers. The bracts of this species are much more persistent than those of *C. verna*, which are early deciduous.

7. *C. TRUNCATA* Guss., Plant. rar. Ion. Adriat. coll., p. 4, t. 2, f. 2 (1826). Boiss. Fl. Orient., ii, 756. Gussone's original description is "*Caules setacei, tenuissimi, omnino pellucidi, ad genicula radicanes. Folia sessilia, apice truncata vel bidentata, pellucida, integerrima, glaberrima. Fructus et pedunculi ut precedente (pedunculo via semi-lineam longo, erecto instructi, læves, glabri) et magis globosi ac marginati.*"

This rare British species has only been recorded for N. and S. Somerset, W. Sussex, W. Kent, W. Gloster, Notts, Guernsey, and Wexford. It was first found by W. Borrer, 6th June 1826, "completely under water in a deep ditch between Amberley Castle and Wild Brooks" in Sussex and the specimens are in Sowerby's Hbm. at the British Museum. They were subsequently described by W. J. Hooker in *Engl. Bot. Suppl.*, t. 2606, under the name *C. autumnalis*. Long afterwards they were sent by Trimen to Dr Hegelmaier and were determined by him as *C. truncata* Gussone. They had previously been wrongly determined also by W. Arnott as *C. pedunculata*. The label reads "*C. pedunculata* Auct. Ang. plur. & Syme E.B., v, 8, t. 1274 (non DC.)." See also *Journ. Bot.*, 1870, 154. These plants are very small and some of the fruits shortly stalked. There are also in herb. Borrer at Kew plants collected by G. E. Smith (1837) in a brook between Brasted and Westerham, Kent, determined as *C. truncata* by W. H. Beeby and confirmed by Jas. Groves. In *Herb. Syme* there is a specimen from Gloucestershire. In *Herb. Musei Britannici* are Marshall's specimens from Chard Reservoir, S. Somerset, v.-c. 5 (16/9/1907). See also *Journ. Bot.*, 1908, 255. Also from S. Somerset are specimens in my own herbarium from the Bridgewater and Taunton Canal at Charlton, 30th August 1931, Miss E. Vachell. The late Mr A. Bennett had seen the species from two Nottinghamshire localities and in *Herb. Druce* there are many examples collected from the Channel Islands by Augustine Ley, W. C. Barton, and Dr Druce personally. The Irish plants from Co. Wexford (1897, E.S.M.) may be seen in *Herb. Mus. Brit.*

Rouy (*Fl. Fr.*, xii, 186) gives a description of *C. truncata* Guss. which is short but very accurate—the translation and italics are my own.

"Plant slender, all leaves *linear, insensibly attenuate from base to summit*. Styles very long (as in *C. autumnalis*), spreading-reflexed, caducous. Fruits large, broadly ovoid, *the lower (at least) longly pedicellate*. Lobes rounded on the back but completely destitute of a keel (one or more lobes often abortive)." This species is quite distinct from *C. autumnalis* L. with which it has been confused even from the first. In Britain much of this is due to Babington's italicised separation of *C. autumnalis* and *C. truncata* from the other species on account of both having linear leaves "enlarged at the base." This basal enlargement is quite obvious in *C. autumnalis* but absent or imperceptible in *C. truncata*, the leaves of which are practically parallel-sided. Hegelmaier describes the leaves of *C. autumnalis* as *lanceolate* and those of *C. truncata* as *linear*. Throughout this paper the term linear implies "practically parallel-sided for the greater part of the length," and I have emphasised this point in the case of *C. truncata* because so many of its examples in this country are sterile that any diagnostic leaf-difference is of the greatest value in the determination of species.

The entire plant is very slender with a thread-like reddish stem and leaves all similar, wider and shorter than those of *C. autumnalis* and darker green in colour. The apex is truncate and feebly emarginate. In this country the plant rarely produces fruits but when found they are small with blunt easily separable lobes, and usually sessile.

The styles are about as long as those of *C. autumnalis*, but rarely seen, being early caducous. Up to the present the typical form of this species (which has the lower fruits longly pedicellate) has not been seen in this country. All the plants of the British Isles, the Channel Isles, and Western France belong to the following variety.

*C. truncata* Guss., var. *occidentalis* (Rouy) Dr. It differs from the type in being of more robust habit, more leafy, more often sterile and having fewer fruits, sessile or only slightly stalked. In the type the fruits have pedicels 2-4 mm. long and in specimens from Sicily I have measured them up to 9 mm. in length.

As an aid to the separation of the last two species, their chief differences are here set out.

TABLE II.

	<i>C. autumnalis</i> L.	<i>C. truncata</i> , var. <i>occidentalis</i> .
Distr.	A plant of lakes in Northern England and Scotland. <i>North of 53° N. Lat.</i>	A plant of pools and ditches in Southern England. <i>South of 53° N. Lat.</i>
Fruit.	<i>Fruits very freely, normally many large fruits (2 mm.).</i>	<i>Fruits very rarely—more often sterile—few and small (1 mm.) fruits, if any.</i>
Ls.	<i>Longer—most over 1 cm. long. Linear-lanceolate—widest at base, distinctly tapering in upper half.</i>	<i>Shorter—none over 1 cm. Linear—practically parallel-sided, imperceptibly tapering above.</i>
Apex.	Most often emarginate and not truncate.	Truncate and less deeply emarginate.
Stem.	<i>Yellowish: straw-coloured.</i>	<i>Reddish.</i>

NOTES UPON *CALTHA PALUSTRIS* L.

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(Reprinted from the *Transactions of the Dumfriesshire and Galloway Natural History and Antiquarian Society*—7th December 1928.)

The Marsh Marigold (otherwise Horse Blob, Water Dragon, or King Cup) is exceedingly common in Great Britain. It has even been recorded at 3400 feet altitude in the Highlands. It is, however, rather rare in chalk or limestone districts. But even in the streamless dales of Yorkshire and Derbyshire it may be found at spring heads and along such burns as do exist (1). It almost always occurs in wet mud, on gravel kept moist by rivers and streams, or in wet, rather marshy meadows.

*Caltha palustris* has an enormous range. It may be found almost anywhere in Europe from Norway to Spain and Italy. It is, however, rare or absent in Southern Spain and in the Midi of France. An interesting point is that it ranges right round the North Pole from Norway through Siberia, Kamschatka and Alaska to Labrador. It does not occur in West Greenland. The southward limit is not so easily defined, but it is recorded for the Caucasus, Taurus, Himalayas, Iowa, S.E. Pennsylvania, So. Carolina, Newfoundland, etc. In America it is found chiefly on the outskirts of the Prairie Swamp Forests and in wet copses.

In April and May its multitudes of golden yellow flowers are quite conspicuous in the bare or thinly occupied marshland amongst immature herbaceous stems, leaves of Rushes, Meadowsweet, etc. In June or July the fruits and mature leaves are not so easily seen, for by this time the regular meadow association is in full development.\* Later in the year its flowers would have no chance in the serried ranks of the meadow grasses; it is only by flowering so early in the season that it has its opportunity.

The flowers are variable. In this country they are of quite a respectable size (3 to 4 centimetres in diameter); in Nova Zembla they are only one centimetre across. The sepals are usually five in number, stamens 70 to 80, carpels from 3 to 13 or more. Nectar is secreted by the bases of the carpels where they touch one another. The stamens mature from the outside inwards and bend towards the centre of the

\*E.g., *Juncus communis*, *Iris Pseudacorus*, *Senecio aquaticus*, *Spiræa Ulmaria*, *Lychnis Flos-cuculi*, *Valeriana officinalis*, *Stachys palustris*, *Ranunculus Flammula*, *Angelica sylvestris*; in wetter places *Glyceria aquatica*, *Veronica Beccabunga*, *Myosotis palustris*, *Polygonum Hydropiper*. Less conspicuous are *Galium palustre*, *Hydrocotyle*, *Juncus bufonius*, *Montia fontana*, and *Epilobium tetragonum*. These are but a few of its regular companions or, strictly speaking, successors in Galloway.

flower so that a passing insect is well dusted with pollen. The stigmas of the carpels form at first a little cushion in the middle of the flower, but later the carpels diverge widely; they are not united together.

Insects probing for nectar must get well dusted with pollen and leave it on the stigmas of the next flower visited. Numerous insects, possibly all those which are abroad in May, have been recorded for the Marsh Marigold.

*CALTHA PALUSTRIS*—INSECT VISITORS (2).

	Germany.	Flanders.	Dumfriesshire and Galloway.	Yorkshire.
Hive Bee,.....	+	+	+	+
Bombus.....	+	—	+	—
Smaller bees.....	2 species*	—	1 species	—
Hover flies and larger sucking flies.....	5 species †	3 species	2 species	—
Small flies.....	+	—	+	—
Beetles.....	+	—	+	—

\* *Andrena, Osmia.*

† *Empis, Melanostoma, Eristalis, Rhingia, &c.*

The Ranunculaceae to which *Caltha* belongs is one of the most primitive of all the natural orders. In all orders, except those few which are considered archaic or primitive, sepals, petals, stamens and carpels are arranged in circles. The number in each circle is usually fixed and definite.

The Marsh Marigold has only one circle of bright yellow sepals; these also act as petals attracting insects to the flowers, but they play the regular part of sepals in that they cover stamens and carpels in the bud.

The number of sepals, however, is *not* fixed; there may be four, five, six, or more. If one could discover why some have many and others only a few sepals, then there might be a clue to the reasons which have induced almost all flowering plants to fix upon three, four or five sepals as the most suitable number to have.

The sepals of *Caltha palustris* have been counted by many observers in different countries and at varying times of the year; some of the results are given in the table.

*CALTHA PALUSTRIS.*

		Percentages of flowers with sepals numbering					
		4	5	6	7	8	9
(3)	Sweden: Gathered 3-28 May	0.7	92.7	5.4	0.8	0.1	0.05
	" " 1st June	0.6	84.3	12.1	2.7	0.2	
(4)	" " Harjedal	3.5	94.9	1.4	0.2		
	" " Bohuslan	0.2	93.5	4.7	1.7	0.2	
	" " Tyskland	—	79.4	16	2.1	1.4	1.1
(5)	Scotland: Meadow, Castle-Douglas	2	95	3			
	" Wetmeadow, Drumwhill	6	85	9			
	" In ditch, in rich soil, Dunlop, Ayrshire	0.6	74.2	22.2	3		

Now, of the three places in Sweden where Falck carried out his measurements, Harjedal is in the north, Bohuslan is in Mid Sweden,

and Tyskland is in the south. A first suggestion was to the effect that the farther south the place (that is the more genial the conditions) the fewer were the flowers with four sepals. This was confirmed by observations in Denmark, which showed that there only 0.5 per cent. had four sepals, as well as by others in Holland and Germany, where none had so few as four. The two series given by Gertz showed that early flowers, presumably opening in worse weather, had a higher percentage with four and a much smaller number with six. The ditch at Dunlop was chosen by myself because the plants seemed to be unusually vigorous; those near Castle-Douglas were in an open, rather exposed place where there was much competition.

The obvious explanation of all these observations is that the more favoured the locality and the more vigorous the plant the more numerous are the sepals. It would surprise no one to find that a particularly vigorous branch of a birch or other tree had more leaves than an exposed and starveling shoot. It seems quite unnecessary to assume that there are special strains of *Caltha*, some with four and others with five sepals. The simplest and most satisfying theory is that the number of sepals simply varies with the food supply and with the general vigour of the individual.

If this is so, stamens and carpels ought also to show similar variations in number. That they do so has been proved by Dr Burkill (6) who counted 11,453 stamens and 891 carpels of the Marsh Marigold. The terminal flower is usually the first to open, and is almost always the largest. His observations show distinctly that the earliest formed flowers carry the most stamens and carpels, and also that the largest branches (*i.e.*, those which produce most flowers) have in their flowers more stamens and carpels than the flowers in corresponding positions on weaker stems.\*

There are two very interesting species of *Caltha* which also suggest that the number of stamens and carpels depends upon individual vigour.

One (*C. limbata* Schl.) grows in Chile at 3000 metres altitude (Maule river), and has only 8 to 10 stamens and 2 to 5 carpels. Another still hardier little plant (*C. Dionaeifolia* Hook.) lives in the Straits of Magellan and about Cape Horn; this almost antarctic plant has 5 to 9 stamens and only 3 carpels.† (7)

In other plants also there is evidence that a favourable position on the stem or other advantage leads to an increase of stamens, carpels or of flowers. For instance, the common Daisy has in Germany an average of 34 ray florets; in the Isle of Wight it has 46, at Rome 55, and near Palermo 65. (8) Dr Burkill (*l.c.*) shows that this holds true in three species of *Ranunculus*, in *Bocconia*, and especially in the Chickweed (*Stellaria media*).

\*For details reference must be made to the original.

†Falck found one specimen in Sweden with five stamens and no carpels at all. In Galloway the carpels vary from four to thirteen: about one-third (31.2 per cent.) have eight carpels.

If the general rule is correct, that is if the number of sepals in *Caltha palustris* and of stamens and carpels in all flowers varies with vigour, then it is just because they cannot manage to develop beyond a certain point.

In all these flowers the first rudiments of sepals, petals, etc., appear as minute projections of embryonic tissue; first come the sepals, then petals, with stamens and carpels in the order named.

In the Cape Horn *Caltha*, which lives in a terrible climate, and probably in a state of starvation, the food supply would, let us suppose, fail after forming at most 9 stamens and 3 carpels, and so no more rudiments would appear.

After pollination there is a distinct elongation and lengthening of the flower stalk, which endeavours to keep pace with, or over-reach, the Ragged Robin and other stems which are now in full development.

The carpels also enlarge and diverge, turning outwards and downwards. They are very like small pea pods, and may be 2 cm. long and 5 mm. broad.

In consequence of this quick growth, which is especially marked in wet weather, a state of strain is developed along the upper edge of the carpels, which is, of course, the seam formed by the united edges of the carpel.

If at this time one touches the tip of a plump strained-looking pod it bursts and most of the seeds are thrown out. In one case the carpel was 4 cm. above the mud and the seeds were scattered to 20 cm. distance.\*

The seeds themselves are about 3.5 mm. long, of which about 1 mm. is due to a spongy air-filled cap, which is the enlarged raphe of the ovule. The characteristic sponginess of water plants is here employed to make the seeds buoyant. They do, in fact, float for from one to four weeks, or even longer, so that in floods or wet weather they may be carried for quite a long way down a river.

When ripe the seed itself is brown, shining and hard; the shell contains astringent tannin which protects the embryo during its voyages (10); the shape is rather like that of a bomb; the contours (except the fleshy annex) are streamlines. All these points are obviously advantages in navigation.

The surface of the seeds becomes distinctly sticky after they have been a little time in water. I lifted a few seeds out of the water with a feather, which was then hung up above the table; twenty-four hours afterwards most of the seeds were still sticking to it.

Thus the Marsh Marigold has three distinct methods of distributing its seeds; the elastic splitting of the carpel is due to the ordinary natural result of growth and of the drying up of the tissues; buoyancy

\*Some authorities say that the opening of the carpels only takes place in wet weather as in *Veronica Beccabunga* and *V. Anagallis*.

is just a slight development of the sponginess of water plants in general; the sticky secretion of the seed coat is probably a mucilaginous degeneration of the cellwall-substance in contact with water, yet this slight change would keep the seeds entangled in a wild duck's plumage even for a very long flight.

None of these modifications are in any way unusual, but they are obviously advantageous. In the Arctic regions, where *Caltha* decorates the flat, undulating and most desolate tundra, running water is probably rare. Birds probably have carried its seeds all round the North Pole.

After six weeks in water most of my seeds had germinated. The embryo lies just below the hard pointed end; it is here that the seed coat splits and the tiny rootlet grows out and fixes itself in the mud by root hairs.\* The tips of the seed leaves remain within the seed coat; in fact, they had considerable difficulty in getting out of it; under natural conditions it is probable that the testa and swollen raphe stick to the mud; this would greatly assist the seed leaves in becoming free.

Most authorities state that *Caltha palustris* is poisonous, and it is certainly not often eaten by grazing animals. It is, however, said that the European bison (now nearly extinct) was very fond of it. It certainly suffers severely from the ravages of snails and various insects. Neat round holes in the leaf are probably made by leafcutting bees; a minute orange grub about half a millimetre in length frequently devours the buds; possibly the mother insect introduced its eggs through a round hole which one finds in such cases between the bases of the sepals.

Some twelve or thirteen parasitic fungi have also been recorded for the Marsh Marigold. These include two Rusts and two Mildew† (11). One of the former, *Puccinia Calthae*, is common on the radical leaves in July, and has been noticed in Europe, Siberia, and North America.

There are some 26 other species of the genus. *Caltha palustris* now flourishes, as we have seen, right across the whole north temperate world. It has the widest distribution of all the species of *Caltha*. There are other species in Scotland, Transylvania, the Caucasus, Asia Minor, Persia, the Himalayas, and East Indies.

In North America there are quite a number of *Calthas* (8 or 9 species), and especially in the Rocky Mountains.

Now, when glaciers existed in the Yosemite valley there was every opportunity for the pioneer *Calthas* to migrate from the Rockies southwards along the Cordillera of the Andes. They certainly seem to have done so, for to-day one finds many *Calthas* in the Andes; there are several in Chile, and at least three in Fuegia and about the Straits of Magellan. If, as seems probable, its seeds can be carried in birds' plumage, the existence of a species in Australia and two in New Zealand is not surprising.

\*The ordinary roots have no root hairs.

†*Erysiphe polygoni*, *Sphaerotheca humuli*.

There are many other interesting points in the mode of life of *Caltha palustris*.

Thus an ordinary plant will have 20 roots, each of which is from 20 to 30 cm. long and 2 mm. or more in diameter. The active transpiration of such a plant, especially if growing in mud and in windy weather, will undoubtedly tend to keep the soil more or less dry.

Now, in cold, wet, temperate regions, mosses are always endeavouring to occupy wet ground. Poor pasture, or, for instance, a tennis lawn, if the grasses are unhealthy, will soon become mossy and fogged. Unless checked there is always the danger that a peat moss might form.

In that case the Ragged Robin association and meadow grasses would be suffocated and a "Lochar Moss" would develop.

You will see then that such plants as *Caltha palustris* take their place as a working unit in the maintenance of the greatest number of the very best plants in their particular station.

The Marsh Marigold has resided in Britain for many thousands of years. (Dr Reid—Origin of the British flora.)

At Mundesley, in Norfolk, its nuts were found in the Cromer Forest bed along with *Trapa natans*, as well as *Elephas meridionalis*, *Hippopotami*, etc., etc. These beds are reckoned as Late Pliocene, that is, before the Great Ice Age.

During warm interglacial times, that is, between the Rissian, which was the worst, and the Wurmian, which was the last Ice Age, *Caltha palustris* was living at West Withering, in Sussex. In late glacial times, during the retreat of the Wurmian ice sheet, there were deposits of peat at Hoxne, in Suffolk, and it was growing there also. There are Neolithic records of *Caltha* at Hailes, near Edinburgh, and also a Roman age record at Silchester, Hampshire.

Now, Dr Colman, in his "Ice Ages," estimates the time occupied by the Ice Age as a whole (that is, including its four great advances as well as the long mild interglacial periods), as from 600,000 to 700,000 years. The time since then, that is since the ice definitely retreated, is estimated by some authorities as 8000 years and by others as 13,000 years.

(I do not myself think that either of these figures can be considered proven.)

During all these years the Marsh Marigold has flourished in Britain!

From the early Chalk period until that of the Cromer Forest bed Europe enjoyed a warm, mild and wet climate, perhaps like that of Tennyson's Isles of Eden. There was just one interruption. During the early Eocene cold water from the Arctic Ocean penetrated southward over what is now the North Sea or German Ocean, and as far, nearly, as the Straits of Dover. The shellfish which formerly lived there became first small and starved looking, and then died out altogether. They were replaced by Arctic species.

At this time quite a considerable part of southern England and northern France was dry land. Yet the climate must have been wet and cold.

The ancestor of *Caltha* was in all probability a woody perennial shrub accustomed to a warm, humid and comfortable climate. This "cold snap" may have been responsible for the appearance of the first Marsh Marigold.

If so, it could escape the rigours of the Great Ice Age, for even in the worst phase of this devastating period England, south of the Thames valley, was not obliterated by boulder clay.

It is a tenable proposition, therefore, that the birth-time of *Caltha palustris* was the cold period of the Eocene. Ever since then it has clung to the frozen limit of vegetation and faithfully followed the wanderings of the Northern Ice.

It was this cold period of the Eocene that destroyed the domination of cold-blooded, gigantic Dragons and Reptiles, and gave the Mammals, including our ancestors, a chance to occupy and possess the earth.

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- (8) Lehmann, *Botan. Centralblatt*, Band 125.
- (9) Guppy, *Studies in Seeds and Fruits*.
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#### COLOURED ILLUSTRATIONS OF HERTFORDSHIRE FUNGI.

The following list of Fungi collected about 1840-2 in the neighbourhood of Hitchin, Herts, by Isaac Brown—who had a school there—has recently come to light and has been supplied by the Letchworth and District Natural History and Antiquarian Society as an addendum to the papers by the late Mr J. E. Little on the "Flora of the Ivel District" published in our Reports of 1932 (375) and 1933 (637). The specimens were painted for Brown by one of his masters, Mons. A. Fillieul. The original paintings can be seen at the Letchworth Museum and they have recently been named by the authorities of the Imperial Mycological Institute, and Miss Wakefield of the Royal Botanic Gardens, Kew.

No.	Date.	Brown's Name.	Correct Name.	Locality.
1 ...	/10/42	<i>muscaria</i>	<i>Amanita muscaria</i> (L.) Fr.	Amphill.
2 ...	20/10/42	<i>phalloides</i>	<i>A. phalloides</i> (Vaill.) Fr.	Hitch Wood.
3 ...	30/ 8/44	<i>asper</i>	<i>A. rubescens</i> (Pers.) Fr. ?	Hitch Wood.
4 ...	/10/42	<i>muscaria</i>	<i>Amantloopsis fulva</i> (Schaeff.) W. G. Sm.	Westwood : Offley Holes.
5 ...	/10/42	<i>vaginata</i>	<i>A. vaginata</i> (Bull.) Roze.	Greenlane.
6 ...	10/11/42	<i>androsaceus</i>	<i>Androsaceus Androsaceus</i> (L.) Pat.	Lax's : St Ippolyts.
7 ...	1/12/43	<i>epiphyllus</i>	<i>A. epiphyllus</i> (Fr.) Pat.	Stevenage.
8 ...	/12/42	<i>Hudsoni</i>	<i>A. Hudsoni</i> (Pers.) Pat.	Hitch Wood.
9 ...	/10/42	<i>melleus</i>	<i>Armillaria melleus</i> (Vahl) Fr.	Everywhere.
10 ...	/10/42	<i>granulatus</i>	<i>Boletus granulatus</i> (L.) Fr.	Hitchin Park.
11 ...	/10/42	<i>luridus</i>	<i>B. luridus</i> (Schaeff.) Fr.	Lax's Plantation.
12 ...	16/11/42	<i>variabilis</i>	<i>Claudopus variabilis</i> (Pers.) W. G. Sm.	Hitch Wood.
13 ...	7/11/43	<i>cyathiformis</i>	<i>Clitocybe cyathiformis</i> (Bull.) Fr.	Hitch Wood.
14 ...	28/11/42	<i>fragrans</i>	<i>C. fragrans</i> (Sow.) Fr.	Lax's Fir Plantation.
15 ...	22/ 8/44	<i>flaccidus</i>	<i>C. infundibuliformis</i> -(Schaeff.) Fr.	Wain Wood : Preston.
16 ...	20/10/42	<i>infundibuliformis</i>	<i>C. infundibuliformis</i> (Schaeff.) Fr.	Hitch Wood.
17 ...	25/11/42	<i>nebularis</i>	<i>C. nebularis</i> (Batsch.) Fr.	Lax's Plantation.
18 ...	15/11/43	<i>nebularis</i>	<i>C. nebularis</i> (Batsch.) Fr.	Lax's Plantation.
19 ...	24/ 9/44	<i>phyllophilus</i>	<i>C. phyllophila</i> Fr.	Lax's Plantation.
20 ...	22/ 8/44	<i>prunulus</i>	<i>Clitopilus prunulus</i> (Scop.) Fr.	Wain Wood.
21 ...	1/11/42	<i>butyraceus</i>	<i>Collybia butyracea</i> (Bull.) Fr.	Lax's Plantation.
22 ...	10/10/42	<i>fusipes (velutipes)</i>	<i>C. fusipes</i> (Bull.) Berk.	Redcoat Green, St Ippolyts.
23 ...	/10/42	<i>fusipes</i>	<i>C. fusipes</i> (Bull.) Berk.	Hitchin Park.
24 ...	24/ 8/44	<i>radicatus</i>	<i>C. radicata</i> (Relh.) Berk.	Hitchin Hill.
25 ...	20/ 9/44	(not named)	<i>C. rancida</i> Fr. ?	Wain Wood.
26 ...	1/10/44	<i>velutipes</i>	<i>C. velutipes</i> (Curt.) Fr.	Hitchin.
27 ...	/10/42	<i>cinerus</i>	<i>Coprinus atramentarius</i> (Bull.) Fr.	Roadsides.
28 ...	/ 9/42	<i>comatus</i>	<i>C. comatus</i> (Fl. Dan.) Fr.	Roadsides.
29 ...	20/ 4/44	<i>macrorrhizus</i>	<i>C. macrorrhizus</i> (Pers.) Rea.	In the hot-bed, Hill Garden, Hitchin.
30 ...	/ 9/42	<i>micaceus</i>	<i>C. micaceus</i> (Bull.) Fr. ?	Roadsides.
31 ...	30/ 9/42	<i>niveus</i>	<i>C. niveus</i> (Pers.) Fr.	Hitchin Park.
32 ...	15/10/42	<i>plicatus</i>	<i>C. plicatilis</i> (Curt.) Fr.	Roadsides.
33 ...	30/11/43	<i>cinnamomeus</i>	<i>Cortinarius cinnamomeus</i> (L.) Fr. ?	Offley Plantation.
34 ...	18/ 9/44	<i>gentilis</i>	<i>C. gentilis</i> (Fr.). ?	West Wood.

No.	Date.	Brown's Name.	Correct Name.	Locality.
35 ...	30/ 8/44	<i>collinitus</i>	<i>C. (sp.). ?</i>	Hitch Wood.
36 ...	/10/42	<i>cantharellus</i> <i>cornucoptoides</i>	<i>Craterellus cornucoptoides (L.) Fr.</i>	Woods.
37 ...	19/10/44	<i>mollis</i>	<i>Crepitodus mollis (Schaeff.) Fr.</i>	Small plantation on road to Willian.
38 ...	22/ 8/44	<i>rhodopolius</i>	<i>Entoloma rhodopolum Fr.</i>	Wain Wood.
39 ...	12/10/43	<i>glutinosus</i>	<i>Gomphidius glutinosus (Schaeff.) Fr.</i>	Pinnacle Hill Plantation, near Hitchin.
40 ...	/ 9/42	<i>rutilus</i>	<i>G. viscidus (L.) Fr.</i>	Hitchin Park.
41 ...	/10/42	<i>fastidius</i>	<i>Hebeloma crustuliniforme (Bull.) Fr. ?</i>	Fir plantation.
42 ...	28/10/43	<i>collinitus</i>	<i>H. sp. ?</i>	Wain Wood: under bushes in a thick part.
43 ...	/10/42	<i>coccineus</i>	<i>Hygrophorus coccineus (Schaeff.) Fr.</i>	Pastures.
44 ...	/10/42	<i>cocctneus</i>	<i>Hygrophorus coccineus (Schaeff.) Fr.</i>	Pastures.
45 ...	/ 9/42	<i>conicus</i>	<i>H. conicus (Scop.) Fr.</i>	Hitchin Park.
46 ...	1/12/43	<i>hypothejus</i>	<i>H. hypothejus Fr.</i>	Lax's Fir Plantation.
47 ...	/10/42	<i>virgineus</i>	<i>H. niveus (Scop.) Fr.</i>	Meadows everywhere.
48 ...	/ 9/42	<i>psittacinus</i>	<i>H. psittacinus (Schaeff.) Fr.</i>	Hitchin Park.
49 ...	/ 9/42	<i>psittacinus</i>	<i>H. psittacinus (Schaeff.) Fr.</i>	Hitchin Park.
50 ...	/10/42	<i>pratensis</i>	<i>H. pratensis (Pers.) Fr.</i>	Lax's Plantation.
51 ...	/ 9/42	<i>atomatus</i>	<i>Hypholoma appendiculatum (Bull.) Fr.</i>	Hitchin Park.
52 ...	/10/42	<i>fascicularis</i>	<i>H. fasciculare (Huds.) Fr.</i>	Everywhere.
53 ...	13/10/43	<i>stipatus</i>	<i>H. hydrophilum (Bull.) Fr.</i>	Hitch Wood.
54 ...	15/10/42	<i>lateritius</i>	<i>H. sublateritium (Schaeff.) Fr.</i>	Hedges near Lax's.
55 ...	/10/42	<i>lachrymabundus</i>	<i>H. velutinum (Pers.) Fr.</i>	Near Wymondley.
56 ...	/10/42	<i>focculosus</i>	<i>Inocybe foccolosa Berk.</i>	? ?
57 ...	17/ 8/44	<i>rimosus</i>	<i>I. rimosus (Bull.) Fr.</i>	Wain Wood.
58 ...	/10/42	<i>laccatus</i>	<i>Laccaria laccata (Scop.) B. &amp; Br.</i>	Hitch Wood.
59 ...	20/10/42	<i>thetogalus</i>	<i>Lactarius chrysoleus Fr.</i>	Hitch Wood.
60 ...	20/10/42	<i>cliticioides</i>	<i>L. cliticioides Fr.</i>	Hitch Wood.
61 ...	/10/42	<i>deliciosus</i>	<i>L. deliciosus (L.) Fr.</i>	Redcoat Green, St Ippolyts.
62 ...	18/ 9/44	<i>fuliginosus</i>	<i>L. fuliginosus Fr.</i>	West Wood.
63 ...	24/ 9/44	<i>quietus ?</i>	<i>L. glyctosmus Fr. ?</i>	Lax's Plantation.
64 ...	20/10/42	<i>hyssginus</i>	<i>L. hyssginus Fr.</i>	Hitch Wood.
65 ...	24/11/43	<i>subdulcis</i>	<i>L. mitissimus Fr.</i>	Hitch Wood.
66 ...	7/ 8/44	<i>piperatus</i>	<i>L. piperatus (Scop.) Fr.</i>	Hitch Wood.
67 ...	17/ 8/44	<i>pyrogalus</i>	<i>L. pyrogalus (Bull.) Fr.</i>	Wain Wood.

