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Plate 1. Sagina caespitosa.
2. " "
3. " "
4. " "
5. " " (i.) Flowering. (ii.) Flower and fruit.
7. " "
8. " "
9. " " (A) Sagina saginoides. (B) S. procumbens.
11. Sagina scotica.
12. " "
13. " " Dried plant.
14. " "
15. (A) Sagina saginoides. (B) S. scotica.

THE AFRICAN SPECIES OF THE GENUS ORTHOSIPHON BENTH.

By Maurice Ashby, Ph.D., D.I.C.

The genus Orthosiphon, characterized by its relatively long corolla-tube and capitate style-apex, was described by Bentham in 1830 in an account of the tribes and genera of the Labiatae published in the 'Botanical Register' (xv. sub t. 1300; 1830). It was included in the tribe Ocimoideae, next to the genus Ocimum, which it closely resembles. At that time Orthosiphon was represented only by a few Indian species, and it was not until many years later that the wealth of African material was discovered.

The critical nature of the generic distinctions within the group Ocimoideae has led in the past to the inclusion of a number of anomalous species under Orthosiphon. The majority of these have already been discussed in two previous papers in this Journal, on Hemizygia (1935, 312) and Endostemon (1936, 121), and it now remains to consider the true species. These may conveniently be grouped into three sections, which, although somewhat difficult to define concisely, are quite distinct in appearance. Of these sections the first (Serrati) is restricted in its geographical range to the Transvaal, while members of the third (Pallidi) are found only in the Abyssinia-Somaliland region, except O. pallidus, which occurs as far west as Dahomey and also in Arabia and India. The remaining section (Eu-Orthosiphon) is widely distributed over tropical Africa, Madagascar, and India, with a few species in China and Malaya. The African species of the genus include the great majority, and it is with these that the present paper is concerned. They are reduced to thirty in number, and an amplified description of the genus is given below.

Journal of Botany.—Vol. 76. [January, 1938.]
In the enumeration of specimens the following abbreviations are used to indicate the herbaria in which they are deposited:—

BM = British Museum (Natural History).
Br = State Botanic Garden, Brussels.
F = Museum and Botanic Gardens, Florence, Colonial Herbarium.
G = Conservatoire et Botanique Gardens, Geneva.
HN = Natal Herbarium, Durban (Natal Government Herbarium).
K = Royal Botanic Gardens, Kew.
P = Natural History Museum, Paris.
TM = Transvaal Museum, Pretoria.

In the citation of type-specimens the herbarium having the holotype is quoted before the word "type," and herbaria to which specimens of the duplicate set from the type-gathering have been distributed are noted after the word "type."

I have pleasure in expressing my thanks to Mr. J. Ramsbottom and Dr. G. Taylor for their encouragement and assistance, and to other members of the staff of the British Museum (Natural History), where this work was carried out, for the facilities afforded me. I am indebted also for loans of material to the authorities of the institutions named above.

Orthosiphon Benth. in Bot. Reg. xv. sub t. 1300 (1830).

Herbs or sometimes undershrubs usually erect and branching, sometimes with tuberous roots. Stems usually 4-angled, rarely 6-angled or terete. Leaves opposite and decussate or rarely ternately arranged, rarely in a basal rosette, sessile or petiolate; lamina usually serrate or crenate at the margin, often gland-dotted, especially beneath. Inflorescence of verticillasters borne in terminal or axillary racemes or rarely with the flowers arranged irregularly on the axis; verticillasters usually 2-6-flowered, sometimes many-flowered; bracts usually more or less persistent, small and inconspicuous or rarely rather large. Calyx usually slightly declinate when flowering, more sharply declinate and more or less accrescent in fruit, tubular; tube glabrous or sparsely pubescent within, cylindrical to campanulate, usually straight, equably 5-toothed at the mouth (=2-lipped, the posterior lip entire, the anterior lip 4-fid); posterior tooth broadly ovate to suborbicular with the margin more or less decurrent on the tube; lateral pair of teeth narrowly triangular to subulate from a deltoid base; anterior pair subulate, usually exceeding the lateral pair. Corolla exserted beyond the teeth of the calyx, tubular; tube glabrous within or with two pilose areas near the base, cylindrical or slightly widened at the mouth, usually straight; mouth distinctly 2-lipped, not truncate laterally; posterior lip shortly 3-4-lobed, more or less erect; anterior lip entire, usually straight. Stamens 4, in 2 pairs, usually lying in the anterior lip of the corolla or rarely exserted beyond it, the filaments all free and usually glabrous; posterior pair inserted in the upper half of the corolla-tube (or rarely near the base); anterior pair inserted near the mouth of the corolla-tube, the filaments well separated at their insertion; anthers reniform, 1-celled. Disk usually enlarged anteriorly. Ovary deeply 4-lobed, the lobes glabrous. Style only rarely exserted beyond the anterior lip of the corolla, entire or emarginate at the apex, obtuse and more or less capitate. Nutlets oblong to suborbicular and slightly compressed dorsally.

Distribution.—China, India, Malaya, Arabia, Socotra, tropical South Africa, and Madagascar.

African species 17. Type-species O. rubicundus Benth.

Key to the African Species.

A. Floral bracts usually more than 6 mm. long and 3 mm. broad, rarely less, but then longer than the pedicels and thickly glandular-pubescent. Corolla-tube usually more than 9 mm. long. Sect. Serrati.

aa. Leaves glandular-pubescent. Calyx-tube not more than 10 mm. long, sometimes much accrescent before the corolla has dropped ........................................ 1. pseudoerinus.

bb. Calyx-tube in flower less than 7 mm. long. Largest leaves usually more than 2 cm. long, but very variable .................. 2. serratus.

b. Calyx-tube in flower more than 7 mm. long. Leaves less than 2 cm. long. AA. Floral bracts less than 6 mm. long and usually less than 3 mm. broad, ciliate, rarely pubescent or gland-dotted. Corolla-tube usually less than 9 mm. long.

B. Corolla-tube relatively long (more than twice as long as its diameter at the throat), subcyllindrical or sometimes gradually widened towards the mouth; anterior corolla-lip about the same size as the posterior lip or sometimes larger. Stamens usually hidden in the anterior lip of the corolla. Petiole of leaves variable in length or absent. Sect. Eu-Orthosiphon.

a. Petiole of mature leaves (at least the largest ones) more than one-quarter of the length of the lamina, or more than 1 cm. long.

b. Racemes obscure, not more than 3 cm. long, and usually axillary. Leaves densely covered beneath with dark red sessile glands ........................................ 4. ferrugineus.
bb. Racemes conspicuous, more than 3 cm. long, and always terminal as well as axillary. Leaves often gland-dotted beneath, but the glands not dark red.

c. Lamina of leaves (at least the largest ones) more than 4 cm. long.

d. Corolla-tube well exserted from calyx, at least twice as long as calyx-tube and usually more than 6 mm. long.

e. Calyx-tube more than 7 mm. long in fruit; 4 mm. long or more in flower.

ee. Calyx-tube less than 7 mm. long in fruit; usually less than 4 mm. long in flower.

f. Lamina of largest leaves usually more than 4-5 cm. long; petiole often more than 1-5 cm. long. Leaves acute at apex, with acute serration at the margin. Verticillasters usually about 1 cm. apart on fruiting raceme.

ff. Lamina of largest leaves usually less than 4-5 cm. long; petiole usually less than 1-5 cm. long. Leaves obtuse or rarely acute at apex, with obtuse serration or crenation at the margin. Verticillasters usually more than 1 cm. apart on fruiting raceme.

dd. Corolla-tube shortly exserted from calyx, not more than twice as long as calyx-tube and usually less than 6 mm. long.

c. Lamina of leaves less than 4 cm. long.

d. Petiole (of some leaves at least) more than 0-6 cm. long.

e. Petiole only just over one-quarter the length of lamina, and then on only the lower leaves. Corolla-tube about twice as long as calyx-tube. Low caespitose herb.

ee. Petiole usually one-third the length of lamina or longer on all leaves. Corolla-tube often more than twice as long as calyx-tube. Herb or undershrub, more or less woody, with spreading branches.

f. Leaves ovate, cuneate at base; when mature the lamina usually more than 2-3 cm. long and petiole usually more than 1 cm. long. Erect herbs, woody at base.

ff. Leaves deltoid; lamina usually less than 2-5 cm. long and petiole usually less than 1 cm. long. Under-shrubs with spreading woody branches.

dd. Petiole less than 0-6 cm. long.

e. Leaves glabrous or thinly pubescent (often smooth and glaucous beneath), entire, dentate or rather largely crenate at the margin. Lamina of the larger leaves rarely less than 1-5 cm. long, often folded along the midrib.

g. Pedicels about 2 mm. long or less, usually less than 3 mm. in fruit.

gg. Pedicels more than 2 mm. long, more than 3 mm. in fruit.

cc. Leaves either thickly pubescent, regularly and finely crenate at the margin. Lamina rarely more than 1-5 cm. long, flat.

d. Lamina of leaves (at least the largest ones) more than 3 cm. long.

e. Leaves glabrous both above and beneath, or sometimes with scattered hairs on the nerves beneath.

f. Leaves all or most of them basal.

ff. Leaves cauline.

g. Pedicels about 2 mm. long or more in flower.

gh. Pedicels more than 2 mm. long.

hh. Pedicels about 4 mm. long or more in flower.

ii. Pedicels about 6 mm. long or more in flower.

jj. Pedicels more than 4 mm. long.

kk. Pedicels more than 6 mm. long.

ll. Pedicels more than 8 mm. long.

mm. Pedicels more than 10 mm. long.

nn. Pedicels more than 12 mm. long.

oo. Pedicels more than 14 mm. long.

pp. Pedicels more than 16 mm. long.

qq. Pedicels more than 18 mm. long.

rr. Pedicels more than 20 mm. long.

ss. Pedicels more than 25 mm. long.

tt. Pedicels more than 30 mm. long.

uu. Pedicels more than 35 mm. long.

vv. Pedicels more than 40 mm. long.
teeth subulate; nerves beneath the leaves green, brown, rufous, or purplish. Dwarf branches rarely present.

i. Racemes with a cluster of small sterile bracts at apex.

ii. Racemes without sterile bracts at apex.

ee. Leaves more or less pubescent both above and beneath.

ff. Corolla-tube 1 mm. broad, nearly three and a half times as long as broad.

gg. Corolla-tube usually more than 1 mm. broad, less than two and a half times as long as broad.

hh. Racemes pubescent, but rarely densely so; verticillasters more or less distant. Leaves variable, but usually ovate-lanceolate or oblong.

dd. Lamina of leaves less than 3 cm. long.

e. Racemes tomentose, with long hairs; verticillasters somewhat crowded together.

ee. Racemes more or less pubescent, with short hairs; verticillasters more or less distant.

ff. Calyx-tube during flowering more than 4 mm. long and finely puberulous, with the nerves conspicuous as purplish lines.

gg. Calyx-tube during flowering not more than 4 mm. long, pubescent to almost glabrous, with the nerves inconspicuous.

h. Racemes tomentose; verticillasters somewhat crowded together. Leaves broadly ovate or obovate.

hh. Racemes pubescent, but rarely densely so; verticillasters more or less distant. Leaves variable, but usually ovate-lanceolate or oblong.

da. Leaves (at least the largest ones) 4 cm. long.

dd. Pedicels about 2 mm. long or less, not more than 3 mm. in fruit.

bb. Leaves all sessile (or subsessile), or very shorty petiolate.

cc. Leaves ternate or opposite; racemes very glandular, with verticillasters usually 2-flowered, or the flowers arranged irregularly on the rhachis.

dd. Leaves (at least the largest ones) 4 cm. long or longer.

ee. Flowers, bracts, and leaves rather membranous; bracts more than 4 mm. long (usually nearly 5 mm.); leaves glabrous.

h. Corolla-tube exerted only just beyond posterior tooth of calyx, curved upwards. Anterior lip of corolla much longer than posterior lip, usually ascending, with margin very crispate.

i. Leaves nearly glabrous beneath, almost entire at margin; rhachis slender.

ii. Leaves usually thickly pubescent or puberulous beneath, serrate at margin; rhachis fairly stout.

hh. Corolla-tube exerted well beyond posterior tooth of calyx, usually straight. Anterior lip of corolla scarcely longer than, or not longer than, posterior lip, straight or slightly decinate, with margin flat or slightly crispate.

i. Leaves pubescent beneath, finely crenate at margin, lamina not more than 1-5 cm. long.

j. Leaves obtuse or rarely subacute at apex, usually shallowly serrate or crenate at margin, or rarely entire. Calyx-tube broad, less than two and a half times as long as calyx-tube, with lips fairly large.

jj. Leaves acute or rarely obtuse at apex, more or less deeply serrate at margin. Corolla-tube narrow, more than two and a half times as long as calyx-tube, with lips small.

k. Pedicels about 2 mm. long or less, not more than 3 mm. in fruit.

kk. Pedicels more than 2 mm. long, more than 3 mm. in fruit.

bb. Leaves all sessile (or subsessile), or very shorty petiolate.

c. Leaves ternate or opposite; racemes very glandular, with verticillasters usually 2-flowered, or the flowers arranged irregularly on the rhachis.

cc. Leaves opposite or very rarely ternate; racemes not glandular, with verticillasters normally 6-flowered and regular.

dd. Leaves (at least the largest ones) 4 cm. long or longer.

ee. Flowers, bracts, and leaves rather membranous; bracts more than 4 mm. long (usually nearly 5 mm.); leaves glabrous.
SERRATI, sect. nov.

Flores bracteis magnis induti. Corollae tubus longissimus, cylindricus; labia subequalia.

1. O. pseudoserratus, sp. nov. Caulis obtuse quadrangularis sulcatusque, pilis simplicibus glanduliferisque plus minusve dense obtectus; internodi 1-7 cm. longi. Folia opposita, patentia, pubescentia, obtecta, laminae ovatae aut lanceolatae, basi rotundatae, longae 1-7 cm. internodii, pilis simplicibus glanduliferisque densi, obtectis, subtus nervatione evidentia. Racemi simplicibus, 3-15 cm. longis, (vel longiores), rhachis pubescens et glandulosus; verticillae 6-florae, per anthesin 0-7 cm. inter distantes; bractae persistentes, ovatis an lanceolatae, apice acuta vel acuminate, 4-6 mm. longae, et 2-4 mm. latae, pilis glanduliferis obtectae; pedicelli 3-4 mm. longi, pubescentes et glandulosi. Calyx extus pilis simplicibus et glandulosis munitus, intus glaber vel minute puberulus, post anthesin vel etiam per anthesin accrescens; tubus campanulatus, 2-7 mm. longus, dente postico suborbiculari et plus minusve acuminato, 1-5-5 mm. longo et lat. dentibus lateralisibus antiques subulatis basis triangularibus, lateralisibus 1-3-5 mm. longis, (in fructu ad 4-5 mm.), antices 1-5-6 mm. longis. (in fructu 6-7 mm.). Corolla extus sparse puberula, intus subglabra; tubus rectus vel leviter deflexus, apicem versus sensim ampliatus, 3-5-9 mm. longo et fauce c. 2-3 mm. lat.; labium posticum 3-lobatum (lobo medio emarginato) plus minusve erectum vel recurvatum c. 2-6 mm. longo; labium anticum plus minusve deflexum, 2-5 mm. longo. Stamina exserta; postica corollae tubus basin versus inserta, filamentis basin versus pilosis, usque ad 17 mm. longo. (vel longioribus); antica fauce corollae inserta, filamentis glabris ad 8 mm. longo. Stylos corollae tubo ad 12 mm. exsertus, apice breviter et acute bilobatus.

Transvaal. Waterberg Distr.: Moordrift, Oct., Leendertz 2243 in Herb. Transvaal Mus. 7347 (BM, type); Potgietersrust, Nov., Leendertz 1494 in Herb. Transvaal Mus. 6592 (K, TM), same locality, 4000 ft., Dec., Thode in Natal Govt. Herb. 20,074 (HN). Pilgrim’s Rest, Grenstock s.n. (BM.)

Resembles O. serratus in general appearance, but the flowers are smaller, the calyx earlier accrescent, and the whole plant much more glandular. Although the forms of O. serratus vary through a wide range, there is no intermediate link to this species among the abundant material studied.


Geographical Range.—Common in Transvaal and Swaziland.


An extremely variable species, especially in the size of flowers and leaves.


Known only from the one specimen, which is, however, quite distinct.

(To be continued.)

THE BREEDING AFFINITIES AND CYTOLOGY OF LOLIUM SPECIES.

BY T. J. JENKIN, D.Sc., AND P. T. THOMAS, B.Sc., PH.D.

From the study of large populations of living plants it appears that at least six general Lolium types, or groups, are sufficiently distinct to rank as independent species. These, apparently, are classifiable as:

1. *Lolium perenne* L. (Non-annual; wind-pollinated.)
2. *L. italicum* A. Br. (Non-annual; wind-pollinated.)
3. *L. rigidum* Gaud. (Annual; wind-pollinated.)
4. *L. loliaceum* Hand.-Maz.*. (Annual; self-pollinated.)
5. *L. remotum* Schrank. (Annual; self-pollinated.)
6. *L. temulentum* L. (Annual; self-pollinated.)

The *L. loliaceum* material so far studied has all been derived from a single original inflorescence obtained from Australia in 1926. The plants have shown no significant variation.

The seed of *L. remotum* and *L. temulentum* has been obtained mainly from various botanical gardens, and the plants within each species have shown a considerable degree of variation, although, as a rule, the plants from any particular seed sample show no significant variation.

The greatest variation is found within the normally wind-pollinated groups, and we are not yet in a position to state whether or not all the variants within the annual types can be included in *L. rigidum* Gaud.

With six distinct types ranking as species, fifteen interspecific crosses are possible. Already, established F₁ hybrids representing eleven of these have been produced by hand-pollination following the emasculation of the florets.

All the parent species are diploids (fourteen somatic chromosomes), and the successful crosses are enumerated below. Brief notes are added concerning anther dehiscence, pollen production, and meiotic behaviour in the F₁ hybrids:

* We are indebted to Mr. C. E. Hubbard, The Herbarium, Kew, for this determination.

Parent species.

<table>
<thead>
<tr>
<th>Cross</th>
<th>Anthers</th>
<th>Good pollen</th>
<th>Rare failure of pairing of chromosomes at the first metaphase of meiosis. (Evans, 1926, 1934.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>L. perenne</em> with <em>L. italicum</em></td>
<td>Dehiscent</td>
<td>25 per cent.</td>
<td></td>
</tr>
<tr>
<td><em>L. perenne</em> with <em>L. rigidum</em></td>
<td>Dehiscent</td>
<td>22 per cent. good pollen; inversion bridge * observed in a back-cross to <em>L. perenne.</em></td>
<td></td>
</tr>
<tr>
<td><em>L. perenne</em> with <em>L. loliaceum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 40 per cent. of the pollen-mother-cells show univalents (unpaired chromosomes) at the first metaphase; inversion bridges and an unequal bivalent (paired chromosomes) observed.</td>
<td></td>
</tr>
<tr>
<td><em>L. perenne</em> with <em>L. remotum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 20 per cent. of the pollen-mother-cells show univalents at the first metaphase; inversion bridges recorded.</td>
<td></td>
</tr>
<tr>
<td><em>L. perenne</em> with <em>L. temulentum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 30 per cent. of the pollen-mother-cells show univalents at first metaphase; inversion bridges and interlocking bivalents observed. This cross has been described elsewhere by one of us (Jenkin, 1935).</td>
<td></td>
</tr>
<tr>
<td><em>L. italicum</em> with <em>L. temulentum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 20 per cent. of the pollen-mother-cells show univalents at the first metaphase.</td>
<td></td>
</tr>
<tr>
<td><em>L. rigidum</em> with <em>L. loliaceum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 15 per cent. good pollen in immature anthers; inversion bridges observed; a trilploid plant with 21 somatic chromosomes.</td>
<td></td>
</tr>
<tr>
<td><em>L. rigidum</em> with <em>L. temulentum</em></td>
<td>Non-dehiscent</td>
<td>3 per cent. good pollen; 20 per cent. of the pollen-mother-cells show univalents at the first metaphase.</td>
<td></td>
</tr>
<tr>
<td><em>L. loliaceum</em> with <em>L. remotum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 10 per cent. of the pollen-mother-cells show univalents at the first metaphase.</td>
<td></td>
</tr>
<tr>
<td><em>L. loliaceum</em> with <em>L. temulentum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; 15 per cent. of the pollen-mother-cells show univalents at the first metaphase; inversion bridges observed.</td>
<td></td>
</tr>
<tr>
<td><em>L. remotum</em> with <em>L. temulentum</em></td>
<td>Non-dehiscent</td>
<td>No good pollen; pairing of chromosomes excellent at the first metaphase of meiosis.</td>
<td></td>
</tr>
</tbody>
</table>

* An "inversion bridge" is formed by a chromosome possessing two centromeres (attachment constrictions), one passing to each pole at the anaphase stage of meiosis. Such bridges are usually associated with fragments which lack a centromere. Their occurrence is interpreted to mean that the plant is heterozygous for one or more inversions in the chromosomes (Darlington, 1937).
The negative results so far obtained for the remaining combinations are not necessarily significant, as they are not extensive enough to be conclusive.

Where F₁ hybrids have been obtained from reciprocal crosses with the same pair of species, the plants substantially agree at maturity both in behaviour and in morphology. On the other hand, the breeding results from different combinations differ considerably, while, as shown above, the resulting F₁ hybrids also differ significantly with regard to anther dehiscence, the production of good pollen, and in meiotic behaviour.

No failure of chromosome pairing has been observed in the L. remotum × L. temulentum hybrids, but in the other hybrids, usually two, occasionally four, and exceptionally more than four, chromosomes fail to pair at the first metaphase of meiosis. This happens in about 40 per cent. of the pollen-mother-cells in the L. perenne × L. loliaceum hybrid.

Other meiotic abnormalities observed in the present material are: incomplete association in the early (pachytene) stage of meiosis, interlocking of bivalents at metaphase, and bridge formation with associated fragments at the first and second telophase stages.

The L. rigidum × L. loliaceum hybrid is of especial interest. Only a single established F₁ hybrid of this type has yet been obtained, the pollen parent being a F₁ rigidum plant. This particular parent plant, when self-pollinated, gave progeny some of which produced normal pollen grains together with giant pollen grains carrying twice the normal gametic number of chromosomes. The L. rigidum parent plant had not been examined in this respect, and, being an annual, it had died before the next generation of plants had been produced. Whether any of its progeny plants produced by self-pollination were triploids. The somatic number of chromosomes in the rigidum × loliaceum F₁ hybrid, however, was found to be 21, rather than the expected 14. The evidence is obviously incomplete, but this triploid F₁ hybrid probably carried two complete gametic sets of L. rigidum chromosomes and one complete gametic set of L. loliaceum chromosomes.

References.

Evans, G. (1928.) Chromosome Complements in the Grasses. 'Nature,' cxvii. 841.


Welsh Plant Breeding Station, University College of Wales, Aberystwyth.

THE OCCURRENCE OF GALIUM DEBILE DESV. IN BRITAIN

AN ACCOUNT OF THE OCCURRENCE OF GALIUM DEBILE DESV. IN BRITAIN.

By C. E. Britton.

G. debile Desvaux, Pl. Angers, 133 (1813), was recorded as an addition to the British flora by the late G. C. Druce in Report B. E. C. 1924, 420, where he wrote: "In Jersey etc. I found Galium debile, a plant belonging to the Palustre section." On p. 438 of the same Report he gave the detailed Latin description from Willkomm and Lange's Prodromus Florae Hispanicae, ii. 322, following by remarks on this plant and on related small narrow-leaved forms, together with a summary of the varying opinions relating to this species held by French botanists.

The Jersey habitat was given as "marshes at St. Brelade, 1924," and a further Channel Islands locality mentioned was "L'Ancresse, Guernsey, 1906." Druce also referred to this species plants gathered at localities in S. Hants. Specimens from Bucks received mention as having been reported on as probable G. debile. Druce's note ended with the expression of the view that the European distribution was not antagonistic to G. debile being a native of the Channel Isles and south-western England.

In the Report B. E. C. 1926, Druce, in his account of fieldwork for that year alludes to a visit to the Sands of Barry in quest of Corallorhiza, the only other plant receiving mention being Orchis incarnata var. dunensis. On p. 116 of the same Report appears the entry "1926. G. debile Desv. Sands of Barry, Torrfae, Druce," without comment. It is strange that the writer did not draw attention to this remarkable northward extension of a species having a supposedly Mediterranean distribution.

In "Herb. Druce" six sheets of mounted specimens are associated under the name of Galium debile Desv. Of these there are correctly named, others appear to belong to G. Witheringii Sm. With regard to the latter name, Rouy (Fl. Fr. viii. 44) has a var. G. Witheringii Babington. Manual, ed. 8, 176, of his G. palustre subsp. G. debile: but few, if any, British botanists would be disposed to assign the English G. debile to G. Witheringii as a variety. The sheets are as follows:—

(1) "Galium palustre L. var. debile. Halton, Bucks, June 1911." Noted by Glück as "probable debile," and referred by Thellung to G. palustre L. The plants are in flower only and appear to be G. Witheringii Sm.

(2) Two gatherings. One from Beaumont, Jersey, 1906, named "G. palustre L. var. constrictum Chaub.," is immature and only in bud. It is a prickly plant referable to G. Witheringii
THE OCCURRENCE OF GALIUM DEBILE DESV. IN BRITAIN

of margin, pricklets intra-marginal above and on midrib beneath, outline (4)-6-(15) mm. in whorls of (5)-6-(7), rameal 4-(8) mm. subequal, in whorls of 4. Panicle-branches erect-spreading; bracts lanceolate, 2-4 mm.; cymes (3)-4-(6)-flowered; pedicels l (1-5-2) mm., obliquely erect; ovary papillosus; corolla 2 mm., purplish or white suffused with purple. Nature carpels orbicular, 1-5 mm., with crowded minute tubercles, one carpel usually abortive; outer pedicels incurved and fruits ± connivent.

British distribution: S. Devon (v.c.3), S. Hants (v.c.11). Also in Jersey. Other records are erroneous or require confirmation.

A NEW SCAPANIA FROM IRELAND.

BY W. E. NICHOLSON, F.L.S.

Scapania apiculata Spruce, var. nov. Jonesii (Schiffn. MS.).

Corticola. Lobus posticis et lobus anticalis dentati, dentibus 1-3 cellulis constructis, apice obtuse acuti, non apiculati; cellulis minores, superae 10-15 µ, medianae 15 µ, ad basin 15 x 18 µ parietibus validis trigonis multo minoribus. Gemmas apice lollorum glomerate, virides, biccilulares, ovales, 15 x 12 µ.


I was at first inclined to describe this plant as a distinct species, as the less apiculate, sharply denticulate leaves give it a very distinct appearance, but a closer study brought out points of essential resemblance with S. apiculata, of which it is probably a strongly hygrophilous form, as suggested by Dr. Schiffner. Although S. apiculata has the leaves generally quite entire, Dr. K. Müller, in his excellent monograph of the genus Scapania, speaks of the postical lobe of S. apiculata as rarely having one or two small teeth towards the apex, and he actually figures such a form. In some of the smaller specimens of the variety the leaves are almost entire and they are more apiculate than they usually are in well-developed specimens of the variety. The difference in the cell-structure is certainly noteworthy, but the size of the cells and of the trigones is rather variable, and the cells are of the same character as in the type. The green colour and larger size of the gemmas are also consistent with the plant being an hygrophilous form.

It is true that the mature gemmae have proved to be two-valved, as pointed out to me by Miss M. E. Malins of Leeds University, to whom I am indebted for the accompanying figure.
I had at first taken them to be unicellular as described for *S. apiculata*, but several species of *Scapania* have gemmæ of both kinds.

The differences are, I think, consistent with the plant being a form from a moister substratum than the type. The plant has the slightly verruculose cuticle which I have found in all the specimens of *S. apiculata*, which I have examined. Stephani speaks of *S. apiculata as corticola*, but the original plant was gathered by Spruce on rotten wood; Dr. Müller in his 'Monograph' and Herr Buch in his 'Die Scapanien nord Europas


and Siberien' both speak of it as growing exclusively on rotten wood, and my only gathering in Switzerland in 1913 was certainly on that substratum. Rotten wood dries rapidly and produces rather xerophytic conditions, and *S. apiculata* has all the characteristics of a xerophyte. The more humid conditions under which the present plant was found growing in Ireland would, I think, account for the differences between it and the type. The plant was sent to Dr. Schifferl accidentally mixed with other things by the late Mr. D. A. Jones, A.L.S., who had done so much to further the study of British hepatics, that it is only fitting that his name should be commemorated in this very notable addition to the British flora.

### ISOETES HYSTRIX AT THE LIZARD.

**By R. Melville.**

The Lizard peninsula is an ideal place to spend a holiday at any time of the year, but in mid-May it is a paradise for both botanist and ornithologist. Though rather too early for the clovers, the sea-cliffs bear a blue carpet of *Scilla verna*, and the valleys are golden with gorse. Many of the rare plants of the locality are to be seen already, and it was while searching for these that a *Juncus* was uprooted in a damp spot in Kynance Valley on the evening of May 16. The *Juncus* proved to be *J. bufonius*, but with it came a plant having the appearance of a scaly bulb with a tuft of grass-like leaves. This could scarcely be anything else but *Isoetes Hystrix* Dur. The old blackened leaf-bases characteristic of this species could be seen, though no spores were visible under a hand-lens. All the likely damp spots in the neighbourhood were searched for further specimens without success until dusk fell. On the following day the specimen was sent to Mr. F. Ballard at Kew, who confirmed the identification.

At the time the writer was unaware of the old disputed record of Mr. Fred Robinson, who found a single plant in Carthilham Valley in June 1919 (Journ. Bot. 1919, 322). History would have been repeated had the visit been one of those fleeting hunts for rarities so many botanists make to the area. The scene was revisited on May 17, and drier spots above the place of the original find were examined. Here numerous plants were seen, mostly not more than an inch high, growing in a friable peat in open formation, but associated with other plants having curled grass-like leaves, making their recognition difficult. Once the type of habitat favoured by the plant and the identity of its usual associates had been discovered, it was a relatively simple matter to explore the neighbourhood and determine its distribution.

*Journal of Botany.*—Vol. 76, [January, 1938.]
Isoetes Hystrix occurs at the Lizard over quite a large area wherever suitable conditions are found. In the writer's experience this area extends from a little to the south of Vellan Head southwards along the coast to a point south of the Lion Rock above Pentreath beach, and reaches inland for half to three-quarters of a mile. It is quite possible that the plant extends some distance beyond the limits explored. In fact, when Mr. N. Y. Sandwith searched for it about a month later he found specimens a short distance to the north-west. of the peat in winter. Places with a northern exposure, but after a further three weeks' hot dry weather, Sandwith found it was almost impossible, so parched as to be nearly unrecognizable.

The Lizard lies at the northern limit of distribution of I. Hystrix, and, to judge from written accounts, the Lizard habitat differs considerably from the damp sandy and gravelly places where it usually occurs in France and North Africa. At the Lizard the soil is a light friable peat of no great depth overlying serpentine. The plant is found on gentle slopes facing southwards, in places where the peat is kept constantly damp in winter by seepage of water from higher levels. It also occurs, perhaps less commonly, where a shallow pan of water has stood upon the peat in winter. Places with a northern exposure, but apparently otherwise suitable, were always without Isoetes, nor could it be found on the eastern side of the peninsula on the serpentine at the northern end of Kennaack Bay. It is apparent, therefore, that temperature is a very important factor in the environmental conditions for I. Hystrix and probably for some of the other rare plants of the area with a similar type of distribution. No doubt, an investigation of the physical conditions of such habitats on the serpentine on the east and west sides of the peninsula would throw much light on this question.

Of the plants commonly associated with I. Hystrix at the Lizard, Juncus capitatus is one of its most constant companions. It appears generally that where the environmental conditions are suited to the Juncus they are also adapted to the needs of the Isoetes. The dominant plant in the association is usually either Scilla verna or Allium sibiricum, though the two often occur together and form an open community. With these, many of the rarer plants of the area are found, including the following mentioned above, Arenaria Gerardi, Moenchia erecta and not infrequently a Riccia. Material of the Riccia brought back to Kew was found to be in atypical condition, and was kept until normal growth enabled Mr. C. V. B. Marquand to identify it as R. sororcarpa Bisch. Festuca spp. occur here and there in the open Scilla verna formation, and contribute to the difficulties of distinguishing the Isoetes in this association of wiry-leaved plants.

The size of the Isoetes plants varied greatly. The smallest bore three or four leaves on a very small corn and was without the black tridentate remains of leaf-bases. The largest had about twenty leaves with their bases swollen with spores and numerous remains of older leaf-bases. Such variation in size is difficult to reconcile with the statement in Babington's Manual that this species is an annual. Several living plants brought back to Kew died down completely during the summer, but put forth a new tuft of leaves in September. There is no doubt, therefore, that the plant is perennial, with its resting place in the dry season. The statement in the literature that the spores are white calls for comment. In the fresh state they are a dove-grey, and can be seen as dark masses through the translucent cells of the leaf-base. On drying they acquire a chalky whiteness.

Specimens from two localities have been deposited in the Kew Herbarium, and it is hoped that the living specimens will survive in the fernery.

NOTES FROM THE BRITISH MUSEUM HERBARIUM.

BY E. G. BAKER.

Bauhinia lambiana, sp. nov. Caulis scandens? rami glabri. Pediculus integra coriacea lanceolata, basi subcordata, usque ad 10 cm. longa, 3-5-6 cm. lata, glabra, 3-5-nervia. Petalae 5 cm. longi. Inflorescentia corymboso-racemosa. Pedicelli 5 cm. longi. Alabastri pars inferior cylindrica; pars superior globosa. Calycis tubus cylindricus, ±2 cm. longus; limbus 5-partitus; partes ovata acuta 7-9 mm. longae. Petala 5 in apicem, 1-8-2-5 mm. longae, laxae oblatae ad basim subacuta, ungunculata. Stamina 3 fertilia. Ovarium compressum oblun- gatum, stipitatum, margine ferrugineo-pilosum, 6-7-ovulatum. [Legumina ignotum.]


This species belongs to the Section Phanera, and is allied to H. Barbidgei Stapf and B. Creaghii Baker, but differs in the much longer distinctly lanceolate leaves.
Albizia (Eualbizzia; falcifolae) Sherriffii, sp. nov. *Arbor* 6-9 m. alta ad *A. Julibrissin* Durazz. et *A. stipulatam* Boiv. accedens, differt primo intuitu foliorum ambitu diversa et calyces majoribus et petalis longioribus. *Rami* brunneo-tomentosi. *Folia* bipinnata; *petiolis* 2-3-5 cm. longis; rachi 10-20 cm. longa brunneo-tomentosa; pininis 8-16-jugis, 5-10 cm. longis oppositis vel suboppositis fere sessilibus; foliis 13-27-jugis 5-10 mm. longis 1-5-3 mm. latis rectangulato-oblongis subfalcatis apice acutis, costa submarginalis, supra glabris subtus pubescentibus. *Pedunculi* 7-10 cm. longi brunneo-tomentosi; capitula 6-7-5 cm. diam. *Flores* sessiles majuculi. *Calyx* 6-6-5 mm. longi extus brunneo-tomentosum, 5-dentatus, dentibus acutis 1-1-5 mm. longis. *Petae* 10-12 mm. longa, eburnea, pubescentia. *Stamens* plurima, 3-3-8 mm. longa; *filamenta* capillacea, basi in tubum 7-8 mm. longum connata. *Ovarium* lineare fere glabrum; *stylus* ±3 cm. longus. [Legumen ignotum.]


"Tree 20-30 ft. Sepals green. Petals creamy, stamens white, except in centre flower, where stamens are thickened when they come out of the tube and are golden yellow. On banks of stream."

There are two glands on the upper surface of the leaf-rachis—a large one near the base and a smaller one between the uppermost pair of pinnae. There is also a gland on the peduncle about 1 cm. from the head. Flowers about 40-50 in a head, usually larger than the others.

*Crotalaria* (Sphaerocarpae) *Gamwelliae*, sp. nov. *Annua* erecta gracilis ad *C. stenorhampa* Harms et *C. floridam* Welw. accedens. *T hautes* 40-70 cm. alti, sparse pubescentes. *Folia* petiolata trifoliolata, *foliis* terminalibus oblongo-lanceolatis 15-30 mm. longis 4-9 mm. latis subtus strigoso-pubescentibus, petiolos pubescentibus gracilibus 5-20 mm. longis. *Flores* flavi, in paniculis dispositi, pedicellis 2-3-5 mm. longis. *Calyx* in toto 6-7 mm. longus, dentibus linear-lanceatis 4-5 mm. longis. *Vexillum* oblongo-ovatum, 10-11 mm. longum, 7-8 mm. latum. *Carina* 9-11 mm. longa, apice in rostrum attenuata. *Ala* 8-10 mm. longa. *Legumen* globosum vel subglobosum, ±2-spermum, 4-5 mm. longum. [Legumen ignotum.]


This is a slender graceful herb allied to *C. stenorhampa* Harms, but differing in the manner of growth; it has not several stems arising from a perennial rootstock. The calyx segments are linear-lanceolate, longer than the tube. The pod is globose or subglobosus, smaller than in *C. floridam*. *C. Gamwelliae* is also allied to *C. acuminatissima* Bak. fil., but that plant differs in the swollen root, smaller leaves, and small standard.

*Tephrosia iringae*, sp. nov. *Herba* perennis. *Caulis* 27 cm. longus gracilibus pubescentibus. *Stipulae* linear-lanceolatis 2-5 mm. longis, 5-10 mm. latis, dentibus suborbicularibus, basi unguiculatis, 5-10 mm. longis. *Flores* medios perennis. *Ovarium* ellipticum, basi emarginatum, 4-6 mm. longum, 15 mm. latum. *Adic* 15 mm. longum, ±6 mm. latum. *Carina* dorso rotundata, cum ungue 11-12 mm. longa, 4-5 mm. lata. *Legumen* ±6-ovulatum. [Legumen ignotum.]


"A perennial tussock herb with bright magenta flowers and trailing stems. Very common throughout the area in *Nyahurura* Mountain grassland and most conspicuous after burns."

The distinguishing features of this plant are the wiry trailing stems, the narrow pubescent leaflets, and bright magenta, generally axillary, flowers.

*Aeschynomene nystekensis* Baker var. nov. *mosaamboensis*. *Fruites* 3-5 cm. alt. *Cortex* rubrofarinaceus. *Flaves* panduriformes circ. 11 mm. longum. *Ala* ±10 mm. longum. [Legumen ignotum.]


*Lonchorcarpus pallascens* Welw. var. nov. *pubescens*. *Arbor* circ. 12-pedalis. *Florea* imparipinnata 3-5-foliolata, foliolis terminalibus majoribus anguste ellipticis vel oblongo-ellipticis 7-11 cm. longis 2-5-4 mm. latis, nervis secundariis utrinque 6-9, apices obtusis, foliolis lateralis minoribus 3-7 cm. longis 2-4 mm. latis subtus pubescentibus et rotundatis. *Flaves* imparipinnatis densis pedunculatis dispositi. *Carina* in toto 7 mm. longus, extus fimbriatus, lobis 2 superioribus connatis obtusis, lobis lateralis 3-4-5 mm. longis. *Vexillum* orbicularium, basi unguiculatum, cum ungue 12 mm. longum, et 12 mm. latum. *Ala* cum ungue 12 mm. longa et 5 mm. lata. *Carina* dorso rotundata, cum ungue 12 mm. longa. *Ovarium* lineare 5-6-ovulatum. [Legumen ignotum.]

*Hab.* NORTH Rhodesia: Abercorn District, alt. 4800 ft., *Miss A. H. Gamwell* 244. (Type in Herb. Mus. Brit.)
On red soil in orchard-bush.

Flowers in August. Leaves come out in September. Only one tree about 12 ft. First time of flowering for six years.

Differ from the species by the leaflets, which are fewer in number, pubescent, and strongly reticulate below.

Hibiscus sparseauleatus, sp. nov. Frutescet ad H. diversisulbium Jacq. acceqens, differt primo intuitu foliis minoribus, petiolis brevioribus, calycibus brevioribus, caulis ad basim pedicellorum aculeatis.

Rami lignosi hinc inde aculeati. Folia parviuscula, ovata interdum lobata, margine serrata, in specimine nostro 10-25 mm. longa, 10-25 mm. lata, petiolis gracilibus 10-18 mm. longis. Flores breviter pedunculati ad apicem racemosi. Epicalycis bracteoles 7-9, 5-7 mm. longae, lineares vel linear-lanceolatae. Calyx \( \pm 12 \) mm. longus, segmentis lanceolatais marginibus incrassatis. Petala lutea 40-45 mm. longa. Columna staminalis 30-35 mm. longa. Capsula immatura acuta, 10-12 mm. alta, seminibus glabris.

Hab. SOMALILAND: Sheik Pass, G. Freeman. (Type in Herb. Mus. Brit.)

A rigid woody shrub with stems aculeate at the base of the pedicel.

A plant collected in Somaliland by A. Donaldson Smith, Nov. 29, 1894, probably belongs here.

By K. P. Biswas.

Cardamine Smithiana, sp. nov., inter species sectionis Papyrophyllum foliis et inflorescentia differt.

Herba annua vel perennis, erecta, superne sparse ramosa. Folia distantis, 5-5-13-5 cm. longa, 3-9 cm. lata, petiolata (petiolis 1-4 cm. longis), basalia trifoliolata, bifoliolata vel superne ad basin inflorescentiae nonnumquam simplicia, unifoliolata; foliolum sub sessile, 5-11 cm. diametro, petiolis 5-8 cm. longis. Stamens 6-9-5 cm. longus, terminalis, interdum insinuato-vulvatus, elliptice-oblongum vel plus minusve elliptice-oblanco-latum, terminale interdum inco-ridiculatum, marginem profunde crenato-serratum vel inaequaliter lobulatum, lobulis et crenis manifeste macrornatis, omnis uliine glabri, capitata. Racemus 6-9-5 cm. longus, terminalis, interdum ramosus, e basi ad apicem uniformiter floriferus. Flores pallide purpurei, circiter 6 mm. longi, 10 mm. diametro, pedicellis circiter 5-7 mm. longis. Sepala 2-3 mm. longa, 1-2 mm. lata, nervis 3-4 convergentibus apice glandulose punctatae, margine albida vel hyalina, dorso pallide viridio, utrinque glabra, apice obtusiuscule vel acuta. Petala 5-6 mm. longa, 4-5 mm. lata, pallide purpurea, obovato-cuneata, apice latte rotundata. Stamina interna 4, 4-5 mm. longa, exteriora 2, 3-4 mm. longa, basi glandulosa, glandulis 5-8 mm. longis, solitarii vel geminati. Ovarium circiter 1 mm. longum, 5-8 mm. latum; stili circiter 1 mm. longi; siliqua globosa, capitata. Capsula subtenuiter pedicellata, laterice oblonga, nonnumquam recurvata.


This species is quite distinct from the rest of the species of the section Papyrophyllum O. E. Schulz. It resembles C. furcata (Greene, C. ovata Benth., and C. africana L. in its general features, but is readily distinguished by its glabrous, stouter, ascending taller growth, much larger and broader 3-foliate, 2-foliate or sometimes unifoliate leaves, the terminal leaflets sometimes deeply laterally dissected, irregularly lobed, or deeply incised crenate-serrate, lobes distinctly mucronate; sepals with 3-4 distinct veins, converging to a brown gland-dotted structure below the apex.

Named after Sir William Wright Smith, Regius Keeper, Royal Botanic Garden, Edinburgh.

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SHORT NOTES.

AN OMITTED SURREY SPECIES.—The cotton-grass, Eriophorurn latifolium Hoppe, a plant of very restricted distribution in S.E. England, finds no mention in the pages of the 'Flora of Surrey' by C. E. Salmon as completed by W. H. Pearsall. In the earlier county flora of J. D. Salmon and J. A. Brewer this cotton-grass is duly entered with the one locality of boggy meadows at Reigate Heath. A second Surrey locality was brought to notice during 1937 by Mr. A. Beadell, who brought specimens for identification. The locality, visited by the writer, is a small swamp draining into the Eden Brook, situated in district IX. of Salmon's flora.—C. E. BRITTON.