No.	Date.	Brown's Name.	Correct Name.	Locality.
68 ...	/10/44	<i>quietus</i>	<i>L. quietus</i> Fr.	Lax's or West Wood.
69 ...	30/ 8/44	<i>tormentosus</i>	<i>L. tormentosus</i> (Schaeff.) Fr.	Lax's, near the Bridge.
70 ...	13/10/43	<i>uidus</i>	<i>L. uidus</i> Fr.	Hitch Wood.
71 ...	22/ 8/44	<i>vellereus</i>	<i>L. vellereus</i> Fr.	Wain Wood.
72 ...	18/ 9/44	<i>volemus</i>	<i>L. volemus</i> Fr.	West Wood.
73 ...	22/ 8/44	<i>cochleatus</i>	<i>Lentinus cochleatus</i> (Pers.) Fr.	Wain Wood.
74 ...	28/ 9/44	<i>granulosus</i>	<i>Lepiota amianthina</i> (Scop.) Fr.	West Wood.
75 ...	10/10/42	<i>cristatus</i>	<i>L. cristata</i> (H. & S.) Fr.	Lax's Plantation.
76 ...	20/10/42	<i>granulosus</i>	<i>L. granulosa</i> (Batsch.) Fr.	Near Hitch Wood.
77 ...	none	<i>procerus</i>	<i>L. procera</i> (Scop.) Fr.	? ?
78 ...	/10/42	<i>procerus</i>	<i>L. rachodes</i> (Vitt.) Fr.	Redcoat Green, St Ippollyts.
79 ...	15/11/43	<i>excoriatus</i>	<i>L. sp.</i>	Lax's Plantation.
80 ...	22/ 8/44	<i>sericellus</i>	<i>Leptonia sericella</i> (Fr.) Quel.	Wain Wood.
81 ...	none	<i>chalybeus</i>	<i>L. serrulata</i> (Pers.) Fr. ?	? ?
82 ...	2/11/42	<i>porreus</i>	<i>Marasmius alliaceus</i> (Jacq.) Fr. ?	Hitch Wood.
83 ...	1/11/43	<i>tenacellus</i>	<i>M. conigenus</i> (Pers.) Karst.	Lax's Plantation.
84 ...	17/11/42	<i>conigenus</i>	<i>M. conigenus</i> (Pers.) Karst.	West Wood.
85 ...	20/ 9/44	<i>dryophilus</i>	<i>M. dryophilus</i> (Bull.) Karst.	Wain Wood.
86 ...	15/11/43	<i>esculentus</i>	<i>M. esculentus</i> (Wulf.) Karst.	Lax's Plantation.
87 ...	30/ 9/42	<i>Oreades</i>	<i>M. Oreades</i> (Bolt.) Fr.	Hitchin Park.
88 ...	8/11/43	<i>personatus</i>	<i>M. personatus</i> (Bolt.) Fr.	Lax's Plantation.
89 ...	16/11/42	<i>ramealis</i>	<i>M. ramealis</i> (Bull.) Fr.	Hitch Wood.
90 ...	3/11/42	<i>alcalinus</i>	<i>Mycena alcalina</i> Fr.	Hitch Wood.
91 ...	/10/43	<i>clavus</i>	<i>M. clavus</i> (L.) Rea.	Mount Pleasant, Hitchin.
92 ...	1/12/42	<i>corticola</i>	<i>M. corticola</i> (Schum.) Fr.	Hitchin Park and Garden.
93 ...	18/ 9/44	<i>epipterygus</i>	<i>M. epipterygia</i> (Scop.) Fr.	Trunks Wood, St Ippollyts.
	and			
	23/11/43	<i>galericulatus</i>	<i>M. galericulata</i> (Scop.) Fr.	Hitch Wood and Lax's.
94 ...	3/11/42			
	and			
	10/11/42			
95 ...	10/10/44	<i>galopus</i>	<i>M. galopus</i> (Pers.) Fr., var. <i>nigra</i> Fl. Dan.	Hitch Wood.
96 ...	8/11/43	<i>lacteus</i>	<i>M. lactea</i> (Pers.) Fr.	Hitch Wood.
97 ...	/10/42	<i>polygrammus</i>	<i>M. polygramma</i> (Bull.) Fr.	Shady places.

No.	Date.	Brown's Name.	Correct Name.	Locality.
98 ...	8/11/43	<i>purus</i>	<i>M. pura</i> (Pers.) Fr.	Lax's Plantation.
99 ...	12/11/42	<i>strobilinus</i>	<i>M. sanguinolenta</i> (A. & S.) Fr.	Wain Wood.
100 ...	17/11/42	<i>stylobates</i>	<i>M. stylobates</i> (Pers.) Fr.	West Wood.
101 ...	9/12/42	<i>tenerrimus</i>	<i>M. tenerrima</i> Berk.	Own garden.
102 ...	13/10/43	<i>pascuus</i>	<i>Nolanea pasqua</i> (Pers.) Fr.	Lane, Chapel Foot, Hitchin.
103 ...	7/ 8/44	<i>parastiticus</i>	<i>Nyctalis parastitica</i> (Bull.) Fr.	Hitch Wood.
104 ...	7/11/43	<i>camptophyllus</i>	<i>Omphalia camptophylla</i> Berk.	Hitch Wood.
105 ... {	9/ 9/44	<i>fibula</i>	<i>O. fibula</i> (Bull.) Fr.	West Wood.
	/10/43	<i>fibula</i> , var. <i>Swartzii</i>	<i>O. fibula</i> (Bull.) Fr., var. <i>Swartzii</i> .	Mount Pleasant, Hitchin.
106 ...	22/12/43	<i>umbelliferus</i>	<i>O. umbellifera</i> (L.) Fr.	Bank of the road, S.E. corner of Hitch Wood.
107 ...	none	none	<i>Paneolus papilionaceus</i> (Bull.) Fr. ?	? ?
108 ...	12/11/42	<i>stypticus</i>	<i>Panus stypticus</i> (Bull.) Fr.	Wain Wood.
109 ...	/ 9/42	<i>giganteus</i>	<i>Paxillus giganteus</i> (Sow.) Fr.	West Wood.
110 ...	/10/42	<i>involutus</i>	<i>P. involutus</i> (Batsch.) Fr.	J. Lucas' Plantation.
111 ...	/ 9/42	<i>aureus</i>	<i>Pholiota aurea</i> (Mattusch.) Fr.	Near Redcoat Green, St Ippollyts.
112 ...	29/10/42	<i>mutabilis</i>	<i>P. marginata</i> (Batsch.) Fr.	Fir plantation on right hand going to Offley.
113 ...	13/10/43	<i>praecox</i>	<i>P. praecox</i> (Pers.) Fr.	Roadside beyond the Greyhound, London Rd.
114 ...	13/10/43	<i>Agaricus praecox</i>	<i>P. praecox</i> (Pers.) Fr.	Roadside beyond the Greyhound, London Rd.
115 ...	none	<i>praecox</i>	<i>P. praecox</i> (Pers.) Fr. ?	? ?
116 ...	10/10/42	<i>Agaricus squarrosus</i>	<i>P. squarrosa</i> (Müll.) Fr.	Hitchin Park.
117 ...	10/10/42	<i>Agaricus squarrosus</i>	<i>P. squarrosa</i> (Müll.) Fr.	Hitchin Park.
118 ...	10/10/42	<i>Agaricus squarrosus</i>	<i>P. squarrosa</i> (Müll.) Fr.	Hitchin Park.
119 ...	10/10/42	<i>Agaricus squarrosus</i>	<i>P. squarrosa</i> (Müll.) Fr.	Hitchin Park.
120 ...	10/10/42	<i>Agaricus squarrosus</i>	<i>P. squarrosa</i> (Müll.) Fr.	Hitchin Park.
121 ...	10/10/42	<i>Agaricus squarrosus</i>	<i>P. squarrosa</i> (Müll.) Fr.	Hitchin Park.
122 ...	30/ 8/44	<i>Pluteus</i>	<i>Pluteus cervinus</i> (Schaeff.) Fr.	Hitch Wood.
123 ...	22/ 8/44	<i>phlebophorus</i>	<i>P. phlebophorus</i> (Ditm.) Fr.	Wain Wood.
124 ...	none	none	<i>Polyporus giganteus</i> Fr.	? ?
125 ...	none	<i>A. campestris</i>	<i>Psalliota campestris</i> (L.) Fr.	? ?
126 ...	/10/42	<i>Georgii</i>	<i>P. sp. ?</i>	Hitchin Park.
127 ...	23/10/43	<i>bifrons</i>	<i>Psathyra sp. ?</i>	Grassybank, Gosmore.
128 ...	23/ 9/44	<i>atomatus</i>	<i>Psathyrella atomata</i> Fr.	Kitchen Garden.
129 ...	4/10/43	<i>A. atomatus</i>	<i>P. atomata</i> Fr.	Hedgebank, near Purwell Mill, Hitchin.
130 ...	7/10/43	<i>A. disseminatus</i>	<i>P. disseminata</i> (Pers.) Fr.	At the lintel of the gate in the garden.

No.	Date.	Brown's Name.	Correct Name.	Locality.
131 ..	12/10/44	<i>gracilis</i>	<i>P. gracilis</i> Fr.	Bury Wood.
132 ...	17/ 8/44	<i>exsuccus</i>	<i>Russula chloroides</i> (Krombh.) Bres.	Wain Wood.
133 ...	7/ 8/44	<i>foetens</i>	<i>R. foetens</i> (Pers.) Fr.	Wain Wood and Hitch Wood.
134 ...	/10/42 and /11/42	<i>emeticus</i>	<i>R. fragilis</i> (Pers.) Fr.	Lax's Plantation and Hitch Wood.
135 ...	24/ 9/44	<i>alutaceus</i>	<i>R. fragilis</i> (Pers.) Fr. ?	Offley Plantation.
136 ...	7/ 8/44	none	<i>R. nigricans</i> Bull.	Hitch Wood.
137 ...	17/ 8/44	<i>nitidus</i>	<i>R. nitida</i> (Pers.) Fr.	Wain Wood.
138 ...	18/12/43	<i>albo-brunneus</i>	<i>R. ochroleuca</i> (Pass.) Fr.	Lane between Lady Grove and Hitch Wood.
139 ...	30/ 9/42	<i>aeruginosus</i>	<i>Stropharia aeruginosa</i> (Curt.) Fr.	Hitchin Park.
140 ...	28/ 9/44	none	<i>S. albocyanea</i> (Desm.) Fr. ?	West Wood.
141 ...	/10/42	<i>Agaricus semiglobatus</i>	<i>S. semiglobata</i> (Batsch.) Fr.	Offley.
142 ...	/10/42	<i>semiglobatus</i>	<i>S. semiglobata</i> (Batsch.) Fr.	Offley.
143 ...	8/11/43	<i>collinitus</i>	<i>S. squamosa</i> (Pers.) Fr.	Hitch Wood.
144 ...	29/10/42	<i>fulvus</i>	<i>Tricholoma albo-brunneum</i> (Pers.) Fr. ?	Fir plantation on right hand going to Offley.
145 ...	15/11/43	<i>columbetta</i>	<i>T. columbetta</i> Fr. ?	Wain Wood.
146 ...	10/10/42	<i>personatus</i>	<i>T. nudum</i> (Bull.) Fr.	Lax's Plantation.
147 ...	15/10/42	<i>fumosus</i>	<i>T. polioleucum</i> Fr. ?	Highbury, Hitchin.
148 ...	/10/42	<i>rutilans</i>	<i>T. rutilans</i> (Schaeff.) Fr.	Towards Offley.
149 ...	/10/42	<i>sulphureus</i>	<i>T. sulphureum</i> (Bull.) Fr.	Redcoat Green, St Ippolyts.

LIST OF 22 PAINTINGS THAT CANNOT BE IDENTIFIED CERTAINLY WITHOUT  
MICROSCOPIC EXAMINATION OF A SPECIMEN.

No.	Date.	Brown's Name.	Locality.
1 ...	7/ 8/44	<i>callosus</i>	Meadow near Hitch Wood
2 ...	14/10/43	<i>campanella</i> ,	Offley Plantation.
		<i>β badipes</i>	
3 ...	1/11/43	<i>cerastinus</i> or <i>albo-</i> <i>brunneus</i>	Lax's Plantation.
4 ...	23/10/43	<i>compressus</i>	Near Hitch Wood.
5 ...	none	<i>elegans</i>	Hitchin.
6 ...	none	<i>fastibilis</i>	None
7 ...	20/ 9/44	<i>fimbriatus β</i>	Wain Wood.
8 ...	none	<i>flavidus</i>	None
9 ...	7/ 8/44	<i>furfurascens</i>	On the ground, Lady Grove.
10 ...	/10/42	<i>geophyllus</i>	J. Lucas' Plantation.
11 ...	19/10/44	<i>imbricatus</i>	Lady Grove.
12 ...	none	<i>infundibuliformis</i>	None
13 ...	none	<i>infundibuliformis</i>	None.
14 ...	15/10/42	<i>melinoides</i>	Hitchin Park.
15 ...	/10/42	<i>multiformis</i>	Fir plantations.
16 ...	11/ 8/44	<i>Cantharellus</i> <i>agaricoides</i>	Hitchin Park.
17 ...	29/11/43	<i>tener</i>	Offley Holes Plantation.
18 ...	none	<i>stipatus</i> C ?	Hitchin.
19 ...	13/10/43	<i>semiovatus</i>	Hitch Wood.
20 ...	24/ 9/44	<i>scaber</i>	Offley Plantation, near the top under beeches.
21 ...	28/ 9/44	?	West Wood.
22 ...	3/ 9/44	?	Lax's Plantation.

N.B.—Brown gave no generic names except where they are given in the columns  
"Brown's Name."

These paintings illustrate 113 named species, 2 named varieties, 14 duplicates,  
21 species of slightly doubtful identity, and 22 that cannot be named—172 in all,  
all from the neighbourhood of Hitchin, Herts.

## LIMOSELLA SUBULATA Ives.

[=*Limosella tenuifolia* Nuttall.]Appearance of *L. subulata* in England.

W. H. PEARSALL.

[For many years competent botanists have queried the status of the *Limosella aquatica*, var. *tenuifolia* Hook. from Kenfig and I am indebted to Lady Davy for the following translation from a valuable paper by Prof. H. Glück—*Botanische Jahrbücher*, Band lxvi, Heft 5, 1934—on this genus.]

The question as to whether *L. aquatica*, var. *tenuifolia* Hook. fil., and *L. aquatica*, var. *tenuifolia* Lej., were the same plant was made the subject of a special enquiry in 1901 by Mr W. P. Hiern and the results were published in the *Journ. Bot.*, vol. 39, 1901, 336-339. From special knowledge we are of opinion that the existing material which originated from Kenfig was insufficient. In this communication W. P. Hiern has made two serious errors, of which the first is clearly the cause of the second. He accepts the authority of Sir Joseph Hooker and combines some of the *L. tenuifolia* of the Antarctic with *L. aquatica* and also with *L. aquatica*, var. *tenuifolia* Hook. fil. Yet Hooker had the proof that the Antarctic "*tenuifolia*" really was identical with the European *L. aquatica*, but he did not convey it.

From Hiern's description it is quite obvious that he had two different species before him and it is remarkable that he did not discern the difference. An unprejudiced reader becomes convinced that the figures (426c) given by Hiern do not agree throughout with his detailed descriptions. The picture of its habit on plate 426 and also the 6-times enlarged flower both fit *L. aquatica* well; but the chief description on p. 337 belongs to *Limosella subulata* Ives = *L. tenuifolia* Nuttall.

W. P. Hiern says "The limb spreading, very nearly regular, 5-partite, about 3 mm. in diameter," and the 6-times enlarged blossom shows a corolla with a diameter of 5.5 mm., but which should be 18 mm. diameter according to this enlargement! Hiern says further, "The segments of the corolla about 1 mm. long." On the 6-times enlarged blossom the corolla segments have a length of 1.5 mm. but according to this enlargement they should be 6 mm. long! Hiern also says "Style rather short, filiform, 1.5 mm. long," and in the 6-times enlarged blossom the style heightens to 1.8 mm. long, but should have by this enlargement a length of 6.9 mm.! These 2 figures represent the real *Limosella aquatica* L. There is, indeed, one form with linear leaves, which is a first-leaf form, and which is identical in reality with *Limosella aquatica* L., var. *tenuifolia*.

But an enigmatical point still remains over. In both these figures the flower is depicted as being very long, the calyx border wide, surpassing the corolla, which does not appear in either *Limosella aquatica* or *L. subulata*. These pictures can only have come through conditions

that result from pressing the corolla itself out of the calyx. It is therefore certain that W. P. Hiern had in fact two quite different objects before him.

The simplest solution of these riddles is this, that one assumes that the examination material that Hiern had before him from the Kenfig Pool in Wales must have embraced two different objects, one of *Limosella aquatica*, var. *tenuifolia* Hoffm., a troublesome form of the European *L. aquatica*, and secondly, the *Limosella tenuifolia* Nuttall. These conclusions completely agree with and confirm what I myself in Autumn, 1930, saw at Kenfig Pool.

#### THE LOCALITIES OF LIMOSELLA SUBULATA IN ENGLAND.

Sowerby's *English Botany*, which is the well-known basis for the flower study of the British Isles, makes no mention of *Limosella aquatica*, var. *tenuifolia*. Both in the first edition of the year 1796 and also in the third edition of 1866 only the well-known typical form of *Limosella aquatica* is figured. It is shown first as *Limosella aquatica*, var. *tenuifolia*—in which, however, *Limosella subulata* is included—in the newer English Flower books. So far as is known to me at present, the following localities are those for the true *Limosella subulata*. Till now the known localities for *Limosella subulata* all lie in England and certainly in Wales.

#### THE KENFIG POOL.

*Limosella subulata* was first found by Prof. A. H. Trow in 1897 at Kenfig Pool. On 7/6/1901 Shoolbred and Marshall together (and for the second time Shoolbred on 12/7/1901) noticed it. By A. H. Trow it was seen for the second time in the year 1905 and the plant was then in greater abundance on sandy edges round the Pool.

The Kenfig Pool, also called Mawellom Pool, lies in South Wales in Glamorgan County. It is between Kenfig and the ocean, from which it is about 4-5 kilometres and about 30 kils. westerly from Cardiff. It consists of sand dunes supplied with characteristic dune-flora.

In autumn, 1930, I searched the locality myself and also in company with Miss E. Vachell of Cardiff. In the space of about 3 hours we made one round of the Pool, but could not find a trace of the *Limosella subulata*, although apparently the locus classicus was well known. But that is what one might expect from a plant which normally is annual but which only after the next muddy shore manages to develop and grow.

Evidently the pollen of the plants is produced abundantly after a rest-period of several years, and at a favourable moment suddenly comes to development. I have observed that other annual mud-inhabitants grow like this, such as *Heleocharis ovata*, *Carex cyperoides*, and *Gnaphalium luteo album*. Kenfig Pool is fresh water and shelters an Atlantic flower-element.

Especially abundant on the whole shore of Kenfig Pool is *Littorella lacustris*, which forms the entire turf.

Moreover, I met with and found abundantly the following plants sharing less or more: *Echinodorus ranunculoides*, *Juncus lampocarpus*, *Pot. heterophyllus* (submersed and land-form), *Myosotis caespitosa*, *Samolus Valerandi*, *Anagallis tenella* (very isolated), *Erythraea pulchella*, *Hydrocotyle vulgaris* (rather abundant), *Helosciadium nodiflorum* (creeping form), *Oenanthe fistulosa*, *Ran. Flammula*, var. *radicans*.

On our joint excursion to Kenfig Pool we nevertheless made another very interesting discovery in spite of not finding *Limosella subulata*, namely, we found in a small water puddle behind the little Inn near Kenfig Pool about a dozen plants of typical *Limosella aquatica*. As the distance of this small water puddle from Kenfig Pool itself is only very short, it is quite possible that on the shore of Kenfig Pool not only *Limosella subulata* is to be found there, but also *Limosella aquatica*. And then it is easily conceivable to us, and what probably happened, that W. P. Hiern when he examined *Limosella subulata* Ives and *Limosella aquatica*, var. *tenuifolia* Hoffur, had both before him at the same time; nevertheless he did not make any distinction between them.

#### THE RIVER GLASLYN.

In this locality *Limosella subulata* Ives (= *Limosella aquatica* L., var. *tenuifolia* Lej., or var. *tenuifolia* Hoffur) was collected by (a) Christopher H. Andrews on 25/8/1916, (b) Gambier-Parry and Daniel A. Jones in 1921, (c) Prof. Slater in 1925 and in July 1931. This second locality is not known to me and so I must depend on the brief communication of Prof. H. Slater and of Mr Gambier-Parry, both of whom know the locality. Prof. Slater had the kindness to look up the said locality in August 1930, but only to find that the plants could not be reached as the place had become full and was under water; so the following year in July he went to look at it again.

Here it maintains itself in a salt marsh in which the plant grows in the mud which probably at the time of the Spring tides is washed with salt water. According to the testimony of Prof. Slater, the following plants are in company with it: *Scirpus Savii*, *Scirpus parvulus*, *Juncus obtusiflorus* (= *Juncus articulatus*, *Juncus acutus*), *Spergularia salina*, *Glaux maritima*, *Plantago maritima*, and at some distance, nevertheless already outside the brackish water zone, Prof. Slater also noticed *Centunculus minimus* and *Radiola linoides*.

It is important to note that the place on the Glaslyn River lies in the brackish water zone. In N. America *Limosella subulata*, so far as is known to me, is always found on brackish water ground, although in N. America it is given as exceptional. Nevertheless, the typical *Limosella aquatica* is a fresh water swamp plant. Still, the neighbourhood should be examined to see if it supplies an exception.

Wheldon and Wilson (Note a) have put before us an account which, according to them, gives it in West Lancashire, the English locality in which *Limosella aquatica* is in fact flourishing on brackish water ground. And those from proved examples (Note b) in fact stand as

the typical *Limosella aquatica* there. Also in Finland, where *Limosella aquatica* is widely spread, it grows here and there on brackish water mud, although it has colonised itself besides on fresh water mud. Against this I have arrived at the conclusion that also for Germany only one place has been found where *Limosella aquatica* prospers on brackish water shores.

Note a: *The Flora of West Lancashire*. Brackish pools near Overton and near Bolton-le-Sands.

Note b: In the Herbarium of the Natural History Museum in Cardiff. The examples referred to have the number 1163 and were collected by A. Wilson, August 1900.

#### THE MORFA SWAMP NEAR SWANSEA.

The Morfa swamp is situated in the neighbourhood of Swansea in Glamorganshire, S. Wales, and forms the third station for *Limosella subulata* Ives, about which till now there has been no publicity.

Recently this place was first found by Mr Arthur Webb, to whom I am indebted for this important locality. This surprising place is in one of the pools that does not contain any big plant growth and is near the little village of Morfa. The plant was on the surface of the ground in an area of 40 × 40 feet and was placed in such a manner and was flowering in such multitudes that the little white or somewhat pink blossoms were already conspicuous at a distance of some yards.

The locality is really not far away from the coast, but typical salt-plants were absent, and after viewing it Mr A. Webb says that it is not, or as good as not, influenced by brackish water.

#### CRUMLIN BOG IN WALES.

The so-called Crumlin Bog forms the fourth locality of *Limosella subulata* in England. This place was discovered by H. J. Riddlesdell in the year 1905. According to a communication by letter from Riddlesdell, Crumlin Bog lies not far from the coast of Swansea Bay and only a few kilometres Eastward of Swansea town. Crumlin Bog is of the swamp order and lies outside the zone of brackish water and at no time comes under the influence of the ebb and flow. *Limosella subulata* was only seen there in trifling amount by myself, and indeed only in one place which was free of the higher herbaceous vegetation. In the Crumlin Bog Riddlesdell also found formerly *Carex stricta*, *Ranunculus Lingua*, *Equisetum hyemale* and *E. variegatum*, *Samolus Valerandi* and *Glaux maritima*.

Unfortunately, however, in this locality *Limosella subulata* is in danger chiefly because the water in the Crumlin Bog remains under the influx of copper washing.

One dares not have any lingering doubt of Mr Riddlesdell's observations as he himself collected *Limosella subulata* at the Kenfig Pool.

Still further confirmation would be the appearance of a narrow-leaved *Limosella* in Cornwall; I should like to have the earliest infor-

mation as to the discovery of such a form in that county, from which, so far, none has been recorded.

DISTRIBUTION OF LIMOSELLA AQUATICA IN THE BRITISH ISLES.

The typical *Limosella aquatica* has a wide range, reaching from Spain to China. A second range inhabits the Central and Western command of North America. In Tirol it reaches to the height of 1250 metres.

The typical *Limosella aquatica* has a big range in the British Isles. Arthur Bennett, who made a census of it, found that it grew in 36 counties. To these I can now add Glamorganshire, the above-mentioned locality at Kenfig Pool. The greater number of these counties belong to England itself; 4 of these counties belong to Scotland, Dumbartonshire, Haddington, Ayr, and Kincardine. The last-named locality is also the most northerly. To Ireland only 2 counties, Galway and Clare in the West. The number of the single localities amounts to 46 respectively according to Arthur Bennett, 47 including Glamorganshire, but some of the counties have more than one locality.

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A NOTE ON THE GENUS SPARTINA.

PATRICK M. HALL, F.L.S.

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The genus *Spartina*—Cord-grass—is of particular interest to Hampshire botanists for the reason that ours is almost certainly now the only county in which all three British species can be found, and one of them, moreover, actually originated on the shores of Southampton Water. It is, therefore, hoped that a short account of the history, distribution and characteristics of the species representing the genus in Britain will be of interest to the members of this Club. At the exhibits meeting held at Winchester early in October, 1933, I displayed a number of dried specimens of plants of interest to Hampshire botanists, among them examples of the three *Spartinas*, together with a short descriptive note: at the request of one or two members that note is published here in a slightly extended form.

The three British species of *Spartina* are:—

1. *S. STRICTA* Roth; a native plant of the south and east coasts of Britain. With the exception of Dorset this species has been recorded from all the littoral counties from S. Devon eastwards and northwards to Lincolnshire. The earliest British record is in Merrett's *Pinax*, 1666, where it is recorded from Crixey Ferry, Essex. The first Hants record is in the *Hampshire Repository*, 1799, near Portsmouth Harbour. It is clear from the list of habitats given in Townsend's *Flora of Hants* that it was at one time common along the coasts of S. Hants

and the Isle of Wight, wherever salt-marshes and estuarine mud-flats suitable to the plant's growth were to be found. But it has now been practically exterminated in the county by the third species to be mentioned below. At the present time it is doubtful whether this species is to be found on the mainland of Hants, but it occurs in considerable plenty in one or two salt-marshes in the Isle of Wight. This species has a wide distribution in Western and Southern Europe, N. Africa, and N. America.

2. *S. ALTERNIFLORA* Lois.; this species is believed to be of N. American origin and to have been accidentally introduced from that country to the estuary of the Itchen, whence it was recorded by Bromfield on August 8th, 1836. Thence the plant spread in such a manner that we find the following records in Townsend's *Flora*:—

- “ profusely on the mud-flats of the Itchen river (1850) ”;
- “ mud-banks on the Hamble, abundant (1871) ”;
- “ abundantly at Hillhead (1872) ”;
- “ now (1879) abundant by the Itchen.”

The range of the species in Hampshire extended ultimately from Lymington in the west to the mouth of the Meon in the east. Outside Hampshire the only British record for this species is from Thorney Island in the extreme west of Sussex, and it is very doubtful whether it is still to be found there. In Hampshire, as far as is known, this species is now confined to two stations, in the estuaries of the Itchen and Test respectively, where it contrives to maintain a rather precarious existence. This species was also introduced from N. America to France and N. Spain.

3. *S. TOWNSENDII* H. & J. Groves. The origin of this plant is unknown, but it is now generally considered to be a hybrid resulting from the crossing of the two foregoing species. It was first recorded by Messrs H. & J. Groves from mud-flats near Hythe in 1878. From this point it must have spread for a time more or less slowly, because in the second edition of the *Flora* published in 1904 it was still possible for Townsend to describe the plant as “rare.” It had by that time extended to Lymington estuary, the Medina (1895), Langstone Harbour and Hayling Island (1900). It had appeared in West Sussex sometime before 1903, as it is given for that county in the First Supplement of *Topographical Botany*. From the Second Supplement of the same work it appears to have been recorded from Dorset (1905), North Somerset (1918), and West Gloucestershire (1923). In recent years the plant has increased in the most remarkable manner, and, having practically submerged its two presumed parents, it has occupied the whole of the mud-flats of the creeks, estuaries and harbours of South Hampshire and the Isle of Wight. It has extended eastwards to Sussex and Kent, westwards to Dorset, and north-westwards to the estuaries of the Severn and Mersey.

Townsend (*Flora*, 2nd Edition, p. 481) was strongly of the opinion that the plant was a species: the discoverers of the plant originally

described it as a variety of *S. stricta*, but subsequently (*Journal of Botany*, 1882) they described it as a species. In more recent years the theory has been gaining ground that this plant was of hybrid origin and this theory has been greatly reinforced recently by cytological study, that is by investigation of the structure and growth of the cells of tissue of which the plant is composed. It will be generally known that hybrids are usually variable: this arises from the imperfect fusion in varying degrees of the gametes of the two parents, so that the offspring vary more or less in their resemblance to one or other parent. Very occasionally such complete fusion takes place that the offspring contains the whole of the elements of both parents: this process is known as "allopolyploidy." Normally hybrid offspring are sterile as well as variable: the offspring resulting from allopolyploidy, known as polyploid hybrids, are exceptionally vigorous, uniform, and fertile; they breed true and behave in every way exactly as true species. A well-known example of a polyploid hybrid is the garden hybrid *Primula Kewensis*. It has been found that the number of chromosomes in the growing cell of *S. Townsendii* is 126, which number is the sum of the chromosome-numbers of *S. alterniflora* - 70 and *S. stricta* - 56. *S. Townsendii* therefore fulfils all the requirements of a polyploid hybrid and this theory of its origin explains how it has obtained the vigour which has enabled it to spread and supplant its parents. Incidentally it may be said that both theories of the origin of the plant were in a sense correct: it is at once a hybrid and a species.

This plant has also appeared in N. France and is believed there to have been of similar spontaneous origin. Owing to the rapidity with which the plant establishes itself on bare mud and forms islands by holding up silt, it has been used extensively in East Anglia and Holland for experiments in the reclamation of land.

The principal characteristics, by which the three species may be distinguished, are as follows:—

#### HABIT.

- stricta*. Short and very rigid, 1-2 ft.  
*alterniflora*. Taller and much more graceful, up to 3 ft. or more.  
*Townsendii*. Rigid, 1-4 ft.

#### SPIKES.

- stricta*. 2-3 pressed closely together.  
*alterniflora*. 6-8 loosely pressed together.  
*Townsendii*. 4-9 rather spreading.

#### RACHIS.

- (i.e., the central stem of the spike from which the spikelets branch off.)  
*stricta*. Scarcely extending beyond the last spikelet.  
*alterniflora*. Produced beyond the spikelets and flexuose.  
*Townsendii*. Produced beyond the spikelets and flexuose.

## OUTER GLUMES.

- stricta*. Hairy.  
*alterniflora*. Glabrous except on the mid-rib.  
*Townsendii*. Slightly downy.

## LEAVES.

- stricta*. Jointed to the sheaths, broadest below the middle, but narrowing to the actual base, breaking off very easily at the joint with the sheath.  
*alterniflora*. Not jointed to the sheaths but continuous, broadest at the base and very long, tapering and slender, equalling and often overtopping the flowering spikes; the leaves are erect and parallel to the stems.  
*Townsendii*. Jointed to the sheaths but not breaking off as in *stricta*, broadest at the base where prominent auricles or shoulders project on either side beyond the outline of the stem; the leaves stand away at a considerable angle from the stem.

*Note*.—The characteristics of the leaves alone are quite sufficient for the identification of the three species, which can be very simply told apart by attention to the characters emphasised above.

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Since the paper on *Spartina* has been printed (Proc. Hampshire Field Club and Archaeological Society, vol. xii, part 3) it has come to my knowledge that *S. stricta* does still exist in at least one station on the mainland of Hampshire. By the kindness of Mr N. D. Simpson, of Bournemouth, I have been able to see a good colony of this species on Hayling Island.

September 17th, 1934.

## BOTANISING IN MONTENEGRO.

By C. D. CHASE and PAULE CERNJAVSKI (University of Belgrade).

The following notes are the outcome of a Leplay tour to Montenegro in August 1934. A week was spent at the small mountain village of Zabljak at the foot of Durmitor (8294 feet). Until July 1934 the village was only accessible from Savnik by a bridle path and our party was the first to arrive by the new motor road from that place. Another road from Zabljak northwards across the deep gorge of the Tara is in course of construction; this will mean, when completed, direct communication with Belgrade. Zabljak will no doubt become a favourite resort and will often be visited by English tourists. Botanists among them will perhaps find the following list of interest.

As Zabljak lies at an altitude of some 4700 feet, it is itself in the montane or sub-alpine zone. Close to the village, above the pastures, are extensive *Picea* forests.

Durmitor is a self-contained massif with several distinct summits, the paths to which are not well defined. Although the flora of Durmitor is not so rich as that of the mountains of the Montenegrin-Albanian frontier district, it includes many rare plants. The formation is limestone.

To mention a few of the outstanding plants:—*Senecio rupestris* W.K. is very common everywhere, even to high up in the alpine zone, where some slopes are yellow with it. *Linum capitatum* Kit. and *Gentiana crispata* Vis. are also very common in the pastures but do not extend so far upwards.

A late-flowering plant is *Colchicum Visianii* Parl., very like *C. autumnale* but with a longer tube to the perigonium and shorter anthers. Of the alpine plants it will be seen that many are Balkan varieties of widely distributed species. Amongst the notable alpins which are also Balkan endemics are:—*Euphorbia capitulata* Rehb., *Arenaria Panicii* Deg. et Bald., *Drypis Linnaeana* M. et W., *Sempervivum Kosaninii* Praeger, *Saxifraga Blavii* Eng., *S. Prenja* Beck., *Oxytropis dinarica* Murb., *Anthyllis pulchella* Vis., *Stachys Jacquini*, var. *lanata* Schiller, *Gnaphalium Pichleri* Murb., *Achillea abrotanoides* Vis., *Senecio Visianianus* Papaf., *Hieracium gymnocephalum* Gris., *Avena Blavii* Asch. et Jka.

We were particularly glad to come across *Sempervivum Kosaninii* Praeger, a new species recently named by Dr Praeger from a single plant in the botanic garden at Belgrade. We saw it again in the mountains above Pec.

The list follows Hayek's *Prodromus Florae Balcanicae*.

Plants seen on Durmitor, August 1934:—

- Botrychium Lunaria* L.  
*Asplenium trichomanes* L.  
*A. adiantum-nigrum* L.  
*A. fissum* Kit.  
*A. ruta-muraria* L.  
*Ceterach officinarum* DC.  
*Nephrodium filix-mas* L.  
*N. rigidum* Hoffm.  
*N. spinulosum* Müll.  
*Polystichum Lonchitis* L.  
*P. lobatum* Huds.  
*Cystopteris fragilis* L.  
*C. regia* L.  
*Juniperus nana* Willd.  
*J. communis* L.  
*Abies alba* Mill.  
*Picea vulgaris* Lk.  
*Pinus silvestris* L.  
*P. Mughus* Scop.  
*Salix retusa* L.  
*S. caprea* L.  
*Thesium alpinum* L.  
*Rumex scutatus* L.  
*R. acetosella* L.  
*Oxyria digyna* L.  
*Polygonum viviparum* L.  
*Euphorbia capitulata* Rehb.  
*E. myrsinites* L.  
*E. amygdaloides* L.  
*Scleranthus uncinatus* Schur.  
*Minuartia bosniaca* Beck.  
*M. verna* (L.), ssp. *montana* Fzl.  
*M. graminifolia* (Ard.), var. *clandestina* Port.  
*Arenaria rotundifolia* M.B., var. *Panctici* Deg. et Bald.  
*Moehringia muscosa* L.  
*Sagina saginoides* (L.), var. *macrocarpa* (Rehb.).  
*S. procumbens* L.  
*Cerastium lanigerum* Clem., var. *Dolineri* Beck.  
*C. lanigerum* Clem., var. *albanicum* (Bald.).  
*C. lanigerum* Clem., var. *durmitoreum* Rohl.  
*C. caespitosum* Gilib.  
*Dianthus cruentus* Gris.  
*D. deltoides* L.  
*D. tergestinus* A. Kern., var. *brevicalyx* (Beck.).  
*Stellaria nemorum* L.  
*Drypis spinosa* L., var. *Linnaeana* M. et W.  
*Silene Antelopum* Freyn.  
*S. saxifraga* L.  
*S. acaulis* L., var. *balcanica* H. et V.  
*S. Sendtneri* Boiss.  
*Heliosperma albanica* K. Maly.  
*Melandryum album* (Mill.), var. *thesalum* (Hausk.).  
*Anemone baldensis* L.  
*Thalictrum minus* L., var. *roridum* (Wallr.).  
*T. flavum* L.  
*Ranunculus Thora* L.  
*R. oreophilus* M.B., var. *concinatus* (Schott.).  
*R. carinthiacus* Hoppe.  
*R. sardous* Cr.  
*Corydalis ochroleuca* Koch.  
*Erysimum crepidifolium* Rehb.  
*Cardamine glauca* Spreng.  
*Arabis crispata* Willd.  
*Alyssum montanum* L. (sens. lat.).  
*A. murale* W.K.  
*Draba aizoides* L.  
*D. aizoon* Wahl.  
*Iberis sempervirens* L.  
*Helianthemum grandiflorum* Lam.  
*H. alpestre* Jacq.  
*Viola biflora* L.  
*V. latisejala* Beck.  
*V. macedonica* B. et H.  
*Hypericum alpinum* W.K.  
*H. immaculatum* (Murb.).  
*Linum capitatum* Kit.  
*L. nervosum* W.K.  
*L. narbonense* L.  
*Oxalis acetosella* L.  
*Geranium silvaticum* L.  
*G. macrorrhizum* L.  
*G. Robertianum* L.  
*Polygala croatica* Chod.  
*Acer Heldreichii* Orph., ssp. *Visianii* (Nym.).  
*Rhamnus fallax* Boiss.  
*Sempervivum Heufelii* Schott.  
*S. Kosaninii* Praeger.  
*Sedum magellense* Ten.  
*S. album* L.  
*S. ochroleucum* Chaix.  
*S. atratum* L.  
*S. dasyphyllum* L.  
*S. glaucum* W.K.  
*Saxifraga rotundifolia* L.  
*S. adscendens* L., var. *Blavii* Eng.  
*S. moschata* Wulf.  
*S. Prenja* Beck.  
*S. brevifolia* Engl.  
*S. oppositifolia* L., var. *meridionalis* (Terr.).  
*Ribes alpinum* L.  
*Rubus idaeus* L.  
*Potentilla clusiana* Jacq.  
*P. Crantzii* (Cr.).  
*P. baldensis* A. Kern.  
*P. Tormentilla* L.

- Alchemilla Hoppeana* (Rchb.) var. *velebittica* Deg.  
*Geum molle* Vis. et P.  
*Rosa alpina* L.  
*Dryas octopetala* L.  
*Sorbus aucuparia* L.  
*S. umbellata* Desf., var. *cretica* Linde.  
*Cotoneaster tomentosa* Ait.  
*Oxytropis campestris*, var. *dinarica* Murb.  
*Vicia cracca* L.  
*Ononis hircina* Jacq.  
*Trifolium montanum* L.  
*T. alpestre* L.  
*T. flexuosum* Jacq.  
*T. noricum* Wulf.  
*Lotus corniculatus* L.  
*Anthyllis Jacquinii* A. Kern.  
*A. pulchella* Vis.  
*A. intercedens* Beck.  
*Hippocrepis comosa* L.  
*Onobrychis scardica* Hal.  
*Genista tinctoria* L.  
*Eptlobium anagallidifolium* Lam.  
*Bupleurum Sibthorpiatum* Sm.  
*Paniccia serbica* Vis.  
*Athamantia Haynaldii* Borb.  
*Peucedanum oligophyllum* (Gris.).  
*Heracleum Pollinianum* Bertol.  
*Laserpittium Siler* L.  
*L. latifolium* L.  
*Pleurospermum austriacum* L.  
*Chaerophyllum cicutaria* Vill.  
*Ch. aureum* L.  
*Ch. aromaticum* L.  
*Armeria canescens* Host.  
*Arctostaphylos Uva ursi* L.  
*A. alpina* L.  
*Vaccinium Myrtillos* L.  
*V. Vitis Idaea* L.  
*Primula Columnae* (Ten.).  
*Androsace villosa* L.  
*Myosotis alpestris* (Schm.), var. *firma* Nellr., var. *suaveolens* (W.K.).  
*Onosma stellulatum* W.K.  
*Cerintho minor* L.  
*Verbascum Bornmülleri* Vel.  
*Scrophularia laciniata* (W.K.), var. *alpina* Heuff.  
*S. Scopoli* Hoppe.  
*Digitalis ambigua* Murr.  
*Veronica balcanica* Vel.  
*V. officinalis* L.  
*V. Orsiniana* Ten.  
*V. urticaefolia* Jacq.  
*V. aphylla* L.  
*Euphrasia salisburgensis* Funck.  
*E. hirtella* Jord.  
*Melampyrum bosniacum* Ronn.  
*M. vulgatum* Pers.
- Pedicularis verticillata* L.  
*Alectorolophus minor* (Ehrh.) W. Gr.  
*A. Rohlenae* Stern.  
*Orobanche gracilis* Sm.  
*O. caryophyllacea* Sm.  
*Ajuga genevensis* L.  
*Teucrium montanum* L.  
*Prunella laciniata* L.  
*Lamium inflatum* Heuff.  
*Stachys Reinerti* Heldr.  
*S. Jacquinii* Fritsch, var. *lanata* Schiller.  
*S. subcrenata* Vis.  
*S. Karstiana* (Borb.) Hay.  
*Micromeria croatica* Pers.  
*Calamintha patavina* Host.  
*C. granatensis* B. et R.  
*Thymus balcanus* Borb.  
*T. moesiacus* Vel.  
*Globularia bellidifolia* Ten.  
*Plantago media* L., var. *pyndica* Hauss.  
*P. argentea* Chaix.  
*P. montana* Huds.  
*Gentiana lutea* L., var. *symphyandra* Murb.  
*G. cruciata* L.  
*G. asclepiadea* L.  
*G. verna* L., var. *tergestina* (Beck.).  
*G. utriculosa* L.  
*G. crispata* Vis.  
*Asperula longiflora* W.K.  
*A. longiflora* W.K., var. *condensata* Heldr.  
*A. odorata* L.  
*Galium anisophyllum* Vill.  
*Lonicera alpigena* L.  
*L. coerulea* L.  
*Valeriana montana* L.  
*Knautia dinarica* (Murb.).  
*Scabiosa leucophylla* Borb.  
*S. columbaria* L.  
*S. Portae* A. Kern.  
*S. silenifolia* W.K.  
*Campanula pseudolanceolata* Pant.  
*C. patula* L.  
*C. glomerata* L.  
*Phyteuma spicatum* L., ssp. *coerulescens* Bogenh.  
*P. orbiculare* L., var. *flexuosum* R. Schultz.  
*Edraianthus graminifolius* L., var. *subalpinus* Wettst.  
*E. graminifolius* L., var. *Baldacii* Janch.  
*Solidago alpestris* W.K., var. *vestita* Hal.  
*Aster Bellidiastrum* L.  
*Erigeron polymorphus* Scop.  
*E. acer* L.  
*Gnaphalium Pichleri* Murb.

- G. silvaticum* L.  
*Anthemis montana* L.  
*Achillea abrotanoides* Vis.  
*A. distans* W.K.  
*A. argentea* Vis.  
*Chrysanthemum tenuifolium* Kit  
*Ch. leucanthemum* L.  
*Homogyne alpina* L.  
*Adenostyles Alliariae* Gon.  
*Doronicum Columnae* Ten.  
*Senecio Vistianianus* Papaf.  
*S. Fuchsii* Gmel.  
*S. rupestris* W.K.  
*Jurinea pluriceps* C. Koch.  
*Carlina acaulis* L., ssp. *alpina* Jacq.  
*Carduus candicans* W.K.  
*Cirsium Velenovskyi* Vand.  
*C. acule* All.  
*Centaurea cana* S.S.  
*Hypochaeris macedonica* Form.  
*Leontodon hispidus* L., var. *glabratus* (Koch).  
*L. crispus* Vill.  
*Scorzonera rosea* W.K.  
*Taraxacum erectum* Schrk.  
*Picris hieracioides* L.  
*Mulgedium alpinum* L.  
*Crepis conyzifolia* Gon., ssp. *monte-negrina* Rohl.  
*C. aurea* L.  
*C. biennis* L.
- Hieractium bifidum* Kit.  
*H. villosum* L.  
*H. glabratum* Hoppe.  
*H. gymmocephalum* Gris.  
*H. sabinum* Seb. et M.  
*Polygonatum officinale* All.  
*Allium carinatum* L.  
*Veratrum album* L.  
*Colchicum Vistanii* Parl.  
*Luzula silvatica* Huds.  
*Carex divulsa* Good.  
*C. gracilis* Curt.  
*C. nigra* All.  
*C. laevis* Kit.  
*Phleum Michelti* All.  
*Bromus transsylvanicus* Steud.  
*Sesleria tenuifolia* Schrad.  
*Agrostis canina* L.  
*Cynosurus cristatus* L.  
*C. echinatus* L.  
*Poa pumila* Host.  
*P. nemoralis* L.  
*P. alpina* L.  
*Festuca sulcata* Hack.  
*F. heterophylla* Lam.  
*Koeleria splendens* Presl.  
*Deschampsia flexuosa* Trin.  
*Avena Blavii* Asch. et Jka.  
*Calamagrostis villosa* Chaix.  
*Helleborine atropurpurea* Rafin.

## RECENT ROSA ADDITIONS TO THE FLORA OF SURREY.

EDMUND B. BISHOP.

Since the publication of Col. Wolley-Dod's *Rosa* Addendum to the *Flora of Surrey* (Salmon), many additional records have come under my personal notice. Those deemed worthy of mention are set out, with amplifications, in the following pages. In most cases, especially of those pre-1933, the specimens have been named by Col. Wolley-Dod, often (as is inevitable in *Rosa*) with reservations more or less important. Only very rarely has any case of serious doubt been included in these notes, and then always with its frank admission. When a specimen is stated to fit or to approach one of Keller's numerous varieties or formae, such statement is made on my own responsibility (unless otherwise made clear), and must not necessarily be considered as implying the approval of Col. Wolley-Dod. The arrangement, nomenclature, etc., of these notes is strictly in accordance with that of *A Revision of the British Roses* (Wolley-Dod).

With very few exceptions, which are duly acknowledged, all the specimens were collected by my sister (Mrs C. L. Wilde) or by myself. Those due to her are distinguished by a following *W.*, their names having been confirmed by me. The remainder are of my own gathering.

In these notes I have given selected records for Districts (or Sub-Districts) *not represented in Wolley-Dod's Addendum by that particular species, variety or forma*. Only in one or two instances of very rare Roses have I added new localities to a District in which that particular Rose has been already recorded by Col. Wolley-Dod. The Districts and Sub-Districts are those adopted by Salmon in his "Flora."

It will be seen that the Sub-Districts most worked by my sister and myself are III (a) and X (b), the most convenient from our dwelling-place.

The N.C.R. mark (\*) means, *in these notes*, that the Rose in question was not definitely recorded in Col. Wolley-Dod's Addendum aforesaid.

"Keller" and "Synopsis," of frequent occurrence in these notes, are convenient abbreviations for Dr Robert Keller's monumental work, *Synopsis Rosarum Spontanearum Europae Mediae*.

Only in the cases where such is explicitly stated have specimens been submitted to Dr Keller and named by him.

## R. ARVENSIS Huds.

Var. *vulgaris* Ser.

f. *major* Coste ..... X(b). Near Grayswood.

f. *baldensis* (Kern.) J. B. von Keller ..... X(b). Hambledon Hurst.

- \**f. hispida* Lej. & Court. .... III (a). Elstead Common, *W.*  
 III (b). Foxbury Copse, Hascombe.  
 IV. Between Martyr's Green and Effingham Junction, *W.* (With ovoid fruit.)  
 X (b). Chiddingfold. Grayswood. Hambledon Hurst.
- Var. *ovata* (Lej.) Desv. .... III (a). Stony Hill, Puttenham, *W.*
- Var. *biserrata* Crép. .... III (a). Munstead. Lydling.  
 X (b). Chiddingfold. Dunsfold Common. Grayswood (two interesting forms which do not fit any of Keller's formae).
- Var. *laevipes* Gremli ..... III (a). Stony Hill, Puttenham, *W.*  
 X (b). Chiddingfold (excellent). High Loxley, Dunsfold, *W.*
- R. *STYLOSA* Desv.
- Var. *Desvauxiana* Ser. .... III (a). Littleton Sandpit, *W.* (Provisionally, as a small *f.* Very likely a hybrid.)  
 X (b). Hambledon Hurst, Chiddingfold, *W.* (Another small *f.*, also a possible hybrid.)
- Var. *systyla* (Bast.) Baker.
- f. lanceolata* Lindl. .... III (a). Stony Hill, Puttenham, *W.*  
 III (b). Hascombe. (With untypically smoothish peduncles.)  
 VI. Mickleham Downs. (Form with small leaflets; untypical in certain respects.)  
 X (b). Dunsfold, *W.* Chiddingfold. (Nearest *lanceolata*, but with short styles, suggestive of *f. brachystyla* R. Kell.)
- f. leucochroa* (Desv.) Ser. .... X (b). Chiddingfold (locally common). Hambledon Hurst.
- \*Var. *cristata* W.-Dod. .... III (a). Seale, *W.*  
 X (b). Dunsfold Common.

[This variety was not described and published by Col. Wolley-Dod until after his Addendum to *Flora of Surrey* had gone to press.]

[R. *STYLOSA* hybrids.

Arising out of a number of submissions at various times, through Col. Wolley-Dod to Dr Robert Keller, determinations in the cases under-mentioned—necessarily ± cautious—have been received. Neither of those set out below has been adequately described and published, but it is hoped that opportunity may arise at an early date.

- R. *stylosa* Desv. × R. *canina* L. .... II. Near Dolley's Farm, Horsell. (*Herb. E.B.B.* Ref. No. R.6A.)  
 X (b). Chiddingfold, *W.* (*Herb. E.B.B.* Ref. No. R.5A.)
- R. *stylosa* Desv. × R. *dumetorum* Thuill. X (b). Chiddingfold. (*Herb. E.B.B.* Ref. No. R.10A.) Dunsfold Common. (*Herb. E.B.B.* Ref. No. R.11A.)]
- R. *SPINOSISSIMA* L. (Agg.) ..... III (a). Witley Common (edge of, on boundary bank). *W. Watson.* (No fruit, probably garden escape.)

- Var. *typica* W.-Dod.  
*f. rosea* Koch ..... III(a). Munstead, *F. A. Marsh.* (On rough bushy, rose-strewn, steep hillside, well away from houses or gardens.)

## R. CANINA L.

- Var. *lutetiana* (Lem.) Baker.  
*f. lasiostylis* Borb. .... III(a). Witley Common, *W.*  
 III(b). Hascombe, *W.*  
 X(b). Chiddingfold, *W.* (With spreading to suberect sepals.)
- Var. *sphaerica* (Gren.) Dum. .... III(b). Hascombe.
- Var. *flexibilis* (Deségl.) Rouy ..... III(b). Hascombe.  
 X(b). Dunsfold. Grayswood, *W.*
- Var. *senticosa* (Ach.) Baker ..... X(b). Dunsfold Common.  
*f. oxyphylla* (Rip.) W.-Dod ..... X(b). Dunsfold Common.  
*f. mucronulata* (Deségl.) W.-Dod ..... III(a). Munstead. Peasmarsh.
- Var. *spuria* (Pug.) W.-Dod.  
*f. syntrichostyla* (Rip.) Rouy ... III(a). Munstead. Hurtmore.  
 III(b). Hascombe.  
 X(b). Grayswood.
- Var. *globularis* (Franch.) Dum. .... III(b). Hascombe.  
 X(b). Chiddingfold, *W.*
- Var. *ramosissima* Rau ..... X(b). Grayswood, *W.*
- Var. *dumalis* (Bechst.) Dum. .... III(a). Compton. Lydling. Elstead, *W.*  
 X(b). Dunsfold.  
*f. viridicata* (Pug.) Rouy ..... III(a). Munstead. Lydling. Witley Common, *W.*  
 III(b). Hascombe, *W.*  
*f. cladoleta* (Rip.) Rouy ..... III(a). Farncombe. Elstead. Elstead Common (a form near *f. acrophylla* R. Kell.).
- Var. *stenocarpa* (Deségl.) Rouy ..... III(a). Compton. Witley Common. Elstead.  
 III(b). Hascombe.  
 X(b). Grayswood.
- Var. *biserrata* (Mér.) Baker ..... III(a). Elstead Common. Loseley, *W.*  
 X(b). Chiddingfold, *W.*  
*f. sphaeroidea* (Rip.) W.-Dod ... X(b). Chiddingfold, *W.*  
*f. eriostyla* (Rip.) W.-Dod ..... III(a). Munstead. Littleton.  
 III(b). Snowdenham, near Bramley.  
 X(b). Dunsfold Common ("nearest *eriostyla*," *W.-D.*).
- Var. *fraxinoides* H. Br. .... III(a). Elstead Common.  
 X(b). Dunsfold.  
*f. recognita* Rouy ..... III(a). Witley Common (with densely hispid styles), *W.*  
 III(b). Hascombe, *W.*
- Var. *sylvularum* (Rip.) Rouy ..... III(b). Hascombe.  
 X(b). Grayswood.  
*f. adscita* (Deségl.) Rouy ..... III(a). Hurtmore ("I think nearest *adscita*, but it may be *firmula* Godet," *W.-D.*). Munstead. Thursley Common.
- Var. *andegavensts* (Bast.) Desp. .... III(a). Stony Hill, Puttenham (somewhat sub-biserrate, may perhaps be a hispid-styled form of var. *hirtella* Chr.).

- III(b). Hascombe. (Not infrequently, in this locality and elsewhere, a form occurs with weakly glandular peduncles, subglobose fruit, and smallish leaflets.)
- f. *agraria* (Rip.) W.-Dod ..... X (b). Chiddingfold, W.  
X (b). Grayswood. (Form with very small leaflets.)
- Var. *verticillacantha* (Mér.) Baker III(a). Shackleford (perhaps a f. of var. *adenocalyx* R. Kell.). Thursley Common, W. (Weakly biserrate, fits var. *hirtella* Chr., seemingly nearest f. *pontiacensis* R. Kell.) Near Seale, W.
- f. *clivicola* Rouy ..... II. Durnford Bridge, near Woking, W. *Biddiscombe*.  
III(a). Thursley Common, W. (Some peduncles smooth; fits var. *adenocalyx* R. Kell.) Witley Common. (A fairly good fit for var. *adenocalyx* R. Kell., f. *mandellensis* R. K.) Witley Common. (Three bushes, with leaflets weakly biserrate, seem to come under var. *hirtella* Chr.)
- VI. Cold Norton, near Hatchford, W. (Two adjacent bushes fit var. *verticillacantha* (Mér.) Baker, f. *fallacina* R. Kell.)
- X (b). Grayswood, W.
- Var. *Pouzini* (Tratt.) W.-Dod.  
f. *anglica* Dingl. .... II. Near Dolly's Farm, Horsell, W. *Biddiscombe*, 1932. (But with hispid styles.) (*Herb. E.B.B.* Ref. No. R.1043.)  
VII. Ham Common, W., 3rd August 1927. Also with hispid styles. Ref. No. R.583.
- Var. *Blondaeana* (Rip.) Rouy ..... III(a). Thursley Common, W. (An untypical form.)  
X (b). Chiddingfold, W.
- f. *vinacea* (Baker) Rouy ..... III(a). Witley Common, W. Chiddingfold, W.
- f. *Beatricis* (Burn. et Greml.) Rouy ..... III(a). Witley Common.
- Var. *latebrosa* (Déségl.) N. E. Br. ... X (b). (On p. 671, *Fl. of Surrey*, "Bunningfold, near Chiddingfold" should read "Burningfold, near Dunsfold.") Also found in a few places near Chiddingfold, W.

## R. DUMETORUM Thull. (Aggregate).

Several specimens cannot further be segregated, either from Keller or from Wolley-Dod. But there is one of special interest—from X (b), Hambledon Hurst, W.—which (from Keller) seems, in most respects, very near var. *hirtifolia* Braun, f. *percliata* Braun, but has very long peduncles, and long spreading-erect sepals. (*Herb. E.B.B.* Ref. No. R.1087.)

- Var. *typica* W.-Dod ..... X (b). Dunsfold.  
 f. *urbica* (Lem.) W.-Dod ..... III (a). Hurtmore. Peasmarsh. Lydning  
 and elsewhere. Witley Com-  
 mon, W. (By Synopsis a very  
 good fit for var. *platyphylla*  
 (Rau), f. *acanthina* (Déségl. et  
 Ozan.) except that fruit is  
 broadly ovoid, not globose.)  
 (*Herb. E.B.B.* Ref. No. R.1576.)  
 III (b). Shalford Common. Hascombe.  
 f. *semitglabra* (Rip.) W.-Dod ... III (h). Hascombe.  
 X (b). Furnace Bridge, Dunsfold. (Per-  
 haps *R. vulgaris* Gams, var.  
*puberula* R. Kell., f. *subcune-*  
*ata* Schwertschl.)  
 Var. *ramealis* (Pug.) W.-Dod ..... III (a). Peasmarsh, W.  
 Var. *Gabriellis* (F. Gér.) R. Kell. .... II. Near Horsell Common, W. (Very  
 near var. *platyphylla* (Rau), f.  
*myrtillina* Braun.)  
 VI. Near Hatchford, W.
- [Our West Surrey forms are often ± intermediate between *Gabriellis* and *calo-*  
*phylla*, and very difficult to allocate satisfactorily.]
- Var. *calophylla* Rouy ..... III (a). Witley Common. Elstead. Comp-  
 ton.  
 VI. Hatchford, W.  
 X (b). Grayswood, W. (With untypical-  
 ly ovoid fruit. Wolley-Dod  
 says that it seems to fit f. *saxi-*  
*cola* Braun, in Keller.)  
 Var. *platyphylla* (Rau) W.-Dod .... III (a). Hurtmore. Elstead, W. Witley  
 Common, W. (With glabrous  
 styles and rising sepals. By  
 Synopsis it seems a fair fit for  
 var. *subglabra* (Borb.), f. *un-*  
*cinelloides* (Pug.) Braun.)  
 IV. Broad Street Common, W.  
 X (b). Dunsfold Common (as *jactata*).  
 Grayswood.  
 Var. *sphaerocarpa* (Pug.) W.-Dod ... III (a). Witley Common, W. Elstead, W.  
 III (b). Hascombe (towards *spinetorum*).  
 X (b). Dunsfold.  
 f. *spinetorum* (Déségl. et Ozan.)  
 W.-Dod ..... III (a). Elstead.  
 VI. Hatchford (fruit not quite typi-  
 cal), W. (By Synopsis, a fairly  
 good fit for var. *hirtifolia*  
 Braun, f. *Richteri* Braun.)  
 X (b). Chiddingfold.  
 Var. *hemitricha* (Rip.) W.-Dod ..... III (a). Seale (near Church). Williams  
 Copse, Seale (a very distinct  
 form, which seems to fit noth-  
 ing in Keller). Near Perry  
 Bridge, Farncombe (another  
 distinct form, which seems to  
 lack a name), W.  
 X (b). South Park (Witley Parish).  
 Dunsfold (with rising sepals).  
 Var. *erecta* W.-Dod. .... III (a). Ockley Common, Elstead.

- Var. *Desegliset* (Bor.) Chr. .... II. Near Scotcher's Farm, Horsell, W. *Biddiscombe*.  
 III(a). Loseley Meadows, W. (N.C.R. in 1928).
- \*f. *Rohreri* R. Kell. .... III(a). Witley Common, several bushes.
- [Differs from var. *Desegliset* chiefly in its large leaflets, large elongate fruit, glabrous styles, and fiat disc. New to Britain. First found by me, September 1931.]
- Var. *incerta* (Déségl.) W.-Dod.  
 \*f. *laevistyla* W.-Dod ..... II. Near Dolley's Farm, Horsell.  
 \*f. *subglabra* W.-Dod ..... III(a). Hog's Back, Compton.
- Var. *seticaulis* W.-Dod ..... VI. Hatchford, W. (Another bush of this extremely rare Rose, found about  $\frac{1}{2}$  mile from the original bush of Col. Wolley-Dod. Mrs Wilde's bush differs from the original in shape of fruit, hispidity of styles, etc. See *B.E.C. Report*, 1933, pp. 525-6.)
- R. AFZELIANA Fr. (R. GLAUCA Vill.)  
 Var. *subcanina* Chr. .... III(a). Littleton, near Guildford.  
 III(b). Hascombe. (Both with some doubt; possibly forms of *R. canina*, var. *globularis*.)
- Var. *denticulata* R. Kell.  
 \*f. *subcomplicata* Hayek. .... X(b). Chiddingfold, W.
- R. OBTUSIFOLIA Desv.  
 Var. *typica* W.-Dod. .... III(a). Quite common around Godalming.  
 IX. Limpsfield Common.  
 X(b). Dunsfold.
- Var. *tomentella* (Lem.) Baker ..... III(a). Peasmarsh. Loseley. Elstead. Stony Hill, Puttenham, W.  
 III(b). Malquoits Wood, Ewhurst.  
 IV. Broad Street Common, W.  
 VI. Great Bookham Common. Banks Common. Hatchford, W.
- f. *canescens* (Baker) W.-Dod .... III(a). Peasmarsh. Royal Common, Elstead (as *Carionii*).
- Var. *deceptiens* Dum. .... II. Near Dolley's Farm, Horsell, W. *Biddiscombe*.  
 III(a). Loseley, W.
- f. *glandulosa* Crép. .... II. Near Dolley's Farm, Horsell, W. *Biddiscombe*.
- Var. *Rothschildii* (Druce) W.-Dod X(b). Chiddingfold, W. (A very weak form.)
- \*x *R. surreyana* W.-Dod.  
 (R. *obtusifolia*, var. *Borreri* x R.  
*canina*) ..... X(b). Hurst Hill, Dunsfold, W. *Biddiscombe*, in 1929. Chiddingfold, E.B.B., in 1930.