GLABROUS STELLARIA MEDIA.—Usually a pubescent plant with hairy pedicels and calyx, ciliated petals, and internodes with alternate single lines of hairs. An uncommon form from the Hebrides is subglabrous, with the pubescence restricted to the intermodal lines. Plants destitute of hairs in all parts, including the internodes, were found at Nottingham by Mr. R. Bulley. To such a completely glabrous form Beck (in Fl. v. Nied. Oesterr. i. 364) gave the name of var. glaberrima.—C. E. BRITTON.

PLUTEUS PATRICIUS Schulz.—My friend Mr. A. E. Thomas visited several times last autumn what appears to be an old sawmill yard at Sutterfield Bushes, near Stratford-on-Avon, and brought me back a large number of specimens of Pluteus cervinus, growing on the habitat which it loves, mouldering sawdust.
Most of them were exactly typical, the pileus varying in colour from grey to deep brownish-grey, and sometimes even becoming blackish-grey. Amongst these were large numbers of specimens identical in every respect, except in colour, and some of them nearly 9 in. in diameter; the pileus was nearly and sometimes quite colourless, showing very few traces of brownish fibrils. When these were in the young state, half opened, they looked exactly like button specimens of the common mushroom (Agaricus campestris), but of course were betrayed at once by the total absence of a ring. The gills also remained of the usual pink colour for P. cervinus, even when the flattened pileus measured 8 in. across. It is evident that P. patricius is only a colour variety of P. cervinæae, but I have never seen such striking specimens before; even the spores were exactly similar in the variety and in the type.—W. B. GROVE.

The Red Whortleberry.—Dr. Burtt Davy’s note in the November number on the second flowering of Vaccinium Vitis-Idaea has brought confirmatory notes from several field botanists.

Miss M. S. Campbell has found flowers frequent in August and September in Perthshire, and has an early record of flower on May 16, 1929, in the same district (near Aberfeldy). Plants bearing ripe berries were well distributed among the later flowering ones.

Mr. R. C. L. Burgess writes:—

"Vaccinium Vitis-Idaea always has two flowering periods in Sutton Park, Warwickshire, and the first time I ever saw it in flower was September 7. At the same time it was fruiting well. It does the same thing in Cannock Chase, but is never so floriferous in the autumn as early summer. The hybrid Vaccinium also flowers in May and September, but I have only seen it in the field in early May, though we have herbarium specimens from N. Staffordshire dated September."

Dr. W. Watson from Somerset writes:—

"By the side of the Pennine track leading from Greenfield to Crowden flowering shoots of this plant are of regular occurrence from August to October. There seems to be no definite break between the flowering in June and the later flowering. A flowering plant in my herbarium is marked 17/6/09. During the last twenty years my occasional visits to the locality have been in August and September, and I have records of flowering for the following dates: 14/8/19, 13/8/20, 16/8/21, 1/8/23, 24/8/26, 2/9/27, 17/8/31, 20/8/33, 21/8/34, 8/9/36. These dates record the time when I first saw the plant in flower for that particular year. In most cases it was seen later in the year."

This is the third of a series of articles on the nature of the cone structures in Conifers, and deals with the androstrombid or male cone. In contrast to the parts in the ovulate cone the stamens are commonly accepted as some form of simple sporophyll. Although these sporophylls are frequently looked upon as essentially fertile leaves it is now common, influenced as so many morphologists are by the bearing of our modern knowledge of Devonian plants on questions of general morphology, to consider the stamens as some form of modified sporangiophoric structures, not perhaps in the strict sense in which the term sporangiophore is used in the Articulatae, and still less, of course, as suggesting any relationship to that group, but in the sense of a primitive structure carrying sporangia and upon which the photosynthetic differentiation which we associate with the leaf was never impressed. In this paper the thesis is maintained that the basal form of the conifer stamen is such a structure, peltate in form, centrally stalked, and carrying marginal sporangia radially arranged. It is represented in living Conifers by Taxus, while in other Conifers the abaxial area only is considered to have remained fertile, the adaxial part becoming sterile and modified in various ways. Such a conception is, of course, nothing new. It was propounded by Celakovsky, for example, as far back as 1897, and frequently by others in the intervening period. This paper examines the question, however, in representative Conifers of all families from the point of view of the development of the young structures in the bud. This aspect, indeed, had already been studied by other workers, notably for Torreyæ, Larix, and Pseudotsuga: but it is useful to have the range of examination extended now over most genera of the group. The illustrations and line drawings are numerous and excellent, the collection of drawings of the mature stamens of at least one species from each of twenty-seven different genera being particularly worthy of note, even though Athrotaxis cupressoides is credited with only two sporangia when it commonly has more, a point which has actually been used to support a suggestion that this species should be separated as a special genus.

Without elaborating details it may be admitted that the results of the developmental study can be readily interpreted in
support of the theoretical claim, even in such cases as the species of Cupressus, where the young stamens look much more like a leaf than a radially peltate organ. When, however the whole is presented, as is done here, in a series from Taxus through Torreya and the Podocarps, a tendency towards early development of the sterile area can be emphasized which permits an easy relation of the Cupressus type to the more Taxus-like forms. Ultimately, of course, the basal hypothesis must be confirmed from fossil evidence. Recognizing this Prof. Hirmer has added a short note on those fossil male cones which can with any degree of certainty be related to the Conifers. Undoubtedly the Liasic strata provide us with Choroplepis, in which the stamens are as peltate as in any Taxus, but it is perhaps a weakness in the theory that the Palaeozoic cones, admittedly very poorly known, possess apparently only scale- or leaf-like stamens. Whatever the final issue may be, and this must ultimately depend on further fossil discoveries, this paper certainly fills many gaps in our knowledge of conifer ontogeny. It is claimed, for instance, that the double row of pollen-sacs in Araucaria (and in other genera, such as Taxodium) is derived from the horizontal splitting of originally uniform archesporial zones, suggesting that the adult condition is not primitive but derived.

No attempt can be made here to analyze critically a theoretical position which has sturdy opponents both of the sporangio-phoric conception of the stamen in general as well as of the more particular conception of the Taxus type as basal. But a fuller elaboration than has yet been made of the comparative homologies of the pollen and ovulate cones on the basis of the ideas put forward in these three papers would prove interesting if only to discover how Prof. Hirmer and his students would interpret the male cone of Austrotaxus. It matters a great deal whether we consider the auxiliary structure here as a branching stamen or a greatly reduced cone.

There are some oddities in nomenclature—Arthrotaxis instead of Austrotaxus, Thuja also appearing as Thuya, and the constant use of the lower case in specific names where capitals might be expected, as in Cupressus macnabiana, to mention a few. But these are only small blemishes.—J. Doyle.


This book is the first to be devoted to the changes occurring in the cell and protoplasm during the process of death. It is, of course, now recognized that just as the animal body dies by degrees, some parts remaining alive long after others, so the death of the cell is a gradual one. The author is well known for his contributions to our knowledge of cell-death, and in this book he has brought together our present information on the subject and illuminated it with some theoretical considerations. The book is divided into two parts, one dealing with the general phenomena of cell-death and the other with the characteristics of death brought about by special means, such as mechanical injury or killing by heat, cold, drying, anaesthetics, and mineral salts. In chapter v. the interesting question of the production of heat and radiant energy on the death of the cell is considered. From the author's work in this field, which began in 1929, it seems clear that on treating yeast and blood-corpuscles with poisons such as HgCl₂ or chloroform a small amount of heat is produced as the cell dies. In chapter vi. the author's vitard theory, which he first put forward in 1935, is discussed. Vitard is short for vitaprotein, the protein in question being an unstable protein-lipoid complex, which may be combined with other organic substances or with salts. It is the breakdown of the vitards that is responsible for the production of heat and of radiation on the death of the cell. It has, of course, been very generally held that the substances in the living cell exist in a higher state of complexity than in the dead. Lepeschkin's theory gives precision to it by defining the particular complexes. The author has produced a very valuable book, which is thoroughly well documented, the literature list containing nearly nine hundred references, to which the author himself contributes fifty-five.—V. H. B.


The high-sounding title of this book is explained by its subtitle as a physiology of indigenous plants for biologists, medical men, pharmacists, chemists, agriculturists, and gardeners. "Dynamic" botany is thus plant-physiology in its widest sense—a study of the activities of the plant. In one part of the book the author gives an alternative definition as the "study of the potentialities of the plant." The field thus included is the whole of plant-physiology, large portions of biochemistry, and some portions of ecology. The author's mode of approach is to select certain subjects from this vast field and devote a chapter to them. The poisonous property of many species of Rhamnus leads to a consideration of the toxicity of the active principle which will work in a dilution of 1 in 100,000. From this the author passes to other activating and inhibiting substances which work in very low concentrations, i.e., vitamins, hormones, and growth substances generally. In another section the question of drought resistance is taken up, and from this the stimulating effects of minute amounts of bone acid and of zinc are brought into the picture. Other sections deal with light responses, with
responses to gravity, the action of salts on plants, the response of the potato to mineral fertilizers and particularly to sulphate, saponin-bearing plants and the action of saponin, fermentation problems, etc. A very wide field is thus covered, and the treatment is fresh and stimulating and up to date throughout. The book is thus very well done within the limits set. The various chapters, however, give one an impression of a series of samples of physiological botany, and the material seems too specialized and detailed to be suitable for most of the readers referred to in the subtitle.—V. H. B.


This is a fully descriptive flora of a comparatively small area in the Pacific North-west United States, mainly in Washington territory, but spreading into the north-west corner of the adjacent eastern state Idaho. The author, now on the staff of the University of Hawaii, Honolulu, who was for nine years Professor of Botany in the State College of Washington, acknowledges the help of specialists, former students, and local botanists in its compilation, and his indebtedness to the work of earlier botanists, especially Profs. C. V. Piper and R. K. Beattie, who published a work with the same title in 1914.

The phytogeography of the area is indicated in a map that forms the frontispiece. It includes arid regions with sparse and mainly shrubby vegetation, grass-lands or prairies, open pine forests, moist dense conifer woods on the mountain slopes, and a higher montane flora. The general characters are described in an Introduction. The flora consists of 459 genera, 1187 species, and 286 subdivisions of species, over 80 per cent. of which are indigenous. The arrangement follows the Englerian system, and the nomenclature is that of the ‘International Rules.’ Only genuine common names are given; book-made English names are avoided. There is a key to the families and genera, and under the latter to the species; full descriptions are also included. Each species is referred to its life-zone. Synonyms are occasionally cited, especially where the name adopted differs from “edition 1,” which refers presumably to Piper and Beattie’s Flora, though this is not stated. There are a few new species, duly diagnosed in Latin, and new combinations.

The book impresses one who is not familiar with its flora as a careful and authoritative presentation of the flora of the area concerned. The general get-up of the volume is excellent, and it opens flat.—A. B. R.
bulbs. A special chapter deals with hypocoityledonary tubers such as are formed in some of the Umbelliferae, in Cyclamen, Eranthis, etc. The modification of the vegetative organs in climbing plants leads to the discussion of the morphology of tendrils. The part concludes with a very complete account of succulent plants, both Cactaceae, Euphorbiaceae, and others, illustrated, as is the whole of the book, with a wealth of figures, both half-tone and line drawings. These will be most useful alike to students and teachers of botany. They will also appreciate the list of relevant morphological publications, amounting to 550 references, given at the end of this part. - F. E. Weiss.

The Botanical Society and Exchange Club of the British Isles.
Report for 1936.

As in previous years this Report appears in two parts. The first of issued under the names of the Hon. Secretary, Mr. J. F. C. Chapple, and the Hon. Editor, Mr. P. M. Hall, and follows largely the new lines adopted in last year’s Report under the supervision of the Society’s Publications Committee. The “Plant Notes,” however, have been given greater prominence, with the object of adequately acquainting members with additions to the British flora, including newly described forms, and also with changes in nomenclature. As presented this year, these notes are both interesting and important. The “Plant Notes” are followed by “Plant Records,” which, as usual, are very numerous in spite of a reduction in the proportion of aliens. In a very few cases, e.g., Jasione montana var. major, identifications seem open to question.

Some of the succeeding papers are of exceptional interest. Miss M. S. Campbell, under the title “Three weeks’ botanising in the Outer Hebrides,” contributes a long and careful list of the plants seen, with adequate bibliography, which may well form a basis for a future complete Flora of the group. The editor himself writes an equally important paper, “The Irish Marsh Orchids,” which is illustrated with several plates. Mr. Hall visited Ireland last year, with Mr. N. D. Simpson, for the special purpose of investigating these plants, and the views here expressed, which do not entirely agree with those of their predecessors in the field, deserve very careful consideration. Among shorter papers Prof. Heslop Harrison has a résumé of the flora of Raasay and the adjacent islands which has notable features, and the “Explanation of the Bramble Plates of Syme’s ‘English Flora,’” as furnished by Dr. W. Watson, should be useful. It is noticed, in a list of “Pansy Records” by Mrs. Drabble, that Viola lutea f. Curtisii (Forster) is given for Pembrokehshire, and V. Curtisii Forster f. Forsteri for Wigtownshire. This appears to indicate two different species, which surely is not intended! The final paper, excluding reviews, abstracts from literature, and bibliography, is by Dr. W. A. Sledge, who maintains that Gibson's V. pseudo-paradoxa is really a variety of O. diandra Schrank.

The second part of the Report, by the Distributor, Mr. E. C. Wallace, shows a contribution of 1805 specimens by 18 members—a falling off even from last year—but there is no lack of interesting notes.

The continued diminution in the Exchange is a matter for regret, but the Report, as a whole, will be generally regarded by botanists as definitely more worthy of a Botanical Society and Exchange Club than those of former years.

H. W. Pugsley.

The Natural History of Raasay and adjacent Islands. Edited by J. W. Heslop Harrison, D.Sc., F.R.S. Reprinted from the ‘Proceedings of the University of Durham Philosophical Society,’ x. pt. 5 (pp. 246-351), 1937.

This volume, which is furnished with a sketch-map and numerous photographic plates, deals with the geology of the islands, and the phanerogams and higher cryptogams, as well as the lepidoptera and other groups of insects inhabiting them. The plants and insects were found during visits in the summers of 1934, 1935, and 1936.

The list of plants takes the form of a complete Flora of the islands, and includes some species of remarkable interest in addition to numerous vice-county records. The most notable discoveries are Cicendia pusilla, Juncus pygmaeus, and J. capiatus, but the records for the two rushes are not entirely satisfactory. Many species of the larger critical genera are listed, but with no indication of their having been subjected to expert examination. The occurrence of Ranunculus reptans L. and Myosotis brevifolia L. is noteworthy. The Orchis incarnata of the list is presumably O. laevigata L., and the O. praeternissa Dr. is probably not that species. In perusing the chapter on the lepidoptera it is refreshing to read that one of the most abundant butterflies is Argyron omphalos L.

The book is well printed and the plates excellent, and the botanical chapter forms a welcome addition to Scottish local Floras.

H. W. P.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on November 11 the President, Mr. John Ramsbottom, O.B.E., M.A., from the Chair, reported the death of Dr. John Augustus Voelcker, O.B.E., F.L.S. Prof. Eric Ashby gave an account of a paper on “Physiological-ecological investigations in the wilderness of Judaea,” by Dr. M. Evenari and R. Richter; and Dr. V. J.
TAXONOMY AND GENETICS.

By W. B. Turnbull, D.Sc., F.L.S.

[From a paper read at the meeting of the British Association, Nottingham; September 1937.]

It is impossible to give any very accurate figures of the number of species of animals and plants known to biologists, because the standard of "species" varies so much. If one accepts a mean between the extremes of splitting and lumping, one has probably to take a figure exceeding a million, but less than two millions. On a similar basis one might say that for the Spermatophyta a figure near 250,000 is a fair approximation, and that this is being added to at the rate of about 1500 a year. These rough figures indicate something of the magnitude of the taxonomist's task, and also emphasize the absolute necessity of classification, if for no other purpose than for "finding one's way" in the biological kingdoms. Further, they suggest that the criteria which could be used for classification are likely to be exceedingly numerous. The general systems of classification which have been prepared by botanists and zoologists are essentially based on morphology, including, especially for some groups, anatomy. Structure is usually easier to determine and to define than function, and can very largely be preserved in specimens stored for reference in museums and herbaria.

We find, therefore, that practically all biologists use, for the purpose of stating the results of their researches in such a manner that they can be understood and verified, a classification and nomenclature which has been established by taxonomists on the basis of structure, and which can be referred to as orthodox or, from the standpoint taken here, as "alpha." It is hardly necessary to remind readers of the great achievements of this alpha taxonomy. It has been built up without help from the newer branches of biology—cytology, ecology, genetics, etc.—and yet it is impossible to conceive that they could have made their rapid progress without it. It is not always appreciated what a tremendous mass of detailed facts are accumulated in taxonomic publications, many of them of extreme importance to students of evolution, heredity, and distribution. Further, probably only a taxonomist working in one of the large museums or herbaria can realize how much still remains to be done by the established taxonomic methods, more especially, but by no means entirely, in tropical faunas and floras. There must be a continuation of the pioneer work of describing organisms in such a way that they can be readily recognized, and naming and classifying them so that they fit into a system by the use of which all future research on them can be correlated. Any remarks made later are to be understood not as destructive criticisms of this.

Indian Science Congress Association.—The Twenty-fifth (Silver Jubilee) Session will be held in Calcutta, January 3-9, 1938, under the Presidency of Sir James Jeans, K.C.V.O., F.R.S. A representative deputation of the British Association, which the Editor of this Journal has been invited to join, will attend the meeting.

In the Editor's absence Mr. I. H. Burkill, M.A., F.L.S., has kindly consented to take charge of the Journal. Mr. Burkill's address is "Clova," The Mount, Leatherhead, Surrey. Dr. Rendle hopes to return early in March.
alpha taxonomy, which, in the present state of biology, is indispensable, but as constructive efforts leading ultimately to an improved and perfected "omega" taxonomy which shall enable all biological knowledge to be made readily accessible—an ideal which will probably never be reached, but can be approached. Alpha taxonomy is, justifiably, conservative. In practice, taxonomists, as a body, do not readily adopt new terms and concepts, and, in theory, their nomenclature is fixed. Since taxonomy is the basis of all other biological work, this relative stability is highly commendable. It only becomes objectionable when its rigidity forms an obstacle to progress. The formulation of subsidiary systems, such as those of Turesson, Danser, and Rensch, is to be encouraged, but it is undesirable that they should be assimilated into general taxonomy until they have been thoroughly tested, and the assimilation can be so made as not to lead to confusion between the old and the new.

Great biological advances have been made in recent years, by extending experimental methods to the problems of heredity, variation, and adaptation. Only a few examples of how the new facts suggest modification in taxonomic method and outlook are discussed here. The taxonomist groups organisms into families, genera, species, varieties, etc. For a number of reasons "species problems" are most fundamental. Experimental methods are, with few exceptions, limited to and below the species level, because we can experiment between species and within species by controlled breeding and by transplanting. These experimental methods should throw some light upon, at least, the following problems of importance to the taxonomist:

1. The degree of plasticity of genotypes.
2. The occurrence and constancy of correlation of characters.
3. The occurrence and nature of sterility barriers.
4. The evaluation of characters.
5. The recognition of hybrids.
6. The phylogeny of species.

Actually the alpha taxonomist classifies phenotypes; but he usually assumes, often correctly but usually without experimental proof, that he classifies together the phenotypes of one genotype. Our knowledge of the plasticity of even common plants is very meagre and even facts already known are sometimes ignored. Thus, in the recent monograph by Pilger (1937) on Plantago, P. major is subdivided into intra-specific groups on characters some of which have been shown by the transplant experiments at Potterne to be reactions of one genotype to different environmental conditions. The numerous apomicts of Taraxacum are exceedingly plastic, and it is difficult, if not impossible, to determine and delimit them by means of the usual descriptions. The taxonomist breeds large numbers of individuals under relatively uniform conditions. Those conditions should be more precisely described than they usually are, and more parallel experiments should be conducted under different conditions. The taxonomist would like to see more correlation in experiment between the geneticist and the autecologist.

Genetical research involves the analytical study of many characters. The degree to which these characters are correlated has led to the recognition of linkage and crossing-over. The taxonomist recognizes his species by the constancy of association of certain characters, but has, by alpha methods alone, to estimate such constancy from the examination of small unequal samples. In the species of Silene of the S. maritima group a very interesting series of facts has been established by research at Kew and Potterne. Full accounts are in process of publication in the Kew Bulletin, and only a brief reference is possible here to one of many important results. Silene maritima and S. Cucubalus (N vulgaris) are well-known species. More than a dozen morphological differences between them can be enumerated, but every one of these is found to "break down" in some, mostly a few, individuals, and this apart from taxonomic hybridization. This "break down" in complete correlation of characters has mainly been ignored by taxonomists, and only the intensive genetical studies which have been made contemporaneously with extensive field analyses has revealed its occurrence and extent. Two examples must suffice here. Silene maritima has broad obloid capsules with reflexed teeth; S. Cucubalus has ovoid capsules with erect teeth. The F1 is intermediate and segregation is complex in F2. In certain far inland populations of S. Cucubalus, as for example at Hog's Back, Surrey, we have found 2 to 3 per cent. of plants of S. Cucubalus with capsules of the shape and with the teeth of S. maritima. Similarly, S. Cucubalus-like capsules can be found, though very rarely, in populations of S. maritima. "Armadillo" seeds are the rule in S. maritima; "tubered" seeds in S. Cucubalus. A varying proportion, usually about 3 to 10 per cent. of S. Cucubalus plants have, however, armadillo seeds, and populations of S. maritima show from 0 to 50 per cent. tubered seeds. Armadillo is always recessive to tubered, and the F2 segregation usually approximates to 3:1, within or between the species. The last pair of characters of those we have studied, which we found to break down, was zygomorphy versus actinomorphy. In spite of this the two species keep essentially distinct, and, except with known or suspected inter-specific hybrids, there is no difficulty in determining a given plant specifically. The taxonomist must obtain data of the degree of correlation, not merely of its occurrence.

Sterility, in the broadest sense of the term, is of many degrees, and, as based on causes, of different kinds. As a barrier between species it is often, but by no means always, associated with other...
barriers, such as difference in ecological or geographical distribution. When sterility is complete between genotypes it obviously results directly in their isolation and in the isolation of the characters by which they are distinguished. The distinctness of buttercup species in a meadow would not be obtained without sterility barriers. Marsden-Jones and Turrill have found complete sterility between Centaurea Scabiosa on the one hand and microspecies of C. nigra on the other, both in experiments and in the wild, though plants of those species often grow close together. On the other hand, Centaurea nigra, C. nemoralis, and C. Jacea hybridize freely with the production in nature of complex hybrid swarms. The main facts of this behaviour have now been correlated from the genetical, cytological, and taxonomic standpoints. It is expected that the experiments which, with field-work, will have extended over fifteen years, will be completed by 1940, and a full account published as soon after as possible. Species in the genus Nemophila have been shown by Chittenden and Turrill to breed true to definite characters, and taxonomists are leading to an "experimental taxonomy" in the sense that tentative schemes of classification are being tested with the possibility that they may finally be incorporated in an improved general taxonomy. There are, however, certain dangers which have to be guarded against. Chief of these is the logical fallacy of circular argument. If, for example, it is desired to ascertain the relationship between a certain type of genetical behaviour and morphology, it would lead to wrong deductions if a classification were used that had been built up on a mixed morphological and genetical basis. One would merely extract what one had put in without independent proof of its truth. The best way to avoid this danger is to have a wide general classification in the making of which all criteria have been fully considered, i.e., a classification approximating as nearly as possible to an omega taxonomy, and at the same time to have subsidiary classifications, every one of which is based on only one kind of attribute. These subsidiary classifications should be the ones to be compared together for purposes of deduction from correlation of characters or data. Further, most often there are reasonable alternative classifications possible. This is certainly true of morphological classifications, and no doubt of cytological, genetical, etc. The chances are that agreement is greater between some one of the alternative morphological classifications and some one of the alternative cytological or genetical classifications than between other combinations. In actual taxonomic research this usually works out by cytological, genetical, or other investigations suggesting changes in a given morphological classification, the basis still remaining morphological. Since taxonomy, and
especially identification and its associated nomenclature, is basic to genetics, ecology, cytology, etc., it should be as precise and stable as possible. Taxonomists have, therefore, to face the difficulty of maintaining an unchanging (or relatively unchanging) system and at the same time incorporating new data largely derived from investigations which have used taxonomy as a tool.

The following suggestions are therefore put forward for consideration:

1. It is essential that alpha taxonomy (based entirely or essentially on morphology) should be maintained. Its methods can, of course, be extended and improved without alteration of fundamental principles. This alpha taxonomy gives and must continue to give the first approximation towards the wider complete knowledge regarding organisms, which biologists seek.

2. Subsidiary classifications, for special purposes and often on a very limited and deliberately abstracted number of attributes, should be prepared whenever they are thought desirable or likely to give valuable information of a particular kind. Turesson (1922) stresses ecological, Danser (1929) stresses sterility-fertility, Rensch (1929) and Du Rietz (1930) phyto-geographical aspects. All of these authors, however, retain at least a large part of orthodox taxonomic method, concept, and nomenclature. Apart from these limited, but useful, expansions of alpha taxonomy, many kinds of more specialized classifications have been proposed—for example, on the basis of chromosome number (diploids, triploids, etc.), of habit, of habitat, of cross- or self-sterility, etc.

3. There should be continued experimentation as to how the new kinds of data can be incorporated in and used in taxonomy. This free “experimenting taxonomy” need not be bound by the traditions of alpha taxonomy, of which it will represent an easily modifiable fringe, in the main advancing but always ready to evacuate positions no longer tenable. By trials and errors this “experimenting taxonomy” will enable, one hopes, orthodox relatively stabilized taxonomy to incorporate new data and so to advance, gradually and cautiously, from an alpha position towards a far-off omega perfection of the classification of all biological knowledge.

4. The recently formed “Association for the Study of Systematics in relation to General Biology” should receive the active support of all biologists, whatever their special lines of work. It is only through such a central and co-ordinating association that our ideals can be approached. An account of the formation of this Association has been published in ‘Nature’ of July 24, 1937, p. 163, and a leading article in the issue for August 7, 1937, pp. 211-12 outlines many of its aims.

In this short paper I have attempted to draw attention to some of the potentialities of taxonomy as a meeting-ground for the different branches of biology, using genetics as an example. If my remarks do something to remove the common misconception that taxonomy is merely a dry museum or herbarium study, hidebound by tradition, and limited to the preparation of technical descriptions, identifications of specimens, and problems of nomenclature, they will achieve an important function. If, further, they serve to attract some younger biologists to studies helping directly towards an “omega” taxonomy they will have fulfilled their main purpose. It remains a fact that taxonomy is now in an interesting condition, and one does not really know what it may bring forth.

[A much longer paper covering the relationship of taxonomy to other branches of biology, not merely genetics, has been accepted for publication in ‘Biological Reviews,’ Cambridge. To this paper has been appended a full list of references.]

Glossary.

Phenotype.—An organism as defined by its visible or demonstrable characters.

Genotype.—An organism as defined by its hereditary constitution.

Homeo.—An organism propagated entirely without fertilization.

Autecology.—The study of the life-history of a single kind of organism, with special reference to environmental factors (whence autecologist).

Linkage.—The constant or high correlation of characters owing to the close association of hereditary units (genes) on the same chromosome.

Reassociation.—The reassociation of linked factors owing to the exchange of corresponding segments of half-chromosomes (chromatids).

F₁.—The first filial generation—usually the first generation after a cross.

F₂.—The second filial generation obtained by selfing or interbreeding individuals of an F₁ family.

THE AFRICAN SPECIES OF THE GENUS ORTHOSIPHON BENTH.

By MAURICE ASHBY, PH.D., D.I.C.

(Concluded from p. 10.)

EU-ORTHOSIPHON, sect. nov.

Flores bracteis parvis induti. Corollae tubus ±longus, cylindricus vel aliquanto fauces versus leviter ampliatus; labia subequalia.

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SoCOTRA: Wadi Digal, 1625 ft., Mar., Schweinfurth 518 (K); without locality, Dec., Balfour 420 (K, type; BM), and 1897 Bent s.n. (K).

By its general habit and inconspicuous racemes this species is readily distinguished from all others.


PORTUGUESE EAST AFRICA. Railway between Beira and Massikessi, Nov.-Dec., Cecil 20 (K, type).


Geographical Range.—From Uganda and Tanganyika Territory to Angola and Northern Rhodesia.

ANGOLA. Loanda Dist.: 30 miles inland from Ambriz, Monteiro s.n. (K, type). CAUNZA SUL Dist.: Mumbonda, country of the Quissamas, Mar., Gosseweiler 8375 (BM; K).

UGANDA. Serene, Teso, 3000 ft., after cultivation, Dec.; Chandler 198 (K).

TANGANYIKA TERRITORY. Mpwapwa, clay hill-slopes, Mar., Hornby 95 (K); Kirangi, Mar., Phillips 8K (K).

NORTHERN RHODESIA. Mazabuka, 4000 ft., Mar., Woods s.n. (BM).


8. O. australis Vatke in Linnæa, xl. 179 (1876), and xliii. 86 (1881–2).


O. mombasicus Bak. tom. cit. 369 (1900).

O. rabaiensis S. Moore in Journ. Bot. xliii. 26 (1906); var. parvisepala S. Moore loc. cit. “parvisepala.”


Geographical Range.—Widely distributed, mostly along the east coastal region, from southern Abyssinia to Transvaal.

ANGLO-EGYPTIAN SUDAN: MONGALLA PROV.: Msai, NW. of Lake Rudolf, nr. the Abyssinian border, 3000 ft., Jan., Donaldson Smith s.n. (BM); Mongalla, Bahr el Jebel, Nathan in Sudan Govt. Herb. 1652 (K).


UGANDA. E. Ankole, 4400 ft., Oct., Eggeling 607 (982) (K); Jinja, Busoga, 3000 ft., Sept., Brown 96 (K).


O. calaminthoides Bak. in Kew Bull. (1895) 225.

BRITISH SOMALILAND. Medd Mts., Serrut, e. 5000 ft., Apr., Hildebrandt 1428 (type; BM, K). Biher, 1897, Lort Phillips s.n. (BM); without locality, June 1896, Lort Phillips s.n. (K, type of O. calaminthoides).


NYASALAND. Nyika Plateau, Nacheni, 1500 ft., Sept., McClownie s.n. (K).

PORTUGUESE EAST AFRICA. MOZAMBIQUE: Rios de Sena, mixed sandy earthy ground, Peters s.n. (B, type). Lourenco Marques, Polana Beach, Oct., Moss 11,886 and 14,110 (BM)—and other specimens.

TRANSVAAL. BARBERTON: Kaapmuiden, Dec., Rogers 25,044 (BM).

BELGIAN CONGO. Upper Congo, Missanje, Sept., Descamps s.n. (Br.); M’Towa, Oct., Descamps s.n. (Br.) (types of O. liebrechtsianus).

A very variable species, especially in the leaf-characters.


O. calaminthoides Bak. in Kew Bull. (1895) 225.

BRITISH SOMALILAND. Medd Mts., Serrut, e. 5000 ft., Apr., Hildebrandt 1428 (type; BM, K). Biher, 1897, Lort Phillips s.n. (BM); without locality, June 1896, Lort Phillips s.n. (K, type of O. calaminthoides).


NYASALAND. Nyika Steppe, in marsh, Sept., Holst 3922 (B, type).

Based on a single specimen, which is unique in the genus by reason of its indumentum of stellate hairs on the stem and leaves.


Angola. HUILLA: Lopollo, in rocky thickets, Dec., Wulfschmidt 5473 (type; BM, K).


TANGANYIKA TERRITORY. Mwanza, May, Stuhlmann 4168 (B, type).

Only the type-material has been seen; this is largely in fruit, but is characterized by a cluster of sterile bracts at the apex of each raceme. It is possibly an abnormal plant of O. rubicundus.

O. coloratus Vatke in Linnaea, xliii. 86 (1881-2).
O. shirensis Bak. loc. cit.
O. pseudoburcianus Lingelsh. and Borza, op. cit. xiii. 389 (1914).
Ocimum cuanzei I. M. Johnston in Contrib. Gray Herb. N.S.
Lxiii. 39 (1924).
Orthosiphon wulfenoides (Diels) Hand.-Mazz. in Meddelanden från Göteborgs Botaniska Trädgård, ix. (30 Apr., 1924).
Geographical Range.—China, India, and widely distributed in tropical Africa.
GOLD COAST. N. Territories, Salaga, May, Kraus s.n. (K, type of O. salagensis).
Wuchia to Black Volta River, Kunta, Mar., Kilson s.n. (BM), and other localities in N. Territories.
Nigeria. Sokoto and Kontagoro Provs., in bush, May, Dalziel 360 (K); Bichikki, 2200 ft., May, Leley 158 (K).
BELGIAN CONGO. Katanga: Kafuro River, Nov., Quaré 802 (Br.).
UGANDA. Teso, 3600 ft., Mar.-Apr., Chandler 649 (K).
KENYA COLONY. Ukamba Prov.: Kitui, barren places, May, Hildebrandt 2747 (type of O. coloratus; BM, K), and Scott Elliot 6206 (BM); Kapenguria, 7000 ft., grassland, May, Napier 1935 (K); Embere, Rumbias, 4000 ft., rather open savannah, Nov., Graham 2299 (K).
TANGANYIKA TERRITORY. Generally distributed, collected by Carson, Migeod, and others.
NYASALAND. Shire Highlands, Mandala, Dec., Scott Elliot 8543 (K). Mt. Mlanje, Zomba, Sept., Whyte 138 (BM) and Whyte s.n. (K). Without locality, Buchanan 187 (K, type of O. shirensis); 1891, Buchanan s.n. (BM) and 1895 Buchanan 134 (BM).
NORTHERN RHODESIA. Broken Hill, under trees, Dec., Kassner 2028 and 2028 bis (BM, B), and other specimens.
SOUTHERN RHODESIA. Bulawayo, Jan., Rand 143 (BM).
Shakwe, 4000 ft., Dec., Egles 71 (BM), and other material.
PORTUGUESE EAST AFRICA. Mozambique, Dec., Dave 327 (K).
TRANSVAAL. Zoutpansberg: Elim, Dec., Obermeyer in Herb. Transvaal Mus. 29,238 (TM); Tshakoma, Nov., Obermeyer in Herb. Transvaal Mus. 31,570 (TM).
The species covers a wide range of variation, but it is considered that without extensive studies of the plants in their natural
environment no useful purpose can be served by the recognition of smaller groups, as all possible intermediate stages occur.
Furthermore, no clue is given by the geographical distribution, for specimens from China and India are in many cases indistinguishable from the Central African plants.
KENYA COLONY. Same (8) River, 100 ft., Aug., Kassner 318 (BM).
TANGANYIKA TERRITORY. Usambara: Maschana, steppe country, July, Holst 3561 a (type; K).
15. O. Schimperi Benth. in DC. Prodr. xii. 51 (1848).
ANGELO-EGYPTIAN SUDAN. Niamniam, Nganje, July, Scheuene-farth 3941 (K).
ABYSSINIA. Summit of Mt. Scholada, among stones, June, Schimper 313 (K, type; BM). Without locality, Petit 128 and s.n. (ex Herb. Franqueville) (K).
Resembling O. rubicundus, but distinguishable by its crowded inflorescence and generally also by the densely pubescent leaves.
CAMEROONS. Buar, Mildbraed 9329 (BM; K).
TANGANYIKA TERRITORY. Without locality, Kilimanjaro Expedition, 60-60 miles from the coast, Johnston s.n. (K, type).
18. O. parvifolius Vatke in Linnaea, xliii. 87 (1881-2).
KENYA COLONY. Common in Naiavasha, Kenya, Ukamba and Seydieie Provs. Collected by Hildebrandt (2745 type; BM, K), Scott Elliot (6556), Kassner (284), Endlich (232), Mearns (68), and others.
TANGANYIKA TERRITORY. Well distributed in Mwanza, Arusha, Tabora, and Kondoa Districts.
BRITISH SOMALILAND. Berbera, Bury 18 (BM, type of O. Buryi); between Dubar and Hammer, Jan., Lort Phillips s.n. (BM); Wagga Mt., Bury s.n. (BM); Golis Range, Drake Brockman 53 (K), June, Lort Phillips s.n. (K, type).
O. glabratus Benth. var. africana in DC. Prodr. xii. 51 (1848).
O. neglectus Brij. in Bull. Herb. Boiss. 2me sér., iii. 988 (1903).
O. incommunis Brij. tom. cit., 991 (1903).

O. Wilmsii var. komghensis N. E. Br. in Dyer, Fl. Cap. v. 1, 256 (1910).

Geographical Range.—Transvaal, Natal (and Cape Province).

Transvaal. Waterberg : Potgietersrust, c. 3600 ft., in thickets, Feb., Bolus 11,011 (K, type of Plectranthus Bolusi).

Marico: Lino Kano, Aug. 1876, Holub s.n. (K). Matebe Val., Oct., Holub s.n. (K); Koudriver, 4600 ft., Nov., Schlechter 3728 (BM, K)—and other material.


Cape Province (introduced ?). Komga: nr. Kei River, among stones, Nov., Flanagan 477 (K, type of O. Wilmsii var. komghensis).

S. Africa—without locality, 1846, Zeyher 1337 (BM, K).


The species is based on very scanty material.


Angola. Malange, open thickets towards N’Golo, Aug., Gossweiler 1036 (BM, type ; K), same locality, in bush veld, Sept., Young 940 and 955 (BM), Vulangombe, in grassy thickets after the fires, July, Gossweiler 1031 (BM). Lunda: Xassengue, dry veld, Sept., Young 722 (BM), same locality, Oct., Young 1014 (BM).

A distinct species by reason of the irregular and very viscid inflorescence, which suggests alliance with the genus Fuerstia. The ternoate arrangement of the leaves is shared by O. pascuensis and O. serratus.

23. O. Buchananii (Bak.), comb. nov.

Ocimum Buchananii Bak. in Fl. Trop. Afr. v. 348 (1900).

Geographical Range.—Kenya Colony, Nyasaland, and Rhodesia.

Kenya Colony. Without locality, 1914, Prescott Decie s.n. (BM).

Nyasaland. Shire Highlands, common, Buchanan 81 (K, type); also Zomba and Blantyre.
triangularibus apios subulatis, c. 1 mm. longis; anticas in fructu ad 2 mm. accrescentibus. Corolla extus labiis puberula, intus infra bases staminum posita, aliis partibus glabra; tubus rectus apicem versus ampliatius, fauce lateraliter compressus, 4–5 mm. long., ore c. 3 × 2 mm.; labium posticum 3–lobatum, 3–6 mm. long., suberectum; antica 4–6 mm. long per anthesin rectum vel leviter deflexum. Stamina in corolla labio antico inclusa, filamentis glabris, postica supra medium partem corollae tubi inserta, c. 4 mm. long., antica fauce corollae inserta c. 2–5 mm. long. Stylus aliquanto corolla labio antico extensus, apice capitatus vel emarginatus.

ABYSSINIA. BORON: M. Gof, Nov., Donaldson Smith s.n. (BM, type), same locality, 3900 ft., Delamere s.n. (BM).

ABYSSINIA. Plain

Geographical Range.—From Dahomey and Anglo-Egyptian Sudan to Abyssinia, Somaliland, Arabia, and India.


Anglo-Egyptian Sudan. Gebel Uaratab, nr. Suakin, Jun., Schweinfurth 249 (B); Erkawit, between Suakin and Berber, Sept., Schweinfurth 277 (K); Wadi Kansisro, Elba, Jan., Newberry 238 (BM).


ABYSSINIA. Plain of Hamedo, 1000–5400 ft., Sept., Schimper 383 (B, type of O. Ehrenbergii); Sabra, Schimper 190 (K, P); Delhi Dikeno, mountains, 4000–5000 ft., Sept., Schimper 1963 (P).


Orthosiphon Ehrenbergii Vatke in Linnaea, xxxvii. 316 (1872).

[Ocimum farsianum Ehrenb. ex Vatke, loc. cit. nomen synonymum.]

[Ocimum nepetalcatum Hochst. ex Vatke, loc. cit. nomen synonymum.]

[Ocimum reflexum Schweinf. ex Vatke, loc. cit. nomen synonymum.]

Orthosiphon reflexus (Ehrenb.) Vatke in Linnaea, xliii. 85 (1881–2).


Geographical Range.—From Dahomey and Anglo-Egyptian Sudan to Abyssinia, Somaliland, Arabia, and India.


Anglo-Egyptian Sudan. Gebel Uaratab, nr. Suakin, Jun., Schweinfurth 249 (B); Erkawit, between Suakin and Berber, Sept., Schweinfurth 277 (K); Wadi Kansisro, Elba, Jan., Newberry 238 (BM).


ABYSSINIA. Plain of Hamedo, 1000–5400 ft., Sept., Schimper 383 (B, type of O. Ehrenbergii); Sabra, Schimper 190 (K, P); Delhi Dikeno, mountains, 4000–5000 ft., Sept., Schimper 1963 (P).
NOTES ON BRITISH CHAROPHYTES.

BY G. O. ALLEN.

The following records from among charophytes I have examined since 1933 represent, so far as I am aware, extensions of their known range:—

NOTELLA OPACA AG. VAR. ATTENUATA GR. In going through the charophytes in the Hiern herbarium for the Devonshire Association I found a specimen of N. opaca with very elongated branchlets that appears to fall within this variety. It was collected by Mr. W. P. Hiern in May 1895 from a stream near Dove's Moor (Bulkworthy parish), N. Devon, v.c. 4.

Mr. G. T. Fraser has also sent me some beautiful specimens, ♀ and ♂, which he collected in May 1937 from Henmock Reservoirs, S. Devon, v.c. 3. Hb. Mus. Brit. G.O.A. 361.

In December 1936 my attention was drawn to what proved to be N. opaca at Haslemere, Surrey, v.c. 17, by Mr. R. C. Blockey, of the Educational Museum there. I then just noted it as in immature condition. In October 1937 I gathered some myself from the same place, a delightfully clear small pond that is fed from a spring. It is not as slender as var. attenuata should be, but it agrees in the branchlets, which freely bear ripe antheridia, being exceptionally long and lax, and hence very different in appearance from the usual form, with its short branchlets and dense fruiting heads. I did not succeed in finding any ♀ plants at all. Hb. G.O.A. 368, Mus. Brit.


N. MUCRONATA MIQ. In October 1936 in the River Wey, near Frensham Pond, Surrey, v.c. 17, I came across one or two clumps of this in a little slack water below the piles of a small bridge. Unfortunately it was without fruit, though in a well-grown condition. It is decidedly rare in the British Isles, and one of the few to be found in running water. My plant was characterized by the frequency of 3-celled dactyls (instead of the normal 2-celled), as in the variety gracilis, but differs from that in being rather a stout form than usual. The following day I happened to gather a little more of it towards chask, and did not discover till it had been lying some hours in a dish that it included four young crayfish. In this connection it may be of interest to quote a passage from Huxley's 'Crayfish' (p. 9), where, speaking of the food of these animals, he writes 'Calcareous plants such as the Stoneworts (Chara) are highly acceptable'; so possibly they may have been feeding on the Notella. Hb. G.O.A. 341, Mus. Brit., Kew.

In August 1937 Mr. D. F. Leney, of the Surrey Trout Farm, Haslemere, obtained a remarkable form of this species, bearing ripe fruit plentifully, in a reservoir at Scolescombe, near Hastings, E. Sussex, v.c. 14. Instead of the uniformly lax growth the fertile whorls form dense heads as in var. heteromorpha Kitto, which is found on the continent. This variety does not appear to have been recorded before from the British Isles. In their 'Review of the British Characeae,' 1880, H. and J. Groves considered Borrer's specimen from West Grinstead, West Sussex, v.c. 13, to be 'near var. heteromorpha,' but there is no reference to this opinion in 'British Charophyta.' It is illustrated in Migula's 'Die Characeen' (Rabenhorst's 'Kryptogamen-Flora'), p. 151, and in his 'Synopsis Characearum Europaeorum,' fig. 31, p. 41. Hb. Kew. G.O.A. 367, Mus. Brit.

(Mr. J. E. Lousley recorded in this Journal (lxxiii. 260) his finding the typical form at Alfriston, East Sussex, in August 1931.)