These are the Roses recorded (under var. *Borreri*) for the stations mentioned in *Fl. of Surrey*, p. 674. Fully described and named in *A Revision of the British Roses* (Col. A. H. Wolley-Dod), p. 103.

## R. TOMENTOSA Sm.

- Var. *typica* W.-Dod ..... III(a). Compton Heath. Bummoor Copse, Compton (towards R. *Sherardii*).

- f. glandulosa* W.-Dod ..... III(a). Compton Heath.  
IX. At foot of downs above Oxted,  
R. W. Robbins.
- Var. *pseudo-cuspidata* (Crép.) Rouy ..... III(a). Milford Heath, Miss M. R. Morley.  
IX. Itchingwood Common, R. W. Robbins.
- R. RUBIGINOSA L.
- Var. *typica* W.-Dod ..... III(a). Witley Common, W. (A form new to me, making a faint approach to var. *jenensis*, but certainly not that var. It has smooth fruit, weakly glandular peduncles, and subglabrous or very weakly hispid styles. Near var. *finitima* Dingl. Ref. No. R.1593, *Herb. E.B.B.*)
- \**f. Corstorphinae* Druce ..... III(a). Witley Common, W.
- Var. *echinocarpa* (Rip.) Gren. .... III(a). Witley Common, W. (Rather a weak form, but with many acicles on stems, and a few on flowering branches, peduncles and fruit; also with suprafoliar glands on every leaflet examined).
- R. MICRANTHA Sm.
- Var. *typica* Chr. .... III(a). Munstead. Thursley Common, W. Stony Hill, Puttenham (approaching *operta*).  
III(b). Albury Downs. Hascombe.  
X(b). Chiddingfold; also from Chiddingfold, a strong-growing form with large leaflets near *f. macrophylla* Coste. Brook Street, Witley. Grayswood, W.
- Var. *operta* (Pug.) W.-Dod ..... III(a). Stony Hill, Puttenham, W.  
X(b). Dunsfold Common, W.
- Var. *septicola* (Déségl.) Gren. .... III(a). Near sandpit, Littleton.  
X(b). Chiddingfold, W. (A robust form, with some leaflets larger and broader than in type, thus making some approach towards *f. subpermixta* Rouy.)
- \*Var. *Burgessi* Bishop ..... X(b). Near Haslemere. (For full description, etc., see *B.E.C. Rep.*, 1933, pp. 468 to 471. It is quite distinct from any other British var. or *f.* of *R. micrantha*).
- R. AGRESTIS Savi.
- Var. *typica* R. Kell.
- f. arvatica* (Pug.) Rouy ..... III(b). Hascombe (several bushes).

[Var. *belnensis* Rouy. Following upon the remarks of Col. Wolley-Dod in *Flora of Surrey*, p. 679, concerning records of this var. from Hammer Ponds, Thursley, my experience leads me to share his doubts. Both Mrs Wilde and I have searched carefully, again and again, round these ponds, and upon the adjacent Common, but have found nothing which will pass as *belnensis*. We have found four bushes of *R. agrestis*, differing considerably in some features, which—at least for the present—can only be put under *f. arvatica*.]

## ROSA NOTES FOR 1934.

EDMUND B. BISHOP.

Since the completion of the foregoing communication on "Recent Rosa Additions to the Flora of Surrey," lack of spare time, due chiefly to continued illness at home, has compelled me to restrict notes concerning other Counties solely to N.C.Rs. This regrettable curtailment means that I am bound to hold over, for the present, comments on some interesting and puzzling Roses. By "N.C.R." must be understood (as in my previous notes) new to the records kept by Col. Wolley-Dod, the nomenclature of whose "Revision" is followed as usual. Where the \* is added it signifies N.C.R. to *Comital Flora* list also.

These notes arise out of personal submissions to me by the members mentioned, as well as from specimens collected by my sister, Mrs C. L. Wilde, and me during last season.

Collected by Mrs E. M. MACALISTER HALL, of Killean:—

- 194/7h. R. CANINA L., var. DUMALIS (Bechst.) Dum., f. VIRIDICATA (Pug.) Rouy.  
 194/7b. R. CANINA L., var. DUMALIS (Bechst.) Dum., f. CLADOLEIA (Rip.) W.-Dod.  
 194/10c. R. DUMETORUM Thuill., var. TYPICA W.-Dod, f. SEMIGLABRA (Rip.) W.-Dod.  
 The above three are from Weston, near Hitchin, Herts, v.-c. 20.  
 194/6a. R. CANINA L., var. LUTETIANA (Lem.) Baker, a small form. Wicken Fen, Cambs, v.-c. 29.  
 \*194/12e(2). R. AFZELIANA Fr., var. GLAUCOPHYLLA (Winch) W.-Dod. St Cyrus, Kincardine, v.-c. 91.  
 194/21c. R. VILLOSA L., var. MOLLIS Sm., f. GLANDULOSA W.-Dod. Between St Cyrus and Montrose, Kincardine, v.-c. 91.  
 194/12k. R. AFZELIANA Fr., var. DENTICULATA R. Kell., f. SUBCOMPLICATA Hayek. Crinan, Argyll, v.-c. 98.  
 194/23a. R. SPINOSISSIMA L., var. TYPICA W.-Dod. Killean, Kintyre, v.-c. 101.  
 194/23c. R. SPINOSISSIMA L., var. TYPICA W.-Dod, f. ROSEA Koch. Killean, Kintyre, v.-c. 101.  
 \*194/19a. R. TOMENTOSA Sm., var. TYPICA W.-Dod. Killean, Kintyre, v.-c. 101.

Collected by Miss E. S. TODD:—

- 194/12k. R. AFZELIANA Fr., var. DENTICULATA R. Kell., f. SUBCOMPLICATA Hayek. Glen Urquhart, Inverness-shire (E), v.-c. 96. (Confirms a doubtful record.)  
 194/21c. R. VILLOSA L., var. MOLLIS Sm., f. GLANDULOSA W.-Dod. "Inverness." (Probably from v.-c. 96, but should be recorded with a ?. Already recorded from v.-c. 97).

Collected by Mr P. G. BEAK, at Mattingley, Hants (N.), v.-c. 12:—

194/8b. *R. CANINA* L., var. *ANDEGAVENSIS* (Bast.) Desp., f. *AGRARIA* (Rip.) W.-Dod. Det. A. H. W.-Dod.

\*194/9b. *R. CANINA* L., var. *BLONDAEANA* (Rip.) Rouy, f. *VINACEA* (Baker) Rouy.

Collected by Mr A. E. WADE, F.L.S., in Monmouthshire, v.-c. 35:—

194/2e. *R. ARVENSIS* Huds., var. *OVATA* (Léj.) Desv. Between Castleton and Marshfield.

194/6a. *R. CANINA* L., var. *LUTETIANA* (Lem.) Baker. Coedkernew.

\*194/7j. *R. CANINA* L., var. *SYLVULARUM* (Rip.) Rouy, f. *ADSCITA* (Déségl.) Rouy. Marshfield.

194/10m. *R. DUMETORUM* Thuill., var. *HEMITRICHA* (Rip.) W.-Dod. Coedkernew. (*Note—Com. Fl.* does not give 35 for 194/10 but the *Welsh Plant List* does.—P.M.H.)

\*194/12e(2). *R. AFZELIANA* Fr., var. *GLAUCOPHYLLA* (Winch) W.-Dod. Marshfield.

Collected during the delightful and memorable B.E.C. Week-end in Upper Teesdale, June 22nd to 25th *et seq.*, 1934. Although the time of year was too early for satisfactory specimens of Roses, yet among the many good things observed of all Orders the following *Rosa* N.C.Rs. could be determined by me:—

From County Durham, v.-c. 66.

194/23c. *R. SPINOSISSIMA* L., var. *TYPICA* W.-Dod, f. *ROSEA* Koch. Near Hanging Shaw, Forest-in-Teesdale. Coll. Mrs Rose Dallas.

From Yorkshire, N.W., v.-c. 65.

All from near Winch Bridge, the first mentioned below having been found by Miss C. M. ROB, the others by Mrs C. I. WILDE:—

194/23c. *R. SPINOSISSIMA* L., var. *TYPICA* W.-Dod, f. *ROSEA* Koch.

194/12j. *R. AFZELIANA* Fr., var. *SUBCANINA* Chr.

194/12l. *R. AFZELIANA* Fr., var. *DENTICULATA* R. Kell.

194/12r. *R. AFZELIANA* Fr., var. *BRIQUETI* (R. Kell.) W.-Dod. (At least three bushes of this. Rather a weak form: weak, that is, in number of subfoliar glands, and in number of glands on peduncles. Both are, however, distinctly in evidence on gatherings from every bush.)

194/20h. *R. SHERARDI* Davies, var. *SUBRECTA* (Ley).

194/20i. *R. SHERARDI* Davies, var. *SUBRECTA* (Ley), f. *GLABRATA* Ley.

I feel reasonably safe in naming this, though it seems to be the first record for an *English* county.

Collected by me near Ketton, Rutland (part of), v.-c. 55, 29/6/34:—

194/7d. *R. CANINA* L., var. *MEDIOXIMA* (Déségl.) Rouy. Seems to come under this var., but as styles are strongly hispid I prefer to say ? N.C.R.

- 194/10b. *R. DUMETORUM* Thuill., var. *TYPICA* W.-Dod, f. *URBICA* (Lem.) W.-Dod.

Collected during a visit to Thetford, Norfolk, September 5th to 19th, 1934. Except the five marked "E.B.B.," all were found by Mrs C. L. WILDE:—

From Norfolk (W.), v.-c. 28.

- 194/2a. *R. ARVENSIS* Huds., var. *VULGARIS* Ser. Thetford. E.B.B.  
 194/6a. *R. CANINA* L., var. *LUTETIANA* (Lem.) Baker. Wretham: near Thetford. E.B.B.  
 194/6a. *R. CANINA* L., var. *LUTETIANA* (Lem.) Baker, f. *LASIOSTYLIS* Borb. Near Thetford: Wretham.  
 194/6i. *R. CANINA* L., var. *SENTICOSA* (Ach.) Baker, f. *OXYPHYLLA* (Rip.) W.-Dod. Near Thetford. Not without doubt: so ? N.C.R.  
 194/6l. *R. CANINA* L., var. *SPURIA* (Pug.) W.-Dod. Croxton: Wretham.  
 194/6n. *R. CANINA* L., var. *GLOBULARIS* (Franch.) Dum. Thetford.  
 \*194/7. *R. CANINA* L., var. *DUMALIS* (Bechst.) Dum. Croxton: near Thetford.  
 \*194/7h. *R. CANINA* L., var. *DUMALIS* (Bechst.) Dum., f. *VIRIDICATA* (Pug.) Rouy. Near Thetford: Wretham. E.B.B.  
 \*194/7c. *R. CANINA* L., var. *STENOCARPA* (Déségl.) Rouy. Weeting.  
 \*194/7k. *R. CANINA* L., var. *FRAXINOIDES* H. Br., f. *RECOGNITA* Rouy. Wretham.  
 194/8e. *R. CANINA* L., var. *VERTICILLACANTHA* (Mér.) Baker. Near Thetford. E.B.B.  
 194/8e. *R. CANINA* L., var. *VERTICILLACANTHA* (Mér.) Baker, f. *CLIVICOLA* Rouy. Croxton.  
 194/10b. *R. DUMETORUM* Thuill., var. *TYPICA* W.-Dod, f. *URBICA* (Lem.) W.-Dod. Near Thetford: Croxton: Wretham. E.B.B.  
 194/10e. *R. DUMETORUM* Thuill., var. *RAMEALIS* (Pug.) W.-Dod. Near Thetford.  
 194/10f. *R. DUMETORUM* Thuill., var. *GABRIELIS* (F. Gér.) R. Kell. Near Thetford: Weeting.  
 194/10i. *R. DUMETORUM* Thuill., var. *SPHAEROCARPA* (Pug.) W.-Dod. Kilverstone.  
 194/10m. *R. DUMETORUM* Thuill., var. *HEMITRICHA* (Rip.) W.-Dod. Kilverstone.  
 \*194/20c. *R. SHERARDI* Davies, var. *OMISSA* (Déségl.), f. *RESINOSOIDES* (Crép.). Near Thetford.

From Suffolk (W.), v.-c. 26.

- 194/23. *R. SPINOSISSIMA* L. (agg., no fruit). Barnham.  
 194/6a. *R. CANINA* L., var. *LUTETIANA* (Lem.) Baker. Brandon: Barnham Cross Common.  
 194/6h. *R. CANINA* L., var. *SENTICOSA* (Ach.) Baker. Brandon: Barnham Cross Common.

- 194/6i. *R. CANINA* L., var. *SENTICOSA* (Ach.) Baker, f. *OXYPHYLLA* (Rip.) W.-Dod. Barnham Cross Common.
- 194/6r. *R. CANINA* L., var. *RAMOSISSIMA* Rau. Brandon.
- 194/7c. *R. CANINA* L., var. *STENOCARPA* (Déségl.) Rouy. Brandon.
- 194/10b. *R. DUMETORUM* Thuill., var. *TYPICA* W.-Dod, f. *URBICA* (Lem.) W.-Dod. Barnham Cross Common.
- 194/10f. *R. DUMETORUM* Thuill., var. *GABRIELIS* (F. Gér.) R. Kell. Brandon.
- \*194/19a. *R. TOMENTOSA* Sm., perhaps a form of var. *TYPICA* W.-Dod. (N.C.R. for aggregate species, but must be only ? N.C.R. for var. *typica*.) Brandon.
- 194/15f. *R. RUBIGINOSA* L., var. *ECHINOCARPA* (Rip.) Gren. Near Brandon. Two bushes seen, about half-a-mile apart. One rather a weak form, but the other a magnificent example of this interesting variety, by far the best that has come under my notice.

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 DESIDERATA.
 

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FLORA OF WESTMORLAND. Mr Albert Wilson, F.L.S., Tir-y-Coed, Ro Wen, Conway, is very desirous of obtaining any plant records for this county, to include in the Flora now preparing.

THE NORTHERN NATURALISTS' UNION is collecting material for the publication of a "Flora" of the Counties of Northumberland and Durham and will be most grateful for help from botanists who have done any work in the area or from anyone who can contribute information on the subject of the occurrence and distribution of plants therein. Notes, records, or other material should be addressed to:—George W. Temperley, 4 Selborne Avenue, Low Fell, Gateshead, Co. Durham.

DR W. A. SLEDGE, Dept. of Botany, The University, Leeds, is anxious to obtain a copy of the *B.E.C. Report* for 1903, to complete a set.

At the last Conversazione, 14th November 1934, Miss Burton again exhibited some of her extremely beautiful water-colour paintings of British wild flowers, and these were greatly admired by the members present. In our last Report (p. 622) we gave a list of species still required to complete all those in Fitch & Smith's Illustrations, and we are greatly indebted to those who supplied any of these. We shall be grateful to any member who can send a fresh and typical specimen of any of the following list—still needed—to Miss Lucy Burton, Stott Park, Lake Side, Ulverston, Lancs.:—

40. *Papaver Argemone*. 43. *Roemeria hybrida*. 48. *Matthiola incana*. 49. *M. sinuata*. 57. *Arabis Turrata*. 59. *A. alpina*. 91.

*Draba incana.* 94. *Camelina sativa.* 110. *Isatis tinctoria.* 116. *Reseda alba.* 124. *Viola arenaria.* 128. *Frankenia laevis.* 129. *Dianthus prolifer.* 130. *D. Armeria.* 134. *Silene acaulis.* 138. *S. gallica.* 146. *Lychnis alpina.* 162. *Cerastium alpinum.* 192. *Linum angustifolium.* 199. *Althaea officinalis.* 245. *Trifolium incarnatum.* 247. *T. stellatum.* 253. *T. Bocconi.* 273. *Oxytropis uralensis.* 293. *Lathyrus sylvestris.* 294. *L. palustris.* 311. *Rubus Chamaemorus.* 334. *Pyrus communis.* 337. *P. torminalis.* 352. *Ludwigia palustris.* 364. *Sedum dasyphyllum.* 366. *S. villosum.* 370. *S. reflexum.* 378. *Saxifraga Hirculus.* 382. *S. cernua.* 385. *S. nivalis.* 408. *Trinia vulgaris.* 411. *Carum segetum.* 412. *C. verticillatum.* 420. *Bupleurum aristatum.* 430. *Ligusticum scoticum.* 432. *Meum athamanticum.* 450. *Caucalis daucoides.* 459. *Cornus suecica.* 467. *Lonicera Caprifolium.* 468. *L. Xylosteum.* 480. *Galium tricorne.* 487. *Valeriana pyrenaica.* 501. *Erigeron alpinus.* 502. *E. canadensis.* 508. *Gnaphalium luteo-album.* 510. *G. supinum.* 515. *Inula salicina.* 519. *I. pulicaria.* 520. *Xanthium Strumarium.* 534. *Diotis maritima.* 539. *Artemisia Absinthium.* 549. *Senecio paludosus.* 551. *S. palustris.* 557. *Saussurea alpina.* 610. *Arnoseris pusilla.* 616. *Phyteuma spicatum.* 621. *Campanula Rapunculus.* 634. *Loiseleuria procumbens.* 636. *Menziesia caerulea.* 643. *Pyrola uniflora.* 648. *Monotropa Hypopithys.* 665. *Pinguicula alpina.* 675. *Cicendia pusilla.* 679. *Gentiana nivalis.* 710. *Asperugo procumbens.* 719. *Orobanche caryophyllacea.* 720. *O. rubra.* 721. *O. elatior.* 732. *Antirrhinum majus.* 737. *Linaria supina.* 767. *Bartsia viscosa.* 816. *Teucrium Scordium.* 873. *Polygonum viviparum.* 882. *Hippophae rhamnoides.* 883. *Thesium linophyllum.* 976. *Alisma natans.* 980. *Stratiotes aloides.* 982. *Liparis Loeselii.* 987. *Cephalanthera ensifolia.* 988. *C. rubra.* 992. *Epipogum aphyllum.* 995. *Spiranthes Romanzoviana.* 1008. *Habenaria intacta.* 1030. *Polygonatum verticillatum.* 1039. *Lloydia serotina.* 1045. *Scilla autumnalis.* 1048. *Allium Ampeloprasum.* 1053. *A. vineale.*

## MELAMPYRUM PRATENSE L. IN THE DRUCE HERBARIUM.

C. E. BRITTON.

The Linnean species mentioned comprises mostly shade-loving (seldom growing in full exposure) plants, semi-parasitic in their mode of life, usually occurring socially and marked among themselves by characters that are little taken note of beyond the limits of *Melampyrum* and allied genera of similar parasitic habit. The individual plant has a life duration of but a few months, and one generation only is produced annually. The oblong or spatulate cotyledons appear above the soil, and are usually present in all forms at the commencement of the flowering period, and may still be seen at the conclusion of the flowering period in forms whose growth is strictly limited. If, however, growth is more or less indeterminate, the cotyledons will not be seen late in the season, as they have already fallen or fall in the act of taking the plant from its surroundings. Following the appearance of the cotyledons, the growing stem produces opposite simple elongated leaves, and from the axils of the lower and median leaves branches arise, which may remain rudimentary, may develop to a certain extent bearing leaves only, or may further develop and bear flowers in addition to leaves, or may even bear secondary branches terminating in leaves and flowers. The leaves may be of fairly uniform character, or the uppermost leaves (bracts) accompanying the flowers may be shorter and broader, and either entire or furnished at the base with teeth-like lobes of varying size. The bracts bear one flower each in the axils and the flowers appear in pairs all directed to one side (secund). It is often the case that above the uppermost pair of branches and beneath the lower pair of flowers are one or more pairs of leaves. These are really barren bracts, and under the name of intercalary leaves constitute important characters in descriptions of the various forms. The flowers furnish two features made use of in distinguishing two primary groups of forms (or sub-species). These are (1) the relative lengths of certain anther-spurs and attendant hairs, (2) the ultimate assumption by the corolla of a purplish hue or not. After studying these characters of the flowers in living plants, no conviction of their supreme diagnostic value has been obtained.

Authors who have especially devoted themselves to the study of *Melampyrum* attach importance to features that have less value elsewhere. Such characters are the number and relative distance apart of the stem nodes, the numerical node at which the inflorescence begins, the absence or presence of intercalary leaves, and, when present, the number of pairs of such organs. Botanists who have not paid attention to these matters may be disposed to attribute little value to characters founded upon these features, but, for my own part, I have been impressed by the dependence to be placed upon certain of these characters, e.g., the number of pairs of intercalary leaves, although it is

necessary that a series of a form from a given locality should be examined to arrive at a satisfactory conclusion, observation of an individual plant being inadequate or even misleading.

The early native observers appear to have been little acquainted with the diversity of forms presented by *Melampyrum pratense*. One form, however, that attracted attention was *Melampyrum latifolium flore albo labio inferiore duabus maculis luteis distincto* recorded from a Yorkshire wood near the residence of Dr Richardson at North Bierley. This deviation, dismissed by Smith as differing only in its paler flowers, finds no special mention in F. A. Lees' *Flora of West Yorks*, although the locality is cited for *M. pratense*. The first British botanist to give particular attention to this Cow-wheat was Johnston, who in the *Flora of Berwick-upon-Tweed* (1829) described a new species, *M. montanum*, in addition to the usual *M. pratense*. After an interval of more than 20 years the youthful Daniel Oliver described in the pages of the *Phytologist* (1852) a plant from the west of Ireland which he distinguished as var. *erice-torum*. To the descriptions of both the preceding forms, Syme, in 1866, added those of vars. *vulgaris* and *latifolia*. In 1884 the late Dr G. C. Druce made a notable contribution to the knowledge of *M. pratense* by describing his var. *hians*, adjudged at the time by certain contemporary botanists to be of very little value, but a form whose importance has been recognised by subsequent monographers. Small plants, with more or less purplish flowers, from the Scottish Highlands, were considered by the late Arthur Bennett, in 1896, to be identical with the Scandinavian variety *purpureum*. In the Report for 1917 of the Botanical Society and Exchange Club (vol. 7, part 1, 1918) Druce made known the numerous additional varieties, sub-varieties, and forms occurring in Britain on the faith of their mention in Beauverd's monograph of the genus *Melampyrum* (1916). The monographer's knowledge of the British forms was derived from a study of the material from the collections of Druce, consisting of about 100 mounted sheets, each usually representing gatherings from three or four localities. As all now bear Beauverd's own identifications, they are of extreme importance in the study of the forms inhabiting Britain, and for the opportunity of consulting this rich collection I am indebted to Mr John Chapple, curator of the Druce Herbarium, and to the Trustees of the late Dr Druce.

As there does not exist in the English language any account of the forms of *M. pratense* derived primarily from a study of the plants, the descriptions that follow have been drawn up from the material referred to. It is true that Druce (*l.c.*) gave brief descriptions of most forms, but these were derived from the Monograph. The arrangement of the native forms given by Druce in the Report referred to was also adopted in the two editions of the *British Plant List*, and closely followed by Salmon in the 11th ed. of the *London Catalogue of British Plants*. In some few cases I have ventured to depart from the views of these botanists.

Var. *typicum* G. Beck, Fl. Nieder-Oesterr., ii, 1070 (1891); Beauverd, Monogr., 480, 488.

Plant c. 24 cm. Stem fairly stout, naked below, branched at the middle, goniotrichous, hairs reflexed; branches naked below, leafy at apex, goniotrichous, non-flowering. Cotyledons persistent or deciduous, oblong-spathulate,  $25 \times 6$  mm. Cauline leaves 1 pair, spreading, scabrid,  $35 \times 2.5$  mm.; intercalary leaves 0. Inflorescence commencing at 2nd or 3rd node; bracts scabrid, the lower, entire, linear-lanceolate,  $35 \times 4$  mm., the upper bracts similar, the apical smaller, bidentate at base; flowers c. 15 mm., calyx-tube 2 mm., teeth c. 2 mm. erect or recurved.

Ireland: Clogher Valley, Co. Tyrone (C. L. Peck). Represented in *Herb. Druce* by two specimens only, which are annotated "*Melampyrum pratense*, ssp. *eu-pratense*, var. *typicum* Beck (f. *luteum* Blytt?), vid. Beauverd, 1916." In the Monograph these Irish specimens are cited under sub-var. *foliatum* Neum. in *Sveriges Flora*, 150 (1901), together with plants from Graffham, Sussex, communicated by the late C. C. Lacaita, which are described as a f. nov. *laxum* and distinguished by its drawn-out habit (internodes 40-100 mm.), larger leaves, and inflorescence commencing at the 4th node.

There appears to be but little to separate var. *typicum* and sub-var. *foliatum*. In the former the branches arising at the lower node are obliquely-erect, sterile, or bear but few flowers, the inflorescence commences at the 3rd node (seldom at the 2nd or 4th), the intercalary leaves are usually absent, rarely is there one pair. In the sub-var. the branches terminate with leaves and flowers, and in length equal the stem, the inflorescence commences at the 2nd or 3rd node and intercalary leaves are absent.

Var. *alpestre* Beauv. in Bull. Soc. Bot. Genève, 2nd ser., iii (1911), 312; Beauverd Monogr., 480, 486.

Plant usually 8-10, rarely reaching 20 cm. Stem erect or inclined, simple or branched, goniotrichous; branches simple and sterile, erect, or floriferous and patent or ascending. Cotyledons persistent or deciduous, spathulate-oblong,  $15-20 \times 3-5$  mm. Cauline leaves 1 or 2 pairs, lanceolate-linear, shortly-petioled, erect or spreading,  $25-40 \times 2-3$  mm., scabrid; intercalary leaves 0 or 1-2 pairs, erect, resembling the cauline leaves, scabrid. Inflorescence commencing at 2nd-4th nodes; lower bracts lanceolate-linear, entire,  $25-40 \times 2-2.5$  mm., upper bracts decreasing in size, entire, or with a few distant teeth below, all scabrid; calyx-tube 2 mm.; teeth 4 mm. setaceous, upper recurved-erect; scabrid; corolla 14 mm.

In small plants the stems are unbranched or with short sterile branches from the lower nodes; the elongated bracts stand erect above the clustered parti-coloured flowers.

The British plant is sub-var. *scotianum* Beauv., l.c. 480, 486, and is an endemic form differing from sub-var. *eu-alpestre* Beauv. in the

less distant lower nodes and the rather thick scabrid leaves. In sub-var. *eu-alpestre* the internodes are elongated (30 mm. or more) and the stem-leaves are thin and glabrous.

First found in Ireland early in the 19th century, later gathered on Mangerton by W. J. Blake in 1844. Found in the Hebrides by W. S. Duncan in 1896 and identified by Arthur Bennett with *M. pratense* L., var. *purpureum* Hartm. Under the latter name distributed by Messrs Wheldon & Wilson in 1909 through the Bot. Exch. Club.

*Habitat*: Associated with *Erica*, *Sphagnum*, etc., on northern moorlands and mountains ascending to 3000 ft.

*Distribution*: v.-c. 68, 88, 92, 96, 97, 108, 110.

*Obs.*: The plant when growing has attracted the attention of collectors by reason of the bright colouring of the flowers, which are described as "tipped with a rich purple or magenta" or to have "a marginal band of deep carmine, throat of a rich yellow, and tube very pale yellow." Confirmation and further details are desirable.

Var. *PALUDOSUM* Gaudin, sub-var. *EU-PALUDOSUM* Beauv., *l.c.*, 480, 489.

In the Monograph two British localities are cited under this: (1) Inch Garth (No. 775 in Herb. Druce), and (2) Wybunbury, Cheshire, viii, 1906, leg. G. C. Druce (No. 1960 in Herb. Druce!). No. 775 consists of three plants labelled *Melampyrum pratense* L. ? var. *ericetorum* D. Oliv. collected by the late W. A. Shoolbred on the 6/7/13. There is also a second sheet of specimens of the same gathering in the Druce Herbarium, and all were received through the Bot. Exch. Club. Salmon, who was present when the plants were gathered, suggested the varietal name, with the observation that the specimens were closely allied to var. *montanum*. The late Arthur Bennett was also inclined to refer the form to var. *ericetorum* though shading off to var. *montanum*. More recently Salmon's specimens collected at the same time and place as Dr Shoolbred's have been referred by Dr R. v. Soó to var. *ericetorum*. I endorse these conclusions and would also place under var. *ericetorum* specimens in Herb. Druce from Coshieville, M. Perth, collected in August 1915 and labelled *M. pratense*, var. *paludosum*, with the remark on one sheet, "Salmon's *ericetorum*." As to the *Melampyrum* from Wybunbury, that is a form which has repeatedly attracted the attention of collectors and more than once has been distributed through the Bot. Exch. Club. In Herb. Druce are examples collected by Marshall in 1895, by Wolley-Dod in 1899, and by Druce in 1906 and in 1915 (?). With the exception of Marshall's gathering, which consists of small slender plants about 13 cm. in height, with entire bracts (consequently referred to var. *montanum* by Messrs H. & J. Groves) the remainder of the gatherings are fairly uniform. Now, of these, Beauverd referred Wolley-Dod's plants to "*M. pratense*, ssp. *eu-pratense*, var. *ericetorum ad var. montanum vergens*," and Druce's plants of 1906 to "*M. pratense* L., var. *paludosum* Gaudin, sub-var. *eu-paludosum* Beauv."

After studying the various gatherings from Wybunbury, I am compelled to adopt the conclusions that one form only occurs there, *i.e.*, var. *ericetorum* D. Oliver, and that var. *paludosum* in any form has not been established as a British plant. Soó has also referred Marshall's plant of 1895 to var. *ericetorum* D. Oliv.

Var. MONTANUM Hook., Brit. Flora (1830), p. 285. *M. montanum* Johnston, Fl. of Berwick-upon-Tweed, i, 136 (1829); Beauverd, *l.c.*, 481, 493.

Plant c. 10-20 cm. Stem simple or branched from below, goniotrichous, nodes 5-10 mm. distant; branches leafy, obliquely erect, 5-10 cm., equalling or exceeding the stem, floriferous. Cotyledons persistent or deciduous, oblong-spathulate, 16 × 3 mm. Cauline leaves linear, spreading or sub-erect, scabrid, 25 × 2 mm.; intercalary leaves 1-3 pairs, lanceolate-linear, erect-spreading, scabrid, 20 × 2 mm. Inflorescence commencing at 4th to 8th node, bracts spreading or sub-erect, scabrid, linear or linear-lanceolate, the lower entire 15-20 × 2 mm., the upper smaller, bidentate or 4-toothed at base. Flowers 12 mm., calyx-tube 2 mm., teeth 3 mm.

*Habitat*: Elevated moorlands and woods in mountainous districts.

*Distribution*: British Isles. Endemic. Details of distribution imperfectly known owing to forms of var. *ericetorum* D. Oliv. being mistaken for var. *montanum*. These two varieties appear linked together by intermediate forms, and are also both closely connected with var. *alpestre*. To the latter should probably be referred the var. *montanum* from Strath Bagaisteach mentioned in the Monograph. The collector noted that the lip was deep orange, recurved, with bright lake-coloured lines round other portions of flower.

Var. ERICETORUM D. Oliver in Phytologist, 1852, 678; Beauverd, *l.c.*, 481, 493.

Plant 22-30 cm. Stem erect or inclined, nodes 15-35 mm. distant, branched from the base, glabrous or goniotrichous, branches spreading, ascending or sub-erect, almost equalling the stem, all flowering or the lower arrested. Cotyledons deciduous or persistent till dispersal of seed, oval-spathulate, 16 × 6 mm. Cauline leaves spreading or declining, linear-lanceolate, scabrid, 35-40 × 4-5 mm.; intercalary leaves 0 or 1-2 pairs, linear-lanceolate, scabrid, 40 × 5 mm. Inflorescence commencing at 4th to 6th node, lower bracts linear-lanceolate or lanceolate, rounded at the base, entire, scabrid, c. 35 × 6 mm., intermediate bracts linear-lanceolate, hastate at the base, or with 2-3 pairs of subulate teeth and elongated sub-falcate limb; flowers c. 13 mm. in somewhat distant pairs, calyx-tube 2 mm., teeth 3-4 mm.

*Habitat*: Moorlands, associated with *Erica*, *Calluna*, *Vaccinium Myrtillus*, etc. Also on sunny borders of woods. Appears to favour localities situated on the Palaeozoic and Mesozoic formations and to be absent from the Tertiary deposits.

*Distribution*: Chiefly in the western and northern regions of Britain but reaching the southern counties (Hants and Surrey). Ireland.

Var. *BRITANNICUM* Beauverd, *l.c.*, 482, 497.

Plant 15-28 cm. Stem erect, c. 1 mm. diam., nodes 30-50 mm. distant, branched, branches remote, divergent or ascending 10-12 cm. long, naked below, leafy and floriferous at apex. Cauline leaves spreading or ascending, linear-lanceolate, 60 × 6 mm., intercalary leaves 0-1 pair, similar to cauline leaves. Inflorescence commencing at 4th node, lower bracts lanceolate-linear, entire, 70 × 8 mm., intermediate bracts lanceolate-linear, hastate at base, 55 × 8 mm., upper bracts much smaller, pectinate-palmatifid. Flowers 15 mm., calyx-tube 2 mm., teeth subulate, 2 mm.

Endemic. The preceding description is based upon a plant from Alton, N. Hants, coll. G. C. Druce. Other plants also named var. *britannicum* by Beauverd are one from Sligachan, Skye, and two from Brockenhurst, S. Hants, coll. C. E. Palmer. The latter are notable for the greater breadth of the bracts as compared with the narrowly linear leaves of the branches, which are again branched. The plants are noted as going off towards var. *oligocladium* Beauv.

Var. *COMMUTATUM* (Tausch) Beck Fl. Nieder-Oesterr., ii, 1069 (1893); Beauverd, *l.c.*, 482, 498. Sub-var. *CONCOLOR* Schönheit; Beauv., *l.c.*, 482, 500.

Recorded by Beauverd in the Monograph from "Bagley Wood (?) anno ? leg. Baxter (in Herb. Druce sub-var. *montano!*)." Baxter's plant is annotated by Beauverd "*Melampyrum pratense*, ssp. *vulgatum* Tausch; sub-var. *verum* Beauv." Two portions exist, each the upper part of a stem or branch, one, flowering, the other with fruit. The specimens are notable for the elongated linear or setaceous lateral lobes of the upper bracts. Herb. Druce also contains upper portions of a large plant referred without reservation to var. *commutatum*, sub-var. *concolor*. It originated at Upton Wood, Warwick, and is distinguished by four pairs of elliptical-lanceolate intercalary leaves, c. 60 × 15 mm. The lower bracts are entire, succeeding bracts hastate, uppermost palmatifid with narrow lobes. A third plant from Silverdale, Lancs, is referred to var. *commutatum* Tausch, sub-var. *concolor* "vel sub-v. nov. aff. *concolori* ? (area britannica!)."

It will be seen from these notes that Herb. Druce affords little material helpful to an understanding of this var. and sub-var.

Var. *BREVIDENTATUM* Beauverd = *M. PRATENSE*, var. *BREVIDENTATUM* Beauverd in Bull. Soc. Bot. Genève, iv (1912), 429. Monogr., 483, 497.

Stem erect, 23-25 cm. in height, 1 mm. in diameter, nodes remote (35-45 mm.), branched from the base, lowest branches short, sterile, upper branches erect-ascending, again branched, flowering at apex.

Cotyledons persistent, oblong-spathulate,  $15 \times 2$  mm. Cauline leaves linear-lanceolate c.  $40 \times 4$  mm.; intercalary leaves 2 pairs, similar to cauline leaves. Inflorescence commencing at 6th node, bracts entire, the lower lanceolate,  $40 \times 4.5$  mm., the upper smaller falcate. Flowers —? Plants with immature and dehisced capsules only.

The foregoing description is based upon two plants enclosed in the "d. *brevidentatum* (Beauv.)" cover in Herb. Druce. To one is attached a label with the pencilled words "*Melampyrum sylvaticum*, Loch Lomond, 12/8/13, Alfred Webster." To the locality, the word "Tarbet" has been added, and "*sylvaticum*" crossed out in ink and "*pratense brevidentatum*" substituted together with the numerals 2887. The second plant likewise bears the numerals mentioned with the same particulars of locality and year of collecting. Under these is written in pencil "*M. pratense*, ssp. ? *vulgatum*, sub-var. *brevidentatum*." Although the last words are not followed by a signature, I do not entertain doubt that they were written by the late G. Beauverd, although his notes otherwise are invariably in ink and signed. These particulars have been given in detail as I do not feel satisfied that the labels refer to the plants with which they are associated. In the first place the var. is characterised as "*Herba monticola perpusilla*" and is described as reaching a height of c. 12 cm., with the lower bracts entire or dentate, and the succeeding bracts furnished with two pairs of somewhat distant large curved teeth. The inflorescence beginning at the 4th to 6th node, rarely at the 3rd, the upper calyx-teeth 1.5 mm. long.

It will be seen that the Loch Lomond plants differ essentially in their larger stature and entire bracts, and for these reasons alone do not seem referable to var. *brevidentatum*. They are as likely as not to belong to var. *hians* Druce.

Var. *VULGATUM* (Pers.) Beck, Fl. Nieder-Oesterr., ii, 1069 (1893), Sub-var. *LAURIFOLIUM* Beauv., Monogr., 483, 507.

Growth lax. Stem stout, 20-40 cm. in height, 2 mm. in diam., nodes 20-40 mm. distant; branches numerous, ascending or divergent, flowering. Cotyledons present when first flowers expand, oblong-oblanco- late,  $20 \times 5$  mm. Cauline leaves shortly petioled, oblong-lanceolate, or elliptical-lanceolate, base rounded, acuminate,  $50-70 \times 12-20$  mm.; intercalary leaves (usually 1 pair) and lower entire bracts,  $70-100 \times 18-23$  mm., similar to cauline leaves, succeeding bracts decreasing in size, with 1-2 pairs of basal teeth, upper bracts smaller and palmatifid. Inflorescence commencing at 4th or 5th node, flowers 13-15 mm., calyx-tube 2 mm., teeth 4 mm.

*Distribution*: England. Endemic. Woolton-under-edge, Glos.; Oaresbury, Berks.; Brickhill, Beds.; Rotherfield, Oxon; Brecon, etc.

*Obs.*: Not always easily separated from vars. *lancoelatum* Spenn. and *ovatum* Spenn., but, in general, the elongated broad leaves and bracts distinguish it from both.

Var. *VULGATUM* Beck, *l.c.*, sub-var. *DIGITATUM* (Schur); Beauverd, Monogr., 483, 507.

There are not any examples of this sub-var. in Herb. Druce that have been so determined by Beauverd without qualification. One of two sheets exhibits the upper part of what must have been a very large plant. It is chiefly in the fruiting stage with the terminal parts of the axes bearing ten or more pairs of markedly palmatifid bracts with narrow elongated acuminate lobes. The lowest bracts are deltoid-lanceolate and the cauline leaves are narrowly lanceolate. The second sheet displays examples of a much reduced form likewise with prominent palmatifid upper bracts and with ovate-lanceolate lower bracts. Both sheets are annotated "*Melampyrum pratense*, ssp. *vulgatum*, sub-var. *digitatum* Schur, f. ad formam *ovatum* Spenn. ± *vergens!* G. Beauverd."

*Distribution*: England. v.-c. 11, S. Hants (New Forest); v.-c. 16, West Kent (Wrotham).

Var. *OVATUM* Spenner, Fl. Frib., ii (1826), 367. *M. PRATENSE*, ssp. *VULGATUM* (Pers.) Beck, sub-var. *DIGITATUM* (Schur) Beauv., forma *OVATUM* (Spenn.) Beauv., *l.c.*, 483, 509.

Stem stout, erect, goniotrichous, 2 mm. diam.; nodes 40-60 mm. distant, branched; branches erect or sub-erect, equalling or exceeding stem. Cotyledons deciduous. Cauline leaves lanceolate or ovate-lanceolate, acuminate, scabrid, 50 × 18 mm.; intercalary leaves 1 pair, ovate-lanceolate, scabrid, 50 × 20 mm. Inflorescence beginning at 5th or 6th node, lower bracts entire, ovate-lanceolate, sub-cordate at base, 50 × 23 mm., intermediate bracts ovate-lanceolate, 35 × 12 mm., with two pairs of basal diverging teeth, upper bracts palmatifid with slender spreading lobes, shorter than the flowers. Flowers 12-16 mm., calyx-tube 2 mm., teeth 4 mm.

*Habitat*: Oak-hazel-ash coppices and woods on calcareous soils.

*Distribution*: England. v.-c. 6, North Somerset (Roper); v.-c. 17, Surrey!; v.-c. 28, Norfolk (Robinson); v.-c. 23, Oxford (Druce!), etc. Ireland. Wicklow (Beauverd).

*Obs.*: A very striking-looking plant when well-developed, but at times showing strong affinities with var. *lanceolatum* and sub-var. *laurifolium*. Distinguished from the latter by shorter and broader-based leaves with a more distinct tendency to an ovate form.

Var. *LANCEOLATUM* Spenner, *l.c.* *M. PRATENSE*, ssp. *VULGATUM* (Pers.) Beck, sub-var. *DIGITATUM* (Schur) Beauv., forma *LANCEOLATUM* (Spenn.) Beauv., *l.c.*, 483, 510.

Growth often lax. Stem stout, 1-1.5 mm. diam., 25-35 cm. in height, erect, often secund at summit, branched, branches ascending in flower, often widely divergent later, all flowering. Cotyledons present at commencement of flowering period, later deciduous. Cauline leaves linear-lanceolate acuminate, 25-80 × 4-10 mm.; intercalary leaves 0 or 1-2 pairs similar to cauline leaves. Inflorescence beginning at 5th or

6th node; lower bracts entire, similar to cauline leaves, succeeding bracts smaller, pectinate at base, uppermost palmatifid, lobes spreading slender. Flowers 14-15 mm., calyx-tube 2 mm., teeth 3 mm.

*Habitat*: An occasional element in the ground flora of Oak-hazel-birch woods and copses on loam, clay (including clay-with-flints) and sandy soils (Lower Greensand, etc.).

*Distribution*: Widely spread in the British Isles, and the form of *M. pratense* most frequently met with.

Var. *hians* Druce in *Naturalist*, 1884, p. 35; Beauverd, *l.c.*, 484, 504.

Plant about 20-30 cm. Stem erect, 1 mm. diam., nodes 20-50 mm. distant, branched; branches originating at lower nodes frequently arrested, upper branches erect or erect-ascending, equalling the stem, flowering, secondary branches sterile. Cotyledons sub-persistent or deciduous, oblong-spathulate, 20 × 4 mm. Cauline leaves linear-lanceolate, 40 × 5 mm., lamina cuneate at base and appearing longer-petioled than in related forms; intercalary leaves similar to cauline leaves, 0-1-2 pairs. Inflorescence beginning at 3rd, 4th, or 5th node; lower bracts entire, lanceolate, 40 × 6 mm., succeeding bracts decreasing in size, entire, bidentate, or pectinate at base, upper bracts seldom palmatifid, usually with elongated narrow limb and 1-2 pairs of ascending teeth. Pairs of flowers usually spaced. Flowers 15 mm., calyx-tube 2.5 mm., teeth 5 mm.

*Habitat*: Umbrageous rocky situations.

*Distribution*: Apparently confined to the northern and western districts of Britain where the rocks of the Archaean and Palaeozoic systems prevail. Appears to be absent from those regions where the Secondary, Tertiary, and post-Tertiary formations occupy the surface. Its distribution does not appear dependent upon the amount of the annual rainfall.

As is well-known, var. *hians* is notable for its uniformly golden yellow (or deep yellow verging on orange) corolla, which is erect rather than spreading, and with the mouth always distinctly open. The leaves vary considerably in width, and two forms were recognised by Beauverd.

Forma *stenophyllum* Beauverd, *l.c.* Stem flexuose, leaves linear-lanceolate, inflorescence beginning at 4th or 5th node, bracts mostly entire, uppermost only hastate or pectinate at base.

Forma *platyphyllum* Beauverd, *l.c.* Stem stout, erect, leaves ovate-lanceolate, upper bracts conspicuously pectinate at base.

The broad-leaved plants that Druce named *Melampyrum pratense* L. agg., var. *hibernicum*, in *Report Bot. Soc. and Exch. Club Br. Isles*, iv, part iii (1915), p. 205—"The Southern *hians*" appear to be only separable from f. *platyphyllum* by reason of the distant basal teeth of the upper bracts. It is known from Millook, Cornwall, and from several localities in Ireland.

Var. INTEGERRIMUM Döll; Fl. des Grossherzogt. Baden (1857), 703.  
MELAMPYRUM PRATENSE, ssp. VULGATUM Pers., var. INTEGERRIMUM  
Döll, f. PSEUDO-SILVATICUM (Schur) Beauv., *l.c.*, 484, 517.

Stem erect, 20-40 cm., 1 mm. diam., nodes 25-35 mm. distant, branched from the base, glabrous or goniotrichous, lower branches arrested and median branches only developing, or all branches lengthening, and bearing secondary branches and flowers. Cotyledons deciduous before flowers expand. Cauline leaves linear-lanceolate, spreading or ascending, 35 × 5 mm.; intercalary leaves 1-2 pairs, linear-lanceolate, 40-50 × 7 mm. Inflorescence begins at 4th to 8th node, lower bracts linear-lanceolate, entire, 50 × 8 mm., upper bracts smaller, entire, or inconspicuously bidentate at base; flowers 15-17 mm., calyx tube 3 mm., teeth 5 mm.

*Distribution*: Southern England (Hants and Herts), Northumberland, and Aberdeen.

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NOTES.

(1) Where the writer has personal knowledge, an attempt has been made to give particulars of the ecological conditions (including geological formations) under which the various forms occur. Little appears to be known in this connection, and it is a subject recommended to the notice of collectors.

(2) In giving details of distribution, material outside the Druce Herbarium has been made use of.

(3) Druce, following Beauverd, applied the term *digitate* to denote the deeply-divided linear-lobed upper bracts. As, however, British usage restricts *digitate* to *compound* organs, I have uniformly made use of the more correct terms *palmatifid* or *palmatipartite*.

## MINTS IN GOWER.

A. L. STILL.

Any excuse is good enough for a visit to Gower. I first made the acquaintance of that delightful country some thirty-eight years ago. At that time my knowledge of the sea-board was confined to the South coast of England; and when I first walked from the Mumbles to Langland Bay I thought I had never seen such a beautiful piece of coast scenery. When, later on, my rambles extended as far as the Worm's Head, I was sure of it. The Mountain Limestone forms a succession of finely-carved cliffs and bays, contrasting with the inland ridges of Old Red Sandstone and conglomerate covered with heath and bracken. Surface water is abundant, but water at depth not too plentiful. This fact, combined with the large area of common land, has kept the builder at bay, so that the district remains even now mostly unspoiled. When I first knew Gower the only means of getting to the end of it was by taking a pair-horse 'bus which left Swansea in the afternoon and took three or four hours on the road. To get back one had to catch it at 5 or 6 in the morning. Now a good service of motor 'buses is available. In those days my interests were centred in the abundant and varied flora and fauna of the rock-pools and I did no intensive botanising. But I remembered seeing several kinds of Mint at Llangennith, and when my attention was diverted to that Genus I thought I must go back and look them up. The excuse for doing so was provided by an invasion of house-decorators threatening to make the house uninhabitable, so on August 8th we migrated to the King Arthur Hotel, Reynoldston. This is a good centre, as the 'buses to all parts of Gower pass through the village. I had stayed there once before in 1896, when I walked with a friend all round the coast from Three Cliffs Bay to Llangennith during an Easter holiday. Now to work!

Reynoldston itself yielded only common forms of *M. arvensis* and *M. verticillata* in addition to *M. Pulegium*. Thursday, August 9th, opened wild and stormy-looking, but I made the attempt on the Worm's Head, and the day cleared up. This visit yielded *Inula crithmoides*, *Limonium binervosum* and sundry *Atriplex* forms, and incidentally enabled me to look up an old friend with whom I used to stay in the early days, the only one who remembered me. Friday, the 10th, was too wet to get far. In the afternoon things looked better, and I started for Oxwich Burrows to get *Limonium vulgare* and the Sea Rushes or whatever else might turn up. A wild afternoon with pouring rain rather spoilt things, but I did find the rarest object of all my quests—a motorist who offered me a lift! Wet as I was, encumbered with mac, pack and vasculum—to say nothing of soaking umbrella—he insisted on my squeezing into the front seat of his van with him-

self and his wife and took me up the steep narrow hill to Nicholson Towers, where our roads diverged. The other drivers who passed me on Oxwich Marsh had contented themselves with splashing the puddles over my feet, already thoroughly wet. Having found the "sundries" which I wanted, Saturday, the 11th, was free for the Llangennith Mints. The first find was a rather dried-up colony of *M. rotundifolia* under the churchyard wall. Down the lane to Coity Green, things began to move. *M. piperita*, var. *subcordata*, and *M. rubra* grew luxuriantly along the stream, while the soft green leaves of *M. gentilis* covered the other bank of the lane. Around the bushes just on the Green was a colony of *M. verticillata*, which Mr Fraser considers the Linnean type—a very branched slight plant with rather small leaves and covered with flowers. I have seen it nowhere else; but among Dr Druce's plants at Oxford there are similar plants labelled var. *elata*. It is an attractive plant. On the Green itself, *M. gentilis* was plentiful, just coming into flower. *M. aquatica*, the common *capitata* form, grew in the stream, and also a fine colony of *M. spicata* which I remember seeing many years ago. *M. rubra* and the Peppermint were all about the Green. Returning to the village, I renewed acquaintance with its narrow ways and found a great quantity of the same form of *M. gentilis*. Mr Fraser is inclined to accept this as var. *Pauliana* F. Schultz, the sub-glabrous form, with long hairs on the calyx-teeth. The vasculum showing signs of repletion I returned to Reynoldston and got busy with the press. On Sunday the morning was stormy, but the day cleared and as no 'bus was available we took a car to Llanrhidian, and walked the new by-pass road to the Common. Here a little bank yielded *M. piperita*, var. *subcordata*, *M. spicata*, *M. arvensis*, var. *agrestis*, and a form of *M. verticillata* which Mr Fraser assigns, on the technical characters, to var. *rivalis*, but which seems to me a very distinct plant which at present cannot be put under any variety and requires further study. I have since had it sent from the Bishopston Valley, though I missed it on my visit there. Down on Llanrhidian Marsh the Marsh Mallow covered acres of ground, a beautiful sight. Monday, the 13th, was a lovely day, so we drove to Llanmadoc. My object here was to search for *Blysmus rufus* at Miss Vachell's request, and also to see if I could run across *Eleocharis uniglumis*, which has been recorded there. Cwm Ivy Marsh is a big place and I spent an hour or so there, but could not find either plant. It was, of course, rather late in the season. *M. aquatica* was abundant on the Marsh and a curious dwarfed and congested form of it on Whitford Burrows close by. Here also occurred *Viola Curtisii*, *Juncus acutus*, and some interesting *Rubi*, one like a Dewberry with large black fruit, all the drupes being developed. As there seemed to be no prospect of any good Mints there, I decided to walk round the shore to Llangennith from the North side, quite new ground. I went down through the village to the Mill, noting by the way *Marrubium vulgare* and more of the Mints already seen. By the road to the Mill a group of small Mints caught my eye and I took two or three plants thinking I had an *arvensis* form not previously seen.

When I got home and was going through my plants with Mr E. C. Wallace he said, "Surely that is *M. cardiaca*." This proved to be correct, and a new county record. Probably this group is a survival of cultivation from the ancient monastic foundation of which the memory survives in the name of College Farm. Tuesday, the 14th, was devoted to Parkhill and the Bishopston Valley, both beauty spots. The task before me was first to confirm, if possible, records of *M. rotundifolia*, var. *Bauhini*, and *M. gentilis*, var. *Pauliana*—the latter by E. F. Linton. The first presented no difficulty, the plant being plentiful by the roadside and also forming a good block in the turf by the tidal stream flowing past Pennard Castle. The *M. gentilis* was a more difficult proposition. I searched all down the East bank of the stream, round the trickles draining the Burrows, but got only *M. verticillata*, var. *pubudosa*, and *M. arvensis*, var. *densifoliata*. Crossing the stepping stones down near the seashore and working up the West bank of the stream and round the marshy ground under the woods I found plenty of *M. aquatica*, a little *M. rubra*, and—as mentioned above—*M. rotundifolia*, but no *M. gentilis*. On the way back to the road, a small patch of Mint by the meadow-path seemed unfamiliar, so was raided for a few specimens. Walking up the road to the Gower Inn the same plant showed up, but the vasculum was getting full and I had the Valley yet to do, so none was gathered. It is in the nature of things that this should now turn out to be the most important Mint of the whole series gathered. It is *M. verticillata*, var. *trichodes* Briquet, a plant hitherto only known in this country from a single very poor example gathered by the late Dr Druce in Hereford about 1894. Miss Vachell has kindly gathered and sent me further material, but this was a month later, and the specimens consequently rather past their best stage. Reaching the Bishopston valley, *M. rotundifolia*, the sub-glabrous form sometimes called var. *Bauhini*, was again in evidence and very fine. Here also *M. gentilis* again showed up but a very different form from that found at Llangennith, decidedly hairy and with deep acute serratures. I have seen similar plants from Cornwall collected by Davey and others and named by A. Bennett var. *Pauliana* Schultz. A. B. must have based this name solely on the long hairs on the calyx-teeth, for the plant does not agree in any other respect with the description of Schultz nor with his specimens at Kew. I believe, however, that Linton's plant from "Pennard Castle" is the same as the Llangennith *M. gentilis*, although his specimen is not in a good stage for comparison. There were other Mints mixed with the *M. gentilis* in the Valley but I did not take as much notice of them as I should have done if I had not already got more than could be properly dealt with. Since then I have had more material sent me and this included not only the *M. gentilis*, but *M. verticillata*, var. *trichodes*, and the doubtful form found at Llanrhidian, both very welcome additions. Wednesday, the 15th, was devoted to Blackhills and Fairwood Common. Here again I failed to find the recorded *M. gentilis*, much to my regret. However, *M. spicata*, *M. verticillata*, var. *adulterina*, and *Bartsia viscosa* were

compensations. I had taken the 'bus intending to complete the search on Oxwich Marsh and in the village, but the conductor, a bit of a botanist, told me a tale of the wealth of Mints at Overton, so I rode on there—a regrettable decision, as all I saw was heavily slashed growths of *M. rubra*. However, I had a chat about old times with a relative of a very gallant man, the late Billy Gibbs, coxswain of the Port Eynon lifeboat, whom I remember well before he was lost in a desperate attempt to rescue the crew of a wreck. Thursday, the 16th, was my last day, and I went again to Llangennith to gather fresh material of the Peppermint and *M. rubra*, which were not well in flower on my first visit, and also more *M. gentilis*, of which I wanted enough for distribution. On Friday we returned to Surrey, where we found the house swept and garnished, but, fortunately, not empty. It had been a most enjoyable trip, and I was glad to have been able to make some fresh records. My only regret is that I had no company on my rambles, and, of course, could only cover a small part of the district. Readers may have noticed that no mention has been made of any find of *M. longifolia* or its hybrids. This group seems to be absent from Gower, save for a record of *M. alopecuroides* at Llanmadoc, which I had no time to verify. I must here gratefully acknowledge the help I have received from Miss E. Vachell, of Cardiff, both in giving me information about previous records and in collecting and sending me material. Dr Esther Bowen, of Swansea, was also kind enough to collect and send me useful material from Bishopston, while Mr Fraser has kindly examined and annotated my whole gatherings of Mints. Miss Howell, of the King Arthur Hotel, a lady universally known and esteemed in that part of the world, made us very comfortable and gave me every facility for drying papers, most necessary in that rather humid climate. The people of Gower are as friendly as ever, although I missed many faces of which I have most pleasant memories. I hope these notes may be of interest to some at least of my fellow-members. They would not have been written without the encouragement of our Secretary. An apology is due for their somewhat egotistical tone, but that is a defect inseparable from an account of a solitary expedition.

Wallington, Surrey, December 1934.

AN ORNITHOLOGIST'S CONTRIBUTION TO THE PROBLEM OF  
PLANT DISTRIBUTION.

GEORGE W. TEMPERLEY.

In a recent paper entitled "Possible Glacial Survivals in our Flora" (*Trans. Northern Naturalists' Union*, vol. i, pp. 30-36) Dr K. B. Blackburn has very ably reviewed the evidence which our Arctic-alpine plants provide for a belief that a few mountain areas, in particular certain portions of the Upper Teesdale moorlands, were preserved as nunataks—ice-free patches amongst the otherwise ubiquitous glacier sheets—during the last Glacial Period. In support of the contention that these Arctic-alpine plants are indeed a relict flora from Glacial times, Dr Blackburn gives details of the present distribution of many of them. In so doing she mentions one species after another whose distribution can only fittingly be described as "freakish." Several plants occur at one single station only in the whole of the British Isles; others occur at two or perhaps three widely distant ones; while others again, native to the Highlands of Scotland, have an odd outlier in England or Wales. The botanist, supported by the glacial geologist, asks one to believe that these plants are the last remaining specimens of a once more widely spread flora, native to these Islands during the last Glacial Period; that, as the climate changed, they became stranded on mountain tops, like the Ark on Ararat, where they have been ever since.

The more one studies these plants in the field the less is one able to believe that their present isolated stations can be taken as an indication that they have occupied them for any considerable period of time. To the writer it seems much more probable that they have only recently arrived and have, as yet, failed to spread, than that they have once been plentiful and are now exterminated in all but a few freakish fastnesses. Let us examine two or three of them.

On a few perpendicular inches of unscalable precipice amongst the Snowdon ranges have been found a few plants of *Lloydia serotina*, the Spiderwort. Close at hand, acres of similar crags abound and further afield are many square miles of crags in Lakeland and the Highlands of Scotland—but on none of these does *Lloydia* grow. Its nearest homes are the Alps and Northern Siberia. The position which this plant occupies is just such as one would expect it to do if it had only recently arrived upon the scene. Its foothold is very restricted. It has not yet had time to spread horizontally along the crags. One would not expect it to do so readily. Its seeds are heavy and naturally tend to fall vertically. That it is being propagated by seed is shown by the fact that in the crevices below the adult plants are many small seedlings—some of the cracks are lined with them. When they reach the base of the crags no doubt the sheep prevent their further progress, should a

"collector" fail to secure them. The chances of the seeds being conveyed horizontally along the crags are small indeed—but the plants are on at least three separate rock-faces already, so it is at least possible.

Another curious distribution is that of *Lychnis alpina*, the Alpine Campion, whose sole British stations are one mountain in Scotland and a certain steep gully in Lakeland. A visit to its Lakeland station shows that the plant is well established in the one long, narrow gully. The rocks on one side of the scree which fills the "rake" are studded with plants—old plants, young plants and seedlings. It is evidently quite capable of propagating itself. It is a plant with a heavy seed. It can therefore spread down the gully, but it cannot readily escape round the corner to the next suitable and safe habitat. Above is turf, below is scree, and the sheep attend to any plants which may stray thereon. The impression one receives is that the colony is a young one. Given more time, fewer sheep and, in these days, fewer amateur gardeners, it might spread elsewhere. From its appearance one would never conclude that this is the last remaining stronghold of a plant which has vanished from every other English and Welsh mountain and from all but one Scottish one.

The distribution of *Dryas octopetala*, the Mountain Avens, in England and Wales is an equally strange one. In Lakeland it is only on Helvellyn; in Teesdale, on a few square inches of Cronkley Fell; in the Pennines, in one or two places near Arncliffe; in Wales, only on a single spur of one of the Snowdon group; and, most astonishing, it has one station in Staffordshire! The writer has recently examined the Welsh station. On one small rib of calcareous rock, standing but a few feet out of the turf, at the end of a mountain ridge, are six small plants—the only plants known in the Principality. They grow within a few inches of one another, clinging to a weathered rock-face. It is hard to convince one's self that these are the last of a vanished race. They seem much more likely to have only just arrived and to be slowly multiplying.

On a small patch of wet, peaty gravel on the upper slopes of Widdy Bank Fell in Teesdale a few plants of *Arenaria uliginosa*, the Bog Sandwort, are to be found. Nowhere else in the British Isles does this plant grow—its nearest home is Scandinavia. One is asked to believe that this tiny plant was a native in Glacial times and has since been exterminated on every patch of peaty gravel except these few square inches in Teesdale. On examining the patch one sees nothing in the least unique or peculiar about it to stamp it as the only possible place whereon such a plant could survive during all these post-glacial centuries. It seems much more likely that the plant is a comparatively recently established "alien" which has reached this isolated spot "by accident."