N. HYALINA AG. The gathering by Mr. N. Douglas Simpson in July 1913 of this species in Llyn Idwal, Cwm Idwal, Carnarvon, v.c. 49, is of exceptional interest, as previously the only known locality was Looe Pool, West Cornwall, v.c. 1, where the late Canon Bullock-Webster discovered it in 1898. It was still there in 1914. In August 1933, in response to an enquiry of mine, he wrote: 'It is not much use looking for N. hyalina in Looe Pool now I think. It seems to have gradually died away. I think it is really an alien. Perhaps fruit brought on birds' feathers from France or Spain.' Mr. Simpson's plant was in a sterile condition, and the authors of 'British Charophyta' had not noted it.
seen a ripe oospore from the British Isles. It is our only heterocoleous Nitella.

TOLYPELLA GLOMERATA Leonh. Miss E. F. Noel collected this at Laugharne, near Carmarthen, v.c. 44, in May 1937 in a curt-

(CHARA BRUNII Gmel. This species still exists in its one British locality, Reddish Canal, Lancs., v.c. 59, having been obtained there this year by Miss E. S. Todd. It was first found there in 1833, and is considered as having been probably introduced accidentally from Egypt.)


The var. hispidula, of which there are few records, was obtained very sparingly by Mr. J. P. M. Breman in Wilstone Reservoir, near Tring, Herts, v.c. 20, in July 1937.

C. ACULEOLATA Kütz. This was collected by Mr. J. F. G. Chapple at Bosherston, Pembroke, v.c. 45, in August 1937. The only other Welsh record for this rare plant is Anglesea.

C. DELICATULA Ag. (This widely distributed species was found in Keston ponds, W. Kent, v.c. 16, in June 1919 by Mr. St. J. Marriott; and in the marshes at Minster, Thanet, E. Kent, v.c. 15, by myself in August 1923.) It was obtained by Mr. W. P. Hiern near South Molton, N. Devon, v.c. 4, in June 1893, and by Mr. G. T. Fraser at Kingsteignton, S. Devon, v.c. 3, in August 1936.

In the 'Fragmente' this species was treated as a subspecies of C. fragilis Desv. (now to be known as C. globularis Thuillier), and it was not till about 1917 that Groves began to refer to it as a separate species. As to the ambiguity about nomenclature, see 'British Charophyta,' ii. 67.

It is sometimes rather difficult to distinguish it from C. aspera Willd. if the latter happens to have inconeiposcent spine-cells and is sterile, particularly if one has only a dried specimen for examination. It is always far easier to determine a charophyte when it is either in a fresh state or preserved in quite weak formalin.

The var. annulata, a small densely tufted form that is very different in appearance from the typical, was obtained in Raasay Island, Inner Hebrides, v.c. 104, by Mr. R. B. Cooke in May 1936. Previous Scottish records are from Sutherland W., Orkney, and Shetland. Hb. Mus. Brit.
Brown's description states that its leaves are 3-5 mm. long, and their accompanying figure (no. 3083) is quite characteristic, showing foliage of much less than half the size of that of *M. spicatum* L. and *M. verticillatum* L. as depicted in the same volume.

*M. alterniflorum* was originally described in De Candolle's 'Flore Françoise' (tom. v., or vol. vi. p. 529; 1815), and was distinguished from *M. spicatum* L. by being slenderer and more delicate in all its parts, with the more distant and finer leaf-lobes alternate and not opposite, the flower-spikes small, only an inch long, and the flowers always alternate, the lower 2-3 together, the upper solitary. The description was taken from a plant of the River Erdre, near Nantes. Grenier and Godron (Fl. Fr. 1. 588; 1848) give a much wider French distribution, comprising Voges, Reims, Côte d'Or, Auvergne, Valley of the Loire, Vannes, Vire, and La Manche. I have not seen De Candolle's original specimen, but numerous French exsicatae in British herbaria (e.g., Hance, Maine et Loire, 1852; Gadeauc, Lac de Grand Glen, Loire Inférieure, 1905; and Wirtgen, Pl. Rhénan. vii. 332, and xvi. 297 bis, Voges) clearly show that the plant intended is the form usual in Britain and generally through Western Europe. This normal form occurs likewise in Iceland (Hooker), Greenland (Traynell), and the Azores (Trelease).

*M. alterniflorum* is well figured in English Botany Suppl. 2854, and this plate, with Flora Danica, t. 2061, and Coste, Fl. France, no. 1303, may be profitably compared with the figure of the American plant as given by Britton and Brown (l. c.).

The existence in eastern North America of a *Myriophyllum* similar to *M. alterniflorum* DC. of Europe, but yet obviously different, might seem to indicate that the two plants are not conspecific, but after carefully comparing the available material, which seemed adequate for forming a conclusion, I am unable to find any points of distinction in the inflorescence and the fruit, and therefore think that the foliar difference, which is so striking and certainly seems constant, can only be held to constitute a varietal or race character. It is therefore proposed to distinguish the American plant as a variety of *M. alterniflorum* DC. thus:—

\[ \beta \text{americanum, var. nov.} \]


**NEW VARIETY OF *MYRIOPHYLLUM ALTERNIFLORUM* DC. 53**

Planta caulibus tenuibus plerumque densissimae foliis grumulina. Folia minima, vulgo 3-5 mm. longa, lacinis capillaceis \( ~1 \text{ mm. longis prædita. Flores fruticosquæ ut in typo.} \)

*M. alterniflorum* var. americanum is of interest to British botanists as an addition to the list of North American plants growing in Ireland whose status in that country is uncertain. It has evidently inhabited Lough Neagh for at least seventy years, and its peculiar aspect was duly noted in 1867 by Stewart, who seems to have found it while in company with Professor Dickie. By a curious coincidence these two botanists must apparently have passed over the habitats of *Spiranthes stricta* Rydb. on that occasion and failed to detect it, perhaps owing to the early date of their visit (13 July).

**A NOTE ON MR. PUGSLEY'S *MYRIOPHYLLUM ALTERNIFOLIUM* VAR. AMERICANUM.**

By R. Lloyd Praeger.

This slender form of *Myriophyllum alterniflorum* has been familiar to me for fifty years now as especially characteristic of Lough Neagh, where I first collected it in company with Mr. A. Stewart. He was of opinion then that it was a habitat-form produced under the special conditions prevailing—great exposure and a sandy bottom; and I never went further into the matter. During the last three seasons I have been examining the Lough Neagh flora especially, in view of the forthcoming new edition of the 'Flora of the North-East of Ireland.' This curious *Myriophyllum* was found on the shores of all the five counties which border the lake—Down, Antrim, Londonderry, Tyrone, and Armagh; and also particularly well developed in the adjoining shallow sandy Lough Beg, in Antrim and Londonderry. It often grows in only a few inches of water, when its short, much-branched habit and extreme slenderness, as seen through the moving water, have caused me sometimes to believe I was looking at *Fontinalis.* I am extremely glad that Mr. Pugsley's recognition of it as something quite unusual in the British Isles has led to his demonstration of it as a North American plant—a member of the small group of Transatlantic plants whose European headquarters lie in Ireland. Typical *M. alterniflorum,* which is common in Ireland, and especially so in the acid waters of the west, I have never seen in Lough Neagh or Lough Beg; the water there is rather alkaline, with a pH as high as 7. Its place is taken in Lough Neagh by *M. spicatum,* which in Ireland inclines to be calcicole, and to favour the wide areas occupied by Carboniferous limestone, though it occurs in every county in the country.
It is many years now since I collected the variety in Lough Ree, as quoted by Mr. Pugsley, and I can give no details till I have revisited the lake; but I believe it was widespread there, and I also saw it in the other great limestone lake of the Shannon—Lough Beg.

The last paragraph of Mr. Pugsley's suggests that the possibility of introduction should be allowed for. I do not think that on the evidence there is the smallest reason for thinking that it is not indigenous in Ireland.

MEN THA HIRCINA HULL.—II.

By A. L. Still.

In the number of this Journal for April 1937 there appeared a note on the above Mint, in which the following points were dealt with:

1. The identity of Hull's plant.
2. The relationship of this to the plant from which Fraser compiled his description in 'Menthe Britannica.'
3. The connection between M. hircina Hull var. hirsuta Fraser and other Mints.

The purpose of the present note is to clear up some misconceptions in the previous discussion, in the light of further material and information which have become available.

With regard to (1).—In the Kew Herbarium there is a sheet of Sole's bearing two specimens, one of which is labelled, in Sole's hand, "M. piperita sylvestris," and under that name "M. hircina Hull." The specimen is not a good one from which to draw up a description, as it consists of the upper portion only of the plant, but it serves to establish the identity of Sole's and Hull's plants.

Among a set of Sole's Mints presented to the Linnean Society in 1797 and recently rediscovered at the Society's Rooms, there is an excellent specimen of M. piperita sylvestris (sive latifolia) Sole, which can be taken as a type for M. hircina Hull. On comparing Sole's figure with his specimen it can only be said that the plate is misleading and does not give a good idea of the plant. I must therefore acknowledge that my identification of this with M. hircina Hull var. hirsuta Fraser was an error.

Speaking generally, it may be said that a Peppermint generally resembling M. piperita sylvestris, o.fficinalis, or subcordata will, with ovate, acute, or acuminate leaves, boldly and regularly serrate. The spikes are much as in officinalis, but grey with hairs on the calyx-teeth. It seems that this was a local form occurring near Bath; and it does not appear to have been found elsewhere or recently. I think it is unfortunate, because unnecessary, that Hull should have renamed it.

With regard to (2).—The specimen from which Fraser drew up his description of M. hircina Hull is now in his collection at Kew. It was gathered by Stonestreet, but no locality is given. An older label says: "M. piperita D. Buddle." In the April paper I said that the plant seemed to be a hairy form of M. piperita L. var. subcordata Fraser, and I am still of that opinion. The leaves are too narrow for sylvestris Sole and the spike too hairy in all parts. During 1937 I have gathered a similar form in two places, one wild and one from a cultivation; and have a specimen gathered by Mr. Lousley in Worcestershire. There is no doubt in my own mind that these represent "sports," and are associated in cultivation with exhaustion of the soil.

With regard to (3).—In August last Mr. R. H. Corstorphine kindly showed me a colony of Peppermint at Fern Den, Angus, with which grew a patch of a hairy Mint, identical in all essentials with those found at Danehill, Aldborough, Bedwyn, and Weston in Gordano. In this locality, no M. aquatica occurred anywhere near, and this species is very local in Angus, so that hybridity is unlikely. Nor was there any longifolia to be seen, and this species is, to the best of my knowledge, only represented in Angus by its hybrids alopecuroides, villosa, and nemorosa. It seems, therefore, that the idea of M. hircina Hull var. hirsuta Fraser, being a hybrid of aquatica X longifolia must be discarded, and with it the identification with M. pubescens Willd. Apparently no authentic sheet of the last exists; but Willdenow's description does not fit the plant we are discussing. I am firmly convinced that we have to deal with a "sport" of M. piperita L. var. officinalis Sole, as suggested in the previous paper. A question of nomenclature arises here. For the present I am marking these plants M. piperita L. var. officinalis Sole, hirsuta pilosus. In the case of the hairy form of var. subcordata Fraser, the same procedure is followed.

To summarize.—The plant from which Fraser drew up his description of M. hircina Hull does not seem to be identical with Hull's plant, but probably a hairy sport of the Black Peppermint var. subcordata Fraser. Hull's plant was the same as M. piperita sylvestris Sole, apparently a local form and possibly now extinct. M. hircina Hull var. hirsuta Fraser seems to be a sport from M. piperita L. var. officinalis Sole.

REFERENCES.

Hull, Menth. Brit. 53, t. 24 (1793); Hull, Brit. Fl. i. 127 (1799);
Fraser, Journ. Bot. 102, April 1937.
SHORT NOTES.

**EPIFACTIS RUBIGINOSA** Cranz.—In Col. Godfrey’s Monograph (‘Monograph and Iconograph of Native British Orchidaceae,’ 1933, 50) the colour of the flowers in Britain is given as wine-red, rarely dull rose or greenish. Such plants are about 12-20 cm. high. Col. Godfrey also says that in South France and Switzerland the plant is usually much taller, 20-40 cm., and with much brighter colours, rosy flowers (as shown in Correvon’s ‘Album des Orchidées de l’Europe’).

Mr. J.S. Wallsman has called my attention to the fact that at Arnside Knott and Newbiggin Crags there are good numbers of plants which in size and colour belong to the Continental type.

Unfortunately, at Arnside the plants are near a public foot-path and exposed positions than the commoner British and Irish form. As it happens, I have a specimen, gathered many years ago in 1933, an interesting account of the occurrence of this plant in the area. Dr. Melville, in his very interesting account of the occurrence of *Isoetes hystrix* at the Lizard, mentions that Dr. Druce, in ‘The Comital Flora of the British Isles,’ treats Mr. F. Robinson’s 1919 record of the plant for Caerthillian Valley as an error, and states that there seems no longer any reason for discrediting that record.

It may be as well to put on record that the doubt attaching to the earlier discovery was solely due to the circumstances of the find. Robinson made no claim to any recollection of gathering the plant; he simply found a single corm in his vasculum after emptying it of other plants. As some at least of these were clovers from Caerthillian he was confident he must have gathered the *Isoetes* with them.

I visited the Lizard with him in June 1919 (he was then staying at Perranporth), but it was on a second visit a few days later that the *Isoetes* was found. I was shown the plant, then rather a dry-looking specimen, by the late Mr. E. Thurston, to whom it had been sent for his inspection, and a good deal of correspondence passed between Robinson, Thurston, and myself.

It was always highly probable, indeed, that the plant had come from Caerthillian, but Robinson was not only a very energetic collector, but was constantly exchanging with others in other districts. I myself had sent him many Cornish plants and had received from him a great number of specimens not only of Norfolk plants, but of others he had received from Scotland and elsewhere. Hence a single semi-dried specimen of *Isoetes* in his vasculum might conceivably have been overlooked, and so might have come from any part of the country.

Neither in Robinson’s note (in this Journal, 1919, 322) nor in Druce’s note (Rep. B.E.C. 1919, 693) was there any mention of the peculiar circumstances of the find, but Druce was well aware of the facts and as time passed and no one else succeeded in finding the plant at the Lizard he seems to have become convinced that the record was a mistake.—F. RILSTONE.

REVIEWS.

_‘Ueber die Entwicklung der Botanik von den ersten Anfängen bis zur Gegenwart._


To write a new history of botany requires no doubt some justification. This the author realizes, and he pleads in his preface that, during the last fifty-six years which have passed since he commenced his studies in Heidelberg under Pfitzer, he has lived through a period of such wonderful progress in the science of botany that he has felt impelled to give an account of the development of botany, of which he was a witness, and to which, we may add, he made considerable contributions. Since his retirement from his professorship he has also had leisure to take up the study of the history of botany in which he was always interested, and this has led him to extend the scope of his history to the beginnings of botany, concerning which much information has accumulated during the last twenty years. Archaeological studies have brought to light specimens and representations of the plants known to and used by ancient peoples, and investigators like Seym, Bretzel, and Singer have shed new light on early botanical writings.

The first two chapters of Moebius’s history, dealing with Botany in Ancient Times and in the Middle Ages respectively are full of interest and are written in a lucid and attractive manner. It is only in the third chapter dealing with the sixteenth and seventeenth centuries that the author comes to the period with which Sachs’s History begins and Moebius’s treatment and division of the subject-matter differs both from that of Sachs and also from that of Reynolds Green, who continued Sachs’s History up to the end of the nineteenth century. After dealing with the various systems of classification, artificial and natural, and with the influence of the Darwinian theory on classification, the author devotes a special chapter to each group of plants, which enables the non-specialist to obtain with ease a clear idea of the progress in each of the groups. It is perhaps due to Moebius’s own work and interest in the Algae that these take up some nine chapters. The information concerning the various groups is quite up to date. We find, for instance, an account of the alternation of generations in *Laminaria* and also reference to Dr. Knight’s observations on *Ectocarpus*. Other groups are less carefully done. Holloway’s valuable contributions to the Lycopodiaceae and Psilotales are not mentioned, and in the case of the Devonian Psilophytales credit is given to the researches of...
Kräusel and Weyland, but Kidston and Lang, who first described Hornea and Rhynia, are not mentioned, and an ordinary reader would imagine that the former two were the discoverers of these primitive land-plants.

The anatomical and physiological chapters of the book are excellent, as one would expect from Moebius’s special interest in this side of botany, and here again the subject-matter is brought up to date, as, for instance, by a full discussion of auxin and other growth-promoting substances.

The really new feature of this history, however, is the inclusion of chapters dealing with applied botany and with aids to the study of the subject. Agricultural Botany is followed up from the Stone Age and from early Egyptian methods of cultivation to the present time, and the progress of horticulture and forestry are equally dealt with. The educational aspect includes the development from ancient times of botanical gardens, herbaria, text-books, and microscopical technique. It seems strange that no mention is made of Linnaeus’s herbarium and its ultimate home in London, even though the space allotted to herbaria is not very extensive. Indeed, in many chapters the careful reader will note omissions which detract from the completeness of the book. None the less, botanists will be grateful to the author for this very excellent history of our knowledge of the range of form within the Heterokontae.—F. E. FRITSCHE.


In an Editorial Preface Prof. A. G. Tansley defines the object of this publication—namely, to introduce Raunkiaer’s work to those teachers, students, and amateurs of botany to whom the much larger book in English is not accessible. To those unacquainted with Raunkiaer’s work a subsidiary title seems necessary. By life-forms is understood those biological types which enable a plant to survive the season that is unfavourable to plant-growth. The standard used is the means by which the bud at the persistent growing point is protected during the unfavourable season by bud-scales, or by more or less burying in the ground, or by immersion in water or mud. Annuals which carry on from season to season by seeds form a special type. The types are more or less characteristic of different climates and conditions, and their occurrence becomes an expression of the climate.

There are many varieties of the types, and these are described in detail and illustrated by clearly drawn diagrams. As Prof. Tansley suggests, the book will form an excellent introduction to the study of our native plants in the field, and thanks are due to Mr. Gilbert-Carter for making it available to English-reading students, and to the Oxford Press for an admirable and reasonably priced production.—A. R.


This is an excellent book for such as would teach themselves the names of plants in order to inform children aright, and a book children themselves could be taught to use. The introduction states that it “is intended to help the ordinary nature-lover . . . to find out the names of such trees and flowers as he meets with.” This purpose is carried through with simplicity and clearness.—I. H. B.
The Flora of Sussex' was published in the last week of 1937. It had been virtually completed nearly two years ago, but could not be printed at once for lack of funds. A circular soliciting subscriptions, though met with some generosity, not producing a sufficient amount. Fortunately, Mr. K. Saville, a publisher in Hastings, undertook to carry out the printing and publication on terms which the Botanical Section of the South Eastern Union of Scientific Societies was able to meet, and this has been accomplished. Advantage was taken of the delay to revise thoroughly the nomenclature—brought up to date by Mr. A. J. Wilmott, while Dr. A. B. Rendle went through the text. Col. A. H. Wolley-Dod, as editor, is entirely responsible for the subject-matter and botanical notes, having received valuable advice in respect of the latter from various eminent botanists.

The 'Flora' enumerates 1413 species for the county. There are chapters or sections in the Introduction on the Topography and Geology of the county, and botanical notes of the older and more important botanists who have contributed to it, from the time of W. Turner and Gerard to the present day. Biographies are not given. There is a list of species of special interest in the county, and another of the more casual aliens. Special care has been taken to grade the aliens which are named in the systematic portion of the book, into those which are accepted as an integral part of its flora and those which are not, the former only being numbered in the series.

The 'Flora' may be purchased from K. Saville, 16 Robertson Street, Hastings, present price 15s. 6d. post free, but this may be raised later, so orders should be placed at once.

The Plants of Cardiff.—In 1937 the National Association of Head Teachers assembled in conference in Cardiff. For the occasion a guide to Cardiff was published under the title 'The Book of Cardiff' (Oxford University Press). To this book Mr. H. A. Hyde contributed a condensed, very interesting, and pleasingly illustrated account of the 'Plant-distribution in the Cardiff District' (pp. 28-38). He described from an ecological standpoint the features of the vegetation in the eastern half of the county of Glamorgan and the western edge of Monmouth, i.e., the country easily accessible from Cardiff.

'The British Fern Gazette.'—The first part of this (part 4 of vol. vii.) under the editorship of Mr. A. G. Alston has appeared.

Professor James Small's 'Text-Book of Botany.'—A fourth edition of this has appeared. It closely resembles the third, which was reviewed on its appearance in this Journal (1934, p. 93). The new edition has the same number of pages as the third, and is published at the same price—21 shillings (J. & A. Churchill Ltd., London). Here and there slight alterations have been made in the text, and here and there intercalations: the diagram of the nitrogen-cycle has been improved; a section defining auxins has been inserted, and the pages dealing with the theories of geotropic movement rewritten.

A New British Flora.—A new British Flora, under the editorship of Professor Tansley, Mr. A. J. Wilmott, and Mr. J. S. L. Gilmour, is now in course of active preparation. We have been asked by the editors to publish a list of contributors and the groups that they have undertaken, so that any botanists who may have interesting notes or specimens of any particular group can communicate with the appropriate contributor. The editors would be very grateful for any assistance that can be given in this way.

Eight of the contributors (those marked B.M. in the first of the two following lists) may be addressed at the British Museum (Natural History), Cromwell Road, South Kensington, London, S.W. 7; and twelve (those marked K.) may be addressed at the Royal Botanic Gardens, Kew, Surrey. The addresses of the others are given.

In the second or subject list the family and generic names and the sequence of genera in Compositae and Leguminosae are taken from the 17th edition of the 'London Catalogue,' and are not necessarily those which will be used in the 'Flora.'

BOOK-NOTES, NEWS, ETC.

Linnean Society of London.—At the General Meeting of 6 January, 1938, the President, Mr. John Ramsbottom, O.B.E., M.A., from the Chair reported the deaths of two Fellows and one Associate—Mr. E. T. Browne, Sir Algernon P. W. Thomas, K.C.M.G., and Mr. Richard F. Tanddrow. 

Mr. A. C. Gardner, M.A., F.L.S., gave an account of the phytoplankton of the River Shannon between Lough Ree and Lough Derg. The Shannon is there a large slow-moving river; and the gradual disappearance in its moving waters of the life which multiplies by the latter on the spreading of roots of desert plants in the soil of the wilderness of Judaea and on the structure of the

Unions of Naturalists.—The Annual Meeting of the North-Western Naturalists’ Union will take place on 8 February, 1938, at Manchester, under the President J. W. Jackson, D.Sc., F.G.S., and the Annual meeting of the Yorkshire Naturalists will be at Hull on 3 December, 1938.

The Sixteenth Annual Conference of the South-western Naturalists’ Union will take place at Cheltenham by kind invitation of the Cotteswold Naturalists’ Field Club from 3 to 6 June (Whitsuntide).

Scientific excursions have been arranged to Painswick Beacon, with a walk to the Cheltenham Oriental Valley, Forest of Dean, and the south Malvans. The President of the Union is F. R. Rowley, F.R.M.S., of Exeter.
The forty-third Annual Congress of the South-Eastern Union of Scientific Societies will be held at Worthing from 21 to 25 June inclusive, under the presidency of Professor Julian Huxley, Secretary of the Zoological Society. In the Botanical Section Dr. T. A. Sprague will give, as his presidential address, an account of sixteenth century herbals in relation to the British flora.

NEW YORK BOTANIC GARDEN.—Dr. William J. Robbins, Professor of Botany in the University of Missouri since 1919, has been called to be Director of the Garden.

CORRIGENDA IN THE 'FLORA OF SUSSEX.'—The following corrections should be made:

Introduction, p. xlix. The proper title of Mr. Belt is "President of the Hastings Natural History Society," and not "Librarian at the Hastings Public Library."

Insert "E. J. Bedford has kindly supplied the photographs for the plates in the end of the book."

p. 1. The number in Sussex should be 1413.

p. 561. Add to the List of Subscribers "L. A. W. Burder."

p. 560. By a printer's omission *Epipactis leptochila* is apparently excluded from Sussex. Only the Saxonbury Hill record should be so excluded. That for Phillis Wood stands.

ALFRED BARTON RENDLE,
1865–1938.

B.A. Cambridge, 1887; M.A., 1891.
B.Sc. London, 1887; D.Sc., 1898.
F.L.S., 1888; Secretary, 1916–1923; President, 1923–1927.
Assistant, Department of Botany, British Museum (Nat. Hist.), 1888; Keeper, 1906–1930.
A contributor to this Journal since 1891 and its editor, 1924–1938.
Died 11 January, 1938.

ALFRED BARTON RENDEL

(WITH PORTRAIT.)

ALFRED BARTON RENDEL was the eldest child and only son of John Samuel Rendle and Jane Wilson Rendle. He was born in London on 19 January, 1865. He was sent to school at Lewisham, and then to St. Olave's, Southwark, and afterwards to St. John's College, Cambridge. From early in his schooling he won scholarships such as almost paid for his education: they were gained at school and at Cambridge; and there was an exhibition from London University won in 1886 at the Intermediate Examination in Science. At his first school he had been taught to know the common British plants: at St. Olave's the interest was kept alive, and his knowledge enlarged by informal instruction during recreation hours; at Cambridge he came under the teaching of S. H. Vines, then University Reader in Botany; and, when, in 1888, he had taken the highest places in his examinations, his wish was to remain in Cambridge as one of the research school which Vines was anxious to build up. But Vines unexpectedly left Cambridge for Oxford, and Rendle in need of a salary applied for and obtained the post of Assistant in the Botanical Department of the British Museum, vacated by H. N. Ridley when he became Director of Gardens, Singapore.

Some ships, as they leave port, have their course set for the whole voyage: some have courses subject to repeated readjustment. Rendle, like the former, had his whole course set on leaving port. It was not a course charted by the teaching at Cambridge, where the student's attention was directed chiefly to the physiological processes within the plant: but Rendle had made use of the living plants cultivated in the University Botanic Garden, had taught himself to know them, and by that self-help had made himself not unfitted for his new work of naming and helping to keep in order the collections of the great Institution which he joined. The Gymnosperms, Monocotyledons, and Apetalae became his peculiar charge. He had written, while yet at Cambridge, under the influence of Vines, three small papers on the cell-structure of onions and lupins; but from the day of his leaving Cambridge such botany was put into the background, and he allowed his new duties to dominate his research entirely. He was soon publishing papers in Systematic Botany and all the first were on Monocotyledons. A list of his papers, far too long to be given, suggests that a keen conception of duty had more influence in directing him than any other attribute. Two relatively early papers of outstanding merit must be named—his paper on Nipadites in the 'Journal of the Linnean Society' (xxv. p. 143, 1895), and his paper on Naias in the Society's 'Transactions' (ser. 2, v. p. 379, 1899). His volume on Monocotyledons and Gymnosperms in the Catalogue of plants collected in the British Museum, London, 1886, and 1888.
by Welwitsch in Angola, published by the Trustees of the British Museum in 1899, should be named also.

He sought and obtained election to the Linnean Society in 1888; and from the very first was a regular attendant at the meetings, where he met other biologists in London. The publication of his paper on *Naias* was followed by a visit to the greater herbaria of Europe, and thereby he met the continental systematists.

He had had a little experience of teaching at Cambridge by way of demonstrating to elementary students. On taking up his work in the British Museum, his senior colleague, James Britten, saw in him that ability in expounding which breaks out also in reviewing, and made considerable use of him in the "review pages" of the *Journal of Botany*. In 1894 he obtained a lectureship at The Birkbeck Institute, afterwards Birkbeck College, teaching on two or three evenings of the week from 7 to 9.30 p.m. Those who attended his lectures say that he was never dull; but one finds that he was happier in expounding the fundamentals to elementary students than in endeavouring to fire the imagination of the more advanced.

The older botanists who saw his work, realized the unremitting care with which he did his tasks, whether appointed or self-appointed, and began to ask his services. Engler in Berlin obtained from him an account of *Naias* for the "Pflanzenreich" (1901), and Thistelton-Dyer one of the African Convolvulaceae for the "Flora of Tropical Africa." (1906). He set himself at this time to prepare a text-book on "The Classification of Flowering Plants," the first half of which, that on the Gymnosperms and Monocotyledons—his own particular subjects,—was issued in 1904. In the preface he wrote "the greater part of volume ii. has been written"; but volume ii. did not appear until 1925, when he was constrained to admit that "increasing official and extra-official duties" had poured upon him. Of volume i. there was a second edition in 1930.

In 1906 he became Keeper of the Department of Botany in the British Museum.

Rather earlier than this Maxwell Masters had persuaded the Royal Horticultural Society to take advantage of his knowledge, and the meetings of the British Association had become an attraction to him.

In 1902 an extension of teaching at Birkbeck College made day-classes imperative, and he handed over some of his work. On becoming Keeper of Botany he gave up the evening teaching.

In 1905 he took a conspicuous part in the deliberations of the International Botanical Congress which, meeting in Vienna, devoted its greatest energies to a revision of the rules for Botanical Nomenclature. Thenceforward his counsel was in demand always on this subject and at all congresses. In 1909 he was elected a Fellow of the Royal Society. A year later he was made botanical editor for the 11th edition of the 'Encyclopaedia Britannica' (1910-1911). In 1911 he was elected President of the South London Botanical Institution in succession to the founder, V. O. Hume, with whom he had been closely associated in its establishment. In 1916 he was President of Section K of the British Association, and in the same year he was elected Botanical Secretary of the Linnean Society. In 1919 he was President of the Botanic Section of the South-eastern Union of Natural History Societies, and President of the Quekett Microscopical Club. In 1923 he was elected President of the Linnean Society and re-elected yearly for the usual term of a presidency. The Royal Horticultural Society now found him a very useful member of several committees, and made him their Honorary Professor of Botany. In 1927 he was President of the South-western Union (as stated above, he had been sectional President earlier). The Union was meeting at Hastings; and in his Presidential Address he advocated the preparation of the 'Flora of Sussex,' which has just issued from the press (published in December last). From 1929 to 1931 he served on the Council of the Royal Society. In 1931 and 1932 he was President of the South-western Naturalists' Union.

These honours brought tasks with them, which he shouldered in full measure, presiding in meeting, council, or committee, or taking his place with unfailing regularity, addressing meetings when a Presidential Address was required, and going thoroughly into all the business to be transacted.

When James Britten died in 1924 he shouldered two new charges, both from Britten: the one was the editorship of the *Journal of Botany*, the other the preparation of a new edition of Britten and Boulger's valuable 'Bibliographical Index of British and Irish Botanists.' Also in the same year he edited the 7th edition of Bentham's 'British Flora.' The Journal demands a few unsigned pages every month from the pen of its editor—these he wrote for fourteen years: and it demands a sound editorial judgment—many a young author contributing to its pages has found the right touch put to the meaning by his kindly critical hand. It was always kindly: and the charity of his outlook towards others is easily detected in the wording of the many obituary notices contributed by him to the Journal.

The Royal Horticultural Society, which had bestowed on him the Victoria Medal of Honour in 1917, bestowed the Veitch Memorial Medal on him in 1929 for conspicuous services.

Retirement in 1930 from the post of Keeper of the Department of Botany in the British Museum did not mean leisure. In 1903 he had collaborated with William Fawcett (died 1926), who was then on leave and was working out orchid collections made in Jamaica. This collaboration developed into the preparation of a 'Flora of Jamaica,' financed partly by the Colony and
published by the Trustees of the British Museum: of its five volumes out of seven have appeared, and Rendle was working towards another up to the date of his departure in December last for India as a delegate of the British Association to the twenty-fifth (silver jubilee) session of the Indian Science Congress Association.

On the voyage to India he took a chill, and in Bombay went into hospital hoping for a quick recovery and to reach Calcutta in time; but the chill had awakened some latent trouble and he was sent home. He reached the house near Leatherhead which he had built for his retirement, and there death occurred peacefully three days after he had been brought back, at the age of almost 73.

There is something more to be said yet about his work. something with a peculiarly appropriate place in this Journal, as it relates to the British Flora. It is not merely that he edited an edition of Bentham's 'British Flora,' or that he initiated the 'Flora of Sussex' and read the whole of it in manuscript, and materially forwarded the publication of Salmon's 'Flora of Surrey,' or that as Keeper of the National Herbarium he was in intimate contact with almost all workers on British Botany, and that for their easy work he separated out a European Herbarium at South Kensington. It is that in and out of season he did all he could to prevent the destruction of our rarer plants. He was Chairman of a section of the Selborne Society devoted to the protection of wild plants, a member of a Wild Plant Conservation Board of the Council for the Preservation of Rural England, and his address to the delegates of Corresponding Societies at the British Association's Conference of Delegates, Blackpool, 1936, was on the subject. On a copy of that address, lying before the writer, he had altered the title to 'The Preservation of Native Floras, especially our own': and one feels that this exactly expressed his interest.—I. H. BURKILL.

THE DISTRIBUTION OF BARTSIA VISCOSA L.

BY E. J. SALISBURY, D.Sc., F.R.S.

The present note is occasioned by a recent discovery of Bartsia viscosa L. in Hertfordshire. This species belongs to the Southern Oceanic element of the British Flora (cf. Salisbury, "The East Anglian Flora" in Trans. Norfolk & Norwich Nat. Soc. xiii. 191-263 (1932)), and is commonly found at low levels, growing in situations that may be submerged during the winter months, but remain moist during the summer. It is not infrequently a feature of the dune slacks and coastal fresh-water marshes of the west. Lloyd Praeger has, however, recorded its occurrence in the mild climate of Kerry up to an altitude of 700 ft., and H. Knocke ('Flora Balearica,' p. 286) mentions its occurrence at 700 m. From its general south-western distribution on the European continent and around the Mediterranean, one would infer that Bartsia viscosa is favoured by mild oceanic conditions, and the distribution in the British Isles is in accord with this view. In the accompanying map the comital and vice-comital areas in which the species has been found are shown. Where the abundance ranges from being locally very common

Map showing distribution of Bartsia viscosa in the British Isles. For description, see text.
generally were wetter and the general water in Salmon's 'Flora of Surrey' (p. 498, 1931), where it is stated we may recall the fact, noted in introduction—apart from deliberate sowing, of which there is no specimen of occurrence of this species in the north-east of Norfolk, to which I called attention earlier, at which time conditions in the country prior to 1876, at which time evidence, and which is extremely unlikely, not more than a few plants would be present in the north of the county: From September of that year the rainfall was only 35 inches, so that m the Balearin Islands the plant begins to flower at least two months earlier than in Britain (Knocke, l. c. ii. 396).

The discovery of Bartsia viscosa in Hertfordshire, which occasioned this note, was in the north of the county. From 1926 to 1930 Mrs. M. A. Holmes was having extensive landscape

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THE DISTRIBUTION OF BARTSIA VISCOSA L.

mounding schemes carried out at 'The Node,' near Welwyn, involving inter alia the construction of three artificial sheets of water, which together totalled about five acres of free water surface. In order to retain this water a considerable bank of earth had to be constructed to form the boundary of the lowest of these ornamental lakes. As a consequence of this feature and the situation of the lakes, they are, though sheltered, free to a considerable degree from the effects of cold air drainage, which so often results in low temperatures in the neighbourhood of ponds or lakes situated in hollows, for here the cold air can flow over the earthen dam towards the lower part of the valley.

Though no temperature data can be furnished, it is not unreasonable to suppose that the lower margin of the lake occupies a situation milder than usual for such locations and where, moreover, the falling temperatures of autumn would not be accentuated. It was here in the marshy grass margin that I found, this September, several patches of individuals of Bartsia viscosa sufficiently numerous to justify the assumption that they had arisen from seed shed the previous year. That the originally introduced seeds were carried by water-fowl seems most probable, since the seeds are quite small, being about a quarter of a millimetre in width, and a third of a millimetre in length. The shape is ellipsoid and slightly flattened. The surface is nearly smooth and readily wetted, so that the seed is well suited to carriage on the feet of water-birds. Tests showed that the moistened seeds adhered readily to any wet surface and that, moreover, they float. So, whilst owing to the small size and light weight of the seeds they are doubtless dependent on wind dispersal for scattering around the parent plant, for longer distances transfer is dependent on water or bird transport. In this particular area Mrs. Holmes informs me that migrant birds were frequent visitors soon after the artificial lakes were constructed. When Bartsia viscosa first appeared is not known, but it was not till some years after the lakes were constructed, so that introduction by human agency during construction of the lakes or the planting of the extensive shrubbery on either side is highly improbable.

This record would appear significant from two aspects. Firstly, the emphasis it places on the ecological conditions, and, secondly, the attention it draws to the efficacy of natural means of dispersal for bringing seeds to any favourable station.

As I have said, the distribution suggests that two factors, namely humidity and temperature, play an important part in determining the limits of this species. Respectfully the former it is of interest to note that during the recent very dry seasons there has been a very marked diminution in the abundance and vigour of individuals of Bartsia viscosa in the damp meadows near Stowborough in Dorset, and perhaps elsewhere, though this is the only locality I have repeatedly visited. The fact
that the species does not occur in the water meadows of the east suggests that the climatic humidity is of more importance than the edaphic, which might well be an outcome of the low-water-conducting efficiency of these semi-parasites. Further, \textit{Bartsia viscosa}, unlike \textit{B. Odontites}, which prefers clays, frequents sandy soils which are not very retentive of water.

Attempts to establish \textit{Bartsia viscosa} by the pond in my own garden at Badlett have failed, not because the plants did not grow and flower, but either because the seeds produced were not viable or failed to germinate. Since seeds brought from Devonshire and sown by the pond produced flowering plants, one is led to believe that the southern trend in the distribution of this oceanic species is connected with the late development of its seeds, and it may be the necessity for a higher temperature for their maturation than normally obtains during September in the north and east is a salient factor in determining its restricted range.

**NOTES ON THE FLORA OF THE BERMUDAS.**

**FRESHWATER ALGAE FROM BERMUDA.**

By Florence Rich, M.A., F.L.S. *

The following is an account of a few freshwater algae collected in Bermuda by Dr. A. B. Rendle. So little work has been done on the algae of these islands that, although the collection now under consideration cannot be looked upon as fully representative, even an imperfect list may serve a useful purpose. In the \textit{Flora of Bermuda} by N. L. Britton, published in 1918, is a list of algae contributed by Marshall A. Howe, but the species enumerated are almost all marine.

The pieces of freshwater on the island from which algae may be collected are few, and some of these, owing to drainage, are rapidly disappearing; those that now exist are just the remains of the original low-lying marshes. There are no rivers or streams, so that the inhabitants have to depend on rain for their water-supply, each house having its own storage tank.

The collections were made in March and April 1933, and the samples all came from ponds and marshes in low-lying districts.

The latitude of the islands is about 32° N., and the nearest mainland is that of the southern United States nearly 600 miles distant. They are surrounded by deep abysses of ocean, the enormous depth of 2500 fathoms being reached 50 miles both to the north and south. The question as to how these algae have been introduced is a very interesting one, which, in the similar case of the Azores, has been discussed by Bohlin (1901).

Bermuda appears to be a locality not very favourable to the growth of freshwater algae; this may be due in part to the absence of lakes and rivers, and in part to the influence of spray from which probably no place on the island is free in stormy weather—no spot is more than a mile and a half from the sea, and violent storms come from the Atlantic. Most of the algae observed are of wide distribution, and therefore, presumably, hardy; as an example may be cited the seven species of the Oscillariaceae now found, all of which are cosmopolitan. A certain resemblance can be noted to the algal flora of the Azores, as quite a dozen species recorded from thence occur in the following list. In several instances only one or two individuals of a particular species were observed, this indicating, in all probability, that at other times of the year they occur in greater abundance.

In the sample from Spittle Pond (Tube No. 9) some of the branches of \textit{Enteromorpha} and \textit{Cladophora} were thickly coated with a luxuriant growth of epiphytic algae, only a few of which could be determined. Spittle Pond is said to be distinctly brackish, and its denizens, therefore, cannot be strictly said to come within the purview of a paper on freshwater algae.

Diatoms are poorly represented; sixteen species in the \textit{Challenger} Collection were attributed to Bermuda by O'Meara and Castracane, but these are all marine. About a dozen species have now been observed, but they are not present in sufficient numbers to render possible a preparation suitable for exact determination. However, in a ditch on the edge of Devonshire Marsh (Tube No. 8) there occurred many beautiful samples of \textit{Navicula ambiguva} Ehrenb.

Ten or eleven Flagellates were found, all in Devonshire Marsh, but only in small numbers; the most interesting of these is a form of \textit{Tropidocyclus}, a genus of which only three species have hitherto been described.

The Myxophyceae (Blue-Green Algae) are represented by nearly twenty species.

It is rather disappointing that the forms in the collection which appear to differ from those already known do not lend
themselves, in the available preserved material, to satisfactory
description. One species of Phacus, one of Tropidolepsus,
and one of Dermocarpa appear to be new. The occurrence of
Oedogonium oelandicum, a species which seems to have been
previously known only from Sweden, is of interest.

The author desires to express her thanks to Professor F. E.
Fritsch, F.R.S., for his kindly advice.

**Enumeration of the Samples.**

4. Devonshire Marsh, March 20. Duckweed and a good
deal of organic debris. Scenedesmus sp., Raphidonema brevirostre,
Oedogonium (sterile), Cosmarium Regnellii, Amphora ovalis f.,
Navicula sp., Nitzschia sp., Euglena spirogyra, Trachelomonas
hispida, Tolypothrix sp., Anabaena oscillarioides var. tenuis.

hieroglyphicum, Diploneis elliptica, Nitzschia sp., Euglena spiro­
gyra, Phacus pleuronectes, Trachelomonas volvocina, Nostoc sp.,
Anabaena oscillarioides var. tenuis, Oscillatoria laevicrus, O.
splendida.

debris. Gosmarium Regnellii, Ophiocytium cochleare, Navicula
ambigua, Navicula sp., Hantzschia amphioxys, Nitzschia sp.,
Phacus acuminata, P. pleuronectes, P. tricuerter, Phacus sp.,
Trachelomonas abrupta, T. Lemmermanni, T. oblonga var. truncula,
Tropidolepsus sp., Chroococcus sp., Oscillatoria sancta, O. tenuis.

9. Spittle Pond (brackish), April 1. Enteromorpha sp.,
Cladophora sp., Xenosoccus sp., Onobyrsa sp., Dermocarpa sp.,
Chamaesiphon sp.

10. Devonshire Marsh, April 4. Characium Brunnthaleri,
Scenedesmus sp., Oedogonium oelandicum f., O. monile, Cos­
marium Regnellii, Staurostrum polymorphum f., Characiopsis
pyriformis, Ophiocytium cochleare, Tribonema bombycinum f.,
Eunotia arcus, Cymbella sp., Peridinium sp., Tolypothrix sp.,
Anabaena oscillarioides var. tenuis, Phormidium Retzi.

minor.

minor.

16. Warwick Pond, April 19. Oscillatoria Bonnemaisonii,
Phormidium Valderianum.

17. Warwick Marsh, April 22. Tribonema bombycinum forma,
Characiopsis pyriformis, Oscillatoria sp.

18. Warwick Pond, April 22. Cladophora sp., Enteromorpha sp.

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* Since writing the above, I find that this species is known from
Woods Hole, Massachusetts, and other American stations.

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**Systematic Enumeration of the Species observed**.

Class CHLOROPHYCEAE (Isokonta).

Characium Brunnthaleri Printz. (Fig. 1, I, J.) Long.,
10-24 μ; lat., 3-7 μ. Growing on Oedogonium. Shape variable.
Very similar to Characium strictum A. Br., a species which is
known to grow on Oedogonium, but in view of the comparison
drawn by Printz (1915, p. 15) between these two species it seems
best to classify it as above.

Sample 10. Rather common.
Enteromorpha sp. Four species of this genus have already been recorded from Bermuda.

Samples 9 and 18. Common.

Cladophora sp. Main stems 80–100 μ broad. Branches usually single. Some branches thickly overgrown with blue-green epiphytes.

Samples 9 and 18. Common. Five species have been recorded from Bermuda.

Rhizoclonium hieroglyphicum (Ag.) Kütz. Filaments 25 μ wide.

Sample 5. Rare. Already recorded from Bermuda.

Raphidonea brevirostre Scherffel; Nygaard, 1932, Trans. Roy. Soc. S. Afr. 134, fig. 29. Filaments, consisting of about four cells 4 μ wide, tapering at the ends; one end more attenuate than the other.

Sample 4. Very rare.

Oedogonium oelandicum Wittr., forma nov. (Fig. 1, D–H.) (Hirn, 1900, p. 273.) Crass. cell. veget., 7–9 μ; altit., 5–6-plo major; crass. oogon., 32–38 μ; crass. oosp., 24–25 μ; crass. cell-androsp., 8 μ; crass. nannandr., 8–10 μ.

Dioecious, gynandrosporous, oogonia single or two together, depressed globose, vertically plicate in the median portion, opening by an operculum which is supra-median, oospore spherical or slightly depressed, not quite filling the oogonium, membrane smooth. The supporting-cell is not tumid. The vegetative cells are slightly capitate, and the terminal cell is obtusely rounded. The androsporangia, which are 2–3-celled, are situated above the oogonia. The dwarf male is oboviform, one-celled, and is seated on the oogonium. The dwarf males; they evidently do not preserve well (Hirn, 1900, p. 229).

Sample 10. Common. The type and certain forms are known from Australia and North America.

Oedogonium sp. Sterile filaments were observed in samples 1 and 10.

Pleurotaenium trabecula (Ehrenb.) Naeg. Only one empty semicell was observed, which, however, undoubtedly belonged to this species.

Sample 5. Isolated.

Cosmarium regnellii Wille. Long. cell., 14–17 μ; lat., 13–14 μ; isthm., 4–5 μ. Ends straight, or very slightly concave. Some of the individuals observed closely resembled C. sexangularare Lund; forma minima Nordst., but as most of them showed the straight, broad, truncate apex characteristic of C. regnellii the above determination is probably correct. (Cf. W. & G. S. West, 1908, p. 89.)

Samples 4, 5, 8, and 10. Very rare.

Cosmarium sp. (2). Only one individual seen. Sample 10. Isolated.

Staurastrum polymorphum Bréb., forma (West and Carter, 1923, British Desmidiaceae, v. p. 125, pl. xliii. fig. 2.) Long. cell., 33 μ; lat., 38–40 μ; isthm., 7–8–5 μ.

Dorsal margin rather strongly convex, causing the length of the cell to be a little greater than usual. The short stout processes are tipped with three minute spines, and are provided with four series of minute denticulations. Vertical view triangular, lateral margins slightly concave.

Sample 10. Very rare.

This is a variable species of almost world-wide distribution.
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**Class XANTHOPHYCEAE.**

**Characiopsis pyriformis** Borzi (*Characium pyriformis* A. Br.). (Fig. 2, A-C) Long. cell. (cum stip.), 20-26 μ; lat., 4-5-6-5 μ.

Epiphytic on Tribonema.

Samples 10 and 17. Rather rare.

**Ophiocytium cochleare** A. Br. Filaments about 6 μ wide; coils consisting of two to three turns. The ends were not clearly seen, as the rare individuals observed were mixed up with débris.

Samples 8 and 10. Very rare.

A widely distributed species.

**Triebonema bombycinum** Derb. & Solier forma minor (Wille) G. S. West. (Fig. 2, A.) Filaments 4-5 μ wide.

Samples 12, 15, and 17. Rather rare. Widely distributed.

A widely distributed Diatom.

**Amphora ovalis** Kütz. (Form or variety, but very few individuals seen.)

**Class BACILLARIOPHYCEAE.**

**Euonothia arcus** Ehrenb. Long., 83-97 μ; lat., 9-10 μ; striae in 10 μ = 12. Larger than the type.

Sample 10. Rather rare.

A widely distributed Diatom.

**ENONEA sp.** Samples 4, 5, and 8.

**Nitzschia spp.** Samples 4, 5, and 8. Rare.

**Nitzschia compacta** H. Smith, 1853, pl. xvi. fig. 140. (N. cuspidata Kütz. var. ambiguus Ehr.)(Syn. N. cuspidata Kütz. var. ambiguus (Ehr.) Cleve.) Long. cell., 70 μ. Sample 8. Very rare. A common Diatom.

**NAVES ambius** Ehr.; W. Smith, 1853, pl. xvi. fig. 140. (N. cuspidata Kütz. var. ambiguus (Ehr.) Cleve.) Long. cell., 70 μ. Sample 8. Very rare. A common Diatom.

**Peridinium sp.** Two or three cysts were observed.

Samples 9 and 10.

**Amphora ovalis** Kütz. (Form or variety, but very few individuals seen.)

**Class DINOPHYCEAE.**

**Peridinium sp.** Two or three cysts were observed.

Samples 9 and 10.

**Class EUGLENINEAE.**

**Euglena spiroryga** Ehrenb.; Lemmermann, Brandenburg Alge, 1910, p. 498, fig. 18 on p. 483. Long. cell. (spin. incl.), 110 μ; lat., ca. 10 μ.

Samples 4 and 5. Rare.

A commonly distributed Flagellate.

**Phacus acuminata** Stokes. (Fig. 2, G, H.) Long. cell., 22-28 μ; lat., 20-24 μ. Fold reaching almost to the hinder end.

Two paramylon grains.

Sample 8. Rare. Known from North America and other places.

**Pleurochrysa** (O. F. M.) Duj. Long. cell., 42-60 μ; lat., 32-34 μ. The fold extends only a short way down the cell.

Samples 5 and 8. Rare.

**Phacus amphiocys** (Ehr.) Grun. f. capitata O. M. Long. cell., 70 μ. Sample 8. Very rare: but widely distributed in the world.

**Nitzschia spp.** Samples 4, 5, and 8. Rare.

**Class DINOPHYCEAE.**

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**Nitzschia spp.** Samples 4, 5, and 8. Rare.
Phacus sp. (Fig. 2, D–F.) Long. cell., 15–20μ.; lat., 10–11.5μ. The cells are small, variable in shape, with the posterior end in the form of a small spine. There are two paramylon grains, one in front of the other. The membrane is spirally striated. The flagellum was not seen.

One of the smallest species of Phacus hitherto described is P. agilis Skuja, which may be identical with the one now figured, but in that the end is not so regularly pointed and the paramylon grains are apparently different.

There is also a resemblance to P. oscillans Klebs, but that has only one paramylon grain and is larger.

P. aenigmatica Drez. is also somewhat like, but it has three paramylon grains.

Sample 8. Rare.

Another species of Phacus is present in sample 9; it is very rare.

Trachelomonas abrupta Swir., emend. Deflandre. (Fig. 2, I, J.) (Deflandre, 1926, p. 95.) Long. cell., 22–23μ.; lat., ca. 12μ.

Cells cylindrical, sides parallel (fig. 2, I) or slightly convex (fig. 2, J); membrane densely and finely scrobiculate, light brown.

Sample 8. Rare.

This seems to be a widely distributed species.

T. HISPIDA (Perty) Stein, forma. Long. cell., 24μ.

Sample 4. Rare. Very few individuals seen.

T. Lemmermannii Wolosyńska, emend. Deflandre. (Fig. 2, K.) Long. cell., 28–29μ.; lat., 16–17μ. Cells pale brown; posterior pole conical with rounded extremity; sides straight, converging slightly towards the upper end; membrane scrobiculate.

This comes very near T. conica Playf. forma punctata Defl., which, however, has parallel sides.

Sample 8. Very rare.

Known from both eastern and western hemispheres.


Sample 5. Rare. A very widely distributed Trachelomonas.

Tropidocytillus sp. (Fig. 2, L, M.) Long cell., 32–36μ.; lat., 15–18μ. The sides are parallel; the anterior end is flattened and the posterior pointed. In material preserved in formalin the flagella are often difficult to see; in three instances I could detect at least one flagellum, but it was not clear, amongst debris, that what looked like a second was not the curved-back tip of the first. The ribs were very prominent. In side-view it appears to be a little flattened.

Of the few known species of Tropidocytillus it seems to be nearest to T. ovatus Skuja.

Sample 8. Rare.

Class MYXOPHYCEAE (Cyanophyceae).


Sample 8. Very rare.

Fig. 3.—A–D. Xenococcus (?) Cladophorae Tilden.

A, less highly magnified than the others.

? C. MINUTUS (Kütz.) Naeg. Cells two together, about 10μ wide.

The somewhat similar Chroococcus turgidus (Kütz.) Naeg. has been recorded for Bermuda, but in that species the membrane is stratified, whereas here it does not appear to be so.

Sample 8. Rare.
colourless membrane which often shows two layers. I think the species now observed must be the same as that originally described by Tilden as growing on Cladophora on the coasts of British Columbia.


ONCOBYRSA sp. On Enteromorpha were growing cushions (up to 40 μ in diameter) of minute cells arranged in radial lines, which I take to belong to a species of Oncobyrsa. It is probably marine, though the degree of salinity of the water in which it was found was not ascertained.


DERMOCARPA sp. (Fig. 4.) Cells 8-12 μ in diameter, spherical, blue, surrounded by a colourless stratified membrane. It was growing on Enteromorpha, to the surface of which the cells were attached by means of a pad of mucilage which stained up well with methyl-blue. The spores appear to be formed successively and not simultaneously (see figure).

! T. TENUIS Kütz. ; Geitler, 1932, p. 716, fig. 455 a. Lat. fil., 5-6 μ ; lat. trich., 8-10 μ. Cells usually a little longer than broad. Branching rare. Plant-mass not seen, hence determination doubtful.

Sample 10. Rather rare. This species is widely distributed.

Nostoc sp. One small colony was observed in Sample 5. (Nostoc commune Vauch. has already been recorded for Bermuda.)

ANABAENA OSCILLARIODES Bory var. TENUIS Lemm. (Fig. 5, C.) Lat. cell., 4-5 μ ; lat. heteroc., 4-6 μ ; spor., 5-7 × 10-14 μ.

Fig. 4.—Dermocarpa sp. growing on Enteromorpha.

It seems to be near Dermocarpa sphaerica Setchell & Gardner (Geitler, 1932, p. 303), but in the description of that species I can find no special reference to the mucilage-pad connecting the cells with the host-plant, and the spores are said to be formed simultaneously. Anand has recently described (Journ. Bot. 1937, Suppl. p. 42) a Dermocarpa (D. Enteromorphae) growing on Enteromorpha paradoxa Kütz., but in the cells are very much larger, and there is no marked mucilage-pad.


Sample 9. Rather rare.

? TOLYPOTHRIX DISTORTA Kütz. var. FENICILLATA (Ag.) Lemm. Lat. fil., 12-16 μ ; lat. trich., 7-8 μ. Cells a little shorter than wide. The plant-mass was not observed, hence the determination is a little doubtful; such filaments as were seen seemed to agree with the above (see Geitler, 1932, p. 719). The false branches are often parallel to the main filament.

Sample 4. Rather rare.

The type is cosmopolitan, and is known from the Azores.

L. H. F. H.
Oscillatoria Bonnemaisoni Crouan; Gomont, 1892, p. 215. (Fig. nostr. 5, F.) Trichomes with slightly attenuated, non-capitate ends, 20–24µ wide. Cells 3–4µ long, very slightly constricted at the joints; partitions not granulate.

Sample 6. Rather rare.

O. laetivirens (Crouan) Gomont, 1892, p. 226, pl. vii. fig. 11. Lat. trich., 6µ. Sample 5. Rather rare.

O. sancta (Kütz.) Gomont, 1892, p. 209. (Fig. nostr. 5, G, H.) Trichomes 14–15µ wide, distinctly constricted at the joints, abruptly narrowed at the apex; end-cell flattened, with thickened membrane. Cells about one-sixth as long as broad, granulated at the joints.

Sample 8. This is a well-defined species of cosmopolitish distribution, and is known from the Azores.

O. splendida Grev.; Gomont, 1892, p. 224, pl. vii. figs. 7, 8. Trichomes 2µ wide, attenuated at the apex, with a few granules at the joints; end-cell with an inflated apex.

Sample 5. This species also is of world-wide distribution.

O. tenus Agardh.; Gomont, 1892, p. 220. (Fig. nostr. 5, E.) Trichome 4–5µ wide. Sample 8. Another cosmopolitan species.

Phormidium retzii (Ag.) Gom. Filaments more or less straight, 6µ wide, scarcely constricted at the joints; not attenuated at the end, not capitate, though the outer membrane of the end-cell is slightly thickened. Cells usually longer than broad. Sheath thin.


P. valderianum Gomont, 1892, p. 167. Trichomes 2µ wide, not constricted at the joints, but with one granule at each end of every cell. End-cell rounded, without calyptra.


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SHORT NOTES.

Anagallis arvensis L. var. carnea Schrank.—My knowledge of the plant usually named as above is limited to Cornwall, but here, at any rate, it seems to be something more than a form of A. arvensis with flesh-coloured flowers. That, as far as I can find, is all the importance most of the British Floras assign to it. Its range of habitat is different from that of typical A. arvensis. It is especially a sand-dune plant, occurring plentifully on the dunes at Perranporth, and also in the Scilly Islands (plentiful on sand dunes, Carn Near, Tresco, Isles of Scilly—J. E. Lousley, B. E. C. 1936 Report, 1937, 267). It occurs, too, on headlands along the coast. Occasionally it is found inland, but probably most of such inland occurrences are directly due to the conveyance of dune sand to farm land. At Lambourne, Perranzabuloe, I have found it on a stony waste place near a small depot of sand, and at Ventongimps in the same parish I once saw it in some quantity with ordinary A. arvensis and a purple-flowered form covering heaps of peaty clay dug from ditches with which dune sand had been freely mixed to lighten it for agricultural use.

I have never found var. carnea growing with root crops or corn, though A. arvensis is, of course, often very plentiful with such crops. In S. T. Dunn's 'Alien Flora of Britain' A. arvensis is said to be a widely spread weed of roadsides, cultivated, and waste places, native on sand dunes in England as well as in southern and western Europe, though not often recorded in England from natural habitats and possibly confined as a native to the southern counties. Scarlet-flowered A. arvensis certainly occurs in our sand dunes, doubtless as a native, in a less robust form than that of cultivated ground. The poverty of the habitat may be the only reason for this weaker habit, though in view of the apparent disincarnation of var. carnea to grow in richer soil there is the possibility that the native scarlet-flowered plant, too, is of a diffrent race from that of the fields. In habit var. carnea is very different from the prostrate, wide-spreading growth usual with A. arvensis. The average plant of var. carnea consists of four to six semi-upright stems, often all less than 4 inches long, and as far as I have seen it preserves the same habit as a casual in inland stations. F. N. Williams ('Prodromus Flora Britannica,' 432) considered that this upright habit of var. carnea pointed to its hybrid origin from a cross of A. arvensis L. and A. latifolia L.—H. HILSTON.
DROSERA AND BUTTERFLY.—In my herbarium there is a very small specimen of both Drosera rotundifolia and D. longifolia, with parts of the damaged and somewhat bleached wings of a Meadow Brown Butterfly (Maniola jurtina L.) adhering to the leaves. The two Sundews were growing together in thick masses on Ashcott Peat-moor, N. Somerset, Aug. 7, 1925; and I kept the two specimens to show the wings of the butterfly. In removing the little plants, of course, the dead butterfly became still more damanged. I cannot say if by chance the insect fell dead on the Sundew, but I believe not.—H. S. Thomson.

OBITUARY.
WILLIAM BYWATER GROVE.

William Bywater Grove was born at Birmingham in 1848. At school he excelled in classics and mathematics; in 1871 he passed the Mathematical Tripos (senior optime) at a Cambridge that knew not botany. He taught a great variety of subjects in private schools; was Headmaster of Birmingham High School for Boys at Queen’s College from 1887 till it was closed in 1900; lecturer in Horticultural Botany and Chemistry at Studley Horticultural College till 1908, and lecturer in Botany at Birmingham Municipal Technical School from 1905 to 1927. Throughout he keenly supported the Birmingham Natural History Society, was in turn librarian, secretary, and President, and contributed about twenty papers to the ‘Midland Naturalist,’ mostly on the fungi of the midland plateau. For many years he was Honorary Curator of the University Herbarium, and an inspiration and a joy on the botanical excursions. He received the M.Sc. (honoris causa) in 1936.

He started to teach himself botany in 1868, and mycology in 1881, the year before the commencement of Saccardo’s ‘Sylloge fungorum,’ the author of which Grove soon acclaimed as “standing head and shoulders above all the other mycologists of the age.” From 1884 to 1886 appeared the first three parts of time he stood, especially among the microfungi, a mycologist in his own right—a well-informed and accurate observer, equipped with adequate draughtsmanship and a flair for apt description, and animated with the true collector’s urge. During the years of his headmastership, the exacting study of the microfungi mostly lapsed, but was resumed shortly after, and continued, with one further break, nearly to the end; “New or noteworthy Fungi.—Part XIII.,” in 1933, marked his hundredth paper.

In 1913 appeared his first major work, ‘British Rust Fungi,’ a book of international calibre, that has been standard here for a quarter of a century. In 1931 appeared the three volumes of Grove’s translation of the Tulssnes’ ‘Selecta fungorum carpo­logia’: an exact, euphonious, and most scholarly rendering of one of the great masterpieces of cryptogamic botany; he completed it on his eightieth birthday. It was a digression, however, and time was pressing. For years, his heart had been set on monographing the British Coelomycetes—” to set before the English speaking reader, for the first time in his own language, and so far as it is illustrated by the British species of the group, a panoramic view of the skilful structure erected by the inimitable Saccardo, some fifty years ago, to include them all in one scheme.” Happily for British mycology he won the race, and the second and final volume of his ‘British Stem- and Leaf­fungi (Coelomycetes)’ appeared in 1937, shortly before his death. That this marks a beginning and not an end, he was vividly aware; his comment, addressed to a generation that knows not the woods, is pure Grovian: “Whatever is done, one thing remains firm. Rotating on a laboratory stool is not the only way, perhaps not even the best way, of solving Coelomycetus mureta.”

He died on January 6, 1938, and is survived by his daughter, Norm.—E. W. Mason.

BOOK-NOTES, NEWS, ETC.

‘LEBENSGESCHICHTE DER BlüTENPFLANZEN MITTELEUROPAIS.’
Fifty-seven years ago Professors O. von Kirchner, E. Loew, and C. Schrötter issued the first part of this book on the plan of giving in detail the life-histories of all the flowering plants of Germany, Austria, and Switzerland. Since then the first two of the authors have died, and the third—may he live long!—is as well advanced in years. Professor W. Wangerin of Dantzig has become joint-author with him. In all over 5,000 pages have been published; but at a moderate estimate the plan of the work demands yet another 10,000. Fortunately the work has a great value, however incomplete, for each genus of plants is treated apart, and may be taken detached from the rest; but the promoters had been wiser to have planned a more elastic work, and more documentation in the text. It should be classed with works of reference; for no one is going to sit down to read anything so enormous; and it should have been made more of a dictionary.

The new part (sheets 62–73, i. e., pp. 953–1144, of volume 2, part I), price R.M. 12, is on the Mistletoe. Though of nearly 900 pages, it does not reach the end of the subject. The writer of the part is Professor Wangerin, and he has done his work well. But had it not been that the plan of the Lebensgeschichte demanded a discussion of the genus Viscum before less worked
subjects be discussed, this green parasite could have been left in the safe keeping of Tuber's ' Monographie der Mistle' (1923), with gain to botanists at large. In fact, the promoters of the Lebengeschichte were too sanguine. The cost of their first part was 3s. 6d. for its 96 pages; the cost of the same amount of printing is three times as much now; and the literature to be gathered together nearly one hundred times as much. Will the work ever be complete?—I. H. B.

In connection with the movement for the preservation of the fauna and flora of the Empire, attention has been drawn to the imperfection of our knowledge of the fauna and flora of Fiji and the Western Pacific High Commission Territories. It is accordingly of interest that these Governments have recently expressed the hope that the subject will attract more attention in future. Adequately qualified naturalists desirous of devoting a few months to such studies in these territories under favourable conditions should consult the Under Secretary of State, Colonial Office, Downing Street, S.W. 1, on the subject.

The Third International Congress for Microbiology will be held at New York, September 2–9, 1939. There will be nine sections, one of which is Fungi and Fungous Diseases, with Dr. B. O. Dodge, New York Botanical Garden, as convener. The registration fee will be five dollars, which will not include the cost of a banquet ticket or a copy of the 'Proceedings of the Congress.'

At the celebrations of the Quartercentenary of the University of Coimbra held in December, Mr. J. Ramsbottom was one of the sixteen recipients of honorary doctorates. An interesting account of the various ceremonies which commemorated the final establishment of the University at Coimbra in 1537 is given in 'Nature' for January 8. The University was founded at Lisbon in 1290 and was moved to Coimbra for the first time in 1308, and twice transferred back to Lisbon (1337 and 1377) before its definitive move.

The name of Elias Magnus Fries ranks as the highest in the history of Mycology. Unfortunately, some of his writings are now to be obtained only with difficulty, and amongst the rarest is his monumental ' Monographia Hymenomycetum Suecic,' published in two volumes, the first of 526 pages in 1857 and the second of 380 pages in 1863; the edition was limited to one hundred copies. Dr. Werner Klinkhardt of Liebigstrasse 6, Leipzig, proposes to issue an 'unchanged reprint' of the work if he can secure a sufficient number of orders; the price to subscribers for the two volumes bound in cloth is 75 Marks less 26 per cent. "Valuta-Nachlass."*


Studies of British Potamogetons.—I.


It was not until towards the end of last century that the study of the genus Potamogeton L. received special attention from British botanists. About that period the pondweeds stimulated the critical interest of certain amateur botanists, notably Alfred Fryer (1826–1912) and his friend Arthur Bennett (1843–1929). Fryer, who had the advantage of living in his native Cambridge-shire within easy reach of aquatic habitats rich in pondweeds, devoted himself to a monographic survey of Potamogeton in Britain, and to that end carried out extensive field-studies which he supplemented with careful observation of cultivated plants. His published work, always scholarly in its presentation, showed that he had a genuine understanding of Potamogetons as living organisms. Unfortunately the magnificently illustrated monograph which he began to publish in 1898 remained unfinished at his death, though it was continued from his notes by W. H. Evans in 1913 and was eventually concluded by Bennett in 1915 with an account of the sections Chlorophyta and Chlorophylla.* Bennett had comprehensive interests in the British flora, paid particular attention to Potamogeton, and became an acknowledged authority on the genus, not merely as it occurs in Britain but as it is represented throughout the World. His work, however, lacked consistency and was confused as the result of inaccurate observation, especially in his later years. Moreover, although he published voluminously on the British species his writings were not improved by their "contradictory and unfinished style" to which Fermald has already made reference (in Mem. Gray Herb. iii. 8 (1932)) in a criticism of Bennett's work on North American pondweeds. The conclusion cannot be avoided that any elucidation of taxonomy for which Bennett was responsible was more than offset by the confusion which he left for future workers to resolve. More recently W. H. Pearsall (1860–1936) engaged himself in the study of Potamogeton, and, for British botanists, the mantle of Bennett fell on him. Pearsall lived for many years in the English Lake District, and made valuable observations on the life-histories and ecology of the pondweeds which occur in that region. His published work, culminating in his 'Notes on Potamogeton,'† was largely an attempt to apply Hagström's elaborate classification to British Potamogetons; unfortunately, however, his results were often marred by inaccurate identification.


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No account of *Potamogeton* has yet been published which gives a comprehensive survey of the British species with satisfactory details of their distribution. It is our ultimate aim to present a monographic study of the genus as it occurs in Britain, and with this end in view we invite the co-operation of botanists in sending us material for examination. In the meantime, we think it may be useful to publish this series of preliminary notes on points of interest as they arise.

I. The Typification of *Potamogeton pusillus*.

*Potamogeton pusillus* L., type of the subsection *Pusilli*, was one of the twelve original species of *Potamogeton* in Linnaeus's 'Species Plantarum' (1753). Since Linnaeus's time the name *P. pusillus* has been variously delimited—even *P. Friesii* and *P. rutillus* have been included as subspecies or varieties—but whatever the limits assigned to the species by post-Linnaean authors there appears to have been general agreement that typical *P. pusillus* is represented by the common *P. pusillus* of Europe, a plant with convolute open stipular sheaths and narrow three-nerved leaves in which the midrib is bordered by lacunae. By the beginning of the present century *P. pusillus*, as interpreted by the majority of authors, comprised a mixture of two widely distributed species, which, though superficially alike in the dried state, are actually very distinct plants with important differences in habit, in the nervation of the leaves, in the form and position of the winter-buds, and particularly in the structure of the stipular sheaths. One of these two species is strictly North Temperate and Subarctic with a distribution in the Old World, and southern Mexico in the New; it was described by Fries in 1828 under the name *P. gracilis* and by Bivona-Bernardi in 1838 under the name *P. panormitanus*. Confusion between these two species persisted until Hagstrom, by careful comparison, discovered the essential differences between them. In Neuman's 'Sveriges Flora' (1901), pp. 792-3, 801-3, Hagstrom recognized the two species as distinct, restricting the name *P. pusillus* to the first and taking up the name *P. panormitanus* for the second, but at that time he was unaware of the important difference in the structure of the stipular sheaths. Subsequently, however, following a more intensive study of the genus, he published his elaborate monograph, 'Critical Researches on the Potamogetons', a feature of which was his masterly elucidation of the morphological differences that exist between these two species which have been so much confused under *P. pusillus*. In his work Hagström for the first time pointed out the difference in the structure of the stipular sheaths, and stressed its importance in the classification of the subsection *Pusilli* by using it as the basic character in separating two series: *Pusilli convoluti* (for his *P. pusillus* and other species with convolute open stipular sheaths) and *Pusilli connati* (for *P. panormitanus* and allied species with closed stipular sheaths). His work on these species received the wide recognition it deserved, and has been largely accepted by specialists in *Potamogeton*, notably by Pearsell in Bot. Soc. & Exch. Club Brit. Is. ix. 151, 154 (1930) and by Fernald in Mem. Gray Herb. iii. 60, 80 (1932).

When we began a study of British *Potamogetons* in 1937 we considered it advisable at an early stage to examine the types of Linnaeus's species of *Potamogeton*, since there has been controversy about the application of some of the names and none of them has been dealt with by the modern type-method. An investigation into the case of *P. pusillus* seemed particularly desirable, for an obvious lacuna in Hagstrom's account of the species was his failure to discuss or even mention the type. Linnaeus (Sp. Pl. l. 127 (1753)) published the species in the following form:—

"12. POTAMOGETON FOLIIS LINEARIbus OPPOSITIS ALTERNISQUE DISTINCTIS; BASI PATENTIBUS, CAULE TERETl. FL. SUC. 147. Dalh. paris. 56.

Potamogeton foliis linearibus alternis remotis. Roj. lagdb. 213.

Potamogeton foliis linearibus alternis remotis. Vaill. paris. t. 32. f. 4.

Habitat in Europae paludibus. ◊".

Except that the word "distinctis" replaced "distantibus", the definition was copied, as indicated by Linnaeus, from his 'Flora Suecica' (1745). In that work (p. 52) the species appeared as "147. Potamogeton foliis linearibus oppositis alternisque distantibus, basi patentibus, caule tereti", with six pre-Linnaean synonyms (including the two cited in the 'Species Plantarum') and the geographical note "Habitat in paludibus & lacubus prop. Upsaliam copioso". In the Linnaean Herbarium the species is represented by a single sheet, named "12. pusillus" by Linnaeus himself and known to have been in the herbarium in 1733. This sheet bears three separate specimens which are taxonomically identical and may well have come from the same individual plant; to the left is a flowering branch, to the right another (smaller) flowering branch with a sterile branch below it. The sheet lacks any indication of the locality or collector, but in the absence of evidence to the contrary it is permissible to assume that the specimens are Swedish and that they came from the small, open swamps near Upsala.
from the neighbourhood of Uppsala. They agree with Linnaeus's definition of *P. pusillus* and clearly rank as syntypes of the species. Superficially they would pass for either of the two species which have been so much confused under *P. pusillus*, but careful examination shows that they undoubtedly belong to the species with closed stipular sheaths—i.e., they are conspecific with *P. panormitanus* and not with the open-sheathed species to which Hagström restricted the name *P. pusillus*.

According to the map published by Almquist in Act. Phytogeogr. Suec. i. fig. 305 (1929) both these species occur in the vicinity of Uppsala*, and it is therefore possible that Linnaeus knew them both but did not distinguish between them. In those circumstances it would be unreasonable to argue that he intended his *P. pusillus* to represent one species rather than the other. It may have been merely by chance that the plant which he preserved in his herbarium belonged to the species with closed sheaths rather than the one with open sheaths, but, be that as it may, his herbarium sheet provides the only syntype material from which a lectotype can be chosen. We therefore take as lectotype of *P. pusillus* the larger flowering specimen, on the left of the sheet. With regard to the two synonyms quoted by Linnaeus under *P. pusillus*, we are unable to identify Royen's plant from the brief description, but Vaillant's figure clearly indicates the species with closed stipular sheaths and thus agrees with the specimens in the Linnean Herbarium.

In view of these facts the name *P. panormitanus* Biv. (1838) must be replaced by *P. pusillus* L. (1753). The "*P. pusillus*" of Hagström, Pearsall, Fernald, and other authors must take the name *P. Berchtoldii* Fieb. in Oecon.-techn. Pl. Bohm. i. 1, 277 (1838), since there appears to be no earlier legitimate name for this common and variable species, which includes *P. pusillus* var. *tenuissimus* Mert. & Koch and *P. pusillus* subsp. *lacustris* Pearsall & Pearsall f.

In Britain, as elsewhere, the name *P. pusillus* has been used for more than one species, though usually it has been misapplied to *P. Berchtoldii*. It is obvious, therefore, that all British records of *P. pusillus* require re-investigation, and this we hope to do in the course of revising the British species of the genus.

* Nearly two centuries have elapsed since Linnaeus published his 'Flora Suecica', and it is now impossible to obtain reliable information as to the relative frequency of the two species round Uppsala at the time when Linnaeus was working. We are kindly informed by Prof. N. E. Svedelius in litt. that great changes have taken place round Uppsala in the local habitats for aquatic plants since Linnaeus's time, and many small lakes and ponds have diminished or disappeared.

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**THE FLORA OF SOUTHAMPTON ISLAND, HUDSON BAY.**

**BY NICHOLAS POLUNIN, M.A., M.S., D.PHIL.**

(Department of Botany, Oxford; Research Associate, Gray Herbarium, Harvard University).

Rather more than 200 miles from north to south and a similar distance from east to west, Southampton Island lies around lat. 64° N. and long. 84° W. in the mouth of Hudson Bay. It has an area of some 20,000 square miles, of which about two-thirds are occupied by limestone and one-third by gneiss (cf. Manning, 1936, map on p. 237). The country is almost everywhere low and rolling, having been heavily glaciated, but, except for numerous lakes and occasional perennial patches of snow, the whole area is free for colonisation by plants (which indeed cover about half the surface), there being no ice-cap.

The first botanical exploration of this very considerable island was carried out by Captain W. E. Parry and certain of his officers (Edwards, Fisher, Hooper, and Lyon) in 1821. This was a mere amateur reconnaissance made during brief landings on the north coast; forty-eight species of vascular plants were collected, of which twenty-eight were recorded by Hooker (1825) from the gatherings of Parry and Edwards. After this, except for a single specimen taken by Dr. L. E. Borden during the cruise of the 'Neptune,' it appears that no botanical work was attempted on the island for a whole century—indeed, until 1922 when Therkol Mathiassen and Jacob Olsen of the Danish Fifth Thule Expedition visited it for archaeological and other purposes and collected a few plants (Groatved, 1936).

In 1928 the island was visited for the first time by a scientifically trained biologist, the late Dr. M. O. Malte (then Chief Botanist of the National Museum of Canada), who wrote me that he had obtained about eighty species in the single day he had adored near the Hudson's Bay Company's trading post in South Bay. According to my computation, there are in this collection of Dr. Malte's no less than thirty-seven species and subsidiary forms not previously known from the island. Two summers later the American ornithologist G. M. Sutton, after wintering on the island, made a further very useful collection of plants which (with another collection made at Chesterfield Inlet on the adjacent mainland) has recently been described in detail by Raup (1936); Sutton's collections added a further twenty-six to the species and forms already gathered on the island, and, of course, a much greater number to those hitherto recorded in the literature (cf. Raup, 1936, p. 17).

In 1933, Southampton and some closely adjacent smaller islands which seem properly to belong to it were visited by the
Norcross-Bartlett Expedition, a few plants (including some noteworthy additions) being collected by J. B. Angel, while the following year I had the good fortune myself, when accompanying the Canadian Eastern Arctic Expedition, to spend a day on the island (in the vicinity of the Hudson's Bay Company's post in South Bay) making a primary ecological survey of the chief plant communities, and also collections and notes which resulted in yet further additions to the known flora. Meeting there my old friend Thomas Manning of Cambridge, I asked him to collect more plants for me; this he very kindly did. Finally, the island for a few hours in 1936 as a member of the Canadian Government Party on the Eastern Arctic Patrol of that year, I was pleased to find that Messrs. Pat Baird and G. W. Roley, who had come out from England with Manning's new expedition, had also been collecting plants industriously.

Thus no less than fifteen people (see table on p. 95) have collected plants on Southampton Island. I have seen most if not all of their material, in my own or one or another of the main herbaria of Europe and North America, and find represented in their collections no less than 161 species and twenty subsidiary forms of vascular plants. This is an increase of more than 50 per cent. to the flora recorded by Raup (1936), and it seems desirable to publish in full the following list of all these species and forms that have been collected on the island. Even now the flora must be far from completely known; the ease with which additions are still being made and the lack to this day of any record of such common and widespread arctic plants as Catabrosa algida, Koenigia islandica, and many others suggest that the species alone may well be brought up to 200 with further exploration.

In conformity with the climate the flora is, of course, arctic in type, including most of the high-arctic plants occurring in the Canadian Arctic Archipelago, almost all of which are of circumpolar distribution. A few relatively southern but often circum-boreal species are also represented. Of the plants whose range is restricted to North America the majority are “Western” in their affinity, as is indeed to be expected from the geographical position of the island and the fact that Sir Thomas Roe’s Welcome, the strait separating it from the mainland of the North-West Territories, often freezes in winter and so allows an easy path for migration from that quarter.

The order and nomenclature followed in the list given below are essentially those of Gray’s ‘Manual of Botany,’ ed. 7 (1908),—with such modifications as seem desirable in the light of recent researches by Professor M. L. Fernald and others or as are necessitated to bring the whole into line with my forthcoming ‘Botany of the Canadian Eastern Arctic.—Part I.’ Since fuller citations of localities etc. will be found in this work, which will shortly be going to press, I have not thought it necessary to mention here the localities within Southampton Island—except for three species which have not been found on the main island but instead only on one of the small adjacent islands which for phytogeographical purposes are best treated with it.

Abbreviations of collectors’ names:—

A. Angel in 1933 (specimens in the U.S. National Herbarium).
Ba. Baird in 1936 (British Museum).
Bo. Borden in 1904 (National Herbarium of Canada).
E. Edwards in 1821 (British Museum).
F. Fisher in 1821 (British Museum).
H. Hooper in 1821 (Linnean Society of London).
L. Lyon in 1921 (recorded in his book).
Man. Manning in 1934 (Brit. Mus., etc.).
Mat. Mathiassen in 1922 (Copenhagen).
O. Olsen in 1922 (Copenhagen).
Pa. Parry in 1821 (Brit. Mus., Kew, Copenhagen, etc.).
Mus., etc.).
R. Roley in 1936 (Brit. Mus.).
S. Sutton in 1930 (Harvard, Gray Herb.).

An asterisk before the name of a plant indicates that it has not been recorded earlier for Southampton Island.

POLYPODIACEAE.

Osttptertis fragilis (L.) Bernh.—O., Ba.
Dryopteris fragrans (L.) Schott. (Thelypteris fragrans (L.)
       Nieuwl.)—S., A., Po. 36.

EQUISETACEAE.

Equisetum arvense L.—S., Po. 34 & 36, Man., Ba.
E. variegatum Schlech.—Mal., S., Po. 34 & 36, Man., Ba.

LYCOPODIACEAE.

Lycopodium Selago L.—Mal., S., Man., Po. 36.

GRAMINEAE.

Hierochloe alpina (Sw.) Roem. & Schult.—H. (note only),
       Mat., S., Po. 34 & 36, Man.

H. paniculiflora B. Br.—A., Po. 36, Ba.

A. alpina var. anthill Smith—Pa., Mat., S., Po. 34 & 36,

Man., Ba.

Elytrigia latifolia (R. Br.) Griseb.—H. (note only), Pa.,
       Mat., S., Po. 34 & 36; *H. aristata Holmb.—Mal., S.
The Flora of Southampton Island, Hudson Bay

Eriophorum Scheuchzeri Hoppe—H. (note only), Pa., Mat., S., Ba.
E. callitrich Cham.—S., Ba., Po. 36.
E. angustifolium Roth†—H. (note only), Pa., Mat., S., Po. 34 & 36, Ba.

Calamagrostis neglecta (Ehrh.) Gaertn. var. borealis (Laestad.) Kearney (incl. C. confinis (Willd.) Nutt.)—Mat.

Archipelago.

Applied to slender specimens of (1826, "Botany

"Eriophorum gracile," which name was frequently applied to slender specimens of E. angustifolium by C. B. Clarke and others.

† Subsidiary forms of this species will be dealt with in my forthcoming "Botany of the Canadian Eastern Arctic—Part 1."
*Betula glandulosa* Schreber—(not seen, but cited by Simmons (1913, p. 81) as in Kew Herbarium), Mal., S., Po. 34.

† *Salix herbacea* Pursh var. callicarpa (Trautv.) Fernald—S., prostrate, named and recorded by Raup (1936, p. 22), but possibly only *S. arctica*. Also ? Po. 36, atypical.

*S. richardsonii* Hook.—Mal., S., Po. 34 & 36, Man.; ? Ba.

*S. calcicola* Fernald & Wiegand.—Mal.; var. *Nicholsiana* var. nov. A type differs from the ovatis, integris vel subintegris. Type in British Museum.—Po. 36, no. 2273.

*S. alaxensis* (Ander.) Coville (*S. speciosa* Hook. et Arn.)—Mat., S., Ba., Po. 36.

**CARPOLYPHYLLACEAE.**

Silene acaulis L.—Mat., S., Po. 34 & 36.

Lycnnis furcata (Raf.) Fernald—S., Po. 36.

L. apetala L. (*Melandryum apetalum* (L.) Fenzl)—H., Pa., Mat., O., Mal., S., Po. 34 & 36, Man.; Ba.

Cerastium alpinum L. (s.l.) §—H., Pa., Mat., S., Po. 34 & 36, Man.; Ba.


*S. crassifolia* Ehrh.—Mal., Po. 34, Man.

S. humifusa Rottb.—O., Po. 34, Ba.

Arenaria peduloides L.—S., Po. 34, Man.; Ba.

A. rubella (Wahlenb.) Smith *A. procingula* Richardson : *A. verna* L. var. *pubescens* (Cham. & Schl.) Fernald—Pa. (not seen, but cited by Simmons, 1913, p. 81) as in Kew Herbarium, Mal., S., Po. 34.

† Subsidiary forms of this species will be dealt with in my forthcoming "Botany of the Canadian Eastern Arctic.—Part I."

‡ Also some intermediate (*S. calcicola* × *richardsonii*)—Mal., Po. 34 & 36.

§ Named and published by Raup (1936, p. 23) as "*var. legitimum* Lindblom," but the material is all glandular and hence cannot be so referred. Another phase of this extremely variable species is represented by the specimens reported by Raup (1936, p. 23) as "*Cerastium cerastoides*," which must accordingly, for the time being at least, be excluded from the flora of Southampton Island.

**CARYOPHYLLACEAE.**

Oxyria digyna (L.) Hill—Mat., S., Po. 34, Man.

Polygonum viviparum L.—Mat., Mal., S., Po. 34 & 36.

**POLYGONACEAE.**

Oxyria digyna (L.) Hill—Mat., S., Po. 34, Man.

Polygonum viviparum L.—Mat., Mal., S., Po. 34 & 36.

**CARPOLYPHYLLACEAE.**

Silene acaulis L. var. exscapa (All.) DC.—Mat., S., Po. 34, Man.

Lychnis furcata (Raf.) Fernald—S., Po. 36.

L. apetala L. (*Melandryum apetalum* (L.) Fenzl)—H., Pa., Mat., O., Mal., S., Po. 34 & 36, Man.; Ba.

Cerastium alpinum L. (s.l.) §—H., Pa., Mat., S., Po. 34 & 36, Man.; Ba.


*S. crassifolia* Ehrh.—Mal., Po. 34, Man.

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**CARYOPHYLLACEAE.**

Oxyria digyna (L.) Hill—Mat., S., Po. 34, Man.

Polygonum viviparum L.—Mat., Mal., S., Po. 34 & 36.
SAXIFRAGACEAE.

*Saxifraga recularis* L.—Po. 34, Ba.
*S. cernua* L.—Mat., O., Mal., S., Po. 34 & 36, Man.; f. latibracteata (Fernald & Weatherby) n. comb. (*S. cernua* var. *latibracteata* Fernald & Weatherby in Rhodora, xxxiii. p. 234, 1931)—S., Ba., Po. 36; *f. bulbillosa* Engler et Irmscher §—Po. 36.
*S. caespitosa* L. (S. sileniflora of authors, incl. Raup, 1936, p. 26).—Mal., S., Po. 34 & 36, Ba.; *f. uniflora* (R. Br.) Engler—Po. 34, Ba.
*S. stellaris* L. var. comosa Retz.—Po. 36.
*S. nivalis* L.—F., Mal., S., Po. 34 & 36, Ba.; *var. labradorica* Fernald §—Mal., Po. 34; *var. tenuis* Wahlenb.—S. part, Po. 36.
*S. aizoides* L.—H., E., Pa., Mat., Mal., S., Man., Ba., Po. 36.
*S. Hirculus* L.—H., E., Pa., Mat., Mal., S., Po. 34 & 36, Ba.
*S. oppositifolia* L.—H. (note only, saying "abundant everywhere that we landed," i.e., including Southampton I.), Mat., Mal., S., Po. 34 & 36, Ba.
*Chrysosplenium alternifolium* L. var. *tetrandrum* Lund (C. *tetrandrum* (Lund) Fries)—E. (note only), Mal., S., Po. 34 & 36, Ba.

ROSACEAE.

*Rubus Chamaemorus* L.—Ba., Walrus I. only.
*Potentilla emarginata* Pursh—Po. 36.

† Raup (1936, p. 25) gives *Draba glabella* as "Previously known from Southampton Island," but the early record should be transferred to *D. cinerea*, which is represented by a good specimen in the British Museum collected by Edwards during Parry's Second Voyage.

‡ Subsidiary forms of this species will be dealt with in my forthcoming "Botany of the Canadian Eastern Arctic.—Part I."

§ Not previously recorded from anywhere in the Canadian Arctic Archipelago.

THE FLORA OF SOUTHAMPTON ISLAND, HUDSON BAY 101

*P. nivus* L.—Po. 34 & 36, Man.; var. *subquintata* Lange—S., var. pallidior Sw.—Po. 34.
*P. Vahliana* Lehnn.—H. (note only), Mat., Mal., S., Po. 34 & 36.
*P. pulchella* R. Br.—Ba., Walrus I. only.

LEGUMINOSAE.

*Tragulus alpinus* L.—S., Mal., S., Po. 34 & 36.
*Hydropis hudsonica* (Greene) Fernald (O. *arctica* of authors)—H., Mal., S., A., Po. 34.
2. *arctobia* Bunge—Mal., S., Po. 34 & 36, Man.

EMPETRACEAE.

*Empetrum nigrum* L. var. *hermaphroditum* (Lange) Sorensen—Mat., Mal., S., Po. 34 & 36, Man.

ONAGRACEAE.

*Eriophyllum latifolium* L.—Mat., S., Po. 34 & 36, Man.

HIPPURIDACEAE.

*Hippuris vulgaris* L.—S., Po. 34, Ba.

PYROLACEAE.

*Pyrola grandiflora* Radius (P. *rotundifolia* L. var. *pumila* Hook.)—S., Man., Po. 34, Ba.

ERICACEAE.