On a few patches of bare rocky ground around the base of the Ingleborough massif a few plants of *Arenaria gothica* grow. This is the sole station for the species throughout the length and breadth of the British Isles. So far as the nature of the soil and under-lying rock is concerned there seems no reason why this plant should not grow on

many another similar plateau of limestone on or about the Pennines or even further afield. In the unique isolation of its station it is comparable with its relative *Arenaria uliginosa*; but the theorists do not claim that this species of the genus is a "glacial survival;" they suggest that "it may have been recently introduced." It is not an Arctic-alpine, and therefore it is necessary that some different explanation be found to account for its presence. No one has yet suggested a theory which would equally well explain the arrival of both. The first theory with regard to *Arenaria gothica* was propounded when the plant was first noticed in 1889 on a bare patch of ground near the Ribbleshead viaduct on the railway just north of Ingleborough. Its seeds, it was said, must have been conveyed there on railway-sleepers imported from Norway for the construction of the permanent way! If the plant was a native of Norway, if it inhabited timber-forests, and if the trees had been imported direct as they were felled, then the theory might have been tenable. But, unfortunately for the theory, the plant does not grow in Norway; nor is it a forest-plant; nor are imported trees cut into sleepers along our railway banks, but shaped and creosoted in intermediate timber-yards. Therefore we must look for some other method by which its seeds can have been carried from Sweden, Gothland or the Jura, where it grows, and deposited on the slopes of Ingleborough and nowhere else in the British Isles.

Have our botanists thoroughly explored the possibility of all these plants being recent arrivals, which, as we have seen, they certainly resemble, rather than "glacial relicts" of long standing? Have all the known agencies for plant dispersal been considered and dismissed as impossible? The writer would draw attention to one agency in particular which, to him, seems able to account for all these and many more "freakish" distributions. This is the agency of birds. Twice every year our Islands are traversed by countless millions of birds. In the autumn the hosts of Arctic-breeding birds pass over on their way to their winter quarters; in the spring an only slightly smaller host repasses going north. Under normal conditions almost nothing of this movement is seen; but it is well known to occur. It is only recently as the result of scientific observation, that the colossal scale of that movement has been fully appreciated. Over the British Isles in autumn the movement is probably more concentrated than over any other tract of land surface; for birds from Northern Europe fly westwards to our shores before turning south along the milder Atlantic sea-board. The autumn migration takes place at the time of the ripening of seed; it would be strange if there were not many viable seeds borne on the limbs, on the plumage, in the crops and alimentary canals of so vast a host. It is not necessary for the birds to alight to deposit their involuntary cargoes. A speck of mud, a portion of a feather, a morsel of excrement, flicked from a passing bird, must fall to earth somewhere and sometimes it will carry a seed. When a seed falls on suitable ground—that of an alpine plant on a mountain, a marsh-plant in a swamp, a water-plant in a pond or river—and the climatic and other conditions being favour-

able, the seed will germinate and the species may establish itself. In the course of ages this must occur frequently and thus there will be a tendency for northern plants to spread southwards to the extreme limit at which they can maintain themselves and for alpine plants to become scattered upon mountain tops that are far distant from their normal stations. It is these outlying colonies that have puzzled the botanist and encouraged him to propound theories to account for their appearance.

It has already been proved that water-fowl convey plants from pool to pool. Cases have been recorded where newly-made and isolated ponds have been rapidly stocked with water-plants which could only have come from neighbouring ponds by this agency. This is easily understandable. Where water birds are frequently moving short distances from pool to pool they will carry seeds or actual portions of living plants on their feet or adhering to their plumage. A longer carriage has to be envisaged to account for such a case as the recent appearance of *Isoetes echinospora* in Little Sea near Swanage or of *Hydrilla verticillata* in Esthwaite Water. The transference of seeds across Europe by the same agency is quite a reasonable proposition. If water-birds can convey the seeds of water-plants, there seems no reason why land-birds should not convey the seeds of land plants; though owing to the different habits of the species it may not occur so frequently.

It is not easy to obtain direct evidence in proof of this theory; but a more detailed study of the seeds of some of the plants concerned, together with an examination of the bodies of migrating birds, might throw some light on the problem. Here the botanist and the ornithologist might profitably collaborate.

[This article by one of our members appeared in the *Vasculum* for August 1933 and so closely agrees with my own views that I am greatly obliged to Mr Temperley for permission to reproduce it. We welcome not only the collaboration of the ornithologist but also of the entomologist and meteorologist in our enquiry as to the causes of the appearance or disappearance of rare plants. Some of these are in danger of early extinction through the unexplained decrease in the numbers of the particular insects mainly instrumental in their fertilisation, and the influence of favourable winds on bird migration or seed dispersal is also a subject needing further investigation.—Ed.]

## NOTES FROM THE WELSH NATIONAL HERBARIUM.

A. E. WADE, F.L.S.

The following notes refer to specimens in the Welsh National Herbarium, National Museum of Wales, Cardiff. New county records are starred. Where these have been published in the List of Welsh Flowering Plants we have added the letters (W.F.P.). We do not publish N.C.Rs. for aliens or species not given in the *Comital Flora*.

Thanks are due to Lt.-Colonel A. H. Wolley-Dod and Mr E. B. Bishop for naming the roses and to Mr W. P. Philipson who has recently revised the naming of the specimens of *Agrostis* in the Herbarium.

1/1b. *CLEMATIS VITALBA* L., var. *INTEGRATA* DC. Royden, W. Norfolk, v.-c. 28, A. R. Horwood, 1916. Painswick, E. Glos., v.-c. 33, A. McKenzie, 1924. Clifton Downs, W. Glos., v.-c. 34, A. E. Wade, 1924, and Oneon, S. G. Charles, 1934. Mon., v.-c. 35. Tenby, Pemb., v.-c. 45, H. A. Hyde, 1925. \*Near Great Ormes Head, Caernarvon, v.-c. 49, J. D. Massey, 1929. Leigh Woods, N. Somerset, v.-c. 6, J. W. White, 1917. [The Caernarvonshire record is N.C.R. for v.-c. 49, which is bracketed in *T.B.*, ed. ii, and not given in *C.F.* (W.F.P.).]

1/1e. \**C. VITALBA* L. Llanrumney, Mon., v.-c. 35, A. E. Wade. This is a variety or form with leaflets deeply toothed and lobed and appears to come under var. *taurica* Bess., described in Rouy & Foucaud *Flore de France*, i, p. 5, as having "folioles propendément dentées ou incisées-lobées."

†4/2. *ADONIS AESTIVALIS* L. Waste ground, Splott, Cardiff, Glamorgan, v.-c. 41, R. L. Smith.

†13/7. *DELPHINIUM PUBESCENS* DC. Allotments, Splott, Cardiff, Glamorgan, v.-c. 41, A. E. Wade, 1926. Grain alien.

35/4c. *NASTURTIUM ISLANDICUM* (Oeder) Dr., var. *MICROCARPUM* (Beck.). Splott, Cardiff, Glamorgan, v.-c. 41, A. E. Wade, 1925. ? Adventive.

35/4d. \**N. ISLANDICUM* (Oeder) Dr., var. *HISPIDUM* (A. Gray). Splott, Cardiff, Glamorgan, v.-c. 41, A. E. Wade, 1929. ? Adventive.

54/15. *BRASSICA ALBA* (L.) Boiss. Chippenham and Rockfield Road, Mon., v.-c. 35, S. G. Charles.

\*88/23. *VIOLA SEGETALIS* Jord. Near Bassaleg, Mon., v.-c. 35, A. E. Wade, 1934.

†164/1. *ROBINIA PSEUDO-ACACIA* L. Two trees in a field near an old mill race, Michaelston le Pit, Glamorgan, v.-c. 41. One seedling was seen.

178/25b. *LATHYRUS MONTANUS* Bernh., var. *TENUIFOLIUS* (Roth) Garcke. Trefloyne, Pemb., v.-c. 45, W. F. Grimes.

178/25b. *L. MONTANUS* Bernh., var. *TENUIFOLIUS* (Martr.-Don.) Garcke, sub-var. *ANGUSTISSIMUS* (Rouy) = *L. MACRORRHIZUS* Race ROTHII,

var. *ANGUSTISSIMUS* Rouy Flore de France, v, 271. This represents the extreme form of the narrow-leaved plant, with the leaflets almost subulate. Penhallo, W. Cornwall, v.-c. 1, F. Rilstone, 1915. Near Bronllys, Breconshire, v.-c. 42, A. E. Wade, 1925. Knighton, Radnor, v.-c. 43, A. McKenzie, 1924. Bach Howey, Radnor, v.-c. 43, A. E. Wade, 1929.

178/25d. *L. MONTANUS* Bernh., var. *OBTUSIFOLIUS* (Martr.-Don.) = *OROBUS TUBEROSUS*, var. *OBTUSIFOLIUS* Martr.-Don. Florule du Tarn, 186, 1864. "Folioles largement ovales obtuses." The following specimens have obtuse leaflets measuring 3.5-4 cm. x 2-2.2 cm. Near Southam, Warwick, v.-c. 38, G. C. Druce, 1920. Saundersfoot, Pemb., v.-c. 45, P. H. Holland, 1920. High Tor, Matlock, Derby, v.-c. 57, T. H. Corry, 1883.

\*190/8. *ALCHEMILLA ALPESTRIS* Schmidt. Limestone Crags, The Leete, Flint, v.-c. 51, J. D. Massey.

194/6r. *ROSA CANINA* L., var. *RAMOSISSIMA* (Rau). Marshfield, Mon., v.-c. 35, A. E. Wade, det. E. B. Bishop. South-east of Pennsylvania, near Bassaleg, Mon., v.-c. 35. "Not clearly one of the *Transitoriae* but perhaps best there under var. *ramosissima*," A. H. Wolley-Dod.

\*194/10b. *R. DUMETORUM* Thuill., var. *URBICA* Léman. North-west of St Mellons, south-east of Pennsylvania, near Bassaleg and Marshfield, v.-c. 35, A. E. Wade, det. A. H. Wolley-Dod.

194/10g. *R. DUMETORUM* Thuill., var. *CALOPHYLLA* (Rouy & Camus). North-west of St Mellons, Mon., v.-c. 35, A. E. Wade, det. A. H. Wolley-Dod. Between Castleton and Marshfield, Mon., v.-c. 35, A. E. Wade, det. E. B. Bishop.

194/10h. *R. DUMETORUM* Thuill., var. *PLATYPHYLLA* (Rau) W.-Dod. Between Castleton and Marshfield, and Marshfield, Mon., v.-c. 35, A. E. Wade. "I prefer to put this under var. *platyphylla* (Rau) W.-Dod, rather than under var. *sphaerocarpa*, but somewhat intermediate," E. B. Bishop.

\*194/12e(2). *R. GLAUCA* Vill., var. *SUBCRISTATA* Baker (=R. *AFZELIANA* Fr., var. *GLAUCOPHYLLA* (Winch) W.-Dod). Marshfield, Mon., v.-c. 35, A. E. Wade, det. E. B. Bishop.

196/1c. *CRATAEGUS MONOGYNA* Jacq., var. *FISSA* (Poiret). Near St Mellons, Mon., v.-c. 35, A. E. Wade, 1934.

196/1k. *C. MONOGYNA* Jacq., var. *SPLENDENS* Dr. Near Bassaleg, Mon., v.-c. 35, A. E. Wade, 1934.

196/1p. *C. MONOGYNA* Jacq., var. *SUBCRISTATA* Dr. Llanedyrne Road, near Cardiff, Glam., v.-c. 41, A. E. Wade. The fruits are rather more globose than stated in the description in *Rep. B.E.C.*, 1915, being 8-9 x 7 mm.

+279/1. *CORIANDRUM SATIVUM* L. N.C.R. Waste ground, Mon., v.-c. 35, S. G. Charles, 1934.

284/1c. *HEDERA HELIX* L., var. *SARNIENSIS* Dr. Near Lake Vyrnwy, Mont., v.-c. 47, H. A. Hyde, 1934.

+330/1. *HELICHRYSUM STOECHAS* L. Waste ground, Barry Docks, Glam., v.-c. 41, R. L. Smith, 1923.

427/2f. \**SONCHUS ARVENSIS* L., var. *RIPARIUS* Magn. A plant some 6 ft. high, growing in a ditch at Hensol, Glam., v.-c. 41, and collected by Professor R. C. McLean, appears to come under this variety, which is described in Rouy, *Flore de France*, ix, p. 205, as follows:— "Plante très robuste, à port de *S. palustris*; feuilles caulinaires longues (25-35 cent. de long), profondément roncînées, à lobes fortement ciliés-spinuleux et à oreillettes moins arrondies, subaigués; calathides grandes, nombreuses; pédoncules ± allongés."

427/4e. *S. OLERACEUS* L., var. *RUNCINATUS* Coss. & Germ. Bassaleg, Mon., v.-c. 35, A. E. Wade, 1934.

467/2c. *ANAGALLIS ARVENSIS* L., var. *VERTICILLATA* Diard. Cultivated field S.W. of Bassaleg, Mon., v.-c. 35, A. E. Wade, 1934.

517/1c. *SOLANUM DULCAMARA* L., var. *VILLOSISSIMUM* Desv. Wyke Regis, Dorset, v.-c. 9, R. L. Smith. Meon, S. Hants, v.-c. 11, R. J. Dix.

517/1d. *S. DULCAMARA* L., var. *OVATUM* Dunal. Sully Island, Glam., v.-c. 41, A. E. Wade. Stanner, Rads., v.-c. 43, H. A. Hyde. Tenby, Pemb., v.-c. 45, J. Grimes. Near Ro Wen, Caern., v.-c. 49, A. Wilson. Near Bringhurst, Leicester, v.-c. 55, A. E. Wade.

517/1e. \**S. DULCAMARA* L., var. *LACINIATUM* Dunal. Near Bringhurst, Leicester, v.-c. 55, A. E. Wade.

517/2d. *S. NIGRUM* L., var. *ATRIPLICIFOLIUM* Dunal. Chepstow, Mon., v.-c. 35, W. A. Shoolbred, 1905. Chippenham, Mon. v.-c. 35, S. G. Charles.

†520/2. *LYCIUM HALIMIFOLIUM* Mill. Wonastow Road, Mon., v.-c. 35, S. G. Charles, 1934.

578/2c. *GALBOPSIS TETRAHIT* L., var. *NIGRICANS* Bréb. Near Penylan, S.W. of Bassaleg, Mon., v.-c. 35, A. E. Wade, 1934.

615/5. *POLYGONUM AMPHIBIUM* L. The peduncle is occasionally glandular; the following specimens in the Welsh National Herbarium have this characteristic. Under var. *natans* Moench. Groby Pool, Leicester, v.-c. 55a, A. Baines, 1871. Under var. *terrestre* Lees. Wakerley, Northants, v.-c. 32, A. E. Wade. Skipwith Pool, v.-c. 61, W. Ingham.

615/5c. *P. AMPHIBIUM* L., var. *GLANDULOSUM* Schönh. Rowsley, Derby, v.-c. 57, 1898. Ex. herb. Leppington. R. Wiske at its junction with the Ryeback, Northallerton, N.E. Yorks, v.-c. 62, J. A. Wheldon, 1883.

615/7c. *P. PERSICARIA* L., var. *RUDERALE* Meisn. Bassaleg, Mon., v.-c. 35, A. E. Wade.

615/7e. *P. PERSICARIA* L., var. *AGRESTE* Meisn. Bassaleg, Mon., v.-c. 35, A. E. Wade, 1934.

633/3. \**ULMUS HOLLANDICA* Mill. Field border, Michaelston le Pit, Glam., v.-c. 41, A. E. Wade, 1934.

637/2c. *URTICA URENS* L., var. *INERS* Wedd. Allotment, Splott, Cardiff, Glam., v.-c. 41, R. L. Smith and A. E. Wade, 1928.

642/2b. *BETULA PUBESCENS* Ehrh., var. *GLABRATA* Wahl. Llanmelin Camp, Mon., v.-c. 35, H. A. Hyde. Vyrnwy, Mont., v.-c. 47, H. A. Hyde. [Add v.-c. 47 to *C.F.* Not N.C.R., see *T.B. Suppl.*, i, (W.F.P.).]

†651/6. *POPULUS TACAMAHACCA* Mill. Copse, near Michaelston le Pit, Glam., v.-c. 41, A. E. Wade, 1934.

780/2f. *AGROSTIS ALBA* L., var. *STOLONIFERA* (L.). Near Abergwessin, Breconshire, v.-c. 42, A. E. Wade, det. W. R. Philipson.

780/2f. *A. STOLONIFERA* L., var. *COMPACTA* Hart. National Museum of Wales building site, Cardiff, Glam., v.-c. 41, A. E. WADE, 1922, det. W. R. Philipson.

780/3f. *A. NIGRA* With. \*Ham, Surrey, v.-c. 17, C. E. Britton, 30th July 1916. (*B.E.C.*, 1916, as *A. tenuis*, var. *aristata* Druce). \*Fairwater, Glam., v.-c. 41 (W.F.P.), A. E. Wade. On the canal wharf, Cromford, Derby, v.-c. 57, C. Bailey, 1884. Near Abbeystead, W. Lancs, v.-c. 60, J. A. Wheldon, 1911. Railway embankment, near Corroun Station, W. Inverness, v.-c. 97, W. A. Shoolbred, 1896, det. W. R. Philipson. [Add v.-cs. 57 and 97 to *C.F.*, but these are not N.C.Rs., see *T.B. Suppl.*, i.]

780/6k. ✕*A. CANINA* L., var. *FASCICULARIS* Sinclair. Richmond, Surrey, v.-c. 17, J. Divers, 1912, det. W. R. Philipson.

†808/3. *CYNOSURUS ELEGANS* Desf. Grain alien, Splott, Cardiff, Glam., v.-c. 41, R. L. Smith, 1927.

A KEY TO THE SPECIES OF RUBI OF THE *LONDON*  
*CATALOGUE.*

F. RILSTONE.

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The list of fruticose Rubi given in the *London Catalogue* numbers about two hundred species and varieties. Most of these are plants which have been known and studied for many years. In the following pages an attempt is made to provide the student with a simple key by which he may be guided to the identification of these recognised types. Some of them are widespread; others are restricted to comparatively small areas. Any bramble-producing district will provide a proportion of them as well, no doubt, as of other forms—local varieties or hybrids, or, maybe, unnamed or unrecognised species to which the names in the Key are not fully applicable. Figuratively speaking, the Key seeks to provide a map of the main roads, leaving byroads and lanes for the students' own exploration.

A bramble bush has growth of two kinds:—

1. New stems of the current season's growth bearing leaves but no flowers. These are the "stems" or "barren stems" and their leaves are the "stem-leaves" of the following Key.
2. Flowering shoots or "panicles" which are borne as side branches from the previous year's stems. The panicle leaves are often different from the stem leaves.

The stem is usually five-angled, the angles either sharp or blunt, but it may be more or less deeply furrowed and in some species is quite round. The shape of the stem and the nature of its clothing of hair and prickles call for close attention in bramble study (see Armature). Study of the flowering shoot or panicle is directed mainly to the shape (see Pyramidal, Cylindrical), the mode of branching, the clothing of the rachis and panicle branches, the form and direction of the sepals, and the varying characters of the other floral organs.

TERMS EMPLOYED IN THE KEY.

**Armature**—The prickly and glandular equipment of stem and panicle. The stalked glands look under the lens like tiny pins stuck in a pin-cushion; the prickles vary from strong hooks to microscopic tubercles and bristles (acicles). Simple armature is that of plants with few or no stalked glands and with stem prickles generally even in size and situated on the angles. Where stalked glands are plentiful on stem or panicle or both the armature is said to be mixed. In plants of mixed armature the stem prickles are usually uneven in size, sometimes extremely so, and scattered, i.e., appearing on the faces as well as on the angles. In *R. radula*

and its close allies, however, the prickles are fairly even and not scattered over the faces of the stem, though stalked glands are very plentiful. Caesian plants with prickles scattered over a rounded stem are also included in the mixed armature sections even when devoid of stalked glands.

**Acicles**—Needle-like bristles found mixed with prickles and stalked glands.

**Acuminate**—Said of the leaf-point when it is hollowed slightly on both sides like a triangle with sides curved inwardly or the section of a hollow-ground razor. Leaves of cherry and lime are generally acuminate.

**Bellardian**—Having armature like that of *R. Bellardii*. Armature is said to be Bellardian when the rounded stem is densely clothed with a regularly graded series of prickles, acicles, and stalked glands, ranging from very long to very short, but even the longest prickles are slender and often needle-like. The panicle shows similar extreme variation of armature, and many of the stalked glands on the pedicels are extremely long, quite double the pedicel diameter.

**Caesian**—Belonging to the group of *R. caesius* (the dewberry). In most Caesian plants the relationship to *R. caesius* is plainly shown by the broad coarsely toothed overlapping leaflets, the lowest almost without stalks, the large showy flowers with rounded petals and the fewer larger drupelets sometimes with a plum-like bloom.

**Cordate**—Said of the base of a leaflet when it is deeply heart-shaped where the stalk joins it (i.e., like a lime leaf).

**Coriaceous**—Of a leathery texture.

**Cuneate or wedge-shaped**—Describes a leaflet which narrows to the base in more or less straight lines. In extreme cases the base is quite triangular, narrowing to a point at the junction with the leaf-stalk.

**Cuspidate**—Abruptly pointed.

**Cylindrical**—Describes a panicle which is about as wide above as below.

**Digitate**—Describes a 5-nate leaf in which all five leaflet-stalks (petioles) grow from the same point at the top of the petiole.

**Drupelets**—The individual fruits which in the aggregate make up the blackberry.

**Emarginate**—Said of a leaflet when the base is slightly hollowed where the stalk joins it.

**Entire-based**—Said of a leaflet which is not at all hollowed where the stalk joins it.

**Falcate**—Curved or hook-like.

**Felt**, on leaf or stem, is seen under the lens to be due to the matting of closely-pressed stellate (i.e., branched or star-like) hairs. When white its presence is obvious but dark felt may easily be overlooked unless a lens is used.

**Glabrous**—Without hair.

- Koehlerian**—A word used to describe brambles allied to *R. Koehleri*. These have very varied armature, the glands on the panicle are very uneven in length as in Bellardian plants, but, unlike the Bellardians, the plants have stout and strong though very varied and scattered prickles on the stem. Glandular, i.e., mixed armature, brambles may be graphically represented by the letter "Y"; the lower portion represents the Radulan series, while the two divergent arms represent two divergent series of plants, the one—with stout strong prickles and usually more robust habit—ranging through such forms as *Griffithianus* and *Moylei* to its extreme limit of armature variation in the Koehlerians, the other—of weaker growth and with more slender prickles—ranging through *fuscus*, *pallidus*, *scaber*, *longithyriger*, *tereticaulis*, and similar forms to its extremes in *Bellardii*, *serpens*, *viridis*, *hirtus*, etc.
- Lax**—Said of a panicle when the branches are comparatively few and well-spaced; quite the opposite of "crowded" or "dense."
- Obovate**—Broadest above the middle like an egg with the larger end uppermost.
- Ovate**—Broadest below the middle like an egg with the smaller end uppermost.
- Oval**—Broadest in the middle like an egg with both ends alike.
- Patent**—Spreading horizontally or at right angles.
- Pedate**—Said of a 5-nate leaf when the stalks of the lowest leaflets spring, not from the petiole but from the stalks (petiolules) of the intermediate leaflets. The Christmas rose has pedate leaves.
- Pedicel**—The stalk of a single flower.
- Petiole**—The main leaf-stalk.
- Petiolule**—The stalk of a leaflet.
- Plicate**—Pleated or corrugated. Sometimes, as in *R. criniger*, the corrugations are confined to the outer margins of the leaflets, which are then described as "wavy-edged." Leaves of the sweet bay (*Laurus nobilis*) are wavy-edged.
- Pyramidal**—Said of a panicle which is triangular in outline, narrowing to the top.
- Quinate (5-nate)**—Composed of five leaflets.
- Racemose**—Describes a panicle with one-flowered branches growing singly from the main axis much as in the flowering raceme of the black currant.
- Rhombic or Diamond-shaped**—Terms used to describe a leaflet when the usual fully curved outline tends to become straight-lined and the outline of the leaf approximates to that of a diamond-shaped pane in a church window, or two fairly equal triangles placed base to base. Sometimes the upper triangle is conspicuously shorter than the lower, giving the leaflet an outline much like that of a child's kite ("kite-shaped" of this Key).
- Rachis**—The main axis of the panicle.

**Radulan**—Armature resembling that of *R. radula*, i.e., main stem prickles fairly even in size and situated on the angles as in the simple armature groups, while the whole plant is abundantly glandular, the stalked glands being fairly even in size.

**Suberect**—A name applied to a group of plants, perhaps nearer the raspberry than most of our brambles, the main stems of which do not usually arch over and root at the tips as is usual with most forms. The stems are glabrous.

**Terminal leaflet** (abbreviated to "t. lt.")—The central or endmost leaflet of a 3-nate or 5-nate leaf.

**Ternate** (3-nate)—Composed of three leaflets.

**Truncate**—Describes a leaflet which looks as if cut straight across at the top. From this straight-cut top a short point rises abruptly, making the leaf truncate-cuspidate.

**Tubercles**—Minute prickles reduced to mere limpet-shell like bases (i.e., lacking the usual needle-like point).

**Wedge-shaped**—See *Cuneate*.

#### COLLECTION OF RUBI FOR THE HERBARIUM.

For purposes of study the student should take at least two good panicles and three or four stem pieces, each with a good leaf. The stem characters are best displayed in the middle portion—the growing point and base of the stem are not fully characteristic. In addition, notes should be made in the field of such characters as may become obscure when the plant is dried. Such are the shape, size, and colour of the petals, direction of the sepals, colour and relative lengths of stamens and styles and the general habit of the bush (e.g., stem high or low arching) and the colour of the stem and leaf (the latter may be light or dark green, greyish or yellowish green, and with dull or shining surface). Great care must be taken to ensure that the stem and panicle are really from the same plant. Mixed gatherings cause endless trouble.

Some care, too, is needed at the outset to avoid gathering ill-developed and uncharacteristic growth; such, for example, as shade-grown plants of species which are at their best in open situations. *R. dasyphyllus*, which is abundant over a great part of Wales and Central and Northern England, is when well grown quite Koehlerian in stem, but shade plants may have weak stem-armature which looks anything but Koehlerian. When the student becomes familiar with the species these forms are recognised at sight—the peculiar erratic leaf-toothing and narrow panicle are pretty constant—but the beginner may find them confusing. *R. Moylei*, too, with densely felted leaves in full sun, may lose the felt entirely in shade. The Key, it must be remembered, is an attempt to indicate the typical plants.

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NOTE.—The “mature leaves” referred to in the index and section headings are invariably stem leaves, never panicle leaves.

## SECTION A.

Fruiting sepals reflexed, armature simple, mature leaves felted beneath.

1. Stem with stellate down but with little or no long hair (except occasionally in <i>subinermis</i> ) .....	2
Stem glabrous or thinly hairy .....	3
Stem usually with a good deal of hair .....	20
2. Leaves small, usually convex, white-felted beneath, terminal leaflet usually obovate cuspidate, petals pink, crumpled: a common, very late-flowering plant .....	<i>rusticanus</i>
Leaves larger with grey or greenish-white felt, t. lt. oval: a rare plant .....	<i>pubescens</i>
Leaves frequently very large, t. lt. obovate or oblong-obovate, panicle almost unarmed .....	<i>pubescens</i> , var. <i>subinermis</i>
3. Leaves all, or nearly all, 3-nate, t. lt. obovate or oval, stem with little or much hair, panicle long, variously branched with rachis and branches hairy and grey-felted and with few declining prickles (Devon and Cornwall) ... <i>egregius</i> , var. <i>plymensis</i>	
Leaves usually 3-nate, t. lt. with rather short point, obovate-cuspidate, panicle long and lax .....	<i>egregius</i>
Leaves mostly 5-nate .....	4
4. Terminal leaflet somewhat diamond shaped or rhombic, floral organs typically all red, panicle with strong hooked often bright red prickles, upper part of panicle rather narrow but with long strongly ascending lower branches .....	<i>rhombifolius</i>
T. lt. oval or oval-oblong .....	5
T. lt. ovate .....	8
T. lt. obovate .....	12
5. Leaves rather small, often somewhat parallel-sided, stem somewhat furrowed, stouter panicles often crowded above with long prickles, lighter panicles with longer branches and fewer prickles, often one branch long and patent, flowers pink and very showy (S.W. England and S. Wales) .....	<i>thyrsoides</i> , var. <i>viridescens</i>
Leaves larger .....	6

6. Stem glabrous, very dark red or purple, with very large leaves and with white flowers rather crowded at top of panicle. Felt under leaves of a dark ashy colour ..... *altiarquatus*  
 (= *cartensis* Genev. of *London Catalogue*)
- Stem thinly hairy (with long silky white hairs), stem prickles strong, straight, panicle with strong declining prickles and shaggy rachis ..... *villcaulis*
- Plant not as described above ..... 7
7. Leaves tough and leathery, shining above, leaflets generally convex, t. lt. on long stalk, panicle loose and straggling with few unequal prickles and felted branches (Cornwall and Devon) ..... *ramosus*
- Leaves not leathery nor shining, concave rather than convex, panicle compact with a good many prickles ..... *Brittoni*  
 (Surrey; under *R. ramosus* in *Lond. Cat.*)
8. T. lt. rather finely toothed with stalk about half its own length ..... 9  
 T. lt. with shorter stalk ..... 10
9. Leaves quite small, panicle much branched, stem with many mostly falcate prickles ..... *Bakeri*  
 Leaves larger, flowers usually white with rounded petals ..... *rhamnifolius*
10. Leaflets thick with thick velvety grey felt beneath, t. lt. often distinctly shouldered at the widest part as if incipiently 3-lobed, sometimes rather like level ledges below a stumpy church spire, panicle narrow, leafy in lower half ..... *incurvatus*
- Leaflets thick with closer but still velvety felt beneath, panicle broader with leaves nearly to the top ..... *subcarpinifolius*
- Plant not as described above ..... 11
11. Stem suberect with crowded prickles, t. lt. with long tapering point (rather like a nettle leaf), leaves often 6 to 7-nate through the t. lt. becoming 2 or 3-lobed ..... *Rogersti*
- Stem generally strong, glabrous or nearly so, deeply furrowed, with fewer prickles, leaves white-felted, not 6 or 7-nate ..... *thyrsoides*
- Stem bluntly angled, t. lt. narrowly ovate (a Caesian plant from the Cotswolds with stem prickles mostly on angles; an unusual feature for a Caesian) ..... *corylifolius*, var. *calcareus*
12. Leaves very small with fine toothing and rather thin felt, t. lt. with stalk half its own length and with long narrow point, stem prickles mostly falcate, panicle prickles often falcate ..... *Bakeri*
- Leaves quite small and finely toothed but thickly felted beneath, t. lt. long stalked but rather short pointed, panicle prickles slender, straight, declining (a rare plant) *Godroni*, var. *foliolatus*
- Leaves larger ..... 13
13. Prickles very few on stem and panicles, leaves convex shining, stem glabrous, panicle loose and straggling with felted branches (Cornwall and Devon) ..... *ramosus*
- Prickles more numerous ..... 14
14. Leaves rather loosely strigose above, whitish-felted below, wavy edged, t. lt. short pointed, roundish obovate, panicle with crowded prickles ..... *Godroni*, var. *clivicola*
- Plant not as described above ..... 15
15. T. lt. broad with very abrupt point, often truncate-cuspidate, leaves often plicate especially on the panicle, stem leaves losing felt (Cornwall) ..... *nemoralis*, var. *cornubiensis*
- T. lt. with more gradual point ..... 16
16. T. lt. rather narrow on long stalk (half its own length), leaf toothing even and nearly simple, sepals grey—a pale grey-looking plant with narrow prickly short-branched panicle (see note at end of section) ..... *Lindebergii*
- T. lt. with shorter stalk or plant not pale and grey ..... 17

17. Flowers large, pure white, stem prickles long, straight and patent, leaves typically dull white-felted with point often somewhat triangular ..... *dumnoniensis*  
 (A Channel Islands plant with deeply cordate t. lt. and cordate leaves on panicle is var. *cordatifolius*).  
 Plant not as above described ..... 18
18. Stem, petioles, petiolules, and even leaf veins very dark red, sometimes blackish, prickles with yellow points, leaves 5-nate pedate rather tough and leathery, panicle with long lower branches, rachis with strongly declining prickles ... *argenteus*  
 (A plant found plentifully south of the Thames with bright or dark red stem and yellow prickles, variable though oftenest obovate t. lt., leaves felted or losing felt, and panicle somewhat glandular, formerly put under this as forma *glandulosa*, is *R. cissburiensis*).  
 Plant not as described above ..... 19
19. T. lt. acuminate, leaves of thick leathery texture, with thick velvety felt, panicle narrow (see A 10) ..... *incurvatus*  
 T. lt. acuminate, leaves thick and leathery, with thinner but still velvety felt, panicle broader ..... *subcarpinifolius*  
 T. lt. broad, acuminate, with cordate base, panicle broad, lax, often with nearly patent branches and many frequently hooked prickles (Surrey. See A 4) ..... *rhombifolius*, var. *megastachys*  
 T. lt. rather abruptly pointed, felt of a greenish or ashy hue, whole plant rather dull in colour, upper part of panicle narrow, sometimes very narrow, leaves sometimes 6-7 nate (widely distributed and often plentiful) ..... *polyanthemus*
20. Leaves very small and finely toothed, t. lt. with stalk half as long as itself, panicle much branched with many flowers ..... *Bakeri*  
 T. lt. with shorter stalk ..... 21
21. T. lt. rather small and narrow with sides nearly parallel, flowers bright red when first opened, stem densely hairy, sepals long pointed (a south-western plant) ..... *iricus*, var. *minor*  
 T. lt. not parallel-sided ..... 22
22. T. lt. obovate, panicle broad and rather stout with wide-spreading branches, the whole often held stiffly erect like flowering spikes of Horse Chestnut, flowers white with crumpled petals, whole plant decidedly grey in hue (*adscit-us* of *Lond. Cat.*) ..... *griseoviridis*  
 T. lt. roundish, ovate, or oval ..... 23
23. Leaves thick, with dull upper surface and with velvety greenish felt beneath, t. lt. oval or roundish, panicle long pyramidal with upper branches patent and rather close together, 1 to 3-flowered. Stem with loose hair, becoming thinner later, stem prickles moderately long, patent or declining ..... *pyramidalis*  
 Plant not as above described ..... 24
24. Stem densely felted and hairy ..... 25  
 Stem not heavily felted, except sometimes in *R. Godroni* ..... 26
25. T. lt. roundish with short point, panicle cylindrical, usually dense in upper part, petal roundish, red or white, stem prickles long and straight ..... *leucostachys*  
 T. lt. oval, panicle broader, long and rather lax, with crowded slender prickles on pedicels, rachis and pedicels often very dark and shaggy (especially plentiful in N. Wales where the large showy pink-flowered panicle is often very conspicuous) ..... *macrothyrsus*
26. Petal obovate, bright pink, panicle short and broad, leaves with much white hair beneath, t. lt. oval or ovate (West of Ireland) ..... *iricus*

- Petal roundish, generally pale pink or white, t. lt. broadly oval, whitish-felted, stem with some down under the longer hair, panicle prickles strong ..... *Godronii*
- Petal roundish, t. lt. roundish oval with dark felt beneath, panicle prickles weaker, needle-like ..... *hirtifolius*, var. *mollissimus*

NOTE.—A plant from the Lake District associated with *R. Lindebergii* and closely allied to it is *R. lacustris* which differs in its compound leaf tooting, broader panicle, and greener sepals with white margins. (See also B 6).