*Loranthum palustre* L. var. *decumbens* Ait.—S., Po. 34 & 36, Man.
*Rhubalum tannonicum* L.—S., Po. 34 & 36, Man.
*Vaccinium tetragonum* (L.) D. Don—H., Pa., Mat., Mal., S., Po. 34 & 36, Man., Ba.
*Vaccinium rubra* (Rehder & Wilson) Fernald—Mal., S., Po. 34 & 36, Man., Ba. Much of the material approaches *V. alpinum* (L.) Spreng. in its small and more or less ciliate leaves.
*Vaccinium uliginosum* L. var. *alpinum* Bigel.—Mat., Mal., S., Po. 34 & 36, Man.
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PLUMBAGINACEAE.
Armeria labradorica Wallr. (Statice labradorica (Wallr.) Hubbard & Blake) f. glabrescens (Blake) Mal.—S., Man., Po. 39.

BORAGINACEAE.
Mertensia maritima (L.) S. F. Gray var. tenella Fries—Mat., S.

SCROPHULARIACEAE.
Pedicularis lapponica—Mat., S., Man., Po. 34 & 36, Ba.
P. flammea L.—Mat., S., Ba.
P. capitata Adams—Pa. (not seen, but cited by Hooker (1825, p. 402) as "P. Nelsonii"), Mat., S., Po. 34 & 36, Ba.

CAMPANULACEAE.
Campanula uniflora L.—H. (note only), Mat., S., Man.

COMPOSITAE.
Erigeron ericeophalus J. Vahl—S., Man., approaching E. unalascakensis.
*E. unalascakensis (DC.) Vierh. (E. uniflorus of authors)—Pa., Po. 34 & 36.
*Antennaria angustata Greene—Po. 36.
*A. labradorica Nutt.—A., north side of White Island, Frozen Strait. This specimen is in the U.S. National Herbarium and is, according to my notes, "not quite typical, but probably correct."
Matricaria inodora L. var. nana (Hook.) Torr. & Gray (M. grandiflora (Hook.) Britton)—Mat., S., Po. 34 & 36, Ba.
Chrysanthemum integrifolium Richardson—H. (note only), Pa., Mat., S., Po. 34 & 36.
Senecio palustris (L.) Hook. (incl. some material which is referable to var. congestus (R. Br.) Hook.)—O., S., Man., Ba.
Taraxacum lacerum Greene—H. (note only, but presumably referring to this species), S., A.
*Crepis nana Richardson—A., north side of White Island, Frozen Strait.

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THE BRITISH ASSOCIATION DELEGATION IN INDIA.

By A. H. REGINALD BULLER, D. SO., F. R. S.

The British Association for the Advancement of Science send a Delegation of about one hundred persons to the Silver Jubilee Meeting of the Indian Science Congress Association. The meeting was held at Calcutta, January 3-9, and was presided over by Sir James Jeans. The Delegation included the following botanists:—Prof. V. H. Blackman, Prof. A. H. R. Buller, Dr. C. D. Duelting, Prof. & Mrs. F. E. Fritsch, Prof. R. F. Ganges, Prof. J. W. Harrison, Sir Arthur Hill, and Dr. A. B. Rendle.

On the way out Dr. Rendle was not well, but at Port Said he and I took a long walk through the city and enjoyed seeing the varied sights, including its ornamental trees and shrubs. That was Dr. Rendle's last botanical excursion, for, unfortunately, as the voyage proceeded, he grew worse, and at Bombay he was obliged to leave the party and return home. Shortly after his arrival in England, as readers of this Journal must have learned with great regret, he passed away.

The Delegation sailed from London on board the P. and O. steamer 'Calcutta' on November 26 and landed at Bombay on December 16. A pre-congress and a post-congress tour, in special trains, had been arranged by the Indian Association.

The pre-congress tour included:—Bombay (University of Bombay, Parsee Towers of Silence, Hindu burning ghat); Hyderabad (Osmania University, where the instruction is given in Urdu, and the neighbouring Golconda Fort and tombs); Amrangabad (with visits to Daulatabad Fort and the rock caves of Ellora and Ajanta); Sanchi (great Buddhist Stupa); Agra (Taj Mahal, Agra Fort, Agra College); New Delhi (Viceroy's House, Imperial Institute of Agricultural Research); Delhi (fort, Peer G. Mosque, Kuth); Dehra Dun (Forest Research Institute); Mussoorie (ridge with view of snowy ranges of Himalayas); Benares (Benares Hindu University, the Ganges, Varanasi where Buddha first preached); Darjeeling (Botanical (ever, view of Kinchinjunga, Tiger Hill); and Calcutta.
The post-congress tour included: Madras (University of Madras, Aquarium, Hindu temple); Bangalore (Indian Institute of Science); Mysore (the Palace, hill view of city, hydro-electric works, jungle); and Bombay.

At Port Said, on the outward journey, Dr. Rendle and I noted the following ornamental plants: *Casuarina equisetifolia*, *Eucalyptus globulus*, *Phoenix dactylifera*, *Quercus ilex*, *Ficus Carica*, *Ligustrum ovalifolium*, *Lantana Camara* and species of *Bougainvillea*, *Poinsotia*, *Cotoneaster*, *Hibiscus*, *Jasminum*, *Ipodama*; and, growing along the banks of the Suez Canal, we saw the great grass, *Arundo Donax*, and plantations of the Australian *Casuarina equisetifolia*. The *Casuarina* trees were well-grown and, at sunset, Kites were seen flying about them. At Aden the Delegation landed, visited the town of Aden and, at sunset, Kites were seen flying about them. At Aden there is no rain rarely falls. Its natural vegetation is most scant and enormous tanks and through the Gardens of the Parsee dead, and in the grounds saw Mango trees. The fuel used is the strongly scented wood of the Sandalwood tree. We also saw a Hindu burning ghat where a body was being cremated over large logs of wood. Consequently, the Indian mode of welcoming an honoured guest was also experienced by the Parsees, followers of Zoroaster, who keep the sacred fire burning night and day continuously.

At the oasis of Agra we visited the Towers of Silence, where vultures dispose of the Parsi dead, and in the grounds saw Mango trees. The Parsi, followers of Zoroaster, have a temple there in which they keep the sacred fire burning night and day continuously. The fuel used is the strongly scented wood of the Sandalwood tree. We also saw a Hindu burning ghat where a body was being cremated over large logs of wood.

Before beginning our pre-congress tour, we each given a copy of ‘An Outline of the Field Sciences of India.’ This useful handbook, published by the Indian Science Congress Association in November, 1937, and edited by Dr. Sunder Lal Hora, contains a chapter entitled ‘An Outline of the Vegetation of India’ by Mr. C. C. Calidre, Superintendent of the Royal Botanic Gardens, Calcutta, and Director of the Botanical Survey of India.

At Agra we visited that masterpiece of the Mogul emperors, the Taj Mahal. On the outside of this beautiful building, which stands in a garden of Cyprus trees and overlooks the broad Jumna River, there are carved in relief on the marble the graceful forms of tulips, lilies, narcissi, and other bulbous plants; and in the interior the cenotaphs of Muntaz and her husband, Shah Jahan, are profusely inlaid with gems in flowered patterns.

At Agra College, Professor K. C. Mehta took us through his laboratory and his rust greenhouse, and gave us an account of his work—now in its fifteenth year—on the Rust disease of cereals in India. It has been conclusively established that in the plains, during October and November when the cereal crops are down, there is no local source of infection; and, apparently, the suspected alternate hosts play but little part in the annual origin of the rust disease. From a study of the spread of the disease in the plains as well as in the hills, extending over a period of seven years, Professor Mehta is convinced that the focus of infection lies in the hills and hilly tracts, where rusts oversummer in the unripen stage. To lessen the incidence of the rust disease in the plains, Dr. Mehta therefore recommends: (1) sowing of wheat and barley in Nepal in October instead of August-September; (2) suspension of the first crop (sown in April-June) in the Nilgiris and Palni hills; and (3) destruction of self-sown plants and tillers of wheat and barley 1–2 months before the sowings in the hills and hilly tracts (3000 ft. above sea-level) in general. Professor Mehta believes that his recommendations, in respect to the Nilgiris and Palni hills could be acted upon by the Government with but little expense and that, if carried out, would result in a considerable increase in the yield of Indian wheat and barley.

At the Imperial Institute of Agricultural Research at New Delhi there were various botanical exhibits, among them the hybrid Sugar-canes raised by Rao Bahadur R. S. Venkatraman, at Coimbatore. By hybridization in and with the genus *Saccharum*, Venkatraman has sought during the past twenty-five years to improve the Indian Sugar-canes, and already the area in which improved canes are grown is upwards of 70 per cent. of the total. Inter-varietal crosses have been made within the species *Saccharum officinarum*; economically important inter-specific hybrids have been obtained from *S. officinarum* and *S. spontaneum*; and inter-generic crosses have been made between *Saccharum* and *Sorghum* with a view to shortening the life-cycle of the sugar-cane, and between *Saccharum* and *Bambusa* for the introduction into the sugar-cane of greater vigour. The Bamboo parent grows to 60 feet high, but the F1 generation consists of short plants closely resembling sugar-canes, thus showing the dominance of *Saccharum* characters. Whether or not the intergeneric crosses, which are of great interest botanically, will yield anything of economic value remains to be determined by further investigation.

At the Imperial Institute I visited the laboratory of Plant Pathology and there renewed acquaintance with Dr. G. W. Hadwick, the newly appointed Imperial Mycologist, and met Sir James Jeans.
Dr. M. Mitra and Dr. B. B. Mundkur. Dr. Mitra has discovered a new bunt, *Tilletia indica*, and Dr. Mundkur a new smut, *Urocystis Brassicae*. The latter fungus has the peculiarity of forming large and curious galls on the roots of Mustard. Dr. Mundkur gave me some carbonized grains of *Triticum ephraecococcum*, which were obtained at Mohenjo Daro, a pre-Aryan city in the Indus valley, and are, according to archaeological authorities, at least 4,000 years old. In this material Dr. Mundkur found some tiny fungus bodies which he regards as smut spores. At Dehra Dun we visited the Forestry Research Institute, inspected its museum, and went through its laboratories and experimental factories. The Institute for some thirty years has been carrying on research upon the growth of trees and the profitable use of timber and other forest products. It was founded primarily for the benefit of the Indian Forest Department, for which it has produced results of acknowledged economic value, but its work has also been of use to other government departments, to Indian States, and to industrialists. In the experimental factories, among other things, we saw machinery at work: (1) producing wall-boards and insulation boards from bagasse (crushed sugar-cane after extraction of the juice); (2) producing printing paper from *Dendrocalamus strictus* (bamboo grown in Orissa); and (3) testing the strength of various kinds of timber in respect of bending, compression, hardness, shear, glue adhesion in triple plywood, etc. In the wood-workshop section we saw the veneer-cutting plant in operation. About 8,000,000 plywood packing boxes for tea are imported into India every year. There are two plywood mills in India, but these contribute only a very small proportion of the tea-boxes required, and the Institute is assisting this young industry in its attempt to meet foreign competition. On departing we were each given as a souvenir a writing-pad of excellent bamboo paper made in the Institute.

At the Benares Hindu University we visited the Botanical and other Departments, and then attended a Degree Congregation in a huge tent erected with the help of bamboo poles. At the ceremony several of our members, including Professor V. H. Blackman, were given honorary degrees.

From Siliguri we drove in motor-cars up to Darjeeling, which stands at a height of 6,900 feet above sea-level. We had an excellent driver, with Mongolian features, who knew no English. The pace permitted was ten miles per hour. The road wound round and round great mountain spurs amid forest and tea plantations on terraced slopes, and ever up, up, and up, past the 4,000-foot-level, past the 5,000, and past the 6,000, until after three and a half hours of progress we arrived at our destination, where Bhutea women porters, who greeted us with smiles, carried our bags on their backs into the Mount Everest Hotel. During the ascent we saw Bamboos, Tree ferns, and Rhododendrons, and we thought of Joseph Hooker and his famous botanical explorations. Early next morning from the windows of the hotel we watched the sun rise on Kinchinjunga (28,146 ft.) as in snowly grandeur it towered up above its sister peaks some 16 miles away. The botanists found much to interest them at Darjeeling. There were: the tea-gardens, whose terraces could be seen up to a height of about 6,000 feet; a Botanical Garden on a hill-side with many fine trees and other plants, mostly out of flower; groves of *Cryptomeria japonica* planted all about Darjeeling and formed by tall conical trees with thick trunks; in the market place vegetable produce and, in an adjoining street, two querns, at one of which sat two women grinding grain; and, finally, the wild plants growing about the hills. *Primula malhocoidea* was in flower on a bank not far from gardens, close by a wild *Mahonia*; and we particularly noticed a fern, with large compound leaves and stems about as thick as a finger, *Thickenia gigantea*, which was climbing freely over various boulders.

We drove to Tiger Hill (8,500 ft.). Our cars wound in and out among the hill-sides for a distance of about seven miles, and then we climbed the last 700 feet. From the top we saw a magnificent panorama of mountains stretching half-way around the horizon; and we looked over one great range hoping to see Mount Everest; but, unfortunately, although two peaks, right and left of it, were often more or less clear of cloud, Mount Everest, 100 miles distant, never came distinctly into view. But we were well rewarded for our journey; for, as the sun set, there were glorious tints of red and purple—red in the west and on the mountains and vast purple shadows. The sun went down in golden splendour and the leaden shadow of the earth rose on the eastern sky. When all was over and the whole earth was growing dark, we hurried down the 700 feet to our car, and then we drove with the help of headlamps along the narrow road with numerous sharp S-shaped curves, downwards for 2,000 feet, and on to Darjeeling. An error in steering might have brought us to serious disaster; but our driver was excellent, and we arrived back at the Hotel in the dark, but safe and sound, and ready for tea.

In the Botany Section at the Calcutta meeting of the Indian botanical Congress Association, Professor B. Sahni delivered his Presidential Address on "Paleobotany in India, a Retrospect"; and, in the course of a week, this was followed by numerous papers, a few special lectures, and six discussions on: (1) Discrepancies between the chronological testimony of fossil plants and animals; (2) The absorption of salts by plants (Sections of Botany and Chemistry); (3) Algal problems peculiar to the tropics with special reference to India; (4) The
dissemination of cereal rusts in India; (5) A national Herbarium for India; and (6) The species concept in the light of cytology and genetics (Sections of Botany, Zoology, and Agriculture).

On January 6, at the seventeenth annual meeting of the Indian Botanical Society, Professor S. R. Bose gave his Presidential Address on "The Effects of Radiation on some Polyploids in Culture," and this was followed by a Conversazione with botanical exhibits and a luncheon given by the Botanical Society of Bengal.

In the afternoon of January 6, the members of the Botany Section proceeded by steamer down the River Hooghly to Sibpur to attend the one hundred and fiftieth Anniversary celebration of the Royal Botanical Gardens. The function was presided over by the Nawab of Dacca, Minister for Industries and Agriculture, Bengal. Sir James Jeans, on behalf of the British delegation, offered the Gardens his hearty felicitations, and Sir Arthur Hill commented on the similarity of the situation of Kew Gardens and the Sibpur Gardens. He remarked that while Kew was located near London, the first city in the Empire, the Sibpur Garden was near Calcutta, the second city of the Empire, and both were on the banks of two of the busiest rivers in the world. Dr. K. P. Bose, the Superintendent of the Gardens, welcomed the guests, outlined the history of the Gardens, and reviewed the economic benefits which India had derived from Sibpur. Among these benefits he included: (1) a demonstration that the Teak tree could not be grown for timber in Bengal as, in the muddy soil of the Gangetic delta, its trunk becomes hollow near the base; (2) the introduction of exotic timber trees; (3) the introduction of exotic plants now found in private gardens; (4) the final establishment of the tea industry in Assam and northern Bengal; (5) the initiation of Potato-growing; (6) the cultivation of quinine Cinchonas of the Andes and the establishment of a factory in the Darjeeling district, whence the Government hospitals and dispensaries have obtained large supplies of quinine required for the treatment of malaria; (7) help given to the Agricultural Society of India in the improvement of Indian cotton and Indian jute; (8) assistance given in the introduction of the best kinds of sugar-cane from the West Indies; and (9) experiments on the cultivation of such economic plants as flax, hemp, rhea or ramie tobacco, henbane, vanilla, coffee, Indiarubber, Japanese mulberry, cardamoms, tapioca, and cocoa.

After the function was over, we walked about the Gardens, admired the beautiful Oreodoxa palm avenue, and visited the famous Banyan tree (Ficus bengalensis). This tree, from whose branches figs were hanging, is now about 163 years old and the circumference of its crown measures 1,151 feet. It has 641 aerial roots actually rooted and grown into posts, and it is still extending. Its main trunk, which was 51 feet in girth, decayed and has been removed, so that the tree is now in three parts; but three young Banyan trees have been planted near where the original trunk was, and the intention is at some future time to graft these three trees together and also on to the three pieces of the original tree, and so once more to construct a single vegetative body.

At a special degree congregation of the University of Calcutta the Chancellor conferred the degree of Doctor of Law, honoris causa, on ten members of the Delegation, including the writer.

The Indian Association for the Cultivation of Science elected Sir Arthur Hill to be the Ripon Professor for the year 1938, and, in this capacity, he delivered three lectures at the Association during the week of the Calcutta meeting. A short visit was made to the Bose Institute founded by the late Sir Jagadis Chandra Bose, and some of Bose's remarkable experiments were demonstrated to us. A detached, partially withered, sagging leaf of one of the herbaceous Composites was placed in a glass vessel containing warm water, and its shadow was projected on to a screen. Immediately after the leaf had thus been given access to water, it began to recover and, with surprising speed, it soon became stiff and upright once more. With the help of very sensitive apparatus making graphic records it was shown that the petiole of a compound leaf of one of the Leguminosae had risen very slightly in correspondence with the lowering of the air during a recent brief storm.

In the streets of Calcutta and its suburbs we noticed Neem trees (Melia Azadirachta), Banyan trees (Ficus bengalensis), the sacred Pipal tree (F. religiosa), and other species of shade trees which we could not identify. Near the Race-course, in one tree, a Brain Fever bird called loudly and monotonously, and in and out and round about another tree flew several large fruit-bats, known as Flying Foxes; and everywhere flying about the city were the scavenging Kites and Indian Crows, ever on the alert and searching for unconsidered truffles.

On the railway journey from Calcutta to Madras, from the carriage windows, we saw widespread stretches of rice fields broken up into irrigated plots and parted by earth divisions or bunds along which in some places were set stately rows of Palmyra palms (Borassus flabellifer); and we also saw many Coconut palms, wild Date palms (Phoenix sylvestris), and, near Madras, fine plantations of Casuarina equisetifolia.

At Madras a visit was made to Professor M. O. P. Iyengar's laboratory at the University and here his own algal cultures and those of his pupils were examined.

With a Madras friend, I entered a Toddy Palm grove and saw the inflorescences of several of the Coconut trees (Cocos nucifera) bent down into black bowls set high in the trees and presumably exuding sweet sap from their wounds.
Among the palms grown for ornament in Madras we noticed: the Cabbage palm (Oreodoxa regia), the Royal palm (Licuala grandis), and Caryota urens. In the Adyar Gardens, in which stands the Hall devoted to the cult of Theosophy was seen a splendid Banyan tree with a crown of leaves 300 feet in diameter, a perfect central trunk, and radiating arms supported by a great many rooted posts. This tree is said to be one of the three finest Banyan trees in India. In a beautiful private garden, the owner had one of his bearers pierce the leaf-bases of two Traveller’s Trees (Ravenala madagascariensis) so that I might see the water, which had accumulated there, gush out into a tumbler.

At Mysore, where we were guests of the Maharaja, a few of the party drove into the jungle where we saw huge sandy erections raised by white ants, traces of wild elephants, a hyaena, and, at one place, we rode on the backs of working elephants up and around a hill, past tall Bamboos, and through a wood in which grew Teak, Rosewood, and other commercial timber trees.

On the second day at Mysore, Sir Frederick Hobday and I, in one of the Maharaja’s cars, drove about 150 miles through the countryside: we visited a Pinjrapole (to which decrepit cattle are brought and in which they are kept alive until the last moment), a very well managed Veterinary Institute, the Maharaja’s stables in which were about 10,000 horses, and a cattle fair. The fair was being held at Chunchanakatte, some 34 miles from Mysore, and 10,000 cattle had already been assembled there. We were told by the director of the fair that within a few days the number of cattle would be increased to 25,000. Altogether, that day, Sir Frederick and I must have passed on the roads at least 400 bullock wagons, each drawn by two bullocks. The population of India (excluding Burma) in 1931 was 338,170,632; and, according to the ‘Outline of the Field Sciences of India,’ the number of bulls and bullocks, cows, and young stock of the Ox tribe in India is 168,000,000. From these statistics it follows that in India there is one animal of the Ox tribe for every two human beings; and in keeping with these statistics were the sights witnessed by Sir Frederick and myself on the day we spent together in the country around Mysore.

On the way home from Bombay, the ‘Strathaird,’ on which we had embarked, called at Port Sudan, and this enabled us to view the bottom of the harbour through a glass-bottomed boat and to see there strange and fantastic corals, sponges, and algae, and fishes of varied form and colour swimming over them. At Port Sudan, too, we saw Ipomoea biloba (I. pes-caprae) creeping over the sandy shore. A runner of one of these plants was measured and found to be 46 feet long!

Many of us landed at Suez, drove over the desert to Cairo, saw the pyramids and the Sphinx at Gizah, examined the magnificent Tut-ankh-amen collection in the Cairo museum, and then took the train to Port Said where we rejoined our boat. We noticed how sparse is the vegetation in the desert, but had no time to study it. Here and there were low thorny bushes with camels feeding upon them. At Cairo, brown again changed to green with Date palms, Bougainvillaeas, and Hibiscus. On sailing from Port Said our botanical observations had perforce come to an end.

On the way west through the Mediterranean, one afternoon under unusually favourable conditions, we gazed upon the snow-covered peak of Mount Etna, and, at night, we saw Stromboli coughing and two red-hot streams of lava pouring down its side. Subsequently we called at Marsailles, Gibraltar, Tangier, and Plymouth; and, finally, on February 4, at Tilbury, we stepped once more on to English soil.

We all felt that the visit of the Delegation to India had been a great success and most profitable. For the warm hospitality that was extended to us both publicly and privately we owe a deep debt of gratitude to the Indian Government, Rulers, and people; and we shall never forget the pleasure that was ours in meeting our Indian colleagues face to face and learning from them at first-hand some of the results of their scientific investigations.

A NEW SPECIES OF SPHAEROBOTHYAX.

BY G. TAYLOR, D.Sc., F.L.S.

Since the genus Sphaerobotryax Bisch. was originally defined, its limits have been confused by varied interpretation of the floral structure. Bischoff in founding the genus (apud Krauss in Flora, xxvii. Bd. 2, 428, t. 1 (1844)) described the androecium as follows:—"Stamina 3, collateralia, basi connati, 2 lateralia Lorilia, intermediate bifidum, antheras 2, loculis inaequalibus querns." While it is now generally accepted that the two lateral structures at the base of the androecium, which Bischoff regarded as lateral staminodes, are rudimentary perianth-segments, the interpretation of the intermediate fertile organ has been disputed. Most recent authors regard it as being formed of two fused staminons, the filaments being connate throughout their length. This view has been accepted in the treatment of the family presented by Baker and Wright in the 'Flora of Tropical Africa' and repeated by A. W. Hill in the 'Flora Capensis,' while Engler, in his recent comprehensive account in the second edition of the 'Pflanzenfamilien,' and in earlier works, has also adopted this interpretation. Examination of the type-species, S. aliformis Link, from Natal, reveals that the fertile organ consists of a single stamen with a broad filament and anther. The filament is expanded towards the apex that the lobes of the deeply
cleft anther appear separate. Engler, depending upon supposed numerical distinction in the androecium, restored the genus *Anastrophea* Wedd., based on *A. abyssinica* Wedd., on the ground that it had a single stamen, but the floral structure is essentially the same as in *Sphaerothylax*.

With the discovery of the present species from southern Tanganyika Territory to Transvaal, part of the wide gap in the known geographical range of *Sphaerothylax* is filled, and it is probable that the genus is also represented northwards in East Africa where suitable conditions occur. From repeated observations on herbarium specimens it would appear that the flowers are cleistogamous. Within the unruptured spathella the ovary is usually full of well-formed seeds, and little time elapses after emergence from the spathella before dehiscence takes place, sometimes the two processes being practically simultaneous.

*S. Wageri* G. Tayl. was first collected in Nyasaland in 1887, and it has remained unrecognised for half a century, although several further collections have been available. During 1934 and 1935 Dr. V. A. Wager collected in northern Transvaal a very fine series of specimens providing an adequate conception of the species which is named in honour of their collector.

*Sphaerothylax Wageri* G. Tayl., sp. nov. *Herba* canescens, saltem juventute foliifera; canales rufescentes vel purpurascentes, plus minusve teretes, simplices vel ramosi, usque ad 20 cm. longi. *Pologia* angustissime linearia vel filiformia, basi leviter dilatata, integra vel parte superiore plerumque in segmenta capillaria partita, ultimo decidua. *Flores* in foliis axillis fasciculati, fasciculis partita, ultimo decidua. *Spathella* sphaeroidea vel ellipsoidea. *Pedicelli* in fructu usque ad 4 mm. longi. *Stamen* 1; filamentum fere usque ad 1 mm. longum; anthera 4-loba, apice profunde bifida, pollina didyma. *Ovariun* sessile, subphaluroidem vel ellipsoideum, S-costatum; stigmae crassa, erecta vel patentia, subsphaeroidea vel ellipsoidea, usque ad 1-25 mm. longa et 0-75 mm. lata, valvis subaequalibus altae persistenti altera decidua.


**NYASALAND.** Blantyre Distr.: Shire Highlands, nr. Blantyre, 1887, *Lloyd s.n.* (Herb. Kew.).

**NORTHERN RHODESIA.** Serenje Prov.: Kaombi River, alt. 1400 m., submerged or partly so at water’s edge, attached to rocks, stem and flowers purple, May 1930, *Lloyd s.n.* (Herb. Brit. Mus.).


**BIBLIOGRAPHICAL NOTES.**

(VI. Nyman’s ‘Conspectus Florae Europaeae.’ By William T. Stearn (Lindley Library, Royal Horticultural Society, Westminster).

At the time of its publication Carl Fredrik Nyman’s ‘Conspectus Florae Europaeae, seu Enumeratio methodica Plantarum phanerogamarum Europae indigenarum’ (Svo, Orebro, Sweden) was a great boon to botanists concerned with the critical study of European plants, and even now its usefulness as a guide to systematic and geographical distribution has not entirely gone, since Richter and Görke’s later and more elaborate ‘Plantae Europaeae’ (1891–1905) was unfortunately never finished. Works of this kind nearly always contain nomenclatural transfers, and to date these with precision is desirable. The titepage of Nyman’s ‘Conspectus’ shows that it was published ‘1878–1882.’ Contemporary references and internal evidence establish the contents and issue of the four original parts as follows:—


1878  Flora, lxi. 448 (1 Oct. 1878); (probably Sept. or Oct.).

1879  Friedländer, Nat. Nov. i. 11 (Jan. 1879).


To complete the work Nyman compiled two supplements. *Supplementum i, dated ‘1883–4,’ consists of ‘Acotyledonace
vasculares et Characae Europae," occupying pp. 859-879, and an "Index Specierum, Subspecies, Variatum," occupying pp. 882-1046. Both also exist as independently-paged works, and the "Acotyledoneae" seems to have been originally issued in this state, "e Conspicues Flora Europaeae scorps ins." either late in 1883 or early in 1884. Supplementum i comprising both was first offered for sale (fide Friedländer, Nat. Nov. vi. 112) in May 1884.

Ernst Roth's unofficial supplement, 'Additamenta ad Conspicua' (46 pages; Berlin), has its titlepage dated "1886," its preface "Nov. 1885." Nyman had received a copy by December 15, 1885, as his critical comments upon it (cf. Bot. Notis. 1886, 72-75, or Bot. Centr. xxxvi. 358-360; 1886) at a meeting of the Botaniska Sällskapet in Stockholm on that day indicate. Friedländer of Berlin offered it for sale in December 1885 (cf. Nat. Nov. vii. 276), which may be accordingly taken as its date of publication.

Supplementum ii by Nyman is dated "1889-1890." It appeared in two parts:—

Pars prima, pp. 1-214 and prefatory note, 1889 (Nyman's introduction is dated "Nov. 1889"); Friedländer, Nat. Nov. xi. 389, offered it for sale in December 1889, which may be taken as its date of publication.

Pars altera, pp. 225-404 and preface, 1890 (Nyman's preface is dated "Jun. 1890"); Friedländer, Nat. Nov. xii. 323 offered it for sale in July 1890, which may be taken as its date of publication.

Nyman was born at Stockholm on August 14, 1820, and died there on April 26, 1893. He studied at Upsala and from 1855 to 1889 was conservator of the botanical section of the Riksmuseet at Stockholm. In 1844 he visited Malta and Sicily.

For a list of his publications, see Th. O. B. N. Krok, 1925, Bibl. bot. Suecana, 690-692.

CVII. Haworth's 'Supplementum Plantarum Succulentarum.'

The preface to Adrian Hardy Haworth's 'Supplementum Plantarum Succulentarum ... Adjungitur Narcissorum Revisio' (160 pages, London) is dated from "Queen's Elms, Chelsea, May 1819." The minutes (unpublished MS.) of the meeting of the Horticultural Society of London on June 1, 1819, record the gift to the Society's library of a copy from the author, a gift made between that date and the previous meeting on May 18, 1819. Haworth's work contains descriptions of many new species; their date of publication can accordingly be taken as May 1819.

SHORT NOTES

Nomenclature of Duthiea Manz.—It is unfortunate that Artemio Valderrama Manza, revising the genera of articulated corallines (Proc. Nat. Acad. Sci. U.S.A. xxiii. 44-48 (1937)), overlooked the valid publication of Duthiea Hackel in Verhandl. h.-k. zool.-bot. Gesellsch. Wien, xiv. 200 (1895) for an Indian grass and used it again for an alga. The only legal course is to make a new name for the alga:

Duthiophycus Tandy, nom. nov.


The appropriate new combination is:

Duthiophycus Setchelli (Manza) Tandy, comb. nov.

Duthiea Setchelli Manza, loc. cit.

In combining the patronymic Duthie with phycus, it is my intention to maintain the personal connection with Miss A. V. Duthie, who collected the type, as well as proximity to Duthiea in an index. I have deliberately suppressed the phonetically redundant "e."—Geoffrey Tandy.

REVIEWS.


This admirable monograph, a worthy continuation of the fine series emanating from the Royal Botanic Garden, Calcutta, represents the work of more than thirty years on a large and difficult genus which is of great importance from an economic point of view. Yams, the underground storage organs of species of Dioscorea, are one of the most important tropical foods, but the taxonomy of the genus and the specific identity of the wild or cultivated forms has been in great confusion. Sir Joseph Hooker, when elaborating the genus for the 'Flora of British India' (1892), and Sir George Watt, when working at the species for his 'Dictionary of the Economic Products of India,' were both impressed with the need for careful study of the species in all stages of growth. As a result Sir George King, Director of the Gardens, and Sir George Watt commenced the growth in the Calcutta Gardens of all the Indian species procurable. On King's retirement in 1898, his successor, David PRAIN, assumed
collaboration with Watt, who a few years later gave place to the junior author of the present monograph. When Sir David left India for Kew in 1906, I. H. Burkill continued the systematic study of the material in cultivation in the Calcutta Gardens, and when transferred to Singapore in 1912 extended his study to other Asiatic species, and on returning to England in 1925 continued his work at Kew.

The supreme value of the monograph lies in its careful description and illustration of the organs (tubers, rhizomes, or corms), by which the plants persist from season to season; but the plant as a whole, stem, leaf, flower, fruit, and seed, has been described as fully as material available allowed. The excellent detailed plates will suffice to name any species included. Collections in all the important herbaria have also been studied, and have afforded useful information as to geographical distribution. Other modern revisions of the genus have been published. E. B. Uline in the 'Pflanzenfamilien' (1897) suggested a subdivision into subgenera, and a complete monograph, by R. Knuth, appeared in the 'Pflanzenreich' in 1924. But these authors depended on herbarium material, and in the light of the present monograph their work is seen often to be faulty. This is well illustrated by a comparison of the subdivisions of the genera adopted by Prain and Burkill with that of earlier workers. The subgenera suggested by the latter are discarded and replaced by ten sections which often run counter to the earlier subdivision.

For the sake of completeness, three western species are included—one, D. pyrenaica, forming the monotypic section Bordera, a very rare dwarf species from the Pyrenees, the two others occur in eastern Europe and the Caucasus respectively. Of the remaining nine sections, eight are characterized by twining to the left; the remaining large section Enantiophyllum, in which twining is to the right, will appear in Part II., which will also contain general sections of historical and phytographical interest.

Synonomy is fully discussed and straightened out. Dialect names and economic uses are included.

A special feature is the detailed geographical distribution included for each species. Fourteen geographical divisions are recognized, and under their subdivisions every specimen examined is cited.

A large proportion of the seventy-six species included have been described by the authors during the progress of the work. Many of the plates are from drawings by Indian artists, the late Matilda Smith of Kew also contributed, and a number are by the junior author. The production of the plates has been aided by a contribution from the Bentham-Moxon Fund.—

A. B. R.
BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on Feb. 3, Mr. R. E. Holttum gave an account of "Leaf-fall in a Non-seasonal Climate (Singapore)." Regular observations of the flowering and leaf-change of a number of species have been made. The climate at Singapore is sufficiently regular for many trees to show a regular periodicity almost independent of climate, whereas the same trees in other climates would be strictly annual with leaf-fall at a definite season. Even such trees, however, are occasionally upset, and may show marked irregularity after a number of regular periods. Different individuals of the same species may also show marked differences of behaviour. Mr. I. H. Burkill followed with a paper on "The Contact of the Portuguese with African Food-plants which gave Words such as 'yam' to European Languages"—an unusual paper giving much information about the changes in native names and their botanical significance.

At the General Meeting on Feb. 17, Professor R. Woltereck was to have given a paper, but was unable to complete his journey to England because of illness. Dr. E. B. Worthington spoke on "Some Aspects of British Freshwater Research."

The General Meeting on March 3 was devoted to exhibits, among which were:—Cantonese paintings on leaves of Ficus religiosa (Mr. J. Ramsbottom); Compleutoria complens Lohde in fern prothalli, a presumed first record for Britain (Dr. B. Barnes); some natural Leucadendron hybrids (Mr. S. Garaido); some interesting members of the Proteaceae, Loranthaceae, and other families from Queensland (Mr. C. E. Hubbard); Telaranea, a genus of Hepatics, new to Europe, discovered in Ireland (Dr. P. W. Richards); and some stages in the development of the cystocarp in Chaetangium saoacum (Miss M. T. Martin).

150TH ANNIVERSARY OF THE LINNEAN SOCIETY.—The Linnean Society of London will celebrate the 150th Anniversary of its foundation in May this year. The special proceedings will open on May 24 at 6 p.m. with the address by the President. This will serve to introduce a symposium to be held on the morning of May 25th on "The Concept of Species from the Time of Linnaeus to the Present Day." The morning of May 26th will be occupied with a symposium on "Geographical Isolation as a Factor in Species Formation." The afternoons and evenings are to be devoted to social functions, including a dinner and a reception.

DR. GEORGE TAYLOR, Assistant Keeper in the Department of Botany, left England on March 12th to make botanical collections in south-eastern Tibet. He is joining Mr. F. Ludlow and Capt. G. Sherriff who have previously visited this region and now propose to extend their investigations eastwards from the Tsari District.

DR. W. H. PEARISALL, reader in Botany at Leeds University, has been appointed to succeed Professor B. H. Bentley as Professor of Botany at Sheffield University, and Dr. J. S. Turner, senior demonstrator in Botany at Cambridge University, has been appointed Professor of Botany at Melbourne University in succession to the late Professor A. J. Ewart.

SIR ALBERT SEWARD, formerly Professor of Botany at Cambridge and Master of Downing College, has been elected a Trustee of the British Museum.

ROYAL SOCIETY.—In the list of recently elected Fellows of the Royal Society are the names of Professor W. Brown, Imperial College, London, and Dr. Kenneth M. Smith, Virus Research Station, Cambridge.

THE International Federation for Documentation will hold its fourteenth International Conference on Documentation under the Presidency of Sir William Bragg, O.M., P.R.S., at Lady Margaret Hall, Oxford, from Wednesday, 21st September, to Sunday, 25th September. Thereafter, members of the Conference will visit the Science Museum, London, on Monday, 26th September.

Advantage will be taken of the meeting being in England to hold Joint Sessions on the mornings of Saturday and Sunday with the Association of Special Libraries and Information Bureaux.

Papers will be read upon aspects of the following, and other, subjects:—Theories of Classification, Cataloguing, and Indexing—Methods and Apparatus used in the Organisation of Libraries, Archive Repositories, Registering and Filing Centres—Photographic and other Copying Processes in their Application to Bibliographical Problems—The Making of Abstracts from Periodical Literature; possibilities of co-operation—Directories of Information—Exchanges between Publishing Bodies, National and International—The Loan of Books and Documents; principles and possibilities—The Practical Application and Use of Bibliographies. In particular an effort will be made to obtain adequate representation of the varying points of view of workers in diverse fields. At a recent International Congress the view was expressed that it was desirable to widen the bases of International Bibliography and Documentation. At the forthcoming Conference a special attempt will be made to secure authoritative reports upon the present state of bibliographical work in such fields of
learning as Archaeology, Archive work, Economics, History, and Linguistic Studies, in addition to the Natural Sciences and their Applications.

The Secretary is Miss M. Gosset, The Science Library, South Kensington, London, S.W. 7.

‘Chronica Botanica.’—This periodical in its first three years was issued annually, and many will regret its new format, though the fact that it is to be published bimonthly enables it to become more what its secondary title claims, ‘International Plant Science Newsmagazine,’ Part 1 of vol. iv. contains 96 pages and is unbound; the annual subscription is 7 guilders 70 cents, post free. It begins with a short account of ‘The Association for the study of systematics in relation to general biology,’ by W. B. Turrill. Then follow 16 pages of ‘Scientific Communications,’ which are preliminary notes (one describing a new genus of Lauraceae) and summaries of recent researches, 17 pages of ‘Plant Science Forum,’ comprising critical reviews and controversies, and 6 pages of ‘Quotations’ from periodicals. The remainder of the part is similar to the previous volumes, giving as it does information about International Congresses, Miscellaneous News, Personalia, Herbarium News; there are also Queries and Notes of New Periodicals and New Books.

Dr. Verdoorn has put a great deal of energy into the ‘Chronica Botanica’ since its foundation. He has now got it more into the form in which he first planned it. Its success depends upon whether individual botanists are sufficiently interested in general botanical news to subscribe to it.

‘The Observer’ for March 6th, in recording the voting of a special credit of £1,000 by the Municipal Council of Paris for the upkeep of its suburban trees, remarks on the fact that the horse-chestnuts of the boulevards and avenues are gradually becoming asphyxiated by smoke, dust, and motor fumes, and are being replaced by planes. As 12,000 of them (about one-seventh) still remain they may occasionally figure in newspapers and in examination questions owing to flowering a second time when rains follow very dry and hot summers.

‘Lebensgeschichte der Blütenpflanzen Mitteleuropas.’—A further part of this publication has rapidly followed the last and completes the account of Loranthaceae by W. Wangerin and F. Buxbaum. Two pages continue the long account of Viscum which occupied 200 pages of the last number, and pages 1147 to 1231 deal with the two species Loranthus europaeus and Arcenthium oxycedri: there are 54 text-figures. The price for the present instalment is 6 R.M., less 25 per cent.

**DR. CARRISSO’S BOTANICAL MISSION TO ANGOLA.**

**BY A. W. EXELL, M.A., F.L.S.**

The British Museum has been long and intimately connected with botanical investigation in Angola, and I myself had worked for a dozen years at its flora, so that it was with the greatest satisfaction that I received an invitation from Dr. Carrissio to join the Botanical Mission to the Colony, which he had been charged to undertake on behalf of the Portuguese Colonial Ministry, and permission from the Trustees of the British Museum to accept it.

We landed at Luanda, a picturesque and in some ways attractive old town, about the middle of March 1937, towards the end of the hot rainy season. There we met our companions, Dr. and Sra. Carrissio, Dr. Mendonça, Mr. John Gossweiler, and Mr. F. Souza, all old friends, and Dr. Jara de Carvalho. Dr. Carrissio and Dr. Mendonça had already, in former years, made two extensive journeys through the country, and Mr. Gossweiler’s thirty-seven years’ experience of botanical collecting there had given him an unrivalled knowledge of it, so we were glad to leave all arrangements in their expert hands.

While preparations were being made, we had an opportunity to see the coastal region between Luanda and the River Dande. It is undulating, low, sandy country lacking water, and hence nearly uninhabited, except near the town, which obtains a fair water-supply in pipes from the River Bengo. At that time of the year the land was green and attractive-looking, but obviously little cultivated, except for occasional plantations of cassava. The vegetation is of savanna type, an association of baobab with the tree-like Euphorbia conspicua being most characteristic. In places, perhaps where the soil is more purely sandy, this gives place to Sterculia tomentosa. The red-flowered Aloe littoralis gives a touch of colour to the scene which strikes one rather as fantastic than beautiful, especially at dusk when the tall stiff Euphorbias form strange patterns against the evening sky.

Another interesting association is that of a palm, a species of Hyphaene, which, according to Mr. Gossweiler, flourishes where there is underground water available. When the ground becomes definitely swampy the arboreal vegetation disappears giving place to an uninteresting-looking association of Gramineae and Cyperaceae. Further inland there are large thicket areas forming a kind of maqui of evergreen shrubs, among which species of Styphnolobium are abundant. Here and there are almost pure aggregations of a species of Copaifera, which produces a very good oil. This region is inhospitable, and was a great barrier to travellers before the coming of the motor-car. Except for paths made by charcoal burners the thickets are nearly impenetrable and animal life is scarce.

**JOURNAL OF BOTANY.—VOL. 76. [MAY, 1938.]**
Two large rivers, the Bengo and the Dande, enter the sea north of Luanda. We spent some interesting hours in the thick vegetation which clothes the banks of the latter. There is here a curious mixture of moisture-loving, almost gallery-forest types, together with baobabs and Acacias belonging to the savanna vegetation. Grewias and various leguminous trees and shrubs are very abundant, and so are dragon-flies, many of them of great beauty. We noted large plantations of oil-palms and sugar-cane, and there was a considerable native population along the river-valley.

Since Luanda is practically cut off from the interior during the rainy season as far as the roads are concerned, we had to take our car, lorries, and equipment by railway to Malange. The journey is an interesting one, as all three main vegetational regions are traversed. For almost eighty-five miles the railway crosses the dry littoral region already described; then the scene changes rapidly as the train climbs up towards the plateau. We had a few glimpses of the Cazengo Forest which clothes the escarpment. This we visited later. Then on top of the plateau begins the typical savanna and dry forest vegetation which covers the greater part of Angola and extends right across the high southern African table-land as far as the Transvaal.

At Malange we were most hospitably entertained by His Excellency the Governor of the Province, who put all his resources at our disposal. While the motor transport was being assembled and tested we made a number of interesting excursions. The first was to the magnificent 300-ft. waterfall of the River Lucala at Duque de Bragança. Here a number of interesting plants were collected from the cracks in flat rocks at the summit of the fall.

We also visited the Condo Falls on the River Cuanza, and collected with some difficulty a species of Tristicha (Podostemaceae) growing on rocks in the centre of the fall. Near the waterfall there was the usual rather more luxuriant vegetation and a few quite tall trees.

The third excursion took us back in a south-westerly direction to the famous rocks of Pungo Andongo, where both Welwitsch and Livingstone were once living at the same time. The former made very extensive collections there and probably left few novelties for later comers. There is something awe-inspiring about these strange rocks which tower up almost perpendicularly above the plateau, and it is little wonder that the natives used to worship them. Visible for many miles they appear, as indeed in reality they are, something quite extraneous to the general landscape. They are formed of a very coarse conglomerate and bear no relationship to the surrounding geological formations. Opinion among geologists is that they are the terminal moraine of a great Triassic glacier. Several plants are endemic, so far as we know, to these rocks, and we were particularly glad to find the tiny Sedopsis sedoides growing in crevices in the bare rock, the only plant, apparently, capable of withstanding the extreme heat to which the rock-surface is raised during the day.

We left Malange on 1 April, making due east towards the province of Lunda, a district only recently effectively occupied by the Portuguese. At this time of the year we were faced by many difficulties, owing to floods, broken bridges, and soft mud, so that we had a rough journey before we crossed the River
Cuango into Lunda and made a comfortable camp at Xa-Sengue. Here we made extensive collections in the dry forest.

Lunda is inhabited by the “Chiokwe” (or “Quioco” in Portuguese), a primitive race once of considerable war-like reputation. Somewhat skilled in the manufacture of iron weapons, they established a superiority in armaments over the neighbouring tribes, invaded Lunda from the south-west, and drove out the original inhabitants, the Lundas, who fled across the River Cassai into the Lunda province of the Belgian Congo. We obtained the assistance of the local medicine-man to give us the native names of the plants, and were astonished by his botanical knowledge. He recognized nearly every plant after Diospyros, and obtained, we hope, a reasonable knowledge of the Lunda vegetation.

From Xa-Sengue we went eastwards to Vila Henrique de Carvalho (formerly Saurino), the capital of the province, where we explored the surrounding country fairly thoroughly and obtained, we hope, a reasonable knowledge of the Lunda vegetation.

Lunda is a plateau 3000-5000 ft. high, covered by a deep deposit of sand, and crossed in a north-south direction by numerous parallel V-shaped river-valleys. The vegetation is mainly dry forest (Leguminosae—Combreaceae—Monotes—Diospyros, etc.) alternating with extensive stretches of grassland known as “chanas.” These “chanas” of Lunda are a feature of great interest, and caused much discussion. They are covered mainly by a few dominant grasses, which are much shorter than the tall Hyparrhenia species of the tall-grass-savanna and dry forest region. Scattered in the grass are very characteristic rhizomatous undershrubs usually sending up sarmentose shoots to a height of three to six feet. They are typically species of Tetracera, Combretum, Annona, Eriosema, Geissaspira, Aeschynome, and various Rubiaceae. Most of them are also to be found in the undergrowth of the dry forest, where, when opportunity occurs, they often grow to greater heights as climbers or scramblers. In the “chanas” the grass is regularly burnt during the dry season, leaving the blackened rootstocks of these shrubs, which sprout again during the following rainy season. Dr. Carrasso was strongly of the opinion that the “chanas” owe their origin.

to these bush-fires and that the climatic climax would be dry forest throughout this region. Mr. Gossweiler is equally convinced that the alternation of forest and grassland is due to differences of soil and of elevation. One can at least say that the fires strongly favour the grassland at the expense of the forest and that a new balance between the two is thus set up, but it is doubtful whether the “chanas” owe their origin entirely to fire. Fire is a dominant factor to the extent that the whole vegetation of a large part of the great southern African plateau must of necessity be composed of fire-resisting or fire-enduring species. Even if the general facies of the vegetation is not much changed, there is every reason to suppose that the species-content has been profoundly modified. Mr. Gossweiler showed me a very illuminating example of how exotic trees planted along the roadside had been completely killed by fire, while the adjoining indigenous vegetation had suffered little apparent damage.

The dry forest belongs to what Rübel calls “hiemisilva,” and is at first sight of very uniform aspect, although it varies considerably in composition. In Lunda it is perhaps more mesophytic than xerophytic, and there is, moreover, a considerable development of epiphytic lichens. Towards the south of Angola this type of forest becomes progressively drier, species of Borreria, Baulinia, etc., being largely replaced by Acacia. At about halfway down the sides of the river-valleys the water of the plateau drains out, forming characteristic clearly defined marshes known in the region as “tengas.” The boundary is so sharply marked that, without exaggeration, one can stand with one foot in the dry forest amidst typical subxerophytic vegetation and the other foot among Utricularias and Droseras. The marshes have a vegetation very rich in species, the genera Utricularia, Xyris, and Polygala being particularly well represented. There is no development of peat, and the water is not completely stagnant, but must be draining slowly downwards towards the river, since there is nearly always a considerable slope. Beneath the surface of the “tenga” there always seems to be a ferruginous pan, a kind of bog-iron which probably plays a very important part in the ecology of the formation. Trees are absent in the “tengas,” and even shrubs are very rare and probably occur only where there is either a slight elevation or a current of running water.

Along the edge of the river itself there is typically a narrow belt of gallery-forest of true rain-forest type, though depending largely on edaphic conditions. There is a sudden and violent contrast between the blazing heat of the “tenga” in the midday sun, and the comparatively cool, very moist, greenhouse atmosphere of the gallery-forest with its tall trees, tangled lianes, and typical preponderance of Rubiaceae. Dr. Carrasso has suggested that this gallery-forest can develop only where the
actual current of the river brings oxygenated water in contact with the roots. Its development seems to be completely inhibited in the surrounding marshland. In the rivers themselves are to be found a number of Nymphaeaceae and Hydrocharitaceae.

From Vila Henrique de Carvalho we penetrated as far east as Muriege, a desolate spot not far from the eastern frontier, and afterwards moved south to Dala, near a magnificent waterfall on the River Chiumbe. The rainy season was now over, and it began to get very cold in the early mornings. From Dala we paid a visit to the Protestant Missions near the valley of the River Cassai. My wife stayed at the charming Mission house at Bula, where she made some interesting collections along the River Chikosso, while Dr. Mendonça and I went on to Luma through some beautiful country. Here we were given a great welcome and every assistance. The forest had been carefully conserved for more than thirty years, with immense improvement to the amenities of the district and with great advantage to botanical collecting.

Southwards from Dala we crossed the wide valley of the River Cassai with its extensive marshes and entered the province of Moçico, coming into touch once more with civilisation at Vila Luso on the Benguela Railway. Here we made some collections in the marshes of the River Luena, a tributary of the Zambezi.

Now the dry season had begun, the grass was drying up and bush-fires became frequent. We had to make for the south as quickly as possible before the vegetation there was completely parched. The rains had been exceedingly heavy all over the country, but particularly in the southern provinces, where all the bridges had been demolished. We hoped to get through as early as possible, but knew we should have many difficulties.

From Vila Luso my wife and I accompanied Dr. and Sra. Carrisso by rail as far as Camacupa in the province of Bié. From there we went by road across the high Benguela Plateau to Nova Lisboa. This part of the country is the most successfully colonized region. The climate is excellent. A considerable amount of coffee is grown, and wheat does well at the higher altitudes. The new town of Nova Lisboa is well planned and brightly lit. Here we were rejoined by Gossweiler and Mendonça, who came all the way by road through some difficult country infested by pugnacious wild bees. A few short excursions were made, the most interesting being one to Quipeio and the upper waters of the River Cuito. Here we found a small area of dense vegetation along the banks of the river. A fine species of Podocarpus was characteristic and is probably confined, at least in Angola, to this and perhaps to a few similar localities. We also collected species of Rhus, Dombeya, Salix, Pittosporum, Faurea,

Memecylon, Ficus, and many Rubiaceae. A fine Hypericum about fifteen feet high was also a conspicuous feature. We left this mountainous region, whose peaks, the highest in the country, reach a height of more than 8000 ft., with regret, but consoled ourselves with the hope, destined to be a vain one, that we should be able to explore it more thoroughly on our return from the south. Although we did not reach the summits, I agree with the opinion often expressed by Mr. Gosswieuler that the vegetation is no more than a continuation of that of the high plateau and that there is no hope of finding there any interesting montane species of temperate affinities.

We left Nova Lisboa for the south on 13 May. Just near the Cuima Agricultural Station we had a motor accident, which interfered with our plans. Dr. Mendonça, Mr. Gossweiler, my wife, and I continued our journey, while Dr. Carrisso went back to Nova Lisboa with the rest of the party. As we went southward the composition of the dry forest gradually changed, associations of Acacia spp. becoming more frequent.

Our next centre was Sá da Bandeira (formerly Lubango), the capital of the province of Huila, a cheerful, picturesque little town set in an amphitheatre of the Chela Mountains at about 5500 ft. The climate is healthy, the air keen and bracing in the day-time and cold at night. Since we saw more of this country later, I leave an account of it until our return.

The journey to Mossamedes is usually easy enough, but the river-crossings had not yet been repaired since the abnormal rains. We went from Sá da Bandeira through upland country to the summit of the escarpment of the Chela Range without difficulty. Suddenly we reached the edge of the high Angolan table-land and the Chela stretched interninally north and south, descending westwards to the dry coastal plain in confused masses of fantastically shaped rocky peaks. As we looked over it the desert seemed to send up waves of hot air and mist-like dust. We hurriedly collected what specimens we could among the rich herbaceous vegetation which here clothes the ground beneath the dry forest. There was no essential difference in the composition of the latter, no trace of rain-forest. The dry season is too prolonged, the mountains are too distant from the sea for the influence of the mist to be felt.

The descent of the Chela is a rapid and spectacular one, but it was always safe, even for our heavily laden lorry. Later, however, engine trouble hindered us and we reached Vila Arriaga (formerly Ribala) only after much difficulty. This hot unhealthy place is like a furnace in the day-time. It lies right at the foot of the Chela, which here rears itself up like a great wall. On top is the Huila Plateau with its cool European climate, below the thorn-scrub and desert, the home of game, lions, and elephants, fever and thirst. Here at Vila Arriaga we were reminded of
some of the older botanists who made collections in Angola. H. H. W. Pearson collected in the neighbourhood and so did Peres Antunes, on his way to the great Catholic Mission at Huila. Welwitsch crossed the desert a little further south along the Majombo and Bumbo Rivers, which no doubt provided him with sufficient water when he made the journey in October 1859.

As one approaches the coast trees gradually disappear, and there are many miles of thorn-scrub with Acacia spp., Boscia spp., Terminalia pruinoides, and various Acanthaceae. At first there is low grass of good grazing quality which supports small herds of cattle. Hay-making was in progress, a curious scene in such a setting. Strangely enough, hay is exported from this district to Cape Town. Towards Mossamedes the country grew more and more arid until it became sometimes a stony, sometimes a sandy desert. A few miles from the town we made a long descent into the curious sinister-looking valley of the River Giraul. The brilliant green of the river-banks and some still flooded areas made a striking contrast with the surrounding desert. After staying a moment to collect Tamarix usneoides we hurried on to the old sea-port of Mossamedes, an eastern-looking town with every street ending abruptly in the loose sand of the desert. The journey from Sá da Bandeira had taken us five days; later in the season we did the same trip in six hours.

Here at Mossamedes we met Sr. Abreu, in charge of the Angolan Forestry Service, a most cheerful energetic person who put his knowledge of the desert country at our service. Without his assistance we could have done little. The climate of Mossamedes is usually cool and invigorating, but we were unlucky enough to strike a period of east wind. This, blowing across the hot desert, made life very uncomfortable. A few days later we made a difficult and rather uncomfortable journey along the coast and through the treacherous area of moving sand-dunes to Porto Alexandre, a little fishing town some fifty miles south of Mossamedes. Here the moving sand is a constant menace both to houses and roads, and we admired the excellent work which had been done by Sr. Abreu in planting Casuarina trees, which were already doing much to ameliorate conditions. We collected what little there was to get in this infertile region, and made interesting excursions over the desert to the dried-up River Coroca, one of the places visited by Welwitsch. One attempt to return to Mossamedes was frustrated by a violent sand-storm preceded by a cloud of dragon-flies which is, apparently, always a warning sign. All this time the temperature was unpleasantly high during the middle of the day, and most of us were anxious to return to the mountains. Only Dr. Mendonça seemed to retain his customary energy and collected the desert grasses with great enthusiasm.

After returning to Mossamedes we made some further trips into the desert, particularly to the north of the town and to the River Mucungo.

Dr. and Sra. Carriso and their party now joined us once more, at Mossamedes. He had some work to do in the desert, in making preparations for a National Park and Game Reserve, while we had more or less finished our collecting there, we decided to part once more and make an effort to reach the extreme south of the colony. He looked rather tired after his strenuous journey from Nova Lisboa to Mossamedes, but we said good-bye to him, little thinking that we should never see him again alive.

Towards the end of May we left Mossamedes, with Sr. Abreu as our guide, in an attempt to collect in the south-easterly direction by way of Pico d’Azevedo, Cahinde, and Tampa—a route which had long fallen into disuse. This would give us an opportunity to collect in regions as yet unvisited by botanists and to ascend the Chela Mountains at a different point. Everything went well across the desert proper, where we had splendid views of herds of zebra, but our troubles began in the thorn-scrub country amid the foot-hills of the Chela. Here the road entirely disappeared, and we had every conceivable difficulty in getting our heavy lorry across the numerous river-beds which seemed to cross our course every hundred yards or so. This region of short dry desert-grass is the real home of Welwitschia. The plant manages, it is true, to survive in the coastal desert, especially in shallow depressions, but here in the whitish sun-bleached grass were dark green Welwitschias in hundreds and thousands. It reproduces readily and there seems no danger whatever of its extinction. In fact, isolated specimens survive in the middle of the lorry-road from Mossamedes to Porto Alexandre, and the Welwitschias do more harm to the lorries than vice versa.

Two great river-beds, the Otchinjau and the Bero, caused us great difficulties in crossing, and in each of them we spent
a night. The sand was covered everywhere with tracks of lions, elephants, and rhinoceros. In the Bero we were much relieved to find a trickle of water, as our supply was nearly exhausted. At the end of the third day we reached Tampa, a Portuguese outpost at the foot of the Chela Mountains, and were glad to get on to a road again.

The Serra de Chela is here lower, and many constituents of the dry forest extend right up the mountains on to the plateau. On the way up a short visit to the waterfall of Ungueria was well repaid by a number of interesting species collected from the cool damp rocks around the fall. Stopping from time to time to make collections at various altitudes we wound up and on up to the delightful Huila Plateau and found ourselves once more at Sá da Bandeira, where we enjoyed the kind hospitality of Sr. Moreno, who was in command of the mountain artillery.

Leaving all the collections to be looked after by my wife, we left almost immediately for the extreme south, taking the route through Gambos, from which there are already small collections made by Newton and Pearson, and arrived at Humbe, near the River Cunene, the same night. With us were Colonel Moreno, our faithful companion Sr. Abreu, and Sr. Tendeiro of the Humpata Agricultural Station. The next day we crossed with some difficulty the deep muddy River Caculovar, and followed the Cunene in a south-westerly direction towards the great Ruacaná Waterfall. This country is different from anything we had seen before, though somewhat reminiscent of the littoral region near Luanda. There are many miles of dense Acacia-Grewia-Conimbricha thickets interspersed with areas of good grazing grasses supporting considerable herds of cattle. The Cunene, during the rainy season, floods to a width of several miles and we passed through still inundated areas rich in water-plants. Various Elatinaceae and Lythraceae were abundant on the drying mud, and pools of water were full of Hydrocharitaceae, Nymphaeaceae, Utricularia, and aquatic Gentianaceae. At other times we passed through savanna country with the ubiquitous baobab and some interesting consociations of a small species of Hyphaene. Long before we reached them we heard the roar of the Ruacaná cataracts, but it was after nightfall before we arrived at the remains of a settlement and a tumble-down mud house where we camped for some days.

The falls were a magnificent sight, as the Cunene carries a great volume of water at this season. If they were not so inaccessible, they would surely rival Victoria Falls as an attraction to tourists. The whole region, however, seems to be badly infested with mosquitos and practically uninhabited.

We had hoped that the spray from the falls would produce a luxuriant vegetation of rain-forest type, but in this we were disappointed. Dry scrub grows right to the water's edge.

DR. CARRISSO'S BOTANICAL MISSION TO ANGOLA

The rainfall is scanty, and presumably the flow of the river is reduced towards the end of the dry season, so that the spray is insufficient to support hydrophytic vegetation. We were compensated, however, by finding many interesting herbaceous plants growing on the damp rocks and a few Podostemaceae on boulders in the current of the river. The surrounding dry forest and scrub also yielded a number of new records and probably several new species, among them a very distinct new Combretum.

After a short trip along the frontier to Chitado, where I was rather surprised to find Tamarix growing along the banks of a small river, we returned to Humbe and crossed the broad swampy Cunene in a beer-cart. From Forte Roçadas, on the other side, we made a hasty trip through thorn-scrub and cattle country, famous for its game, to Vila Pereira d'Eça (formerly Ngiva), where we were hospitably entertained by Dr. Martins of the Angola Veterinary Service. All this country is rich in cattle, but the vegetation is poor in species and everything was much dried up when we were there.

After making the long journey back to Sá da Bandeira we were much distressed the next morning to hear that Dr. Carrissó had died suddenly of heart-failure in the Mossamedes desert. We left almost immediately and travelling all night across the desert arrived the following day at Mossamedes in time for the funeral service. This sad end to a life which had been largely devoted to a study of Angola cast a deep gloom over our party, and the expedition was officially declared to be closed.

Elsewhere in this Journal I have tried to express my personal appreciation (lxxv. (1937), 356-7).

As the Portuguese members of our party had to return by sea to Luanda, Gossweiler and I crossed the desert once more by the Vila Arriaga route, which was now becoming almost familiar ground. A broken axle near Vila Arriaga delayed us a day, but gave us a little time to collect in the neighbourhood. By now a few of the trees and shrubs which flower in the dry season had come out, particularly a white-flowered flat-topped Tamarix, two or three species of Boscia, a species of Euclea, and the new Combretum which we had found at Ruacaná. Here, too, we collected Hexalobus huillensis from the type-locality, actually in the province of Mossamedes, and not Huila, as we had erroneously but naturally supposed.

The next day I was glad to rejoin my wife, who had been left for a fortnight with all the presses of plants. She had taken the opportunity to make a small collection at the Huila Cataract. At the same time we heard of the death of Père Bonnefoux of the Huila Mission, who sent collections to the Musum d'Histoire Naturelle, Paris. He continued the botanical tradition of Dekindt and Antunes, whose names have long been well known in taxonomic literature.
Mr. Gossweiler had now to settle up our affairs at Sá da Bandeira and arrange for our journey back to Luanda. Meanwhile, my wife and I made several excursions with Sr. Tendeiro to the high Humpata Plateau, which is to me the most delightful part of Angola. Welwitsch was also charmed by it and spent a considerable time there, so our collections may contain but few novelties. Here the South African element of the Angolan flora is most strongly represented. The typical vegetation is a kind of maqui composed of heath-like shrubs with a number of Protea species and many interesting Compositae. Here, as nearly everywhere on the plateau, Clematopsis was very abundant, and the genus Crotalaria seemed to be represented by an endless number of species. Particularly charming was a dwarf annual species of Belononisia with large brilliant yellow flowers. It grows in wet sand. Aquatics and bog-plants were plentiful, and the banks of the River Nene provided a good hunting-ground. From the little mountain-village of Humpata, where many European plants, even oak-trees, flourish, we ascended amidst lovely mountain scenery to the well-organized “Posto Zootechnico,” which has done much to improve the races of cattle and pigs in Angola. With only a few hours available we climbed up about another thousand feet almost to the highest point of the Chela Mountains, but found everything very dry on the summit.

We left Sá da Bandeira and our kind hosts at the barracks of the Mountain Artillery with much regret, and started on the seven hundred mile journey back to Luanda. At Nova Lisboa we had time for only one day’s collecting among the Benguela Mountains. The vegetation was mostly dried up, but we found a few interesting Labiatae along the banks of one of the upper waters of a tributary of the Cunene.

North of Nova Lisboa we spent some time in a typical “chana,” collecting the characteristic rhizomatous undershubs, all very similar in habit and appearance, but belonging to such different genera as Cryptosepalum, Hibiscus, Biophytum, Ascocynomenota, Euphorbia, and Combretum.

It was now nearly the end of June, mid-winter in Angola, but a few precocious-flowering trees were already covered with blossom. Among these were several species of Drimys, one of Anisophyllea, and the beautiful and very conspicuous Erythrina suberifera, a mass of scarlet flowers.

As we gradually descended from the Benguela tableland into the province of Cuanza Sul the country became broken up into mountain-masses, but with much apparent change in the vegetation. Here are large sisal plantations belonging mainly to Germans. The rocky bed of the River Longa yielded some Podostemaceae, and a few hours later we made a long descent into the great valley of the River Cuanza, the vegetation changing suddenly into a tropical richness with great festoons of scarlet-flowered Combretums hanging from the trees. The valley of the Cuanza is the main cotton-growing country of Angola and is characterized by dense associations of Elaeis guineensis. Here, according to Mr. Gossweiler, is the real habitat of the species, and not, as has been claimed, the mountain-forest region.

After spending one night at Dondo, the old port on the broad Cuanza River, once the starting-point for all travel into the interior of northern Angola and an old centre of the slave-trade, we crossed once more the broad littoral belt and arrived again in Luanda at Mr. Gossweiler’s comfortable house.

When all business had been settled up and the Portuguese party had sadly embarked for Lisbon, taking Dr. Carrisso’s body with them to be buried in Portugal, we were left with sufficient time for a short trip with our ever-energetic and indispensable friend Mr. Gossweiler. Packed in a single Ford truck we were soon back again at Dondo and ascending once more on to the plateau. Turning southward from Quilala, in Cuanza Sul, we made for the coffee-country of Amboim, whose centre is the cheerful little town of Gabela. Here the mountains are near enough to the sea to be enveloped in mist throughout the dry season, and there is a very fine development of forest. The sudden change from the dry plateau to the towering trees and luxuriant vegetation of the mist-zone is very remarkable. This forest reminded me of the mist-forest of S. Tome, in the Gulf of Guinea; only the rich growth of epiphytes was lacking. We spent a few very interesting days in this cold misty country, and Mr. Gossweiler was in his element, immediately recognizing practically every tree by a glance at the trunk.

One excursion to the south took us to Vila Nova do Seles. On the way we crossed the lovely valley of the River Cuvo, along the banks of which we found an interesting climbing Hibiscus and a fine mauve-flowered Randia. The rocks in the river-bed yielded a few more Podostemaceae. Near Vila Nova do Seles, after a long search, we found good material of the remarkable annonaceous Mischogyne michelioides, which Mr. Gossweiler collected from the same locality, in rock-crevices, some years ago. This Seles region is enveloped at this time of the year in constant mist and the curious native villages, with houses perched on the tops of large flat-topped rocks, with ladders for climbing up to them, look very weird in the half-light. Amboim and Seles are fine coffee-country and the greater part of the forest has now been planted with Coffea robusta. The forest-trees, however, are left as shade-trees, and there are fine specimens of Piptadenia africana, Ficus spp., Maesopsis Eminii, Chrysophyllum sp., and many others.
From Amboim we went down again to the coast at Porto Amboim, noticing the abrupt transition between the mountain-forest and the dry littoral vegetation. From Porto Amboim northwards is hilly grassland, almost uninhabited owing to lack of water. In spite of the fact that no rain had fallen since the end of the rainy season (middle of April), already, in mid-July, the country was quite green again owing to mist from the sea. Soon we saw spread before us the immense valley of the River Longa, which we crossed by ferry. From the Longa to the Cuanza is dry undulating country covered with scrub, xerophytic forest, occasional plantations of cotton, and many deserted native villages.

With only two more days before we were due to leave Luanda we paid a hurried visit to the beautiful Cazengo forest, so intimately known and so adequately studied by Mr. Gosweiler. We arrived for the night at the old village of Golungo Alto, made botanically famous by Welwitsch, who lived there for about two years. Sorry to have no more than a glance at this fine forest-region, we consoled ourselves with the thought that no part of Angola is better known than the Cazengo and Golungo Alto forests. From Golungo Alto we followed a new, very fine road across the Serra de Muxaula through magnificent mountain-forest. Most interesting were imposing examples of Monodora Myristica laden with their great spherical fruits. Here also were butterflies in great profusion and my wife was disappointed that we could stay so short a time.

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Orchis.—A specimen of *Orchis pyramidalis* L., gathered near Newquay, was brought in 1936 to Dr. C. C. Vigurs. The plant thus occurs sparingly at intervals along the north coast from Bude to St. Ives. *Orchis laifolia* L. (of the "Flora") is recorded for various localities. It is certainly present in the extreme west, but probably most of the other records should be put to *O. praeternissa* Dr.

*O. maculata* L. is said to be "very common in all the districts" and *O. ericetorum* Linton "perhaps not infrequent." This more or less transposes the actual facts. It is *Orchis elodes* Giseb. (O. ericetorum Linton) which is the commoner plant, while *O. maculata* (O. Fuchsi Dr.) is a rarity, only certainly known from the extreme west.

The only other species of *Orchis* at all common in Cornwall, apart from the very common *O. mascula* L., are the two marsh orchids *O. pardinina* Fugsley with spotted leaves and *O. praeternissa* Dr. with leaves unspotted. Where one grows the other may generally be found, though *O. pardalina* is not usually present in equal numbers with *O. praeternissa*.

*Agrostis.*—Under *Agropyron repens* Beauv. appears the note, "An all too common and troublesome weed." This was probably written in the belief that the "Couch grass" or "Stroil" which troubles Cornish cultivators is all *A. repens*. This is by no means true; most of it is *Agrostis gigantea* Roth. I have known for some time that the underground runners in my own neighbourhood were often produced by a form of *Agrostis alba* agg., though *Agropyron repens* also occurs, and the description of *A. gigantea* Roth. by Mr. Philipson in his "Revision of the British Species of the Genus Agrostis L." (Journ. Linn. Soc., Nov. 1937) led me to seek further information from Mr. W. Borlase, F.L.S., formerly Agricultural Organiser for the Cornwall County Council. I learn from him that "Couch grass" in Cornwall is mostly the *Agrostis* and only rarely the *Agropyron*. This, he says, has been especially noticed for years past on wheat stubbles. Evidently *Agrostis gigantea* is in Cornwall both widespread and plentiful, while *Agropyron repens* is far less abundant than has been supposed.

The mistake is more easily understood when one remembers that the underground runners or rhizomes are chiefly seen during land-cultivation in early spring when neither flowers nor foliage are in evidence. But in the breaking of wheat-stubble in autumn the true state of affairs becomes evident, and it is rather surprising that the facts have been so long unrecorded in botanical publications.

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*Carex spiculosa var. hibridensis* Ar. Benn.

BY A. J. WILMOTT, F.L.S.

On July 26th, 1895, W. S. Duncan wrote to Arthur Bennett from Searp (Outer Hebrides)—"I enclose specimen of long-glumated *Carex* which I picked up on a moor in the N.W. part of Harris on Wednesday last. I've never seen it in Harris before, and I am not certain whether I've gathered it at all before. I shall feel obliged if you will name it for me . . . and say whether it is recorded for the Outer Hebrides."

I have no copy of Bennett's answer, but on August 5th Duncan writes again, giving some account of the habitat and adding:—"It cannot be the *C. Kattegatensis*, if that has the glumes mucronate, as the glume of this has no approximation to a mucro or cusp, but has more or less of the end hyaline, often acute, at other times sub-acute and sometimes lacerate. Did you observe that the perigynium was papillose at least in the upper half? I send you a few more specimens, and hope you will soon make the plant out. If you would wish living specimens, I could get a sod for you . . . ."

Bennett refers to the plant in the September (1895) number of the Journal of Botany (p. 283) as:—"A very puzzling *Carex*, having much of the facies of the *acuminata* (Wild.) form of *C. glauca* Scop. (*C. flacca* Schreb.), but with two stigmas, and otherwise in some degree combining the *vulgis*, *agatulis*, and *salina* sections of the genus. At present I am unable to give it a certain name; I hope to get living specimens.

These living specimens he obtained, and in the next issue of the Journal (p. 315) he notes:—"The receipt of living plants . . . has proved it to be a *salina* form, but one that at present I am unable to match. From descriptions it seems to hold a middle place between *C. flavicans* Nyl. and *C. spiculosa* Fr., wanting the serratula apex of the glumes of the latter. . . . It is a much smaller plant than the *C. kattegatensis* Fr., and forms an interesting addition to the Hebridean Flora." Bennett also refers to it in the (1895) October number of the 'Annals of Scottish Natural History' (p. 246) as:—"*C. salina* Wahlb., var. . . . Mr. Duncan has just lately (26th August, 1895) sent me a turf with living specimens of this interesting *Carex*. It corresponds with nothing I have under the species for Asia, America, or Europe, and *ex descrip.* seems to come between *C. flavicans* Nyl. and *C. spiculosa* Fr., but wanting the rough apex to the glumes of the latter. I have not been able yet to see authentic specimens of the species 'Nylander describes . . . ." There is a note on Bennett's herbarium cover:—"I do not see what this plant is so near to as *C. spiculosa* Fr.—there are the prolongations of the end of the glume, and indications of asperity here and there." Actually Journal of Botany.—Vol. 76. [May, 1938.]
Duncan's observations are more accurate, for there is no trace of a mucro or cusp; Bennett seems to be trying to make the plant fit the description of *C. spiculosa*.

In a MS. note found with the specimens in his herbarium Bennett has written: "Considering the rarity etc. of the Finnish plant I felt dubious and sent the specimens to Dr. Almquist of Stockholm who had worked at this section of the genus for many years. He replied 20. 7. 98. Your *Carex* really resembles *C. spiculosa*, though—as you say—not exactly identical, and is undoubtedly the same hybrid." Almquist's letter, preserved in Herb. Bennett, continued, however, "C. Goodenovii x *salina*. The specimen is although too incomplete that I should be able to make a sure determination." This determination was evidently sent to Duncan, who writes (18. 10. 98) thanking him and giving precise details of the locality.

Bennett therefore in 1897 (Journ. Bot. xxxv. 232) published the name *C. spiculosa* Fr. forma nov. *Hebridensis* (sic) for the plant, stating that "Dr. Almquist agrees with me in considering that the specimens of *Carex* gathered by Mr. Duncan in Harris, Outer Hebrides, are the nearest to *spiculosa* of any named form, the only appreciable difference being the want, in the Hebridean specimens, of the serrulate glumes (although they are equally as elongated) of Fries's plant. The difficulty with our plant is to find the *salina* parent; the only other Carexes Mr. Duncan can find in the neighbourhood are *C. glauca* and two forms of *C. Goodenovii*. The peculiar colour is very marked in our plant."

As synonym Bennett there cites: "C. salina cuspidata x Goodenovii, incella, teste Almquist, Bot. Not. 128 (1891)," which is misleading, since that determination applied only to the original *C. spiculosa* from Russian Lapland, and Almquist’s letter indicates that he was not prepared to state which forms of the two species might be concerned with the Hebridean plant. Almquist in that publication considered that another plant from "Karelia pomorica" might be *C. salina cuspidata borealis x Goodenovii*. He should also be noted that Bennett's reference to Prof. Bailey's remarks (the reference should read—Proc. Am. Acad. xxii. n.s. xiv. p. 85, 1887) belong solely to an American plant and have nothing to do with that from the Hebrides.

*Carex spiculosa* was first described by Fries in 1843 (Bot. Not. p. 99, as "n. sp."), then by Nylander in 1844 (Spicileg. Plant. Penn. cent. alt. p. 21, as of "Fr. et Nyl."), and again by Fries in 1845 (Summ. Veg. Scand. 226). These three accounts, of which Nylander’s is the most detailed, relate to the same plant, collected near Komet in Russian Lapland. Bennett saw no authentic specimen of the Lapland plant, but, contrary to Hooker’s statement (p. 150) in Booth’s Illustrat. *Carex*, vol. iv. (1887), the specimen from which the figure (t. 524) in that work was prepared was in Herb. Booth, now in the Kew Herbarium, collected and labelled by Fries. Notes by Booth on the sheet state:—"The only specimen I have! Observe the woolly roots," and "vaginis aphyllis! Does this separate it from *C. salina*?"

C. B. Clarke adds a note dated "18 July, 1901. Laid in from Herb. Booth, where it was found in his cover of *salina*.—This is the "type" of Booth, tab. 524."

Booth’s figure shows well the points emphasized by Fries:—The cespitose habit, the fibrils of the lower sheaths, the long-produced serrate midrib of the female glume. None of these characters is possessed by the Hebridean plant, and what Bennett may mean by the peculiar colour of the plant is not clear, for the only indications of colour in these descriptions are (i.) the plant is "flavicans," (ii.) the lowest sheaths are "eximio fusc-nitentes," (iii.) the female glumes are "fusce, nervo dorsali pallidiori," and (iv.) the fruits are "flavicans," and none of these points seem to me very peculiar in this group.

(1) I might observe in passing that the possession of fibrils to the lower sheaths is a character of *C. caespitosa* L., and *C. stricta* Good., lacking in *C. salina* Wahl. and *C. Goodenovii* Gay; their possession by *C. spiculosa* would suggest that *C. caespitosa* and not *C. Goodenovii* might be the other parent, which the cespitose habit might be held to confirm. The "fibrils" are at least exaggerated in the figure, and are not easy to observe in the specimen. Many are certainly extraneous matter, as now observed on the mounted specimen. Moreover, the figure does not give a good impression of the slenderness of the plant, which is about a foot in height, with slender narrow leaves suggestive of those of *C. caespitosa*. Many localities are given for *C. caespitosa* in Finland (Hjelt, 1895: Conspl. Fl. Fenn. i. 274), and the coloration of the lower part of the plant is exactly the same as that shown by several specimens of that species in Herb. Mus. Brit.

The Hebridean plant, as Duncan emphasized, has glumes without any trace of a produced midrib. The midrib ends below the apex, and the hyaline point is merely the continuation of the hyaline margins. Since the projecting midrib is the character which chiefly shows the influence of *C. salina*, I am in full agreement with Groves, who wrote (note in Herb. Bennett):—"As far as we can see the most important character of Fries’s plant is the long scabrid excurrent keel and the stalked female spikes, and as these are not present in Duncan’s plant we do not feel justified in admitting the species as British without further evidence. Duncan’s is certainly a curious plant . . . . " (cf. Bab. Man. ed. (ix.) Groves, p. 462, 1904). Bennett’s reply to this (Ann. Scot. Nat. Hist. 1905, p. 172) is:—"This is the reason why I called it a variety, and to this Dr. Almquist agreed.

Being probably a hybrid, and with the same derivation as *spiculosa*, it seemed better to do that than to give it a name as
a species," which seems a poor excuse for referring the plant to a species the special characters of which it lacks.

In 1928 G. C. Druce searched for the plant without success (R. E. C. 1928 Rep. 602, 1929—also 1931 Rep. 675, 1932), but he did not obtain Duncan's precise directions until after his return. He says, however, "although I had worked over the spot, I saw nothing like it in Harris, nor should I have thought salina would have grown by an inland freshwater loch two or three hundred feet above sea-level. Dr. Kükenthall, however, thinks that the specimen collected by Duncan is Goodenovii × salina = spiculosa, but goes no further." Druce sent Kükenthall the "fragmentary specimen" given him by Bennett in 1928 B. E. C. Rep. 602, and a note on this specimen in Herb. Druce reads:—Hancce plantam (utriculis salina = spiculosa, B. E. C.)

Dr. Druce's remark that he saw nothing like it in Harris, there in its size is very like Duncan's. Its glumes are nearly as large as those from Loch Langavat in his herbarium which except he labelled determination as data. Bennett's herbarium, determined them as C. spiculosa var. [rightly], but it bears Kükenthall's determination as C. glauca.

In 1930 Prof. Holmboe, after examining the specimens in Bennett's herbarium, determined them as "C. salina var. cuspidata of the Swedish flora." In view of the complete absence of excurrent midrib in Duncan's specimens, I cannot understand this determination.

In view of these legitimate criticisms, viz. that the Hebridean plant lacks the characters of × C. spiculosa which come from C. salina, and that C. salina is not known in the Outer Hebrides and is not likely to grow near Duncan's plant, a re-examination of the locality was very desirable. An opportunity to do this occurred last year during a visit to the Islands with Mr. Francis Druce and Miss M. S. Campbell. The locality was easily traced from the directions given by Duncan to Bennett, and on July 11th we stood on what I am satisfied was the exact spot where Duncan gathered his specimens, a small grassy flat a few square yards in extent some 9 inches above a small burn above Loch Langavat two miles west of Amhuinnsuidh. Here we found a peculiar form of C. Goodenovii with extremely narrow glumes, of which a few at the base of the lowest spikes were like those of Duncan's plant: the majority, although quite as narrow, were obtuse or only slightly acute. Those collected in the turf match Duncan's plant exactly in habit, but less than a foot away from these were specimens which had fallen into the burn and which grew among the stones in the water. These had the same type of glume, but were stronger specimens, with creeping rhizome and other-
The tree is recognizable by a tendency of the younger branchlets to droop, and by the longer catkins with longer and more conspicuous bracteoles. It is said to be of slower growth than var. caerulea. It is stated, also, that its timber is less valuable than that of var. caerulea, and that it is used only for the cheaper classes of cricket bat; on this point, however, precise information based on manufacturer’s returns as to the quality and relative value of the wood obtained appears to be lacking. Accurate tests of relative rate of growth and quality of timber would be of interest; these should, of course, be under strict control as regards the identity of the varieties tested.

The long catkins and relative length and shape of bracteoles suggest possible hybridity, with S. fragilis as one of the parents. The leaves are definitely of the S. alba var. caerulea type, and the variety may well be a segregate of a hybrid between S. alba and S. fragilis.

Dr. Björn Floderus, when examining the Salix collection of the Imperial Forestry Institute, expressed the opinion that this form represented a hybrid between those two species, the long catkins and those of S. fragilis, and the variety may well be a segregate of a hybrid between S. alba var. caerulea and S. fragilis.

I have not found any named form of ×S. viridis (S. alba × S. fragilis) which matches the particular willow under discussion, nor has Dr. Floderus identified it with any of the named forms known to him. Although there is some resemblance between its catkins and those of S. fragilis, it is not impossible that this is a case of parallel development. In the absence of genetical evidence of origin it seems best to treat the plant as another "variety" of S. alba L., and I propose, therefore, to call it Salix alba var. elyensis: —


A tree up to about 60 feet in height, with slightly drooping branchlets. Allied to S. alba var. caerulea Smith, differing in the relatively longer catkins; the longer, relatively narrower, acute, rather persistent bracteoles which exceed the stamens and ovary at the flowering stage; and the shortly stipitate ovary with a distinct style. The coppice shoots of the year are greenish in winter and early spring, instead of mahogany-coloured as in S. alba var. caerulea, and the circumstomatal dots are slightly less densely distributed on the surfaces of the mature leaves. All of these characters suggest some affinity with S. fragilis, but the tree is more closely allied to S. alba.

Salix alba var. elyensis Burtt Davy, var. nov.—Ramosi novelli argenteo-adpresso-sericei, tandem glabrescentes.
ARUM NEGLECTUM (TOWNS.) RIDL.

BY H. N. RIDLEY, C.M.G., F.R.S.

This plant, confined to the south coast of England, the Channel Islands, and the north coast of France, has never been adequately described, as it has always been considered conspecific or at most a form of the very distinct Arum italicum Mill. of southern Europe. I have had the opportunity of studying it both wild and in cultivation for many years and of observing the differences between it and A. italicum Mill. I have also had the opportunity of reading the very extensive correspondence of Mr. F. Escombe to the late Mr. A. R. Horwood, with a very large series of specimens from East Meon near Petersfield, Hants, of which I have made use in this paper.


Description.—Rhizome oblong, thick, 5-6.5 cm. long. Leaves tufted on a stout stem, 15 cm. long, petioles stout, 20 cm. long, blade fleshy light green, shining, nerves 6-7 pairs, and midrib pale yellowish green, never white. Hiberna form ovate-oblong, blunt lobes overlapping, rounded, blunt, 15 cm. long, 7.5 cm. wide in centre, 15 cm. across lobes at base. Autumnal leaves small and hastate. Spathe on a peduncle, 7 cm. long, pale translucent green, oblong-acuminate, the apex deflexed, 40 cm. long, lower sterile organs, whole whorl 5 mm. long, base conic, smooth, pale yellow, tapering to a filiform tail twice as long as the body. Bare space below 5 mm. long. Male flowers, whole 5 mm. long, orange, oblong, numerous. Bare space below 5 mm. long. Female flowers sterile, globular, with slender tails, orange. Ovaries oblong, green, with depressed purplestigmata. Whole spike 2 cm. long. Fruit-peduncle 25-45 cm. long. Fruit-spike 14-15 cm. long. Berries oblong, scarlet, 1 cm. long. Seeds 1-2, rarely 5, ovoid, reticulate, brown, 4 mm. long.

The plant was first discovered in the British Isles by Mr. A. Hambrough at Steep Hill, near Ventnor, Isle of Wight, in February 1854. He had noticed it some years before ('Phytologist,' 1854, p. 194). It was later collected by Mr. Townsend and other botanists at Bonchurch and along the coast to St. Lawrence and Niton in the same island. At this time, and till recently, it was identified with A. italicum Miller of southern Europe, from which it is quite distinct. In 1874 I found it growing among brambles along the wall between Anvil Point and the cliff-track to Seacombe, near Swanage, Dorset. Some years later the wall was rebuilt, the brambles and Arum being destroyed, and it has not reappeared there. It still persists, however, in Durleston Bay and along the coast sporadically as far as Arish Mill Gap.

It has also been found in the following localities all along the south coast, and in the Channel Islands and Brittany:—

Kent: Folkstone Undercliffe, 3 miles from Folkestone; between Sandgate and Southdiffe (Mebille, 1879).
Sussex: Broadmoor and Offington Lane (F. H. Arnold); Arundel Park (Webster, 1924).
Hants: Petersfield, East Meon, and Compton, near Winchester (F. Escombe).
Dorset: Swanage, Arish Mill Gap, etc. (Ridley, 1874).
Isle of Wight: Bonchurch, Steep Hill to Niton (Hambrough, Townsend).
Devon: Salcombe Regis, Sidmouth (Wyatt); Braunton (Elliston-Wright); Torquay (Carruthers).
Cornwall: Newquay, Ponscouth, Helston, Carbis Bay (Rafs, 1877); Penzance (Roberts); Bude (Thurston).
Gloucs: Curtyhalu, on limestone (Miss Vachell).
Hounsey: Cobo, Kingsmill (Marquand, 1891).
Jersley: Bagot, Le Hoq, etc., commoner than A. maculatum.
Lester-Wright, St. Saviour's (Louis Arsen, 1927).
Waldners: St. Anne's (Jackson & Airey-Shaw, 1934).

The plant grows in light shade or under brambles, usually within a mile of the sea coast in England at least (Escombe's locality, East Meon, is however, fifteen miles from the sea), and it appears almost confined to the south coast. Escombe states that in his locality, where it is abundant, it shuns clay, marl, and sandstone, and is restricted to the chalk escarpments. In Dorset it is found often in stony ground in the Purbeck and Portland rocks.

It is usually found from sea-level to 200 or 300 feet altitude, but in Petersfield up to 768 feet, where, however, it is depauperate.

The hiberna leaves appear in December in suitable shady localities, and attain their full size and characteristic form at the end of that month or in the first weeks of January. Escombe found them at their largest in May with longer petioles. The inflorescence appears rather later than in A. maculatum.

The fruit-spike turns red in later July, August, or September, by which time the leaves have become fewer, smaller,
forms are hybrids with *A. maculatum*. Escombe in his voluminous correspondence says that in the Hampshire plants the depth of spot-shades in intermediate forms between the two species varies between a scarcely distinguishable lavender-grey and the deepest pitch-black. The spots are commonest in young plants and more hastate or, more usually, have quite disappeared. The seedling leaves are ovate or oval, bluntly or round-pointed, entire and rather dusky blue-green.

Purple spots on the leaf and spathe occur occasionally but rarely, and usually on very young leaves; according to Townsend the plants are quite as liable to be spotted as in *maculatum*, but that the spots have not a jagged outline as in the latter. I have never seen true *A. neglectum* with spots on the leaves in the Isle of Wight or elsewhere, and there are very few specimens with spotted leaves in the Kew Herbarium. I suspect that these forms are hybrids with *A. maculatum*. Escombe in his voluminous correspondence says that in the Hampshire plants the depth of spot-shades in intermediate forms between the two species varies between a scarcely distinguishable lavender-grey and the deepest pitch-black. The spots are commonest in young plants and more hastate or, more usually, have quite disappeared. The intermediate forms between the two latter are plants put up the characteristic narrow hastate deep blackish green leaves with white veins occasionally, especially in January, when the leaves of both kinds appear, the two forms being mixed in the same plant and the *italicum* leaf-form soon disappearing.