## SECTION B.

- Fruiting sepals reflexed, armature simple, mature leaves not felted beneath.
1. Leaves so much divided that the leaflets become more or less pinnate, i.e., cut into pairs of narrow segments on either side of the midrib (an escape from gardens) ..... *laciniatus*
  - Leaflets not so divided ..... 2
  2. Leaves green with very little hair on either side, panicle narrow, long and leafy, pedicels white or grey-felted ..... *Questierii*
  - (A plant with similarly contrasted colours, but with broader panicle and fairly many stalked glands is *R. Lettiii*).
  - Plant without above striking and unusual contrast between green undersides of leaves and whitish flower stalks ..... 3
  3. T. lt. with a somewhat wedge-shaped base, stem generally green, grey, or dull-coloured ..... 4
  - T. lt. without wedge-shaped base ..... 6
  4. Stem hairy at first, then glabrous and glossy, panicle leaflets with very narrow cuneate base, panicle cylindrical, often nodding at top, white-flowered ..... *Lindebergianus*
  - Mature stem rather hairy, t. lt. obovate .....
  5. T. lt. with rather short point, panicle with rather weak prickles *Schlechtendalii*
  - T. lt. with longer point, panicle very prickly ..... *amplificatus*
  6. T. lt. obovate or oval on a very long stalk (one half its own length), leaf tooting compound, panicle lax with many hooked or declining prickles, sepals olive green, white margined (English Lakes) ..... *lacustris*
  - Leaves usually 3-nate, t. lt. with rather short point, obovate-cuspidate, panicle long and lax ..... *egregius*
  - Plant without above combination of characters ..... 7
  7. T. lt. obovate ..... 8
  - T. lt. ovate ..... 20
  - T. lt. oval or roundish ..... 27
  8. Panicle lax, little more than a raceme, stem suberect, furrowed, with a few straight prickles ..... *sulcatus*
  - Panicle very narrow, petals crumpled, t. lt. usually with stalk half its own length ..... *caerestensis*, var. *integribasis*
  - Panicle narrow, leaves imbricate with teeth very crowded but deeply cut, t. lt. roundish obovate with stalk about one-third its length, stem prickles short, declining. (The overlapping leaflets with "overcrowded" teeth are very noticeable in the plant from the original locality, the Wye valley below Monmouth) ..... *imbricatus*
  - Panicle broader, more branched ..... 9
  9. Leaves very large, leaflets all broad, stem furrowed throughout and almost without hair (Babington's plant from Scotland) *latifolius*
  - Plant not as above described ..... 10
  10. Fully developed panicle abnormally large, long, pyramidal, with its branches strikingly felted ..... *egregius*, var. *bracteatus* (*mercicus*, var. *bracteatus* of *Lond. Cat.*)
  - Panicle less strikingly developed ..... 11

- Leaves all, or nearly all, 3-nate, t. lt. obovate or oval, stem with little or much hair, panicle long, variously branched with rachis and branches hairy and grey-felted and with few declining prickles (Devon and Cornwall) ... *egregius*, var. *plymensis*
11. Stem and often leaf stalks and midribs dark red, stem prickles with yellow points, leaves usually 5-nate pedate. (See A 18; the leaves of this species may retain the felt or lose it when mature) ..... *argenteus*
- Plant not as above described ..... 12
12. Stem with a good deal of hair ..... 18
- Stem thinly hairy or glabrous (fairly hairy when young in *R. Colemannti*) ..... 14
13. Leaflets long, narrow and coarsely toothed. (See B 33 below) *silvaticus*
- Leaflets roundish; a striking feature is the silky sheen of the close white hair on the underside of all leaflets *hirtifolius*, var. *orbifolius*
14. T. lt. shortly and rather abruptly pointed ..... 15
- T. lt. more gradually pointed ..... 17
15. Leaves often plicate, especially on panicle, stem leaves white-felted at first, panicle leaves usually white-felted throughout, flowers large, soft pink, panicle rather small and narrow in poor soils, large leafy and well-branched in good soil, rachis stout and felted. Mature leaves often lose the felt (Cornwall, plentiful) ..... *nemoralis*, var. *cornubiensis*
- Plant not as described above ..... 16
16. Stem prickles rather short, declining, t. lt. with long stalk ..... *nemoralis*
- Stem prickles long and patent, leaflets often overlapping, panicle showy, flowers bright pink (Commons near London) *imbricatus*, var. *londinensis*
17. Panicle long and narrow with flowers on long greyish or whitish felted pedicels, the latter sometimes strongly ascending, i.e., almost erect, sepals long-pointed (not a common plant) ..... *nemoralis*, var. *glabratus*
- Panicle not as described above ..... 18
18. Panicle prickles slender and needle-like, leaf toothed finely cut, t. lt. with cordate base (typical yellowish-stemmed plant from neighbourhood of Bangor) ..... *chrysoxylon*
- Panicle prickles strong ..... 19
19. Leaves coarsely toothed, stem very prickly, prickles compressed, rachis very prickly and hairy with falcate prickles generally predominating ..... *Colemannti*
- Leaves deeply but not very coarsely toothed, panicle with shaggy rachis, prickles on stem and rachis most often long and straight ..... *villicaulis*
- T. lt. broad, acuminate, with cordate base, panicle broad, lax, often with nearly patent branches and many frequently hooked prickles (Surrey. See A 4) ..... *rhombifolius*, var. *megastachys*
20. T. lt. large, often triangular ovate, stem furrowed, glabrous or nearly so, panicle leafy ..... *stanneus*
- (The Cornish plant recorded as *latifolius*).
- T. lt. not triangular ovate ..... 21
21. Floral organs all pure white, panicle irregular, pedicels felted, t. lt. usually long-pointed ..... *leucandrus*
- Floral organs not all pure white or panicle regular in shape ... 22
22. Stem distinctly furrowed, glabrous or nearly so ..... 23
- Stem not much furrowed ..... 24
23. Panicle elongate, often little more than a raceme, stem sub-erect ..... *sulcatus*
- Panicle normally stout and short, leaflets broad, coarsely toothed, thinly softly hairy below ..... *gratus*

- Panicle normally short and small, leaflets broad, coarsely toothed and lobed, densely softly hairy below, perhaps felted when young (Babington's plant from Scotland) ..... *latifolius*
24. Stamens short, rarely exceeding styles, stem and panicle prickly with usually curved or hooked prickles, leaves often blotched with red above, t. lt. roundish ovate, stem nearly glabrous ..... *Selmeri*  
Stamens longer ..... 25
25. T. lt. with cordate base, stem glabrous, or nearly so, prickles on main stem straight and very long ..... *affinis*  
Stem hairy, t. lt. not usually cordate ..... 26
26. Flowers white, panicle rather long, t. lt. with a remarkably long narrow point (Dorset) ..... *purbeckensis*  
Flowers pinkish, panicle rather long, t. lt. with point of varying length but not remarkably long and narrow as in above species ..... *nrtifolius*  
Flowers bright red or bright pink, panicle broad and stout, short (West of Ireland) ..... *iricus*
27. Leaves thinly hairy beneath, stem glabrous (or thinly hairy in *R. mercicus*) ..... 28  
Leaves with a good deal of soft hair beneath ..... 31
28. Leaves small, t. lt. oval, panicle varying from racemose to remarkably branched and compound ..... *affinis*, var. *Briggsianus*  
Leaves larger or panicle different ..... 29  
Leaves rather small, often somewhat parallel-sided, stem somewhat furrowed, stouter panicles often crowded above with long prickles, lighter panicles with longer branches and fewer prickles, often one branch long and patent, flowers pink and very showy (S.W. England and S. Wales) ..... *thyrsoideus*,  
var. *viridescens*
29. Panicle very narrow and lax, generally little more than a raceme, t. lt. on long stalk (nearly half its own length), petals crumpled, soon falling ..... *caerestensis*, var. *integribasis*  
Panicle long and lax, usually a raceme, stem suberect, furrowed, leaves large, t. lt. with long point ..... *sulcatus*  
Panicle not usually racemose or narrow ..... 30
30. Panicle lax, irregular, pedicels often long and slender with very slender prickles, leaves dark green (a scarce plant of the Midlands) ..... *mercicus*  
Panicle regular, cylindrical, broad and short, leaves glabrous and wrinkled above, t. lt. typically oval (a local Derbyshire plant) ..... *durescens*  
Panicle regular, pyramidal, with little or no felt on rachis and pedicels, t. lt. acuminate, roundish or broadly oval, stem glabrous (especially common in Wales) ..... *nemoralis*, var. *Silurum*
31. Leaves coarsely toothed ..... 32  
Leaves with finer teeth ..... 34
32. Leaves 3 to 5-nate, t. lt. broadly oval, with long acuminate point, very coarsely toothed, panicle long, pyramidal with very wavy rachis, long pointed sepals and numerous stalked glands. Stem prickles slender rather scattered. (Panicles often very large, sprawling on the foliage or hanging down the sides of the bush—Cornwall and Devon) ..... *adscitus*  
Leaves usually 5-nate, t. lt. oval-obovate or roundish, leaflets broad and imbricate, panicle long, the upper branches patent with 1 to 4 pure white flowers (Cheshire) ..... *castrensis*  
Plant not as described above ..... 33
33. Flowers bright red or bright pink, panicle short and broad, leaves large, t. lt. oval (Ireland) ..... *iricus*

- Flowers paler, usually white, panicle long and leafy, leaflets narrow and long-pointed ..... *silvaticus*
- Flowers bright red or bright pink, leaves small, t. lt. rather parallel-sided, panicle cylindrical (south-western counties) ..... *tricus*,  
var. *minor*
34. All leaflets on stem leaves broad, t. lt. rounded cordate acuminate with long petiole nearly half its own length, panicle cylindrical, mature stem glabrous (Armagh and Down) ... *Lindletianus*,  
var. *latifolius*
- Leaves large, generally very large, t. lt. oval-cordate, panicle rather weak and weakly armed, stem hairy ..... *macrophyllus*
- Leaves very large and densely hairy below, t. lt. oval, panicle very strong with rather crowded prickles (see A 6) ..... *altiarcuratus*
- Leaves all, or nearly all, 3-nate, t. lt. obovate or oval, stem with little or much hair, panicle long, variously branched with rachis and branches hairy and grey-felted and with few declining prickles (Devon and Cornwall) ... *egregius*, var. *plymensis*
- T. lt. roundish oval, panicle cylindrical with weak needle-like prickles, stem usually hairy ..... *hirtifolius*, var. *mollissimus*
- T. lt. nearly circular with very short point, panicle long with crowded prickles, stem glabrous with stout strong prickles. (On open ground in Scotland the low-domed bushes are as rounded in outline as the terminal leaflets) ..... *Scheutzii*  
35
- Plant not as described above, t. lt. oval ..... 36
35. Stem prickles long and even in length. (See B 19 above) ..... *villicaulis*  
36
- Stem prickles short or unequal ..... 36
36. T. lt. rounded below with very long narrow acuminate point, stem prickles unequal, straight, slender, declining, flowers white (Dorset and S. Hants) ..... *purbeckensis*  
37
- T. lt. with shorter point ..... 37
37. T. lt. rather rounded, stem prickles unequal, rather short, patent, flowers white with white stamens longer than green styles (Surrey, Oxfordshire and W. Sussex) ..... *surrejanus*
- T. lt. rather rounded, stem prickles more or less declining, stamens hardly longer than styles (W. Sussex) *surrejanus*, var. *wealdensis*  
(*R. purbeckensis* and *R. surrejanus* = *R. leucanthemus* of Lond. Cat.).

SECTION C.

Fruiting sepals reflexed, armature mixed, leaves felted beneath.

1. Plant almost without stalked glands but with more or less slender prickles scattered over a roundish stem, pedicels white-felted (Caesian) ..... 2
- Plant considerably glandular in stem or panicle or both ..... 4
2. Stem hairy, flower white (a plant of the Bristol neighbourhood) ..... *Bucknalli*  
Stem glabrous or nearly so (varieties of *R. corylifolius*) ..... 3
3. T. lt. roundish with short point ..... var. *conjungens*  
T. lt. with longer point often somewhat lobed or divided ..... var. *subulstris*
4. Drupelets rather large and only fairly many, flowers showy with rounded petals, leaves broad, leaflets short-stalked and overlapping, basal almost sessile (Caesian—see note after Section N) ..... *dumetorum*
- Drupelets usually more or less normal in size and number (i.e., averaging 30 or 40 to the fruit) ..... 5
5. T. lt. widest about the middle and thence narrowed each way (i.e., between diamond-shaped and oval), panicle very wavy (i.e., rachis zigzag) and leafy with short branches and very short glands ..... *foliosus*

- T. lt. roundish rhombic, stem roundish with some stout prickles, panicle narrow, lax, few-flowered, with dark purple glands in abundance, some very long and a few even on the surface of upper panicle leaves ..... *rubiginosus*
- T. lt. narrow oval, parallel-sided, stem reddish and glossy almost without hair, felt under the leaves often dark or greenish ..... *apiculatus*  
6
- Plant not as described above .....
6. Panicle almost without prickles, panicle branches often almost erect, flowers small red, stem with many pricklets ..... *Boraeanus*
- Panicle peculiar—typically lax and broadly cylindrical with truncate top, branches roughly at right angles to rachis and some even pointing downward, each long with an umbel-like cluster of flowers at the end, the whole thickly clad with felt, hair, and slender prickles; t. lt. oblong-oval or obovate, broad, stem prickles mostly on angles and fairly equal ..... *Babingtonii*  
7
- Plant not as described above .....
7. Stem densely hairy, leaves remarkable for the patent or recurved state of the larger teeth, panicle long and leafy with the lower branches remote and generally very short (Koehlerian) ..... *dasyphyllus*
- T. lt. without the ugly, "pointing-any-way" toothing described above ..... 8
8. Leaves usually 3-nate, t. lt. with long point, prickles very slender on stem and panicle (Norfolk) ..... *Lintoni*
- Leaves usually 3-nate, t. lt. with rather short point, obovate-cuspidate, panicle long and lax ..... *egregius*  
9
- Leaves usually 5-nate .....
9. T. lt. diamond-shaped (i.e., rhombic), stem with strong bright red prickles ..... *setulosus*
- T. lt. ovate ..... 10
- T. lt. obovate ..... 14
- T. lt. oval or roundish ..... 21
- T. lt. variable even on same plant (common south of the Thames—see A 18) ..... *ctissburiensis*
10. Stem considerably hairy ..... 11
- Stem with little or no hair ..... 12
- Stem somewhat hairy, prickles on the angles few and strong, nearly equal, flat faces of stem rough with a crowded growth of nearly equal stalked glands, acicles and pricklets, t. lt. broad, cordate ..... *radula*
11. T. lt. roundish ovate, leaves usually white-felted, stem with strong but unequal red prickles (see C 19) ..... *Griffithianus*
- T. lt. with long acuminate point and coarse irregular toothing, leaflets rather dark-felted below, edges wavy, stem densely hairy, prickles chiefly on angles, weak, declining ..... *criniger*
- T. lt. with sharp deep very compound toothing, leaves greenish felted beneath, stem furrowed with abundant prickles, deep purple or red, panicle cylindrical, narrow and leafy, panicle leaves also with very prominent teeth ..... *echinatus*
- T. lt. with long acuminate point, leaves shining white-felted beneath, rather finely toothed ..... *fuscus*, var. *macrostachys*
12. Stem yellowish-brown with strongly declining prickles, leaf toothing very even, occasionally almost obsolete, panicle pyramidal, rachis with yellowish-brown hair and slender crowded declining prickles ..... *Leyanus*  
13
- Stem not yellowish-brown .....

13. Flowers greenish-white, leaves very softly felted beneath, wrinkled above, coarsely toothed, t. lt. with very long point, pedicels with little or no hair but with dark stalked glands standing out conspicuously from close white felt (Plym Valley, Devon. *R. mutabilis*, var. *nemorosus* of *Lond. Cat.*) ..... *sagittarius*
- Flowers pink, t. lt. broadly ovate, sharply toothed, panicle cylindrical with branches patent or nearly so, stem usually dark purple with abundant unequal prickles ..... *raduloides*
14. T. lt. with base rather wedge-shaped or at least narrowed considerably ..... 15
- T. lt. not wedge-shaped nor considerably narrowed ..... 16
15. Stem prickles slender declining, leaflets narrow, those on the panicle often strikingly cuneate, panicle narrow with only fairly many prickles. (*R. ericetorum*, var. *sertiflorus* of *Lond. Cat.*) ..... *radulicaulis*
- Stem prickles slender declining, panicle narrow, panicle and leafstalks with abundant slender mostly curved prickles ... *uncinatus*
- Stem very prickly with prickles varied, those on angles usually stout and strong, panicle when well developed long and broadly pyramidal, leaflets cuneate or much narrowed at base. (*R. ericetorum* of *Lond. Cat.*) ..... *Moylei*
- Shade grown plants of *R. Moylei* may lack felt beneath the stem leaves. The species occurs in Herefordshire and in counties south of the Thames.
16. Leaflets narrow, t. lt. normally on a very long stalk (often half its own length), stem greenish (*R. radula*, var. *anglicanus*) ..... *ericetorum*
- Leaflets broader ..... 17
17. Stem glabrous or very thinly hairy ..... 18
- Stem considerably hairy ..... 19
18. Armature of stem typically radulan but panicle very prickly. (In well-grown plants the contrast between the moderately armed stem and robust very prickly panicle is sometimes so great that they look as if they belong to different plants) ..... *radula*,  
var. *echinatoides*  
*raduloides*
- Stem prickles strong, uneven (see C 13) .....  
(N.B.—*R. Newbouldii* occasionally has felted leaflets. See D 31).
19. Typical plant with unequal strong bright red prickles both on panicle and stem and white felt on pedicels and beneath the leaves—an unusual contrast ..... *Griffithianus*
- Plant without above contrasts ..... 20
20. T. lt. roundish obovate or narrower, stem dark purple with patent prickles but few acicles or stalked glands, reflexed fruiting sepals white and conspicuous ..... *vestitiiformis*
- T. lt. roundish obovate, stem with many acicles and stalked glands ..... *ctnerosus*
- T. lt. not roundish obovate (but obovate, short-pointed with narrowed base), whole plant yellowish and very prickly both on stem and broad panicle, panicle rachis and branches hairy and felted ..... *Borreri*
- T. lt. with long acuminate point, leaves shining white-felted beneath, rather finely toothed ..... *fuscus*, var. *macrostachys*
21. T. lt. narrow oval, normally on very long stalk, stem greenish (*R. radula*, var. *anglicanus*) ..... *ericetorum*
- R. echinatus* may have also an admixture of rather narrow oval t. lts. (See C 11).
- T. lt. broader or with shorter stalk ..... 22
22. T. lt. oval, narrowed at both ends, leaflets all long with deeply cut teeth and with greenish-grey felt beneath, stem pale with prickles chiefly on angles (Hants, Sussex and Surrey) = *mutabilis* of *Lond. Cat.* ..... *Wedgwoodiae*

- R. Wedgwoodiae*, var. *Naldretti*, from the Sussex Downs has the oval or oval-obovate t. lt. with simple shallow nearly regular teeth, stem glandular with crowded tubercle-based prickles and strong uneven acicles, and panicle somewhat pyramidal with truncate top and crowded slender prickles. The var. *Sabrinae*, from W. Gloucester, Glamorgan, and Brecon differs from the type in its pink or lilac (instead of whitish) petals and broader t. lt., less narrowed below.
- T. lt. oval long pointed coarsely toothed, panicle long pyramidal with very wavy rachis, long pointed sepals and numerous stalked glands (Devon and Cornwall; see B 32) ... *adscitus*
- T. lt. with sharp deep very compound toothing, leaves greenish felted beneath, stem furrowed with abundant prickles, deep purple or red, panicle cylindrical, narrow and leafy, panicle leaves also with very prominent teeth ..... *echinatus*  
23
23. Panicle broad but of light appearance because of the slenderness of the (sometimes interwoven) rachis branches and pedicels, t. lt. with entire base (see D 3) ..... *rudis*
- Panicle more heavily built, broad and leafy, stem leaves large, t. lt. with cordate base ..... *Gelertii*

## SECTION D.

Fruiting sepals reflexed, armature mixed, mature leaves not felted beneath.

1. T. lt. broadest about the middle (more diamond shaped than oval), leaves chiefly 3-nate, rachis very wavy, panicle narrow and leafy with very short stalked glands ..... *foliosus*
- T. lt. much as in *R. foliosus*, but rachis not strikingly zigzag as in that species, stalked glands longer (a small plant from Sprowston Heath, Norfolk) ..... *Lintoni*
- T. lt. usually narrow, widest as a rule just above the middle and tapering to base and point (in outline often much like a boy's kite), panicle narrow cylindrical usually with many narrow leaves. Flower white or faintly pinkish. Plant early in flower and fruit (Cornwall and Devon; very common in West Cornwall) ..... *Rilstonei*
- T. lt. broadest above middle and narrowed each way (kite-shaped), leaves very large, panicle an enormous triangle sometimes twenty inches across base, armature Bellardian ..... *Kaltenbachii*
- T. lt. almost oblong, i.e., parallel-sided, with uneven toothing, truncate cuspidate, leaves chiefly 3-nate, panicle narrow ... *regillus*
- T. lt. usually oblong-obovate, with some teeth recurved, panicle large, lax ..... *curvidens*
- T. lt. rather roundish rhombic, panicle very glandular with a few stalked glands on surfaces of upper panicle leaves (see C 5) ..... *rubiginosus*  
2
- T. lt. ovate, obovate, oval, or round ..... 2
2. T. lt. usually oval but may be ovate or obovate, shortish pointed, stem roundish, closely downy, with main prickles short and stout and fairly equal in size, stem rough with abundant tubercles and (or) short rigid bristles ..... *scaber*
- Panicle peculiar—typically lax and broadly cylindrical with truncate top, branches roughly at right angles to rachis and some even pointing downward, each long with an umbel-like cluster of flowers at the end, the whole thickly clad with felt, hair, and slender prickles; t. lt. oblong-oval or obovate, broad, stem prickles mostly on angles and fairly equal ..... *Babingtonii*

- T. lt. obovate or oval, plant hairy, panicle leafy with felted pedicels and long slender prickles, stalked glands plentiful on petioles and petiolules (especially of panicle leaves), much fewer elsewhere (Co. Down) ..... *Letiti*  
3
- Plant not as above described ..... 3
3. T. lt. variable even on the same plant (see A 18) ..... *cissburiensis*
- T. lt. ovate or oval or even diamond shaped, stalked glands on stem numerous and very short, panicle usually much branched but of light appearance because of the slenderness of the long (often interlacing) branches and pedicels and the smallness of the flower and fruit; t. lt. of panicle leaves with cuneate base ..... *rudis*  
4  
32  
42
- T. lt. obovate ..... 4  
T. lt. ovate ..... 32  
T. lt. oval or roundish ..... 42
4. Leaves small, leaflets narrow with long points, sepals strongly reflexed (Epping Forest) ..... *Powellii*  
5  
Leaves larger or wider ..... 5
5. Stem densely hairy with abundant stalked glands (sunk in the hair) and slender prickles; leaves 3-nate, base of t. lt. somewhat wedge-shaped, panicle few-flowered lax, leafy (Sproston Heath, Norfolk) ..... *tereticaulis*  
6  
7  
20  
Plant not as above ..... 6  
7  
20
6. Stem considerably hairy ..... 7  
Stem glabrous or thinly hairy ..... 20
7. Panicle long, very narrow, interrupted below with very short lower branches, leaves with main teeth patent or recurved (Koehlerian) ..... *dasyphyllus*  
8  
Plant not as above described ..... 8
8. Stem leaves 3-nate, stem purple, roundish, with slender varied prickles, panicle broad with many patent branches, stalked glands purple, armature Bellardian ..... *divextramus*  
9  
Armature not Bellardian ..... 9
9. Whole plant yellowish, very prickly (see C 20) ..... *Borreri*  
10  
Plant not noticeably yellowish or not unusually prickly ..... 10
10. Plant glandular; pedicels white-felted contrasting with green under surfaces of leaves ..... *Letiti*  
11  
Plant not so contrasted ..... 11
11. Base of t. lt. narrowed and wedge shaped ..... 12  
Base of t. lt. not wedge shaped ..... 15
12. T. lt. shortly and abruptly pointed, stem dark purple with blunt angles, main prickles on angles; fairly even stalked glands numerous on faces ..... *cenomanensis*  
13  
T. lt. with more gradual point ..... 13
13. Leaves very large, panicle an enormous triangle (see D 1) ..... *Kaltenbachii*  
14  
Panicle not abnormally large ..... 14
14. Panicle narrow cylindrical with crowded slender curved prickles ..... *unctinatus*  
*Lejeunei*  
Panicle lax, pyramidal .....  
Panicle a long lax leafy cylinder with 1-2 flowered branches, stem leaves 3-nate with strikingly wedge-shaped base of t. lt. (The panicle is unique: well spaced branches of equal length interspersed with leaves stand at right angles to the rachis each usually carrying two flowers) .....  
15. T. lt. broad, abruptly cuspidate .....  
T. lt. with more gradual point ..... 16
16. Panicle narrow and leafy with dark red rachis, highly glandular and aciculate, leaves coarsely toothed, stem bluntly angled, stem prickles long and slender, not very unequal, patent or slightly declining (Dorset) ..... *praeruptorum*