Engler, in the ‘Pflanzenreich,’ includes this plant under *Aran italicum* Miller, from which it seems to me specifically distinct. In both plants the leaves appear at the end of the year, and in sheltered spots they are well developed by the end of December, long before those of *A. maculatum* L. appear. In *italicum* they are deep blackish green with very conspicuous white midrib and veins, narrow, hastate, acuminate, the basal lobes spreading, sometimes turned over upon themselves, but not overlapping each other. Later in the year they sometimes become broader and more of the shape of those of *A. neglectum*, and the white venation becomes greener, though still retaining the darker green colour. In *italicum* the leaves are always broader, broadly ovate, with overlapping blunt lobes and a sinuate edge, light bright green, the veins paler. Escombe says, ‘varying from palelrid green to yellowish to marked yellow.’ I have seen only pale green veins. The spathe of *A. italicum* is very similar to that of *A. neglectum* and appears about the same time, but is rather narrower. The spadix has a very similar sterile portion.

The upper sterile organs in *A. italicum* are more numerous, have the conic body covered with papillae, and a much longer tail. The bare portions between the upper steriles and the male flowers and between the lower steriles and the female flowers is much shorter. The female flowers, ovaries, are oblong, not globose-obconic as in *A. neglectum*. The fruit-spike is usually longer and the seeds more numerous, two to four in a fruit, whereas they are usually one to two in *A. neglectum*, though I have seen more.

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**REVIEWS.**


This is an admirable performance, the fruit of twenty years’ study of seaweeds in the field and in the herbarium. This kind of thing may be said of many taxonomic works (and it is always worth noting); but not always is there the additional advantage that the author has had to meet the taxonomic difficulties of an annual course of students in the field. This is to say that Dr. Taylor was peculiarly well qualified to undertake such a work as he has now produced. It is hardly necessary to stress the dangers of indefinite discrimination which beset a taxonomist isolated in his herbarium. His capacity for hair-splitting is proverbial, though often greatly exaggerated. It is not so widely realized as it ought to be, however, that the academic botanist who has not served the herbarium discipline is in even greater peril. It is unfortunately true that taxonomic literature is overburdened with work by people who publish new units without even bothering to acquaint themselves with the International Rules of Botanical Nomenclature; nor even with the literature of the group with which they purport to deal. Between this Scylla and that Charybdis Dr. Taylor has steered a very good course. He has accepted limitations honestly and has not attempted to give his work a complexion of bibliographic detail for the purpose of making the maximum impression on the uninitiated. This does not mean that the work is deficient bibliographically. It means that Dr. Taylor has restricted himself to such references as he has actually seen and used in applying names to plants. So it comes about that references to the places of valid publication are often omitted. It is
therefore to be expected that some of his names will be assailable on taxonomic and nomenclatural grounds. As the treatment is that of a handbook and not of a monograph the first consideration is that of accuracy of application in the more immediate sense. For instance, he is content to use the name *Polysiphonia nigrescens* (Hudson) Greville with a var. *fucoides* (Hudson) Harvey without attempting to adjudicate the claim that *Polysiphonia fucoides* (Hudson) Greville is the valid name, of which *P. nigrescens* and *P. violacea* (Roth) Duby are later synonyms. Of the plant on which Yamanouchi did his classic cytological work he says: "The greater part of what has passed as *P. violacea* in American algal literature appears to be this plant [P. flexicaulis (Harvey) Collins], although the following much less common plant [P. novae-angliae Taylor] has also been called by that name." But if any botanist wishes to know what Dr. Taylor means by a particular name he may look up his reference with every confidence, both in the accuracy of the citation and of the identification.

The remarks on bibliography made below are not in any way derogatory to Dr. Taylor's beautiful and precise elaboration; nor yet to Dr. Ch'in-Chih Jao's exquisite illustrations. There are keys at every important point: that is, under the Class headings there are keys to the Orders; under the Orders, to the Families; and so on, down to species. Distribution is given for north-eastern America only—a further example of Dr. Taylor's principle of confining himself to the more immediately verifiable records. Students of British phycology will find a great deal of valuable information about our native species; though the difference between the two floras is too great for it to be more than supplementary. Students of American phycology will have abundant reason to be grateful to Dr. Taylor for many years to come. His work will be numbered among the classic handbooks.—Geoffrey Tandy.

[There are one or two matters of bibliography which are worth noting. In the details at the head of the above review the esoteric symbol "Svo" is given in parenthesis. It is not sufficiently realized that this is strictly an anatomical term and not a measure of size unless the size of the sheet, of which the page is an eighth, be stated. It is apparent that the pages resulting from printing on demy half-sheets in quarto, and on demy sheets in octavo, will be the same size. The University of Michigan Press has done a beautiful job in many respects (the binding is water- and insect-proof); but the anatomy of the book is not at all easy to make out owing to the fact that the sheets are identifiable (if at all) only by inspection of the spine of the book. Of this practice Esdaile's *A Student's Manual of...*]

**MARINE ALGAE OF NORTH-EASTERN COAST OF NORTH AMERICA**

*Bibliography* (p. 66) says: "Still less is error saved by the total omission of signatures, a recent product of the un instructed desire for modernity." Justification of this severity should be sought in the Manual itself. It will suffice to say here that scientists, of all people, should take the utmost precautions against errors and omissions in the published versions of their work. Printers of the fifteenth century were careful enough; they even put the exact date in the colophon. In spite of the fact that the book under notice bears the date 1937, it is possible that it was not technically published until the first week of 1938.

It is, also, nowhere clearly stated that the book treats of the Chlorophyceae, Phaeophyceae, and Rhodophyceae only.—G. T.]

'Lilloa.—The first volume of this new "Revista de Botonica" was issued on December 27, 1937, by the Instituto Miguel Lillo of the National University of Tucumán (Argentina). It is well produced and consists of 414 pages with 57 plates. The editor is H. R. Descole, who in a preface, states that the Institute was founded with a legacy from the Argentine naturalist Miguel Lillo (1862-1931); it consists of a herbarium and library, and it is the intention of the Trustees to make it a centre of botanical investigations. 'Lilloa' will publish original articles by the staff of the Institute and other Argentine botanists as well as by foreign contributors. Accounts of the herbarium will appear as the collections are arranged. The present volume has a photograph of M. Lillo as frontispiece and an account of his career. There are sixteen articles which are written in Spanish, prefaced by a short summary in English, French, or German.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY OF LONDON.—At the General Meeting on March 17, Mr. H. W. Pugsley exhibited specimens of *Myciophyllum alterniflorum var. americanum* from Ireland. Dr. W. B. Turrill then discussed "Problems of the British Taraxacum." Over 100 stocks of *Taraxacum* grown at Kew, mostly representing different biotypes, have all proved to be apomictic. It is probable that the numerous biotypes did not arise separately as the direct result of hybridization or of abnormal chromosome behaviour, but that primary hybridization preceded apomixis, which was followed by mutation. Mutations, probably rare relative to the number of offspring, are at once "fixed" by
apomyxins, in the sense that mutational characters reappear in all the offspring.

Capt. C. Diver gave a general account of "The Plant-carpet in relation to Animal Distribution." This forms a part of the survey he has been carrying out for some years on the plants and animals of a portion of Studland Heath. It is a biological commonplace that the composition of the plant-carpet, considered in broad terms, is an important factor in limiting the distribution of animals, but the detailed investigation of a restricted area has given results interesting to botanists as well as zoologists.

At the meeting on April 7, Mr. Norman Woodhead gave a paper on "Algal Cultures from the Silt of Llyn Maeby." This lake in Anglesey, which is now the water-supply reservoir for a neighbouring village, shows the recurrent phenomenon of water-bloom, and as this is accompanied by unpleasant odours a study was made of the resting periods of the organisms concerned in this periodic development. Although Myxophyceae form a striking phase in these algal seasonal cycles they are seldom recognized in the silt samples themselves; they occur in large numbers in silt samples only when the culture has been maintained for some considerable period, suggesting that the conditions for their success require long spells of bright light with a relatively high temperature.

Mr. Cecil H. Hooper gave a general account of "The Pollination of British Fruit-trees and Shrubs," illustrated with lantern-slides and specimens.

At the Meeting on April 21, Mr. E. M. Marsden-Jones and Prof. F. E. Weiss, F.R.S., each described his portion of an investigation of "The essential Differences between Anagallis arvensis Linn. and Anagallis foemina Mill." As a result of detailed morphological and genetical observations, they propose to accept Schinz and Keller's subdivision of A. arvensis with the subspecies phoenicea, which includes the scarlet pimprenel and its various colour-varieties, some of them blue, and foemina, which is always blue-flowered.

Dr. J. C. Willis, F.R.S., read a paper on "Some Conceptions about Geographical Distribution and Origin of Species," in which he gave an account of the distribution of surnames in the Canton Vaud of Switzerland, an area much broken up into more or less isolated valleys by mountains. The figures show a good "hollow curve," and a comparison was made between the distributions of a family and of a plant species.

Mr. J. Chaworth-Musters described a general collecting visit to the Atlas, illustrating his account with a series of excellent lantern-slides.

**THE VISION OF CERTAIN SMALL OPHRYS-VISITING BEES.—** In 1915 Correvon and Ponyanne published (Journ. Soc. Nat. d'Hort, France, xvii, pp. 29 & 42; see also xxvi, p. 372, 1923) a very interesting account of the pollination of *Ophrys* in Algeria by male bees of the genus Colpa. The males emerge in the spring a month before the females, and conduct a frenzied search for their mates in which they pounce frequently on the labellum of the orchid, mistaking it for the female insect. In doing so they pollinate the flowers. In 1929 Godfrey in this Journal (1929, p. 298) published additional observations on the pollination in France of species of *Ophrys* by another bee.

On March 30th last I was watching *Andrena fulva* on the downs near Leatherhead, where the males were in number about three times as many as the females and the competition for mates was keen, when a shining smooth slate-coloured pill-millipede came through the short grass of a bank where the bees nest. It was immediately the object of the attention of male *Andrenas* one after another, yet is totally unlike a female *Andrena*. The occurrence recalled to my mind the papers to which I have referred, and may be worth remembering as suggesting that a very close resemblance to the female insect may not be necessary in the labellum of an *Ophrys* for attracting frenzied males. But adaptation of the flower to its peculiar method of pollination ought to be a matter of comparative rapidity: i.e., *Ophrys* may be a very modern genus. —I. H. Burkill.

**Pluteus patricius** Schulz.—The late W. B. Grove suggested in the January issue of this Journal that *Pluteus patricius* is a colour-form of *P. cervinus*. Carleton Rea in his 'British Basidiomycetes' gives specific rank to *P. patricius*. I think that many mycologists who have had long acquaintance with *P. cervinus* and *P. patricius* will agree that they are quite distinct.

*P. cervinus* is brown and longitudinally fibrillose. *P. patricius* is always white or light grey with more or less pointed squamules, usually most apparent in the centre of the pileus, and is generally monospitose.

Rea also gives specific rank to *P. Bullii*, formerly considered a variety of *P. cervinus* from which it is abundantly distinct in the more robust habit and dark gibbous pileus. Some of the "blackish-grey" specimens of *P. cervinus* on the old saw-mill yard at Snitterfield Bushes, near Stratford-on-Avon, may have been *P. Bullii*.

*P. cervinus*, *P. Bullii*, and *P. patricius* appear to be a trio of distinct species that occur throughout the year on large sawdust heaps. —E. W. Swanton.

"A Microbiologist digs in the Soil" is the subject of a Presidential Address given by Dr. C. Thom to the Washington Academy of Sciences (Journ. Wash. Acad. Sci. xxviii. pp. 137-153, 1938). In it he gives a critical summary of many of the varied
aspects of the soil population with frequent intermixtures of a characteristically American penetrating humour. "The demonstration that soil, instead of being all dead, harbours millions of organisms, releases that flight of imagination which pictures the soil as a sort of Lilliputian zoo in which some magic hand has eliminated all barriers and set free every grade of minute but rapacious monster to go roaring after the next lesser grade as its lawful prey... Twenty-five millions of organisms to the gram of soil! Bacteria, molds, actinomycetes, myxomycetes, algae, protozoa and more complex!—they fill a microbiological jungle in which friends and foes, saprophytes and parasites, symbionts and antagonists compete with each other and with crop plants for space and food. They are a challenge to our skill in culture, to our discrimination in interpretation and to our constructive imagination in devising means to control and direct these myriads to useful ends."

The abnormality of the English spring of this year has had a noticeable effect on the time of flowering and appearance of foliage. Thus the trees and shrubs of the south of England were clearly more advanced than those of northern France on April 9. Even down to Dijon fruit and lilac blossoms and the leaves of Lombardy poplar and birches were on the whole not so far forward as around London. A few days later Crataegus was in flower near Domodossala, Wistaria at Lugano, and Horse Chestnut at Milan, but by that time cold and drought had intervened at home, though on April 22 the oaks of southern England were in advance of those in France north of Paris.

Sir William Wright Smith has been appointed Honorary Professor of Botany to the Royal Horticultural Society in succession to the late Dr. A. B. Rendle. The duties in the past have not been very onerous, but the R. H. S. are to be congratulated on honouring one who has done so much for the science and the practice of horticulture.

A New British Flora.—We have been asked to publish the following corrections and additions in the list of contributors given in this Journal for February 1938, pp. 61-63:—

(1) Under Cyperaceae, Nelmes (not Nelmes and Lousley) is responsible for Carex.
(2) Under Juncaceae, Richards and Pugsley (not Richards and Lousley) are responsible for Juncus alpinus.
(3) Under Naiadaceae, Dandy and Taylor (not Dandy, Taylor, and Butcher) are responsible for Potamogeton, and Butcher (in place of Dr. A. B. Rendle) for Naias and Zannichellia.
(4) Under Rosaceae, Mr. W. Watson, 245 Southlands Road, Bickley, Kent, is responsible for Rubus.
doubtless based on the Acharian original, for he writes, l.c.: "non tamen ecelanum, sub L. cincerea-astra in herb. Ach. adesse modo plantam Lusaticam nec Anglicam, de qua etiam in Univer-
mantio fit." Wainio (Medd. Soc. F. et Fl. Fennic. x. 70, 1883) also mentions that he had seen the type, but since that time it has apparently been mislaid, for I failed to find it in the Acharian herbarium at Helsinki in 1937, and Lynge (in Wainio, Lichenerog. Fennic. iv. 173, 1934) has based his diagnosis of this species on some Finnish plants in Wainio's herbarium, and on Havås's and Malme's excisata. Therefore, in spite of the clarity of Th. Fries's description, *Lecidea cincerea-astra* was necessarily regarded as a somewhat critical species.

There is at the rooms of the Linnean Society of London a collection of authentic specimens sent by Acharius in 1809 to the Society, and it contains a sheet with two specimens labelled by him "Lecidea cincerea-astra Ach.", followed by the abbreviation "msc.", which has been struck out later (as shown by the difference in colour of the writing fluids employed) and replaced by "Lichenogr. univers. 167". This point is important, for it shows that these specimens were in Acharius's possession before the publication of his 'Lichenographia universalis', and that they therefore almost certainly represent type-material from one or both of the localities given in the original description. I was able to examine these specimens. They are not of the same species; the right-hand specimen, on account of its minute size, I did not venture to subject to a detailed examination, but the fact that its thallus is dull brown with the medulla 1+ purple-blue indicates that it is not part of the plant upon which Th. Fries based his description in Lichenogr. Scandin., but it is almost certainly the English specimen mentioned by Acharius. The left-hand specimen is larger, on a flake of schistose rock 3 by 1-2 cm., and it was possible to make a detailed microscopic analysis, the results of which were in almost complete agreement with the description (as far as it goes) given by Th. Fries. Using Lynge's key to the genus *Lecidea* (in Wainio, Lichenogr. Fennic. iv. 10, 1934) the characters shown by this specimen led with precision to *Lecidea cincerea-astra*. Therefore it is practically certain that this specimen preserved at the Linnean Society rooms is part of the type-material seen by Th. Fries, and hence, in order to establish the conception of this hitherto rather critical species on a firm basis, I append the description resulting from my investigation of it.

*Thallus* thick, unequal, verrucose-acarolate, 0-5-1 (-1-5) mm. thick; edge not shown, but probably indeterminate; acarole 0-6-1-5 (-2) mm. diam., pulvinate-convex or hemispherical-globule or more rarely ±plane with rounded-off edges, in outline variously obtusely angular (the corners rounded-off) or ±irregularly rounded; now a dirty cream-colour or ash-grey with a faint yellowish tinge, not changing colour when wetted, matt, not pruinose, not isidiate nor sorediate. Indications of a blackish hypothallus seen here and there between areolar verrucae, but very indistinct. Thallus KHO−, CaCl₂O₂−, internally and externally.

*Cortex* of thallus 32-48 μ thick, not nubilated, colourless in outer 9-15 μ, faintly dull yellowish in inner 18-30 μ, or in places completely dull yellowish; composed of strictly adnate, vertically parallel hyphae 3-7 μ diam., with walls 0-5-0-7 μ thick, and cells 4-7 μ long; these cells being often ±isodiametric and rounded, hence forming an almost paraplectenchymatic tissue, in which, however, the union of the cells into vertically parallel hyphae is ± obvious. Surface rather uneven from the rounded ends of the cells, not covered by any amorphous layer. *Gonidia stratum* continuous, ±regular, 60-120 μ deep. *Goniodes protococoid*, now pallid yellowish green, round, easily isolated, 0-15 μ diam., with colourless walls 0-8-1 μ thick; contents ±disintegrated; mode of reproduction not observed. *Medulla* now somewhat opaque from air-filled hyphae, in its lower parts enclosing particles of the substratum, colourless, not nubilated, composed of finely intertexted fine branched hyphae 1-2 μ diam., with thin distinct walls usually running in various directions, with here and there irregularly filled cavities between them. KNO₃ produces no colour-change in section of thallus; I merely yellows medulla, both macroscopically and microscopically.

*Apothecia* very numerous, irregularly scattered over thallus, isolated or contiguous and often 2-6 coalescent to form irregular masses; arising on the thalline verrucae, at first immo-depressed, soon becoming adpressed-sessile, only slightly constricted at base, ± round or irregularly obtusely angular, 0-6-1-3 mm. diam. (groups formed by coalescence up to 1-8 mm. diam.); for a long time ± plane with distinct ± prominent, moderate, rounded, entire, black, matt or submatt, non-pruinose, proper margin finally becoming pulvinate-convex, with the proper margin excluded. Disc black both wet and dry, matt, at first with a subtle greyish pruina which is worn off in mature apothecia; not infrequently minutely umbonate.

*Excipulum* developed as a lateral continuation of hypothecium, reddish black, composed of adnate hyphae radiating fanwise outwards, 2-8-4-5 μ diam., with cells 4-5-8 μ long, and reddish wall-walls about 0-7 μ thick; in outer 25-45 μ, and in irregular patches further in, quantities of an amorphous, dense, black secretion lie between the cells, making the tissue opaque even in thin section. *Hypothecium* reddish brown-black in section, paraplectenchymatic, of ±isodiametric rounded or irregularly angular small cells 2-4-5 (-6) μ diam., with reddish walls about 0-7 μ thick, dense masses of black secretion lying between them and rendering the tissue very opaque. The hypothecium does
not end sharply downwards, but runs down into the subjacent thalline tissue as a "tail" composed of fine hyphae 1-5-2-5 \(\mu\) diam., with thin reddish walls, running in various directions and with few or no air-spaces between them. Hymenium 90-105 \(\mu\) high, not inspersed, completely faint blue-green in section except in uppermost 6-12 \(\mu\), where it is blue-green blackish. Paraphyses not discrete, distinct, traversing copious colourless mucilage, frequently branched, 1-3-2 \(\mu\) thick, colourless or with a very faint blue-green tinge, at apices clavate-capitate or submoniliiform, there swollen up to 3 \(\mu\) and fuliginous blue-green or blackish; septate, often slightly constricted at septa, which are ± distinct in water and 5-14 \(\mu\) apart. Asci 78-90 \(\mu\) by 12-20 \(\mu\), colourless, but their plasm faintly yellowish (oil); wall 1-2 \(\mu\) thick at sides, at apex thickened up to 9 \(\mu\). Spores in ascus, irregularly biseriate, simple, colourless or very faintly yellowish (oil), ellipsoid or rarely slightly tapered at both ends, with distinct smooth walls 0·8-0·9 \(\mu\) thick; 14-15 by 7·5-9 \(\mu\).-KHO produces no colour-change in section of apothecium; \(\text{HNO}_3\) turns epithecium a beautiful rose-red; with \(\text{I, Hymenium blue, darkening to blue-black.}

[Lichenological Notes]

3. Lecidea (Sect. Eulecidea) Recensa Stirton in Scot. Naturalist, v. 219 (1880), was described from Scotland, Ramnoch, Craig Var (v.c. 88). A. L. Smith, Monogr. Brit. Lich. ii. ed. 2, 70 (1926), listed this species as synonymous with L. rivulosa Ach. A. H. Magnusson, on p. 31 of his "Studies in the rivulosa-Group of the Genus Lecidea" (Göteborgs Kgl. Vetensk.- och Vitterh.- Samh. Handl. ser. 4, xxix. no. 4, 1925), suggested that on account of the narrow spores it must be very nearly related to L. arcuatula (Arr.) Hue, a North American species, if not quite identical with it. The type-specimen of L. recensa is preserved in the British Museum Herbarium, and I was able to make a detailed study of it, the results of which are given in the following description.

Thallus effuse, indeterminate, up to 0·3 mm. thick, the areolae rounded or irregularly obtusely angular, tumid-convex, 0·3-0·6 mm. diam., contiguous or ± scattered, cream-coloured or whitish grey, matt, not isidiate nor sorediate nor pruinose, \(\text{KHO-, } \text{CaCl}_2, \text{KHO(CaCl}_2, \text{Pd-}.\) No visible hypothallus.

Cortex of thallus colourless, hyaline, 10-30 \(\mu\) deep, composed of indistinct intricate thin-walled hyphae 3-5 \(\mu\) diam. Gonialia stratum dense, up to 175 \(\mu\) deep in the more tumid areolae; gonidia protococcoid, round, thin-walled, 6-10·5 \(\mu\) diam., without any visible pyrenoid, and multiplying by transverse fission. Mucilage around gonidia densely nubilated with dull yellowish granules which disappear on the addition of KHO; below
gonidial stratum colourless, hyaline, of rather closely intertexted gelatinous hyphae 3-4-5 \( \mu \) thick, running in various directions, with walls 0-7-1-0 \( \mu \) thick; merely yellowed by I.

Apothecia fairly numerous, isolated or often several aggregate and coalescent, 0-4-0-7 mm. diam. (aggregate masses up to 1-5 mm. diam.), round, well constricted at base, plane or finally very slightly convex, with ± persistent, thin, matt, black, proper margin; disc black both wet and dry, minutely roughened, not pruinose.

Excipulum of apothecium developed at sides only, dark brown-black, sharply delimited from hypothecium, composed of ± isodiametric or radially elongated cells 3-10 by 3-6 \( \mu \) heavily coated with an amorphous dense brown-black substance which renders the tissue opaque in section. Hypothecium faintly yellowish, in very thin section almost colourless, composed of densely and intricately interwoven thin-walled hyphae 2-5-5 \( \mu \) diam., with short often rounded articles, hence heavily thick; medulla diam. below, and smaller round bright green cells thick, rounded at apices irregularly swollen high, with ± persistent, thin, matt, black, proper margin; disc black both wet and dry, minutely roughened, not pruinose.

Excipulum of apothecium developed at sides only, dark brown-black, sharply delimited from hypothecium, composed of ± isodiametric or radially elongated cells 3-10 by 3-6 \( \mu \) heavily coated with an amorphous dense brown-black substance which renders the tissue opaque in section. Hypothecium faintly yellowish, in very thin section almost colourless, composed of densely and intricately interwoven thin-walled hyphae 2-5-5 \( \mu \) diam., with short often rounded articles, hence heavily thick; medulla diam. below, and smaller round bright green cells thick, rounded at apices irregularly swollen high, with ± persistent, thin, matt, black, proper margin; disc black both wet and dry, minutely roughened, not pruinose.

Apothecia moderately thick, running in various diam., with short often rounded articles, hence heavily thick; medulla diam. below, and smaller round bright green cells thick, rounded at apices irregularly swollen high, with ± persistent, thin, matt, black, proper margin; disc black both wet and dry, minutely roughened, not pruinose.

Excipulum of apothecium developed at sides only, dark brown-black, sharply delimited from hypothecium, composed of ± isodiametric or radially elongated cells 3-10 by 3-6 \( \mu \) heavily coated with an amorphous dense brown-black substance which renders the tissue opaque in section. Hypothecium faintly yellowish, in very thin section almost colourless, composed of densely and intricately interwoven thin-walled hyphae 2-5-5 \( \mu \) diam., with short often rounded articles, hence heavily thick; medulla diam. below, and smaller round bright green cells thick, rounded at apices irregularly swollen high, with ± persistent, thin, matt, black, proper margin; disc black both wet and dry, minutely roughened, not pruinose.

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Surrey. Limpsfield Common, near Oxted (v.c. 17), on stems of Ulex europaeus and Calluna vulgaris, leg. A. H. Norrest, 1897. Of interest on account of the unusual habitat. The thallus is in many places of a somewhat brighter green than in the usual pine-inhabiting form, but the internal characters tally completely. Vainio (Lichenogr. Fennic. ii. 250, 1922) records this species also on poplar, birch, alder, oak, and mountain ash.

8. The identity of Cladonia cillata Stirton. This, in Scot. Naturalist, n. s. iii. 308 (1888), had the following description: "similis Cl. sylvaticae var. sylvestri (K., C.), sed fibrillibus numerosis, quasi rhizinoideis, abidis, fasciculatum dispositis presentim apices versus ramulorum osbita." I was recently able to investigate the type-specimen from Scotland, New Galloway, Knockmalling Wood (v.c. 75). Apart from the presence of the white fibrillae, the plant is typical C. tenuis (Flk.) Harm. With KHO a dull yellowish reaction is produced, which later goes over into a pale brownish, a reaction noted for C. tenuis by Sandstedt (Rabh. Krypt.-Fl. ix. iv. Abt. 48, 1931), and due to the presence of fumarprotocetraric acid, which gives rise also to an orange-red coloration when paraphenylenediamine is applied to the podetia*. The white fibrillae are 0.2-0.5 mm. long, 0.03-0.1 mm. thick, borne laterally and terminally in many places on the podetia, chiefly towards the apices. Under the microscope they are seen to be acuminated, colourless or faintly yellowish, often longitudinally cleft, and composed of adnate parallel hyphae 2-3\( \mu \) thick. They contain no gonidia, and are outgrowths of the podetial cortex. This form of C. tenuis has been described by Sandstedt (op. cit. p. 52) as f. setigera Sandst.

9. Cladonia subsylvatica Stirton versus Cladonia mitis Sandst. Cladonia subsylvatica Stirton in Trans. and Proc. Bot. Soc. Edinburgh, xiv. 357 (1883), as shown by the type-specimen from Newfoundland, Brigus, preserved in the British Museum Herbarium, is identical with C. mitis Sandst. (Clad. Exs. no. 55, 1918). It shows complete agreement in every respect with Schaerer, Lich. Helvet. no. 78, indicated by Sandstedt as mitis, and also with material in the British Museum Herbarium from N. Norway, Nordkyn, leg. Lyng e and Haga, determined by Sandstedt himself. At first sight it would seem as if the well-known epithet mitis would have to be replaced by subsylvatica, but reference to the original description shows that this can be avoided, for Stirton there writes: "Meanwhile, I have thought it right to give expression to these views by constituting a new sub-species, under the name Cladonia subsylvatica." It is thus clear that the epithet subsylvatica originated as the name of a subspecies, and according to the International Rules of Botanical Nomenclature does not invalidate the subsequent specific epithet mitis.

C. mitis has not up to the time of writing been recorded from Britain, but a number of plants in the British Museum Herbarium under the name "C. sylvatica" belong here. They are:

(3) East Perth or Forfar, Sidlaw Hills (v.c. 89 or 90**), ex herb. Forbes Young (2 specimens).
(4) Forfar, Rosie Moor (v.c. 90**), leg. A. Croall.
(5) Aberdeenshire, Braemar, Ben-naboord (v.c. 92**), leg. J. M. Crombie.
(6) Banffshire, Rothiemurchus (v.c. 94**), leg. J. M. Crombie.
(7) Argyllshire, Ben Cruchan (v.c. 98**), leg. J. M. Crombie.
(8) "Highlands of Scotland," without precise locality, leg. Merry, 1778, named "Lichen rangiferinus."
(9) Ireland, Galway, Castle Kelly (Ire. v.c. 16**), ex herb. Miss Moseley.
(10) Ireland, Mayo, Mallaranny (Ire. v.c. 27**), leg. W. E. L. Wattam.
(11) Ireland, Mayo, Clare Island (Ire. v.c. 27**).
(12) Ireland, Mayo, Achill Island, Slievemore Mt. (Ire. v.c. 27**), leg. W. E. L. Wattam.

As far as one may judge from these few records C. mitis is relatively more common in Scotland and Ireland than in England. Yet the Sussex specimen shows that it is not confined to the upland and subalpine tracts, and it will probably prove to be fairly common all over the British Isles if careful search is made. It is readily distinguished from C. sylvatica by its lighter whitish colour, less nutant terminal branches, and mild taste, the podetia being KHO—. Asahina (Acta Phytochim. viii. 52, 1934) states that C. mitis gives a negative reaction with paraphenylenediamine. This statement requires some qualification; at and near the growing tips a yellow then red

*L The reagent paraphenylenediamine has been recently introduced by Asahina (Acta Phytochimica, viii. 47-64 (1934)) for the more accurate investigation of the lichen-acids belonging to the Depsidsone-group. More sensitive than potash, it will, in conjunction with the latter, often allow of specific determination of lichen-acids without the necessity of macrochemical analysis. It is hence a valuable criterion for the confirmation of determinations made on morphological grounds, but its application in systematic lichenology calls for caution and a due appreciation of the actual chemical differences of which it is an indicator.
coloration is quite frequently produced. This is the case in the authentic specimen from N. Norway, Nordkyn, mentioned above, and also in Stirton's type-specimen of *C. subglaucata*. The Scottish specimens from the Sidlaw Hills and from Braemar listed above show the same faint reaction in the ultimate branches. But the coloration is never intense, as in *C. sylvatica*; the amount of lichen-acid present must be extremely small, and never sufficient to produce any perceptible bitter taste.


F. *Atrosanguinea* H. Magn. in Rabb Krypt.-Fl. ix. 5. Abt. 1 Teil, 95 (1935).

Somerset, Cheddon, near Taunton (v.c. 5*), on mortar of wall, leg. *I. M. L.*, 1937 (coll. no. 470). Thallus obsolete. Apothecia up to 1·5 mm. diam., flattened, appressed to substratum, with plane, naked, subnudit, dark reddish-black disc and thin but prominent, naked, subnudit, concolorous or somewhat darker proper margin. Hymenium 75-85 µ high. Spores circ. 5 by 2·2-2·5 µ, with a length/breadth-coefficient therefore of 2·2-2·5, i.e. somewhat broader in relation to length than in the typical species, in which the coefficient ranges between 2·5 and 3·0. This agrees with Magnusson’s statement (l.c.) that the spores may be shorter and broader in this form. It scarcely differs from *f. nuda* (Nyl.) Magn. except in the larger apothecia.


E. Cornwall, Looe (v.c. 2*), on maritime rocks not far above high-tide mark, leg. *I. M. L.*, 1937 (coll. no. 478). Magnusson has shown in Bot. Notiser, 437 (1932), that this specific unit embraces the forms described by Nylander as *Lecanora prosechoides* and *L. prosechoidia*. A. L. Smith (Monogr. Brit. Lich. i. 345 & 347, 1918) has treated these as species belonging to the genus *Lecanoria*, on account of the alleged 1-septate character of some of the spores. When seen in water many of the spores certainly appear definitely 1-septate, but by treating with KHO, HCl, and iodine it can be seen that the appearance of a transverse septum is usually, if not always, due to protoplastic retraction, and not continuous with the spong-wall.


E. Norfolk, Wheatfen Broad (v.c. 27*), on mortar of wall, leg. *M. J. D. Cockle*, 1937. Zahlbruckner (Cat. Lich. Univ. v. 790, 1928) uses the epithet *aurella* for this species, based on *Verrucaria aurella* Hoffm. *Deutschl. Flora*, 197 (1796), but as Lyne points out (Rept. Fifth Thule Exped. 1921-24, ii. no. 3, 22, 1935) this is at present a very doubtful synonym, and until the type-specimen of Hoffmann can be investigated it is better to make use of the Acharian name, which certainly refers to this plant.


Channel Islands, Jersey, Noirmont Point, on coarsely crystalline non-calcareous rock, leg. *A. H. Norrsett*, 1937. Previously recorded only from Wales, Pembrokeshire, Fort Hill near Fishguard (v.c. 45) (the type-specimen); Cornwall, the Lizard (v.c. 9*); Watson in Journ. Bot. lxxi. 331, 1933; and Ireland, Howth near Dublin, leg. *Knowles*, listed by A. L. Smith (Monogr. Brit. Lich. ii. ed. 2, 189, 1926; see subsequent note). Here follows a description of Leighton’s type-specimen from Fort Hill, now in Herb. Kew.:

Thallus effuse, or here and there determinate by a black hypothallus, covering large areas of rock, ending abruptly or becoming thinner towards margin, 0·4-0·8 (-1·0) mm. thick, basally-areolate, with cracks 0·5-0·7 mm. wide, delimiting irregularly angular areole 0·3-1·0 mm. diam., areole plane or sometimes slightly convex, with unequal rugose surface; dirty whitish or ash-grey, but without any yellowish tinge, matt, not isidiate nor sorediate, not pruinose; KHO+yellow then blood-red, CaCl₂-, Pd+lemon-yellow.

Cortex of thallus 20-45 µ deep, either entirely densely yellowish grey rubilated or with the outer 6-12 µ colourless and hyaline; composed of ±isodiametric irregularly angular cells 3-6 µ diam., with walls 0·5-0·7 µ thick. *Goniidial stratum* ±interrupted, 60-105 µ deep. *Goniidia* protococcosid, round, brightgreen, 7-12 µ diam., with colourless wall about 0·7 µ thick. *Medulla* densely yellowish grey rubilated, of rather closely interlaced colourless hyphe 2-5·5 µ diam., with walls 0·5-0·7 µ thick. *Hypothallus* paraplectenchymatic, of ±isodiametric or slightly elongated cells 3-7·5 µ diam., with yellowish walls up to 1 µ thick; many of these cells replete with a dark reddish brown pigment.—With KHO a yellow solution flows out of section, and soon simple spicule-like red crystals characteristic of salazic acid α-methyl ether or nor-stictic acid are formed. Iodine merely yellows the medulla.

**Apothecia** scattered, rarely contiguous (but not coalescent), muscil from the first, well to moderately constricted at base,
round, black, up to 1-3 mm. diam. Proper margin moderate, prominent, finally becoming almost excluded, occasionally lighter than the disc (pallid brown, particularly on the lower side). Disc, first plane, then becoming convex, sometimes slightly irregularly umboonate and furrowed, minutely roughened, black, matt, not pruinose.

Proper margin of apothecium a lateral continuation of hypothecium: either completely dark reddish brown, of compacted radially parallel hyphae 2-5 μm diam., with cells 3-10 μm long and reddish brown walls 0-5-0.7 μ thick, or with an outer colourless hyaline paraplectenchymatic layer 7-38 μ deep of indistinct ±isodiametric irregularly angular cells 3-5 μ diam., with indistinct walls 0.5-0.7 μ thick. Hypothecium dark reddish brown, composed of densely compacted intricate hyphae 2-4-5 μ diam., with reddish brown walls up to 1-5 μ thick, in upper subhyaline portion mostly vertically parallel, in lower part running in various directions, tissue interspersed with clumps of ±isodiametric irregularly angular cells 5-8 μ diam., with reddish brown walls 1-1.5 μ thick. Bottom of hypothecium flat; no "tail" runs down into thalline tissue. Hymenium not sharply delimited from hypothecium, 70-105 μ high, pale brown or in places colourless, except for upper 6-9 μ, which is dark reddish brown. Paraphyses subconcrete, colourless or slightly yellowish, 1-5-2 μ thick, at apex gradually thickened up to 4-9 μ, and there dark reddish brown, this colour spreading gradually downwards. Asci oblong-clavate, 37-60 by 9-18 μ, with colourless wall about 1 μ thick at sides, at apex thickened up to 9 μ. Spores 8, biserial or irregularly massed in ascus; ellipsoidal, equally rounded at both ends, 1-septate, occasionally somewhat constricted at septum, reddish brown, 12-16 by 6-9 μ; spore-wall smooth, 0.7-1 μ thick.—With I, hymenium blue, darkening to blue black.

[No pycnidia observed.]

In its internal characters B. ryssola is closely related to B. subdispariformis (Leight.) Wain., the lichen-acing being also apparently the same in both. The two species may, however, be readily distinguished by the following differences:—

B. ryssola.

Thallus-areolae rugose, whitish Thallus-areolae ±smooth, pallid or ash-grey, never with any yellowish tint. Thallus ±fragile. Hypothecium with ±flat base.

B. subdispariformis.

Thallus-areolae rugose, whitish Thallus-areolae ±smooth, pallid or ash-grey, never with any yellowish tint. Thallus ±fragile. Hypothecium with ±flat base.

Leighton's reference to "nigrofuscus" and "rusty" apothecia in his original description of "Lecidea ryssola" is difficult to understand. The disc is entirely black and non-pruinose, only the proper margin being, as described above, occasionally paler.

The specimen from Ireland: Howth, near Dublin, leg. Knowles, which is listed under B. ryssola in A. L. Smith, Monogr. Brit. Lich. ii. ed 2, 189 (1926), is not this species, but B. subdispariformis.

14. Buellia dispariformis var. triphragma (Nyl.) Oliv. is recorded in A. L. Smith, Monogr. Brit. Lich. ii. 178 (1911), and ed. 2, 193 (1926), also in Leighton, Lich.-Fl. Gt. Brit. 329 (1971), and ed. 3, 349 (1979), from one locality in Scotland, Morrone, Braemar, on shady rocks, leg. J. M. Crombie, 1870. The nature of the substratum is sufficient to arouse suspicion that this is incorrect, and on examination of the above-mentioned specimen in the British Museum Herbarium I found it to be Lecidea Lauri Cassiae and by Nylander as Lecidea triphragma. It is not improbable that it may be detected in Britain.


Var. venusta (Körb.) Mong. l. e. Diplotomma alboatrum var. venustum Körb. apud Rabenh. Flecht. Europ. fasc. xiii. no. 384 (1858), non vidi; fide Zahlbruckner, Cat. Lich. Univ. vii. 449 (1931).

Channel Islands, Guernsey, Moulin Huet Bay, on mortar of wall, leg. A. H. Norrell, 1937. The plant has the smooth rimose cretaceous white thallus and immersed to emergent apothecia characteristic of this variety. The thallus becomes yellow then orange on application of potash, this reaction being due to the formation, here and there in the medulla, of simple needle-shaped crystals of the potassium salt of either nor-stic acid or salacic acid α-methyl ether. This reaction of the medulla has been shown by Steiner (Verhandl. Zool.-bot. Ges. Wien, lxix. 63, 1920) to be characteristic of Körbér's "Lich. Sel. German." no. 191, and it therefore seems advisable to include in var. venusta only those plants which show it; others of the venusta-type, but with a negative reaction to potash, will then be included under other varieties such as lannea (Ach.) Oliv. Steiner (op. cit. pp. 61 and 63) asserts that Buellia epipola differs from B. alboatrum (Hoffm.) Br. & Rostr. in lacking longitudinal septa in the spore, these being always present in B. alboatrum. Adherence to this view would necessitate a considerable number of recombinations in varieties and forms, and seems unjustified until the question is settled by examination of the original specimens.
STUDIES OF BRITISH POTAMOGETONS.—II.


II. Some British Records of Potamogeton trichoides.

Potamogeton trichoides Cham. & Schlecht, is one of the rarer "pusilloid" species in Britain. It was not reported from this country until the year 1850, when Babington (in Henfrey, Bot. Gaz. ii. 285-288) correctly recorded it from a locality in the parish of Framingham Earl, East Norfolk, near the boundary of Bixley parish. The plant was discovered there by K. Trimmer in 1848, and specimens collected by him in Oct. 1849 and by J. B. Wilson in Sept. 1850 served as the basis for Babington's record. In 1865 P. trichoides was independently reported from the same locality by Caspar (in Journ. Linn. Soc., Bot. viii. 273), who had received material from Trimmer. Caspar, influenced by the presence of muriculations on the backs of the fruiting-carpels, designated the plant as a new variety, Trimmeri, but after studying a large series of specimens we consider this variety untenable as the muriculations are variable in their degree of development and do not furnish a satisfactory diagnostic character. Since 1865 P. trichoides has been reported from a number of British stations ranging from South Devon to Mid Perth and Co. Down, but some of the records are errors arising from the fact that slender-leaved states of P. pusillus (P. panormitanus) * and P. Berchtoldii bear a superficial resemblance to P. trichoides and are sometimes mistaken for that species. At the present stage of our investigations we cannot pretend to offer a complete account of the distribution of P. trichoides in Britain, but having already examined much of the material upon which published records have been based we are in a position to confirm some of these and expunge others. In addition we have seen specimens of P. trichoides from several vice-counties for which the species has not hitherto been recorded, and by publishing these new records we hope to stimulate further search for this comparatively rare plant so that fuller details of its distribution can eventually be given.

Before dealing with the records it may be useful in the interests of collectors to indicate the principal characters by which P. trichoides can be distinguished from those slender-leaved forms of P. pusillus and P. Berchtoldii which have been confused with it in the past. P. trichoides always has very narrow leaves which are usually under 1 mm. in breadth; the leaves of the other two species are much more variable, sometimes reaching a width of between 2 and 3 mm., but often they are very narrow as in P. trichoides and then confusion is liable to arise, especially when the plants are in the dried state. If, however, the material is examined with proper care little difficulty ought to be experienced in identifying the species, even when flowers or fruits are not available. P. pusillus is at once distinguished from the other two species by its closed (tubular) stipular sheaths. P. Berchtoldii and P. trichoides both have convolute open stipular sheaths, but they are easily separated from each other by the nervation of the leaves. In P. Berchtoldii the midrib is usually bordered, at least towards the base, by one or more rows of lacunae, and the two lateral nerves are evident; in P. trichoides the midrib is proportionally thicker and more prominent and is usually without a border of lacunae, while the two lateral nerves are so faint that they are often scarcely discernible *.

When flowers or fruits are present P. trichoides is easily recognized by its tendency to monocarpy; the carpels in each flower are usually reduced to three, two, or one, and the fruit, when developed, consists of one carpel only. In P. pusillus and P. Berchtoldii, on the other hand, the flowers normally have the full Potamogeton complement of four fertile carpels, though these may not all develop in fruit. Moreover, the fruiting-carpels of P. trichoides are appreciably larger than in P. pusillus and P. Berchtoldii, and are usually more or less muriculate along the dorsal keel.

In Druce's 'Comital Flora' (1932), p. 317, P. trichoides is indicated for twelve British vice-counties (3, 14, 17, 25-29, 31, 33, 39, 88) and with doubt for Co. Down in Ireland. A record for vice-county 4 (North Devon), published by Hiern in 1906, was apparently overlooked by Druce. Since the appearance of the 'Comital Flora' the species has been reported also from vice-counties 12 (North Hants) and 6 (North Somerset) by Pearse in Bot. Soc. & Exch. Club Brit. Is. x. 112 (1933) & 415 (1935). So far we have not seen any material named P. trichoides from vice-counties 12 or 39, and are thus unable to confirm these records at present. We should, therefore, specially appreciate the opportunity to examine specimens named P. trichoides (or suspected to represent that species) from either of these two vice-counties. The other vice-counties are dealt with in numerical order below, erroneous records being placed in square brackets and new county records distinguished by the letters N.C.R.

South Devon. P. trichoides var. Trimmeri was recorded from Bradmere Pool, Drewsteignton, by Dunn in Journ. Bot. xxxii. 23 (1894) on the authority of A. Bennett, and again in

* See the first of these notes, pp. 90-92 supra.
J. E. Lousley (Ref. P. E. Salmon at Fen of Torquay Natural History Society there are further specimens of P. Berchtoldii from Teigngrace and from Kingsteignton which have also been named P. trichoides.)