Plant not as described above .....	17
17. T. lt. typically narrow and very long pointed, prickles slender declining, not very unequal, pale in colour, panicle lax, stalked glands very dark coloured .....	<i>pallidus</i>
T. lt. more broadly obovate .....	18
18. Flowers small, greenish white, stalked glands on stem short and abnormally numerous .....	<i>pallidus</i> , var. <i>leptopetalus</i>
Flowers not greenish white .....	19
19. Prickles on stem scattered, hooked or strongly declining, panicle peculiar—lax, broad with three or four flowers at end of each long slender branch .....	<i>acutifrons</i>
Prickles on stem weak, declining or curved, chiefly on angles, panicle shaggy, broad and leafy with slender prickles, point of t. lt. generally curved, toothing often coarse .....	<i>Bloxamii</i>
Prickles on stem rather short and fairly equal, partly on the angles, panicle cylindrical, stem densely hairy .....	<i>fuscus</i>
20. Stem and petioles blackish purple (often as if ink-stained), t. lt. shortly and abruptly pointed (obovate-truncate—sometimes rather cuneate), panicle narrow and lax .....	<i>melanodermis</i>
Stem not blackish purple .....	21
21. Stem crowded with very unequal scattered prickles, panicle broadly laxly cylindrical with long patent branches, pedicels crowded with long slender prickles .....	<i>Koehleri</i>
Prickles not so crowded nor unequal .....	22
22. T. lt. roundish obovate with abrupt point .....	23
T. lt. with narrower, not roundish, base or without abrupt point .....	24
23. Leaves 3-nate, stem with crowded short declining prickles, glands and tubercles, panicle long .....	<i>ochrodermis</i>
Leaves large, 3-5 nate, stem with rather few glands .....	<i>morganwagensis</i> (= <i>horridicaulis</i> )
24. Leaves usually 5-nate, t. lt. with wedge-shaped base and abrupt point .....	<i>cenomanensis</i>
Leaves 3-nate, t. lt. obovate cuspidate, petals narrow, white ...	<i>longithyriger</i>
Leaves usually 3-nate, t. lt. truncate obovate cuspidate, petals narrow .....	<i>botryeros</i>
Petals not narrow or leaf different .....	25
25. T. lt. with somewhat wedge-shaped base .....	26
T. lt. without wedge-shaped base .....	28
26. Panicle narrow with crowded slender curved prickles .....	<i>uncinatus</i>
Panicle not crowded with slender curved prickles .....	27
27. Leaflets narrow, those on panicle extremely wedge shaped ...	<i>radulcaulis</i> (= <i>sertiflorus</i> of Lond. Cat.)
Leaflets fairly broad .....	<i>cenomanensis</i>
28. T. lt. large, roundish obovate, panicle very prickly, large, lax and spreading .....	<i>festivus</i>
Plant not as described above .....	29
29. Leaves mostly 3-nate, t. lt. with rather short point, obovate-cuspidate, panicle long and lax (rare) .....	<i>egregius</i>
Leaves mostly 5-nate .....	30
30. Panicle lightly built with slender intertwining branches and pedicels, stalked glands numerous and very short (see D 8)	<i>rudis</i>
Panicle stouter .....	31
31. Stem with blunt angles, panicle with wide erratic branching (see H 21) .....	<i>mucronatoides</i>
Stem sharply angled, panicle more regular .....	<i>Newbouldii</i>
32. T. lt. gradually narrowed to a very long point (Monmouth and neighbouring counties) .....	<i>cavatifolius</i>
T. lt. with shorter or more acuminate point .....	33

33. Stem yellowish brown with declining prickles (see C 12) ..... *Leyanus*  
 Plant much like *R. Leyanus* (C 12) but main prickles patent or  
 nearly so (Co. Down) ..... *hibernicus*  
 (var. *dunensis* has stronger armature).  
 Plant not as described in C 12 or above ..... 34
34. Stem thickly hairy, leaves small, coarsely toothed, very hairy  
 below, panicle narrow above with distant lower branches  
 either erect or spreading, looking like smaller copies of  
 the upper part, stem prickles mostly patent, very unequal  
 (Koehlerian) ..... *Marshalli*  
 Plant not as described above ..... 35
35. Stem considerably hairy ..... 36  
 Stem glabrous or thinly hairy ..... 39
36. Leaflets narrowly ovate (see D 17) ..... *pallidus*  
 Leaflets broadly ovate ..... 37
37. Leaves mostly 3-nate, t. lt. roundish ovate, panicle lax, arma-  
 ture Bellardian ..... *flaccidifolius*  
 Leaves mostly 5-nate ..... 38
38. Stem purplish or brownish, t. lt. with very long point, panicle  
 lax, usually drooping with narrow simple leaves ..... *nuticeps*  
 (*R. fuscus*, var. *nutans*)  
 Stem purple or brownish, t. lt. with fairly long point, panicle  
 not drooping ..... *fuscus*  
 Stem reddish or reddish brown (see D 19) ..... *acutifrons*
39. Leaves with soft hair beneath, leaves deeply toothed, 5-nate,  
 stems angled (a scarce plant ?) ..... *Koehleri*, var. *cognatus*  
 Leaves only thinly hairy beneath ..... 40
40. T. lt. large roundish-ovate, petioles and panicle densely clothed  
 with long stalked glands, acicles and slender prickles,  
 armature Bellardian (Dorset) ..... *Durotrigum*  
 Armature not Bellardian ..... 41
41. Stalked glands very short, panicle light (see D 3) ..... *rudis*  
 Stalked glands long, leaves rather small, panicle with lower  
 branches as in *R. Marshalli* (see D 34 and H 26) ..... *Marshalli*,  
 var. *semiglaber*
42. T. lt. roundish ..... 43  
 T. lt. oval ..... 44
43. Leaves mostly 3-nate, large, t. lt. with short point, sepals long  
 pointed, stem with little hair, large prickles on angles,  
 fairly equal, tubercles, etc., numerous on faces ..... *rosaceus*  
 Leaves mostly 5-nate, panicle lax, broad and prickly ..... *festivus*  
 Leaves mostly 5-nate, finely toothed, plant rather intermediate  
 between *Borreri* and *infestus* ..... *infestus*, var. *virgultorum*
44. Panicle long with very wavy rachis, leaves large, very  
 coarsely toothed (Devon and Cornwall, see B 32) ..... *adscitus*  
 Plant not as above ..... 45
45. Leaves thinly hairy beneath ..... 46  
 Leaves considerably hairy beneath ..... 47
46. Panicle broad but light (see D 3) ..... *rudis*  
 Panicle narrow, stalked glands on panicle longer than the hair ..... *podophyllus*
47. Stem prickles crowded and very unequal ..... *Koehleri*  
 Stem prickles not very uneven ..... 48
48. Panicle with dense felt, t. lt. broadly oval ..... *Geletii*  
 Panicle with little felt, t. lt. more narrowly oval, or through  
 the narrowing of the base rather obovate, leaves coarsely  
 and sharply toothed with veins prominent beneath and  
 long acuminate point, sepals long-pointed, usually erect at  
 first (Devon) ..... *Borreri*, var. *dentatifolius*

## SECTION E.

Fruiting sepals spreading more or less horizontally, armature simple, mature leaves felted beneath.

1. Leaflets long and narrow, parallel-sided, t. lt. on a rather long stalk ..... *lasioclados*, var. *angustifolius*  
 Leaflets not as described above ..... 2
2. Leaflets very small and finely toothed, t. lt. on long stalk (see A 12) ..... *Bakeri*  
 Leaflets larger ..... 3
3. Stem hairy and felted, panicle very prickly ..... 4  
 Stem glabrous or nearly so, t. lt. oval long-pointed, panicle almost without prickles, flowers on long pedicels except terminal flower which has a very short stalk ..... *opacus*
4. Stem prickles falcate or declining, panicle close ..... *lasioclados*  
 Stem prickles long and straight, patent or nearly so, panicle lax ..... *lasioclados*, var. *longus*

## SECTION F.

Fruiting sepals spreading more or less horizontally, armature simple, mature leaves not felted beneath.

1. Ripe fruit dark red, not black, panicle little more than a raceme, leaves often 6-7 nate, stem suberect ..... 2  
 Ripe fruit black ..... 3
2. Leaves thick, plicate, hairy below, prickles numerous, long and slender ..... *fissus*  
 Leaves large thin not plicate, almost hairless, prickles few and short ..... *suberectus*
3. Leaves plicate, pale green, 5-nate or occasionally 6-7 nate, t. lt. long and acuminate, oftenest oval but also ovate or obovate, flowers white—a pale and very prickly plant with yellowish prickles especially common south of London ..... *carpinifolius*  
 Plant not as described above ..... 4
4. T. lt. ovate ..... 5  
 T. lt. obovate ..... 9  
 T. lt. oval or roundish ..... 11
5. Mature stem deeply grooved above, with prickles mostly short, leaves very large, flowers rose-coloured large and showy (N. Wales) ..... *monensis*  
 (R. *latifolius* of Lond. Cat. in part.)  
 Mature stem not deeply grooved ..... 6
6. Stem suberect, panicle racemose or nearly so, prickles often hooked ..... 7  
 Stem not suberect, prickles declining not hooked, panicle not racemose ..... 8
7. Stamens hardly longer than styles, basal leaflets hardly stalked ..... *plicatus*  
 Stamens much longer than styles, basal leaflets distinctly stalked ..... *plicatus*, var. *Bertramii*
8. Panicle broad and short (a local Derbyshire plant) ..... *durescens*  
 Panicle long (plant chiefly from Ireland) ..... *hesperius*
9. Panicle very narrow, petals crumpled, t. lt. on stalk half its own length ..... *caerestensis*, var. *integribasis*  
 Panicle long, flowers on long stalks typically red, t. lt. on stalk about one-third of its own length ..... *holerythros*  
 Panicle different ..... 10
10. Stem glabrous (see B 34) ..... *Scheutzii*  
 Stem considerably hairy ..... *hirtifolius*

- |  |                                   |
|--|-----------------------------------|
| 11. T. lt. oblong-oval, small, shining green, panicle compound, with many flowers and numerous prickles .....  | <i>nitidus</i>                    |
| T. lt. oblong-oval, large, with large compound tothing, teeth somewhat erratic in direction .....  | <i>calvatus</i>                   |
| T. lt. not oblong oval .....   | 12                                |
| 12. T. lt. large, broadly oval, with large compound tothing (see F 11 above) .....   | <i>calvatus</i>                   |
| T. lt. without large erratic tothing .....   | 13                                |
| 13. T. lt. small oval, short pointed, rachis and pedicels felted .....   | <i>opacus</i> , var. <i>minor</i> |
| T. lt. larger or with longer point .....   | 14                                |
| 14. T. lt. with cordate or subcordate base .....   | 15                                |
| T. lt. without cordate base—emarginate or entire .....   | 17                                |
| 15. T. lt. roundish or oval (or oval obovate) leaflets broad and imbricate, panicle long, the upper branches patent with 1 to 4 flowers, the flowers pure white (Cheshire) ..... | <i>castrensis</i>                 |
| Plant not as described above .....   | 16                                |
| 16. T. lt. very gradually narrowed to the point, panicle almost without prickles, flowers all long-stalked except the short-stalked terminal flower .....                        | <i>opacus</i>                     |
| T. lt. with less gradual point (see B 30) .....  | <i>durescens</i>                  |
| 17. Flowers red, large, showy, on long stalks .....  | <i>holerythros</i>                |
| Flowers rather small, on long stalks, petals pink, usually crumpled .....  | <i>Sprengelii</i>                 |

## SECTION G.

Fruiting sepals spreading more or less horizontally, armature mixed, leaves felted beneath.

- |   |                       |
|---|-----------------------|
| 1. Stem considerably hairy .....  | 2                     |
| Stem with little hair .....   | 5                     |
| 2. Whole plant yellowish and very prickly, panicle broad .....  | <i>Borreri</i>        |
| Plant not noticeably yellowish .....  | 3                     |
| 3. Stem prickles strong unequal, leaves white felted (see C 19) ...   | <i>Griffithianus</i>  |
| Plant not as above described .....  | 4                     |
| 4. Stem very hairy, prickles very unequal, flowers bright red (Koehlerian) .....  | <i>fusco-ater</i>     |
| Stem fairly hairy, flowers pinkish, panicle peculiar (see C 6) ...  | <i>Babingtonii</i>    |
| 5. T. lt. cordate ovate acuminate, very soft below (see C 13) .....   | <i>sagittarius</i>    |
| T. lt. broadly ovate, stem and panicle strongly armed with curved prickles .....  | <i>infestus</i>       |
| T. lt. broadly ovate, stem yellowish with declining prickles (see C 12) .....   | <i>Leyanus</i>        |
| T. lt. ovate or oval or even diamond shaped, stalked glands on stem numerous and very short, panicle usually much branched but of light appearance because of the slenderness of the long (often interlacing) branches and pedicels and the smallness of the flower and fruit; t. lt. of panicle leaves with cuneate base ..... | <i>rudis</i>          |
| T. lt. not ovate .....  | 6                     |
| 6. Stem and panicle blackish-hued, leaflets with fine even teeth (chiefly Scotland) .....   | <i>fulvicolor</i>     |
| Stem without peculiar blackish hue .....  | 7                     |
| 7. T. lt. variable even on same plant (see A 18) .....  | <i>ciissburiensis</i> |
| T. lt. roundish obovate or like those of <i>foliosus</i> ; a small plant with small panicles (Sprowston Heath, Norfolk) .....   | <i>Lintoni</i>        |
| T. lt. narrow oval, parallel sided (see C 5) .....  | <i>apiculatus</i>     |
| T. lt. ovate or obovate, broader (see C 13) .....   | <i>raduloides</i>     |

## SECTION H.

Fruiting sepals spreading more or less horizontally, armature mixed, leaves not felted beneath.

- |   |   |
|---|---|
| 1. T. lt. narrowed gradually at each end (often somewhat kite-shaped) .....   | 2   |
| T. lt. roundish .....   | 3   |
| T. lt. obovate, ovate, or oval .....  | 5   |
| 2. Panicle very large, stalked glands on panicle purple, long (see D 1) .....   | <i>Kaltenbachii</i>                       |
| Panicle narrow cylindrical leafy (Cornwall, common. See D 1) .....  | <i>Rilstonei</i>                          |
| 3. Leaves large, usually 3-nate, sepals long-pointed, plant often very dark green (see D 43) .....  | <i>rosaceus</i>                           |
| Leaves 3-5 nate, small, very hairy below, stem densely hairy, panicle narrow above (see D 34) .....   | <i>Marshalli</i>                          |
| Leaves 5-nate or stem only thinly hairy .....   | 4   |
| 4. Leaves finely toothed (see D 43) .....   | <i>infestus</i> , var. <i>virgultorum</i> |
| Leaves coarsely toothed, prickles on stem very unequal and scattered .....  | <i>Koehleri</i> , var. <i>cognatus</i>    |
| 5. T. lt. broadly ovate or obovate, stem roundish, downy (see D 2) .....  | <i>scaber</i>                             |
| T. lt. broadly ovate or obovate, stem with blunt angles and hooked or declining prickles (see D 19) .....   | <i>acutifrons</i>                         |
| T. lt. oblong oval or obovate, prickles mostly declining (see C 6) .....  | <i>Babingtonii</i>                        |
| T. lt. ovate or oval or even diamond shaped, stalked glands on stem numerous and very short, panicle usually much branched but of light appearance because of the slenderness of the long (often interlacing) branches and pedicels and the smallness of the flower and fruit; t. lt. of panicle leaves with cuneate base ..... | <i>rudis</i>                              |
| T. lt. obovate, ovate or oval, but plant differing from those described above .....   | 6   |
| 6. Stem considerably hairy .....  | 7   |
| Stem glabrous or thinly hairy .....   | 14  |
| 7. T. lt. ovate .....   | 8   |
| T. lt. obovate .....  | 9   |
| T. lt. oval (see H 22) .....  | <i>viridis</i>                            |
| 8. Stem prickles very unequal, chiefly patent (see D 34) .....  | <i>Marshalli</i>                          |
| Stem prickles declining, glands on pedicels long (Bellardian) ...   | <i>viridis</i>                            |
| Stem prickles declining, stem and panicle yellowish (see C 12) .....  | <i>Leyanus</i>                            |
| 9. Stem and leaves of a yellowish tint, whole plant very prickly (see C 20) .....   | <i>Borreri</i>                            |
| Plant not noticeably yellowish .....  | 10  |
| 10. Stem roundish densely hairy and glandular (see D 5) .....   | <i>tereticaulis</i>                       |
| Stem angled .....   | 11  |
| 11. T. lt. with wedge-shaped base .....   | 12  |
| Base of t. lt. not wedge shaped .....   | 13  |
| 12. Panicle very large, pyramidal (see D 1) .....   | <i>Kaltenbachii</i>                       |
| Panicle cylindrical with well-spaced 2-flowered branches (see D 14) .....   | <i>thyrsiger</i>                          |
| 13. T. lt. short pointed, roundish obovate .....  | <i>Drejeri</i>                            |
| T. lt. with longer often curved point (see D 19) .....  | <i>Bloxamii</i>                           |
| 14. Stem glabrous or nearly so, prickles nearly equal, panicle narrow above—stem, petioles, petiolules, panicle and all its branches everywhere crowded with bristles and glands ...  | <i>cenomanensis</i>                       |
| Plant not as above described .....  | var. <i>Bloxamianus</i>                   |
| Plant not as above described .....  | 15  |
| 15. T. lt. variable (see A 18) .....  | <i>cissburiensis</i>                      |
| T. lt. obovate .....  | 16  |
| T. lt. ovate .....  | 22  |
| T. lt. oval .....   | 27  |
| T. lt. roundish .....   | 30  |

16. Stem of marked blackish hue, leaflets broad, finely toothed  
(chiefly in Scotland) ..... *furvicolor*  
Stem not as above ..... 17
17. T. lt. with long point ..... 18  
T. lt. with short point ..... 19
18. Plant strong and very prickly ..... *infestus*  
Plant small with weak prickles (see C 8) ..... *Lintoni*
19. Stem leaves large with soft hair beneath, leaves mostly 3-nate ..... *mucronatus*,  
var. *nudicaulis*  
Stem leaves not very softly hairy beneath ..... 20
20. Stalked glands on pedicels standing out of felt with little or  
no long hair ..... *podophyllus*  
Pedicels hairy, often with glands more or less hidden in the  
hair ..... 21
21. T. lt. roundish obovate (see H 14) ..... *cenomanensis*, var. *Bloxamianus*  
T. lt. more narrowly obovate, panicle with straggling branches  
(In the typical plant of the Welsh borders the short stalked  
terminal flower is overtopped by long lateral branches) ... *mucronatoides*
22. T. lt. short pointed, stalked glands on panicle very long, leaves  
5-nate (Bellardian) ..... *viridis*  
T. lt. long pointed ..... 23
23. Stem yellowish brown with strongly declining prickles (see C 12)  
Stem different ..... *Leyanus*  
24
24. Leaves softly hairy beneath ..... 25  
Leaves thinly hairy beneath ..... 26
25. Prickles on stem very unequal and scattered ..... *Koehleri*, var. *cognatus*  
Main prickles on angles, often curved and not very unequal,  
faces with numerous smaller prickles and pricklets ..... *infestus*
26. T. lt. roundish, armature Bellardian (see D 40) ..... *Durotrigum*  
Leaves usually rather small, stem with many usually straw-  
coloured prickles, some very long straight or curved, panicle  
larger than that of *R. Marshalli* but like it in having rising  
or spreading lower branches like lesser panicles, panicle  
very prickly with long prickles. (The plant from Wales  
and the borders is often so over-armed with long pale  
prickles as to look a caricature of a bramble) *Marshalli*, var. *semiglaber*
27. Stem furrowed with few or no stalked glands, stem prickles  
often red based (see D 48) ..... *Borreri*, var. *dentatifolius*  
Plant not as above ..... 28
28. Stem blackish purple, leaflet broad, finely toothed (chiefly  
from Scotland) ..... *furvicolor*  
Stem not blackish ..... 29
29. Stalked glands on pedicels very unequal, some very long,  
leaves 5-nate, Bellardian ..... *viridis*  
Stalked glands on pedicel not Bellardian, stem armature  
Radulan, stalked glands on panicle standing clear of felt ..... *podophyllus*
30. Leaves thickly hairy beneath ..... *Koehleri*, var. *cognatus*  
Leaves thinly hairy below (see 26 above) ..... *Marshalli*, var. *semiglaber*

## SECTION K.

Fruiting sepals rising, erect, or clasping, armature simple, mature leaves felted below.

- Stem glabrous, leaves long-pointed (see E 3) ..... *opacus*  
Stem rather hairy, sepals long pointed clasping the fruit ..... *Salteri*  
Stem hairy, leaflets narrow parallel-sided with whitish felt  
beneath ..... *lastocladus*, var. *angustifolius*

## SECTION L.

Fruiting sepals rising, erect, or clasping, armature simple, mature leaves not felted beneath.

- |  |  |
|--|--|
| 1. Ripe fruit dark red (see F 2) .....   | <i>fissus</i>                                      |
| Ripe fruit black .....   | 2  |
| 2. Drupelets very few covered with a waxy bloom, stem eglandular but with scattered prickles, stem leaves 3-nate .....   | <i>caestius</i>                                    |
| Drupelets more numerous .....  | 3  |
| 3. Panicle lax, rather glandular with few prickles, with flowers on long pedicels, t. lt. oval or ovate long-pointed, stamens short .....                        | <i>Sprengeltii</i>                                 |
| Panicle lax, rather glandular with long 1 to 2 flowered branches and crowded usually slender prickles, t. lt. oblong or obovate, stamens short .....             | <i>lentiginosus</i>                                |
| Panicle hardly more than a raceme, stamens shorter than styles, t. lt. oval .....  | <i>plicatus</i> , var. <i>pseudo-hemistemon</i>    |
| Panicle well developed with many hooked prickles, leaves small and shining .....   | <i>nitidus</i>                                     |
| Panicle long with long patent 1 to 3 flowered peduncles, very sparingly glandular, upper part cylindrical, sepals long and clasping .....                        | <i>Salteri</i>                                     |
| Plant not as above .....   | 4  |
| 4. T. lt. short pointed with cordate base (see F 11) .....   | <i>calvatus</i>                                    |
| T. lt. with moderately long point, base not cordate (see B 8) ...  | <i>caerestiensis</i> ,<br>var. <i>integribasis</i> |
| T. lt. with longer point .....   | 5  |
| 5. Terminal flower of panicle often short-stalked, others often on long stalks .....   | 6  |
| Panicle not as above .....   | 7  |
| 6. Panicle with fairly many stalked glands, and few prickles (a form from Sussex, etc.) .....  | <i>lentiginosus</i>                                |
| Panicle without stalked glands or almost so .....  | <i>opacus</i>                                      |
| 7. Stem furrowed, prickles rather short, panicle usually short and stout, flowers large and showy with long stamens, leaves with coarse compound tootthing ..... | <i>gratus</i>                                      |
| Stem sometimes rather furrowed, leaves sharply toothed, sepals erect only on young fruit .....   | <i>hirtifolius</i>                                 |
| Stem bluntly angled, leaves with irregular tootthing, 3-nate or 5-nate, pedate, panicle with fairly many stalked glands (Monmouthshire) .....                    | <i>orthoclados</i>                                 |

N.B.—*R. sciaphilus*, a plant closely allied to *R. gratus*, is said to differ by its non-furrowed more hairy stem, longer slender prickles, and hairy instead of glabrous anthers. *R. hirtifolius* has sepals erect at first, then reflexed (see B 26).

## SECTION M.

Fruiting sepals rising, erect, or clasping, armature mixed, mature leaves felted beneath.

- |   |                    |
|---|--------------------|
| 1. Foliage yellowish green, prickles on stem crowded, often curved (see C 20) ..... | <i>Borreri</i>     |
| Stem yellowish with straight declining prickles (see C 12) .....                    | <i>Leyanus</i>     |
| Plant not noticeably yellowish .....  | 2                  |
| 2. Panicle almost unarmed (see C 6) .....   | <i>Boraeanus</i>   |
| Panicle more prickly .....  | 3                  |
| 3. Prickles very varied in size, flower red, stem very hairy (see N 7) .....        | <i>fusco-ater</i>  |
| Prickles not very varied in size, flower paler (see C 6) .....                      | <i>Babingtonii</i> |

Larger prickles rather uneven, flower paler, panicle with many slender curved prickles, leaves sharply toothed, t. lt. with rather narrow sometimes somewhat cuneate base, sepals long-pointed ..... *adenanthus*

## SECTION N.

Fruiting sepals rising, erect, or clasping, armature mixed, mature leaves not felted beneath.

1. Stem roundish with scattered prickles, usually with few glands, fruit of few drupelets covered with waxy plum-like bloom, leaves 3-nate ..... *caestus*  
 Plant not as above ..... 2
2. Drupelets comparatively few or large (caesian) ..... 3  
 Drupelets more numerous and smaller ..... 4
3. Stem bluntly angled with few stalked glands, leaves large and thin, fruit very large ..... *Balfourianus*  
 Stem often with numerous stalked glands, leaves thicker (see note at end of section) ..... *dumetorum*
4. T. lt. usually oval but may be ovate or obovate, short pointed, stem roundish (see D 2) ..... *scaber*  
 Plant not as described above ..... 5
5. Stem considerably hairy ..... 6  
 Stem glabrous or thinly hairy ..... 23
6. T. lt. with a long almost triangular point, base often broad and cordate, stem strongly armed with unequal strongly declining prickles ..... *adornatus*  
 T. lt. not as described above ..... 7
7. Flower red, stem strongly armed with crowded unequal prickles densely hairy (a Midland plant) ..... *fusco-ater*  
 Flower red, stem densely hairy, main prickles strong and declining but pricklets very small and sunk in the hair ..... *obscurus*  
 Flower not bright nor deep red ..... 8
8. T. lt. variable but oftenest broadly oval, short pointed, leaves chiefly 3-nate with coarse tothing, stalked glands deep violet or purple, those on panicle often long (Bellardian) ... *hirtus*  
 Under *R. hirtus* comes var. *minutiflorus*. Ley's Whitfield (Herefordshire) plant is an enormous plant with 5-nate stem leaves, large oval or slightly obovate t. lt., the panicle broad, lax, pyramidal, with short stalked terminal flower, erect long-pointed sepals and, in the lower part of the panicle, enormous 3-nate leaves with t. lt. as much as five inches long.  
 T. lt. oval ..... 9  
 T. lt. ovate ..... 12  
 T. lt. obovate ..... 17
9. Leaflets narrow and long-pointed, sepals with long and narrow points ..... *hostilis*  
 Leaflets broader, long pointed, panicle long with glands mostly sunk in dense hair ..... 10  
 Leaflets broader, short pointed, armature Bellardian ..... 11
10. Panicle cylindrical with branches fairly equal in length (see C 6) ..... *Babingtonii*  
 Panicle pyramidal ..... *adenanthus*
11. Leaves very large, 3-5 nate, mostly 3-nate, t. lt. roundish oval, panicle with crowded slender prickles ..... *rotundifolius*  
 Leaves 5-nate of moderate size ..... *viridis*

12. Plant strongly armed, stem with scattered varied prickles though the strongest are mainly on the angles, panicle long and narrow with Koehlerian armature, leaflets generally narrow ..... *hystrix*  
 (A similar plant with broader panicle is var. *bercheriensis*).  
 Armature weaker, prickles short or slender, panicle lax ..... 13
13. Stalked glands on pedicels very unequal, many very long ..... *viridis*  
 Stalked glands on pedicel shorter than its diameter ..... 14
14. Panicle often drooping, leafy almost to the top with narrow simple leaves, stem and panicle densely hairy, stem prickles uneven in size ..... *nuticeps* (= *fuscus*, var. *nutans*)  
 Plant not as above described ..... 15
15. Leaves very broad, ovate or obovate, panicle lax, rather peculiar, with three or four flowers crowded at end of each long branch, stem prickles strongly declining ..... *acutifrons*  
 (Var. *amplifrons* from Big Wood at Wormbridge, Herefordshire, long the only locality, has broad leaflets on short stalks and overlapping while the panicle is cylindrical with short branches).  
 Plant not as above described ..... 16
16. Stem very hairy, prickles on stem strongly declining, t. lt. rather narrow, coarsely toothed, stalked glands dark coloured ..... *pallidus*  
 (Sepals at first erect, then reflexed, as also in *leptopetalus* (see D 17 and 18).)  
 Stem only fairly hairy, yellowish, stem prickles mostly patent or nearly so, panicle with crowded pale-coloured declining prickles and yellowish hair ..... *hibernicus*  
 (N. Ireland. A more strongly armed plant is var. *dunensis*).
17. Stalked glands on panicle often very long (see D 8) ..... *divexiramus*  
 Stalked glands on pedicels shorter or plant not Bellardian ... 18
18. T. lt. short pointed ..... 19  
 T. lt. with fairly long point ..... 22  
 T. lt. narrow with very long point ..... *hostilis*
19. Whole plant yellowish and very prickly (see C 20) ..... *Borreri*  
 Plant darker in colour ..... 20
20. T. lt. with wedge shaped base, panicle cylindrical (see D 14) ... *thyriger*  
 T. lt. roundish obovate ..... 21
21. Leaves mostly 5-nate ..... *mucronatus*  
 Many leaves 3-nate ..... *Drejeri*
22. T. lt. with rather wedge shaped base, stem roundish, very prickly and hairy, prickles scattered and very unequal ..... *Purchasianus*  
 T. lt. narrowed somewhat to base, stem roundish (Norfolk. See D 5) ..... *tereticaulis*  
 T. lt. narrow with long point, stem bluntly angled, leaves almost all 3-nate ..... *glareosus*  
 T. lt. broadly obovate (see D 19) ..... *acutifrons*
23. Leaflets softly hairy below ..... 24  
 Leaflets not very soft to the touch beneath ..... 25
24. T. lt. oval, rachis and pedicel felted, fruit only partially formed, sepals long pointed, panicle broad, lax, pyramidal ..... *infecundus*  
 T. lt. oval, rachis almost without felt (see D 48) ... *Borreri*, var. *dentatifolius*  
 T. lt. roundish obovate, with point only fairly long, stem roundish ..... *velatus*  
 T. lt. ovate or obovate, long pointed, stem angled, whole plant very prickly ..... *infestus*  
 T. lt. ovate, stem yellowish-brown with declining prickles (see C 12) ..... *Leyanus*  
 T. lt. roundish obovate, short pointed ..... *mucronatus*, var. *nudicaulis*

- T. lt. broadly oval or obovate truncate (Brecon, Glamorgan, Leicester. See D 23) ..... *morganwogensis*
25. Leaves large, usually 3-nate, t. lt. roundish, short pointed, panicle abundantly furnished with glands and prickles ... *rosaceus*  
 Leaves broadly ovate or obovate (see D 19) ..... *acutifrons*  
 Plant not as above described ..... 26
26. Plant with roundish stem, short prickles and numerous tubercles (see D 2) ..... *scaber*  
 Plant not as above described ..... 27
27. T. lt. typically long, oval, or ovate, with short stalk and long point, prickles on stem very slender, stalked glands on pedicels long, rather yellow or straw-coloured (Bellardian) ..... *serpens*  
 T. lt. with fairly short point ..... 28
28. T. lt. oval with even toothed leaves 3-nate, glands on pedicels long, red, panicle rather short with patent branches (a scarce woodland plant) ..... *Bellardii*  
 T. lt. ovate or roundish (see H 26) ..... *Marshalli*, var. *semiglaber*  
 T. lt. obovate, truncate-mucronate ..... *botryeros*  
 T. lt. obovate, short pointed, but not truncate ..... *longithyrziger*

*R. dumetorum*. Every district seems to have its own special forms of *R. dumetorum*, only a few of which have varietal names. Of the more widespread forms, var. *ferox* has a roundish t. lt. and a very prickly almost glabrous stem; var. *diversifolius* has an obovate t. lt. with a very prickly hairy stem; var. *tuberculatus* is known by its broadly oval t. lt. and prickles with large tubercle-like bases; and var. *raduliformis* has considerable resemblance in stem to *R. radula*. Strongly armed forms of *R. dumetorum* are sometimes confused with *Koehlerian* species.