(4) NORTH DEVON. Hiern in 'Victoria History of Devonshire' (1906), p. 68, reported P. trichoides from the Barnstaple District. The record was based on plants collected at Braunton and Molland on various dates between the years 1882 and 1905 and preserved in Hiern's herbarium. All the plants are referable to P. Berchtoldii. We have seen no genuine P. trichoides from Devon.

(5) SOUTH SOMERSET. N.C.R. Wellington, comm. R. P. Murray, 2nd Oct. 1884 (Herb. Brit. Mus.). The material, which is sterile, was sent by Murray to A. Bennett with the note: "It is certainly P. pusillus, but I never saw it before with the leaves veined in exactly the same manner." In Bennett's herbarium the plant was placed, apparently provisionally, under P. panormitanus.

(6) NORTH SOMERSET. P. trichoides was correctly recorded from this vice-county by Pearsall in Bot. Soc. & Exch. Club Brit. Is. x. 845 (1935). His material, which was received through Lady Davy, came from a locality near Weston-super-Mare.

(13) WEST SUSSEX. N.C.R. Henfield Level, July 1849, W. Borrer (Herb. Borrer, at Kew). This plant has lain in Borrer's herbarium for nearly ninety years under the erroneous name P. pusillus.

(14) EAST SUSSEX. We have seen numerous authentic specimens of P. trichoides from the neighbourhood of Lewes and Hord, collected by T. H. Hilton, C. E. Salmon, G. C. Druce, C. Bucknall, J. E. Lousley (Ref. C. 7/A), E. C. Wallace, and others. The species occurs also in the north-west of the vice-county, for fragments of it are included among a gathering of P. pusillus made by Salmon at Fen Place Mill Pond, near Kingscote, in July 1921.

(17) SURREY. Beeby in Journ. Bot. xxxii. 88 (1894) correctly reported P. trichoides from Hedge Court Mill Pond and from the Basingstoke Canal near Aldershot. He collected specimens at Hedge Court on 28th Sept. 1879 and 12th Sept. 1886 *, and

* Hagström (Crit. Res. 126) referred this gathering to his P. franconicus var. spicatus, a supposed hybrid between 'P. pusillus' (i. e. P. Berchtoldii) and P. trichoides. There is no justification for ascribing a hybrid origin to Beeby's plant, which agrees in all respects with P. trichoides. P. Berchtoldii, it may be noted, has not been reported from Hedge Court.

In the Basingstoke Canal on 31st July and 7th Aug. 1881, apparently no one since Beeby has succeeded in finding the species in either of these localities. Beeby also found P. trichoides in Birdwood Pond in July 1884 *, and further material of the species, mixed with P. pusillus, was collected at Newdigate by L. Haig in June 1932 (Herb. Kew). [In Bot. Soc. & Exch. Club Brit. Is. x. 990 (1935) specimens obtained from Hedge Court Mill Pond by J. E. Lousley (Ref. F. 30) were referred to P. trichoides, but these are P. pusillus, as also is a plant collected at Old Woking by Lady Davy and recorded as P. trichoides by Druce in Bot. Soc. & Exch. Club Brit. Is. viii. 762 (1929). Another Surrey plant, collected by F. Clarke at St. Catherine's, Guildford, and referred to P. trichoides by Druce, op. cit. vi. 751 (1923), is P. Berchtoldii; the material in Herb. Druce had been determined as P. trichoides by Hagström in 1921.]


(25) EAST SUFFOLK. P. trichoides was correctly recorded by A. Bennett in Journ. Bot. xvii. 317–318 (1880) from Worthing. Long Green. We have seen specimens collected in that locality by Bennett himself and dated 5th and 6th Aug. 1880.

(26) WEST SUFFOLK. We have examined authentic material of P. trichoides from Babington's herbarium, collected in Barton Ford and cited by Hind, Fl. Suffolk, 362 (1889).

(27) EAST NORFOLK. The first British records of P. trichoides, as we have already mentioned, were from Framlingham Earl, in East Norfolk. We have also seen material of the species from Wardenstone, Marlingford, Flordon, Alpington, Roydon, Happisburgh, Potter Heigham, Lessingham, Hempstead Marshes, and the New Cut near Palling. All these localities are represented in the British Museum Herbarium (including the Boswell Herbarium). [Specimens from a ditch near Horsey, collected by J. Groves on 10th July 1912, were referred by him to P. trichoides in Bot. Soc. & Exch. Club Brit. Is. iv. 166 (1915); these are P. pusillus.]

* This gathering (wrongly ascribed to Straker) was placed along with the Hedge Court plant under P. franconicus f. spicatus (err. aspicatus) by A. Bennett in Journ. Bot. iv. 19 (1919). The same remarks apply as in the preceding footnote.

† Dr. R. W. Butcher has informed us that the plate of P. trichoides in Butcher & Strudwick's 'Further Illustrations of British Plants' (1930), p. 374, t. 392, was based on a plant from Old Woking. The figured plant is certainly P. pusillus, but some of the accompanying analyses do not agree with that species and are either inaccurate or derived from another source. Thus fig. B shows a fruiting-carpel with muriculate back, fig. C' an apical stipular sheath, and fig. D the apex of a leaf which appears to have a midrib and two marginal nerves meeting at the tip.
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(28) West Norfolk. The localities cited for P. trichoides in W. A. Nicholson's 'Flora of Norfolk' (1914), p. 152, include Little Ryburgh, Shipdham, Walpole St. Peter, Terrington, and Wimbotsham, all in West Norfolk. We cannot material from any of the localities. [A gathering from a drain between the R. Nar and Shouldham Warren, made by J. E. Little on 25th June 1914, was referred with some doubt comment on these records, however, as we have not yet seen between the R. Nar and Shouldham Warren, made by J. E. Little var. Correctly recorded specimens were gathered in Hammond's Eau (Ref. 1915) and in the Mepal Engine Drain (Ref. 3112) and in the Mepal Engine Drain near Ely, by H. and J. Groves on 2nd Aug. 1884.

(29) Cambridge. Fryer in Journ. Bot. xxxv. 446-447 (1897) correctly recorded P. trichoides from the parish of Mepal. His specimens were gathered in Hammond's Eau (Ref. 3077, 3102, and 3112) and in the Mepal Engine Drain (Ref. 3105 and 3142). Further material was collected at Mepal by Drury and Fryer in Aug. 1909, and in Hammond's Eau by E. W. Hunnybun on 9th Sept. 1909. We have also seen a specimen gathered in Crooked Drain, near Ely, by H. and J. Groves on 2nd June 1894.


(31) Hunts. We have examined specimens collected at Brocas by G. C. Druce in Aug. 1905 and at Holme Fen by E. W. Hunnybun on 9th Sept. 1909. They are correctly named P. trichoides.

(33) East Gloucester. P. trichoides var. Trimmeri was reported from an old brick-pit near Gloucester by A. Bennett in Bot. Soc. & Exch. Club Brit. Is. v. 131 (1918). The plant was collected by Miss Todd and is P. trichoides. Specimens were also obtained near Gloucester by A. S. Montgomerie in 1916 and by Mrs. Wedgwood in 1921, while J. W. Haines collected material at Walham, just north of Gloucester, on 10th June 1915.

(32) Anglesey. N.C.R. Cors Ddygai, Malltraeth, H. Davies (Herb. Brit. Mus.). These specimens were labelled by Davies as "another rather uncommon appearance of Pot: pusillum", and were determined by A. Bennett as P. pusillus var. tenellissimus. They were collected by Davies about the beginning of last century, and it would be interesting to know whether the species still occurs in the region.


(88) Mid Perth. P. trichoides was recorded for the first time from Scotland by A. Bennett in Journ. Bot. li. 336 (1913), the record being repeated in Bot. Exch. Club & Soc. Brit. Is. iii. 305 (1914) and in Trans. Perth. Soc. Nat. Sci. vi. 6 (1914). Bennett's material, which is now in the British Museum Herbarium, was collected in White Moss Loch, Dunning, by J. R. Matthews on 4th Sept. 1913. It represents P. pusillus in a sterile condition.

(89) Down. A. Bennett in Journ. Bot. xix. 312 (1881) reported P. trichoides from Co. Down on the basis of material sent to him by D. Orr with the label "Pools, Conlig hill, Co. Down, D. Orr, 1844". The material is now in the British Museum Herbarium, and is correctly named P. trichoides, but the record cannot be accepted since the accuracy of Orr's labels is very much open to question. Stewart and Corry, in their 'Flora of the North-east of Ireland' (1888), p. 303, refused to credit the locality assigned to the plant by Orr, and placed P. trichoides among the "plants excluded".

P. trichoides is obviously a species of very sporadic distribution in Britain, even if we assume that all the records not dealt with in the present note are correct. Most of the known British stations are in south-eastern England (especially East Anglia), the remaining ones being sparingly scattered in south-western England, the Midlands, Anglesey, and Scotland. The species may, however, be commoner than is supposed, and possibly has been overlooked in some at least of the intervening areas. We have seen gatherings of P. trichoides mixed with P. pusillus from countries as distantly separated as England, Kashmir, and Southern Rhodesia, and it is clear that these two species favour similar ecological conditions. P. trichoides should therefore be sought wherever P. pusillus occurs.

THE BRITISH BRYOLOGICAL SOCIETY.

By Eleonora Armitage.

The above Society held its Annual Meeting and Excursion at Bundoran, Co. Donegal, Ireland, from June 19 to 26, 1937, under the presidency of Mr. J. B. Duncan, Berwick-on-Tweed. About twenty members and friends were present. Thirteen of the party went on to Achill Island, Co. Mayo (I. 27) for another week. In East Donegal (I. 34) the Bundoran sand-dunes were explored, and two excursions were made up the
River Erne—one from Ballyshannon and the other from Belleek; the latter included a small area of Co. Fermanagh (I. 33). But the chief interest centred in the range of the Darty Mountains in Counties Leitrim (I. 29) and Sligo (I. 28). The excursions here included the attractive valleys of Gleniff with Annacoochee Rocks, Sligo, and Glenade, Leitrim; also in Sligo was the huge bluff of Ben Bulben, facing towards the Atlantic, with very steep wet grassy slopes, and, near the summit, the great curved wall of precipitous rock, the jutting cliffs of which are deeply grooved. This walk taxed the climbing powers of the bryologists, though the cliff-top was but 1500 ft., and the grassy summit beyond was 1700 ft.

A good deal of rain impeded the walks on Achill Island (I. 27). The bog land near Dugort was interesting, and the cliffs, rocks, and Corrie of Slievemore held many bryophytes. One day the barren summit (2204 ft.) of Slievemore was reached. Crooghaun has precipices of over 1000 ft. At Keel and Doogah were sandy stretches of beach.

The Annual Meeting took place on June 22. The following elections were made: President and Treasurer, Mr. J. B. Duncan; Vice-President, Miss E. Armitage; Secretary, Mr. A. Thompson. The next meeting is to be at Llangollen for the Berwyns in August 1938.

The *Sphagnum* list has been collated by Mr. A. Thompson; all are now v.c. records. Most of the Mosses and Hepatics are also new or interesting.

**Sphagnum.**


Irish Mosses (new county records starred.)


ACHILL ISLAND MOSSES.


HEPATICOS.


NOMENCLATURE OF THREE SPECIES OF CAESALPINIA.

BY J. E. DANDY AND A. W. EXELL.

As we have had occasion to examine the nomenclature of three well-known species of Caesalpinia L., and find that our conclusions are not in agreement with the generally accepted names, we make this attempt to clear up the problem.

The first species concerned is C. Crista L. Sp. Pl. i. 380 (1753). It has long been recognized that Linnaeus included in his protologue elements belonging to two species, the one usually known as C. Naga (L.) Alt., the other as C. bondawilla (L.) Fleming. Here no doubt exists about the taxonomy; the difficulty lies in typification and application of the name. The complete citation in the 'Species Plantarum' is as follows:—


Acacia gloriae, lentiscifolio, spinoso, flore spicato luteo, siliqua magna. Pluk. abm. 4. t. 2. f. 21.

Christa pavonis, glycyrrhize folio, minor repens spinosisimae, flore luteo spicato minimo, siliqua latissima echinata. Breg. ic. 58. t. 28.

Habitat in Zeylano."

There is no specimen named C. Crista in the Linnaean Herbarium, so that in choosing the lectotype we have to consider the three syntype elements represented by Linnaeus's synonyms. These three elements are: (1) the 'Flora Zeylanica' citation (Hort. Ups. 102 merely repeats this and the other two synonyms); (2) the Pluket figure; and (3) the Breyneus plate. The citation in the 'Flora Zeylanica', p. 69, n. 157, consists of three parts: firstly the Pluket reference quoted in the 'Species Plantarum'; secondly Kuburrwael. Herm. zeyl. 12; and thirdly a description worded as follows:—Rami lignosi, solidi, glabri. Folio duplicato-pinnata, foliolum ovatis, glabria (absque acuminem setaceo), in singulo partiali folio 3 paria remotis. Flores glabri, in racemis laxioribus, magis tabiati. Fructus Guillardina. This description was clearly drawn up from the material of Kuburrwael on fol. 68 of vol. i. of Herrmann's Herbarium (now at the British Museum) except for the words Fructus Guillardinae, which presumably were based on the cited Pluket figure since there is no fruit

† The three species are not always included in the genus Caesalpinia. thailandina L. is sometimes maintained for two of them, and Tcanto Adans. for the other. This, however, does not affect the questions of typification involved; nor does it alter the fact that all three species are (and probably will continue to be) placed in Caesalpinia by many authors.
with Hermann's material. The brief note about the fruit is, however, scarcely diagnostic, and it is obvious that Hermann's material must be regarded as typifying the 'Flora Zeylanica' reference in Linnaeus's protologue of C. Crista. Hermann's plant belongs to the species usually known as G. Nuga (L.) Ait. f., and was so identified by Trimen in Journ. Linn. Soc., Bot. xxiv. 141 (1887). The Plukenet figure, which is the second syntype element of C. Crista to be considered, was taken from a specimen now in the Sloane Herbarium, vol. xcv. fol. 6, at the British Museum. This specimen, which Linnaeus never saw, is referable to the species commonly known as C. bonduella (L.) Fleming, as also is the Breynius plate which forms the third syntype element of C. Crista.

Linnaeus's definition of C. Crista—"Cassalpinia folis ovatis integerrimis—" is too short to be conclusive, but the evidence, as far as it goes, is that it was taken from the 'Flora Zeylanica'. The word ovatis agrees particularly well with Hermann's material, although allowance must be made for the fact that Linnaeus used the term ovatis in a very wide sense. Thus we see that, although the specific epithet Crista came from the Breynius synonym, the brief definition applies well to Hermann's specimens which are the only existing material seen by Linnaeus; further, that the first reference quoted is based on this material, and that the geographical note Habitat in Zeylona certainly refers to it. The balance of evidence, therefore, seems clearly in favour of regarding Hermann's material as lectotype of C. Crista L., and this name should thus be applied to the species commonly known as C. Nuga (L.) Ait. f. and not to the one known as C. bonduella (L.) Fleming.

Merrill (Interpr. Rumph. Herb. Amboin. 260-262 (1917)) came to the opposite conclusion, and used the name C. Crista in the same sense as Urban (Symb. Antill. ii. 269 (1900)); but we consider that he did not give sufficient consideration to the facts here stressed, and especially that he did not realize that the 'Flora Zeylanica' citation must be typified by the Hermann material (owing to the description given) and not by the Plukenet synonym.

It is interesting to follow the later history of C. Crista in Linnaeus's own works, for in such a controversial case any lectotype indicated either deliberately or inferentially by Linnaeus might have some influence on a decision made now. In his 'Systema Naturae', ed. 10, vol. ii. p. 1018 (1759), Linnaeus added to his definition of C. Crista the words pininis trijugis, apparently referring to the number of leaflets in each pinna. The origin of this extra information was probably the phrase in stipula partiali folio 3 partia remota in the 'Flora Zeylanica' description quoted in full above. Thus the Hermann material is again indicated and our view confirmed.

In the second edition of the 'Species Plantarum', vol. i. p. 544 (1762), we find that C. Crista was entirely reconstituted, not emended in the ordinary sense. The Breynius reference beginning Christa paconis (now corrected to Crista paconis) was here (p. 545) transferred to the new species Guilandina bonduella, and the Plukenet synonym was placed under G. Bonduce, while the 'Flora Zeylanica' element regarded by us as lectotypical of C. Crista was completely omitted. Linnaeus apparently abandoned his original conception of C. Crista and applied the name (with a new definition worded Cassalpinia caule aculeato, foliis ovatis, floris pentandris) to a concept coinciding with 'Cassalpinia folis duplicato-pinnatis foliolis ovatis integerrimis floribus pentandris Mill. Gard. Dict., ed. 7 (1759), which is O. brasiliensis L. There is no evidence as to what Linnaeus now thought of the 'Flora Zeylanica' plant, but it is quite definite that he no longer retained in C. Crista the Plukenet and Breynius elements which Urban and Merrill regarded as typifying the species.

The second species with which this paper is concerned is Guilandina Bonduce L. Sp. Pl. i. 381 (1753). Owing to a misapprehension by Roxburgh, who transferred G. Bonduce to Cassalpinia while describing a different species, there has been considerable confusion. The lectotype of G. Bonduce, and hence of Guilandina Bonduce (L.) Roxb., according to our interpretation, must undoubtedly be taken from the Hermann material indicated by the citation Fl. zeyl. 156, which includes a description drawn up from Hermann's specimens. These comprise two flowering gatherings preserved in Hermann's Herbarium, one in vol. ii. fol. 17, representing Kuburnuvel, and one in vol. iii. fol. 35, representing Arbor exotica spinosa foliis lenticis. The two gatherings are, as near as can be, identical, and belong to the species commonly known as C. bonduella (L.) Fleming; they both agree with the description given by Linnaeus in the 'Flora Zeylanica', but the one in vol. iii. fol. 35 (representing Arbor exotica etc.) shows the characteristic foliaceous stipules and so therefore take it as the lectotype of G. Bonduce. There are two specimens named G. Bonduce in the Linnean Herbarium, and these are conspecific with Hermann's plants. Thus there is no question of the identity of G. Bonduce, and, in fact, this has not been a matter of controversy in recent times.

That Roxburgh (Fl. Ind. ii. 362 (1832)) in publishing the name Cassalpinia Bonduce referred the synonym Guilandina Bonduce to Willd. 2. 534 is of no significance since in the 'Flora Indica' he invariably cited Linnaeus's species by reference to Willdenow's edition of the 'Species Plantarum'. Hence there is no evidence that Roxburgh's intention was to transfer Guilandina Bonduce (non L.) Willd. to Cassalpinia. Actually Willdenow's account
of G. Bonduc was practically copied from the second edition of the 'Species Plantarum', in which Linnaeus had himself reconstituted G. Bonduc so that it comprised elements belonging to two species.

We are well aware that it is possible to take the contrary view of Caesalpinia Bonduc, i.e., that Roxburgh regarded Willdenow's Guilandina Bonduc as a misidentification and therefore intended C. Bonduc Roxb. (not C. Bonduc (L.) Roxb.) to be a new specific name, the epithet Bonduc being used over again. This would make it impossible legitimately to transfer Guilandina Bonduc L. to Caesalpinia. In our opinion there is insufficient justification for this interpretation and every probability that Roxburgh considered that he was transferring Linnaeus's Guilandina Bonduc to Caesalpinia. Thus the species usually known as C. bonducellea (L.) Fleming or more recently, and in our view erroneously, as C. Crista L. becomes C. Bonduc (L.) Roxb. emend.

There remains for consideration the third species—the one confused by Roxburgh with Guilandina Bonduc and hence widely known as Caesalpinia Bonduc Roxb. Merrill (Interpr. Rumph. Herb. Amboin. 261 (1917)) took up for this species the name G. Jagade Maza (in An. Soc. Esp. Hist. Nat. xix. 234 (1890)), but this name is illegitimate since Maza cited several legitimately published specific names as synonyms, including Guilandina Bonduc L., G. bonducella L., and glycyrhiza aculeata Forsk., the latter two under the var. cyanosperma. The oldest legitimate name for the species appears to be Bonduc majus Medic. (Theod. Specios. 43, t. 3 sup. (1786)). It is true that Medicus cited Guilandina Bonduc L. as a synonym of B. majus*, but his description and the rest of his synonymy clearly indicate that his species was the one with which we are now dealing. No doubt he interpreted G. Bonduc from the second edition of Linnaeus's 'Species Plantarum' and therefore referred it to B. majus. Thus the correct name for the third species (when placed in Caesalpinia) seems to be C. major (Medic.), comb. nov. It is worthy of note that the genus Guilandina major (DC.) Small, used for the species in some recent works, was based on Guilandina Bonduc var. majus DC., which was founded independently of Bonduc majus Medic. Small's name stands if the genus Guilandina is retained.

The nomenclature here proposed is based on conclusions which conform with those reached by Skeels in a paper entitled “The Method of Types Applied to the Nickernut,” presented to the Botanical Society of Washington in 1913 and summarized in ‘Science’, new ser. xxxvii. 921-922 (1913), except that he retained the second and third of our three species in Guilandina.

* Owing to the rule against tautonyms, B. majus is a legitimate name despite the inclusion of C. Bonduc L. by Medicus.

In the summary mentioned, however, no detailed arguments were given for the results arrived at. We appreciate the convenience of the nomenclature here proposed, but feel that a completely unprejudiced investigation leads to it. All the necessary materials have been available to us in the British Museum Herbarium, and we hope that the position now arrived at can be regarded as stable.

The relevant synonymy of the three species is as follows:


Caesalpinia aculeis recurveis, foliolis ovatis L. Fl. Zeyl. 69, n. 157 (1747) pro parte, excl. syn. Pluk.

Nagae silvarum Rumph. Herb. Amboin. v. 94, t. 50 (1747).


This is the smooth-fruited species usually known as C. Nuga (L.) Ait. f.


Crista paviae Glycyrrhizea folio, minor, repens, spinosisima, folio lutoe spicato minimo, siliqua latissima echini, semine rotundo cinereo, lineis circularibus cincito, major Breyn. Prodr. ii. 38 (1689). —Breyn. f. in Breyn. op. cit., ed. nov. 58, t. 28 (1739).


Acacia floriae Lentinse folio spinosa folio spicato lutoe, siliqua magna muricata Pluk. Phytoogr. t. 2, fig. 2 (1691); Alm. Bot. 4 (1696).


Caesalpinia aculeis recurveis, foliolis ovatis L. op. cit. 69, n. 157 (1747) pro parte, quoad. syn. Pluk.
3. Caesalpinia major (Medic.) Dandy & Exell, comb. nov.


Boudouc majus Medic. Theod. Specios. 43, t. 3 sup. (1786) excl. syn. L.


Guilandina Bonduc var. majus DC. Prodr. ii. 480 (1825).


This is the Grey Nickar, a species with aculeate fruits and leaden-grey seeds, commonly known as C. Bonduc Roxb.


This is the Yellow Nickar, a species with aculeate fruits and yellow or yellowish grey seeds, usually known as C. Bonduc Roxb.
In the paper quoted above Ventenat published with descriptions the new genera and species from plates 31–42 inclusive (parts six and seven) of the as yet unpublished second half of the 'Choix de Plantes.' These are thus validly published in 1807. Strangely enough two of them are cited correctly in the 'Index Kewensis,' and the others incorrectly.

In a further paper in the same journal entitled 'Observations sur la famille à laquelle il faut rapporter les genres Samyda et Casearia' (Mém. Math. et Phys. Inst. Nat. Fr. 1807, 2: 142–155 (1808)) Ventenat described the new species from plates 43–47 inclusive (making part eight with t. 48). These citations antedate those from the 'Choix de Plantes,' though probably published in the same year.

As these two papers are quoted in the 'Choix de Plantes' we now know that plates 31–42 (parts six and seven) were published after January 16, 1807, and plates 43–48 (part eight) after January 18, 1808.

This leaves plates 49–60 (parts nine and ten). The names published in them date from the 'Choix de Plantes,' as apparently they were not published previously by Ventenat in any other work. All we know definitely about the dates of plates 49–60 (parts nine and ten) is that they were published after January 18, 1808. In an obituary of Ventenat, however (see Journ. de Bot. 1. 39 (1808)), 'Choix de Plantes' is spoken of in a way which suggests that the work was then complete, and the sentence "La mort vient d'enlever ce savant botaniste à l'âge de 51 ans, au moment où il venoit de terminer ses deux derniers ouvrages ..." also indicates that 'Choix de Plantes' had been completed before Ventenat's death, which took place on August 14, 1808.

Thus, unless more definite information ever becomes available, one cannot go far wrong in assigning the date 1803 to plates 1–30 and 1808 to plates 31–60.

The information obtained is summarized below, the dates which are almost certain being printed in clarendon:

**Fasc. 1** ... Plates 1–6. 1803. New names not published previously elsewhere.

**Fasc. 2** ... Plates 7–12. 1803. New names not published previously elsewhere.

**Fasc. 3** ... Plates 13–18. 1803. New names not published previously elsewhere.

**Fasc. 4** ... Plates 19–24. 1803. Certainly before February 19, 1804. New names not published previously elsewhere.

**Fasc. 5** ... Plates 25–30. 1803. Certainly before April 20, 1804. New names not published previously elsewhere.


**Fasc. 7** ... Plates 37–42. 1808. As fasc. 6.
In this last post he wrote the first part of Gamble's 'Flora of the Presidency of Madras.' Other writings were mostly on various genera of the Leguminosae.

He was one of the gentlest of men, and some of the tenets of Christian Science which he adopted were natural to him. Beyond them he acquired outwardly a very great control of a very sensitive nature, and bore with fortitude a long illness.—I. H. B.

BOOK-NOTES, NEWS, ETC.

A PLEASANT ceremony took place in the Department of Botany on May 31st, when colleagues and friends presented the Keeper of Botany with the robes, cape, and hat of the doctorate of science of Coimbra University. Mr. A. J. Wilmott, in making the presentation, spoke of the close association of the Department with the investigation of the flora of Angola, which dated from the friendship between Welwitsch and Robert Brown, and which led to a profitable co-operation with Portuguese botanists made feasible by the enthusiasm and organizing ability of the late Professor L. Carrisso. The Portuguese Ambassador was unable to be present, but was represented by Dr. Ferreira da Silva; Dr. F. A. Mendonça represented the University of Coimbra.

Many botanists throughout the world who know of the splendid work done by Dr. T. A. Sprague and Miss M. L. Green on the 'Index Kewensis' and on botanical nomenclature will be interested in the following announcement, which appeared in 'The Times,' May 10, and will wish to add their congratulations and good wishes:—

"Dr. T. A. Sprague and Miss M. L. Green. The engagement is announced between Thomas Archibald, sixth son of the late Dr. and Mrs. Thomas Bond Sprague, of Edinburgh, and Mary Leititia (Mamma), second daughter of the late Rev. Philip William and Mrs. Green, of Llywel, Brecon."

SOUTH LONDON BOTANICAL INSTITUTE.—This Institute was founded and endowed by A. O. Hume, in 1910: it is situated at 323 Norwood Road, S.E. 4. "The sole object for which the Institute is established is to promote, encourage and facilitate, among the residents of South London, the study of the science of botany exclusively." On the death of the founder in 1912 he was succeeded as President by Dr. A. B. Rendle who continued in office until January last. At a meeting of the Council of Management on February 20th, Mr. J. Ramsbottom was elected President.

CAPT. F. KINGDON-WARD has proceeded on a plant-collecting expedition to the Assam Himalaya. He will be away until early next year.

CONTRIBUTIONS TO THE STUDY OF BRITISH ELMS.

I. WHAT IS GOODYER'S ELM?

By R. Melville, Ph.D., F.L.S.

In 1633 the second edition of Gerard's 'Herbal' was published. Thomas Johnson, as editor, made use of the opportunity for revising many of the descriptions of plants and inserting additions. He was aided in this work by John Goodyer, of Maple Durham, Weston, near Petersfield, Hants, an able botanist, and one responsible for adding a number of new species to the British flora as it was then known. Among the descriptions for which Goodyer was responsible are four of elms, two of which were described for the first time in this edition of the 'Herbal.' It is the second elm of this series with which we are concerned, the "Ulmus minor folio angusto scabro. The Narrow-leaved Elm."

The informative account of the tree which follows the phrase name reads:—

"2. This tree is like the other* but much lesser and lower, the leaves are usually about 2½ ins. long and an inch and a quarter broad, nikt or indented about the edges and with one side longer than the other as the first hath; and are also harsh or rough on both sides, the barke or rinde will also stripe as the first doth: hitherto I have not observed either the foures or seed or blisters on the leaves, nor have I had any sight of the timber, or heard of any use thereof. This kind I have seen growing but once, and that in the hedges by the highway as I rode between Christ Church and Limington in the New Forrest in Hampshire about the middle of September 1624, from whence I brought some small plants of it, not a foot in length which now, 1633, are risen up ten or twelve foot high, and grow with me by the first kinde, but are easily to be discerned apart, by any that will look on both."

The illustration which accompanies this account is in the somewhat conventional style current at the time. It depicts a branch with rather narrow and acutely serrate leaves, with objects apparently intended for fruits distributed in a haphazard manner over leaf and branch. Goodyer states plainly that he saw neither flowers nor fruit, and it is evident that this picture has nothing to do with his elm, for it is an exact copy of that used earlier by Dodoens in his 'Pemptades' (1616) for a different elm, probably correctly referred to U. nitens Meech.

The small plants Goodyer brought back with him from his excursion were most probably rooted suckers of perhaps one year's growth. They grew to 10 or 12 feet high by 1633, and were

* The first elm is that now known as U. procera Salisb.
therefore about ten years old at that time. It is interesting and probably important that the date 1633 is mentioned, since it is also the date of publication of the description. Goodyer saw the tree growing in the wild but once, and it is highly probable that he compiled his description from the saplings in his garden shortly before sending it to Johnson. It follows that the plants described could not have borne a mature type of foliage, as elms of about ten years' growth normally have a juvenile type of leaf. Such juvenile leaves generally differ somewhat in shape, and are invariably much more rough and hairy than adult leaves of the same species. It is possible, also, that Goodyer's recollection of the tree in the New Forest may have been mainly of this type of foliage, which would have been common in the hedgerow growth. If this view is accepted it will account for much of the difficulty botanists have encountered in trying to fit Goodyer's description to the foliage of a mature tree.

Goodyer's descriptions of the four elms in Gerard's 'Herbal' were certainly much better than any hitherto published. For a time they became the standard copied by other writers, including Miller. In the first edition of the 'Gardeners' Dictionary' (1731) Miller gives as his third elm "Ulmus; minor, folio angusto scabro. Ger. Emac. The small-leaved or English Elm." The descriptive part of Goodyer's account is omitted, and Miller states further on that "the first four sorts are very common in divers parts of England." This statement, together with the change in the vernacular name, arouses the suspicion that Miller had misidentified Goodyer's elm.

Miller gives no further particulars of this elm in the various editions of the Dictionary until the seventh edition (1759). The phrase name is then changed to the following:

"3. Ulmus foliis ovatis acuminatis duplato serratis basi inequalibus.—This is the Ulmus folio angusto scabro. Ger. Emac. 1480. The small-leaved or English Elm."

In the eighth edition (1768) no change is made beyond the addition of the specific epithet "sativa" in brackets after "3. Ulmus." The seventh and later editions contain the additional statement:

"The third sort is commonly known in nursery gardens by the title English Elm, which is far from being a right appellation for it is not a native of England and is only found growing near London or in plantations where the young trees were procured from the neighbourhood of London. Where this tree grows naturally it is not easy to determine, some persons having supposed it was brought from Germany. As this tree is well known it requires no description. Flowers purplish red, generally appear at the beginning of March, but I could never observe any seeds upon this sort."

It is apparent from Miller's account that his Ulmus sativa was most probably an introduced tree, possibly a hybrid, known only in cultivation in the neighbourhood of London. Perhaps at this early date the importation of bastard elm seedlings from the continent had already begun; undoubtedly it has been in full swing for at least a hundred years. But apart from this, other statements in Miller's account are irreconcilable with Goodyer's. If U. sativa were at all common near London in Goodyer's day, he could scarcely have failed to find it. From Druce's account of Goodyer's work (Rep. B. E. C. Suppl. 1916) we know that he had friends in London and must have been a frequent visitor. Furthermore, before the publication of the second edition of the 'Herbal' Goodyer had visited various parts of Hertfordshire, Buckinghamshire, Oxfordshire, Northamptonsire, and Essex. It is inconceivable also that he could have found an introduced tree in what was then a rather remote district of the New Forest of the same kind as any of frequent occurrence near London. Much more probable is the assumption that Goodyer's tree was a local native form and that Miller had blundered in identifying his U. sativa with Goodyer's elm.

Miller's misidentification of this elm has been one of the principal causes of confusion in the nomenclature of British elms. Following Miller, every writer who studied this problem up to recent times has added something to the tangle of nomenclature. There is little point in detailing this chapter of errors. Reference may be made to the paper by Gilmour and Steam (Journ. Bot. 1916, Suppl.), where the more important works are cited under Ulmus minor Mill. sec. Henry. In view of what is to follow mention should be made of Druce's suggestion (loc. cit.) that Goodyer's tree was probably the Cornish Elm (U. stricta Lindl.). Druce also states that the Cornish Elm grows in the New Forest, though there are no specimens of this species or anything resembling it from that area in his herbarium. He came to the conclusion that the Cornish Elm was U. minor of Miller, but this is a view that cannot be maintained, for Miller states that U. minor is "very common in some parts of Hertfordshire and in Cambridgeshire", where U. stricta is found only occasionally as a planted tree. Aiton, also, cited Goodyer's description under his "U. campestris stricta, Cornish Elm" (Hort. Kew., 1789, i. 319), and in Hunter's edition of Evelyn's 'Silva' (1756, 115-16), under U. sativa Mill., appears the statement: "It is by some called the Cornish Elm." However, it is not clear from these early works whether the true Cornish Elm or the Hampshire variety is intended.

Following the study of the literature the next step in the unravelling of this problem was to visit the places mentioned by Goodyer. If the tree were native there should be a good chance of finding it in the district where Goodyer found it originally.
and a rather remote chance of its survival from suckers or seedlings at or near the site of his garden at Maple Durham. Both places were visited during August 1837. Maple Durham House is marked on old one-inch to a mile ordnance maps. It lies just west of the Portsmouth Road, near the small village of Weston, about two miles south of Petersfield, and the Southern Railway runs through a part of the grounds. There is still a derelict house with outhouses on the site and a neglected orchard partly enclosed by old walls. The only elms seen here or anywhere in the immediate neighbourhood were forms of *U. procera*. There were remains of several large dead trees, probably of this species, close to the house, but nothing recalling Goodyer's description of the Hampshire elm was found.

The country between Lymington and Christchurch was explored on 20 August, starting from Lymington. At Pennington, about a mile to the west of Lymington, the road dips into a small hollow. Here a number of elms were seen, all of an unfamiliar kind. The foliage of mature branches closely resembled that of *U. stricta*, but the habit was very different. The trunks were rather short, with several ascending branches spreading to make a dome-shaped head, the longer branches of which were generally more or less clothed with a growth of short epicormic shoots* giving rise to a "mossy" appearance. The branches of *U. stricta* growing in Cornwall in exposed places not far from the sea often have a similar epicormic growth; killing back of branches either by drying winds or salt spray appears to stimulate it. However, at Pennington and elsewhere along the coastal plain between Lymington and Christchurch this particular type of elm bore the epicormic growth on its branches when growing in sheltered situations. It may be a normal feature, therefore, and not dependent on adverse conditions. Sucker shoots and saplings of the tree had rather small, narrow leaves roughly hairy on both surfaces. The change from the juvenile to the adult type of foliage appeared to be a gradual process occupying a number of years in the life of an individual. Young trees 15-20 ft. high were not fully mature when judged on this character. The foliage of epicormic shoots was more or less intermediate in shape and indumentum between the juvenile and adult types.

Some reasons for believing that Goodyer described the shoots of an immature tree have been advanced above. The juvenile forms of the trees at Pennington agreed in every particular with Goodyer's description, and were growing in the district he mentioned. Material was collected from two mature trees about 40 ft. high, one young tree about 18 ft. high, and from hedgerow growth about 10 ft. high. The exploration was then continued to determine whether this kind of tree was common in the neighbourhood. Between Pennington and Milford-on-Sea several trees and much hedgerow growth with narrow rough leaves were seen. From Downton to Wootton Hill there were many more trees of the same type on the damper soils. No elms were encountered on the dry gravelly soils about Wootton Hill or elsewhere in the Forest. The tree was common between Wootton Hill, Bashley, and Hinton, and in all the area mentioned so far it was a common hedgerow tree to the exclusion of all other kinds of elm. A few *U. glabra* Huds., *U. hollandica* Mill. var. major Rehd., and *U. stricta* Lindl. var. *sarniensis* (Loud.) Moss were seen, but only in parks and planted copses. Passing westward to Winkton and Sopley the tree was found in company with *U. procera*, but became less frequent as the Avon Valley was traversed to Ringwood. East of Ringwood no further specimens were found once the dry gravels were reached. It is highly probable from the distribution, so far as it is known, that this is a distinct native race of elm, and possibly endemic. There is very good reason to believe that it is the tree that Goodyer described from this neighbourhood, for there is no other common elm along the coastal plain of south-west Hampshire that will fit his description.

Although the tree differs markedly in habit from typical *U. stricta*, there are so many points of similarity in the foliage and branchlets that it is considered preferable to describe this elm as a variety of *U. stricta* rather than to give it specific rank.

*Ulmus stricta* Lindl. var. *Goodyeri*, var. nov., a typo ramis ascendendibus, capite plus minusve rotundato, lateribus foliorum basi latioribus minus cuneatis, marginibus magis composite serratis recedit.

The broad crown with ascending branches is shown in the habit sketch of a tree by the roadside near Pennington, not far from Lymington (fig. 1, E). This may be contrasted with the photograph of typical specimens of *U. stricta* published as "*U. stricta* Moench. var. *stricta Henry*" in Thurston's "Trees and shrubs in Cornwall," tt. 33 & 34. The mature leaves are subcoriaceous and somewhat cupped on the upper surface as in the type, but are broader and differ slightly but consistently in shape, as will be noticed when adult distal and subdistal leaves of short shoots are compared. The most obvious divergence in the outline occurs near the base on the long side of such leaves. In var. *Goodyeri* this part of the leaf is broad, much as in var. *sarniensis*, but it is narrow in the type. The leaves are therefore broad-based, in contrast with the relatively narrow wedge-shaped base in the type. The serrations of the margin in the upper half of the distal and subdistal leaves of adult short shoots frequently have two or three secondary serrations, whereas those on comparable leaves of the type are simple or have one or rarely two secondary serrations.
The indumentum of adult leaves is similar. The petiole in relation to the length of the lamina is nearly twice as long as is usual in the type, which varies to some extent in this character. The somewhat tufted arrangement of the terminal branchlets and almost complete absence of simple hairs on them, excepting the axillary tufts, are other features common to both.

It is not possible to convey in words the exact shapes of asymmetrical leaves, but their outlines can be defined with exactitude by a series of rectangular co-ordinates obtained by a method already described (Ann. Bot. n. s. i. 4, 1937). Co-ordinates are expressed as percentages of the length of the lamina; for convenience the co-ordinate of length is written as the numerator of a fraction and that of breadth measured from the midrib in each half leaf as the denominator. Outlines based on the mean co-ordinates derived from ten comparable leaves from one tree for distal and subdistal leaves of adult short shoots are shown in fig. 1, C & D. The co-ordinates for these are as follows:

Distal leaves, short side.—6/0, 10/7, 20/15, 30/22, 40/26, 50/28, 60/26, 70/23, 80/15, 90/6, 100/0.
Distal leaves, long side.—3/0, 0/4, 10/18, 20/24, 30/27, 40/28, 50/28, 60/26, 70/21, 80/14, 90/6, 100/0.
Mean length of lamina 4·7 cm.

Subdistal leaves, short side.—8/0, 10/7, 20/17, 30/24, 40/27, 50/29, 60/28, 70/24, 80/16, 90/7, 100/0.
Subdistal leaves, long side.—4/0, 0/6, 10/21, 20/26, 30/30, 40/32, 50/32, 60/29, 70/24, 80/16, 90/7, 100/0.
Mean length of lamina 4·3 cm.

It is obvious that any of these measurements can be converted into absolute terms by reference to the lamina length, which is given in centimetres.

The leaves of sucker shoots and young saplings are narrow, oblong to lanceolate, subequal at the base, and roughly hairy. They are generally narrower than in the type. The change from this juvenile foliage to the smooth, relatively broad, and symmetric adult form is a gradual process occupying a number of years. Foliage of a 10-ft. sapling is shown in fig. 2, A, and a shoot from a sucker in B. It is evident from the arguments advanced earlier in this paper that Goodyer must have been describing shoots resembling A or B, and from the age of his plant probably similar to A.

Epicormic shoots (fig. 2, C) bear leaves intermediate in character between sucker leaves and those of adult branches. They are generally more or less roughly hairy. Proleptic shoots* from epicormic shoots (tip of fig 2, C) or from adult branches

* Proleptic shoots are vigorous shoots continuing the axis of a branchlet, developing after normal growth for the year has ceased.
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revert to the narrow juvenile form. This phenomenon of the transformation of proleptic shoots is a common feature of elms, and such leaves may be compared in different species and varieties.

Fig. 2.—A. Shoot from a 10-ft. sapling, near Pennington, S. Hants, upper surface. (Ref. no. 37.122.) B. & D. Shoots from suckers of different ages from the tree at Bashley, S. Hants, upper surface. (Ref. no. 37.123.) C. Epicormic shoot terminated by proleptic shoot from tree at Bashley, lower surface. (Ref. no. 37.123.)

Both sucker leaves and those of proleptic shoots are narrower in var. Goodyeri than is usual in the type.

It is regrettable that road-widening operations during the winter 1937–8 resulted in the destruction of the tree illustrated in fig. 1, E, and the sapling Ref. no. 37.122.

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SOME PRELIMINARY NOTES ON THE DRIFTWEED AROUND WORTHING.

BY LILIAN LYLE.

The excessive amount of seaweed cast up on the shores of Worthing and its neighbourhood has for years aroused discussion as to its origin and methods of disposal. Last July some driftweed was collected at East Preston, about six miles from Worthing. It was a slimy mass of green algae, mostly Enteromorpha and Cladophora, with an admixture of Ceramium, Polysiphonia, and Brongniartella byssoides.

As summer progressed the rejectamenta changed in character, became more abundant, and of an offensive odour. On 6 September a gathering was obtained for examination. There were fewer green algae and more of the red and brown species. Ceramium, Polysiphonia, and Brongniartella byssoides occurred more frequently with the addition of Chorda Filum, Dictyota dichotoma, and Cladostephus spongiosus. As usual in autumn, the algae were beset with epiphytes.

The amount of rotting material was enough to constitute a serious nuisance during the 1937 holiday season, and the municipal authorities followed a practice which had been in use for many years: the drift was collected from the beach, transported offshore, and put back into the sea.

The Nature of the Substratum.

The substratum is a wide expanse of sand, pebbles, and shells. In the neighbourhood of Worthing it is comparatively flat. Shallow banks border the coast from Shoreham to Bognor about one and a half miles in width, and one and three-quarters to three and a half fathoms below the surface. Along the shores of Brighton the sea-floor slopes abruptly into five fathoms of water—a depth which continues in a line westward, outside the shallow ledges across to Selsey Bill, about two and a half miles from Worthing. Beyond, the depth increases to ten fathoms, in a line between Selsey Bill and Seaford, at a distance of five and a half miles from Worthing. Low rocks and reefs are scattered here and there: the largest occur at Bognor, including the Middleton lodge. The Kingsmere lobster grounds lie off Angmering. At Ferring, Kingston, and East Preston there are more rocks; and lastly the Brill rocks near Worthing. These conditions are fairly uniform and extend for about forty miles between Selsey Bill and Beachy Head.

The Type of Vegetation.

As is well known, certain ecological factors (such as nature of substratum, degree of exposure, climatic conditions, etc.)
modify the kind of flora that grows in their vicinity. Here, where the substratum consists of sand, pebbles, and low rocks, with moderate shelter, and fairly equable climate, the vegetation assumes a certain facies typical of these conditions. The type has been named by Cotton (1912) "The Pebble-attached Association of Quiet Bays." The association, he says, is found on a soft bottom strewn with stones and pebbles. A very large number of species go to form it, and they are for the most part characterized by finely divided bushy fronds, though heavier and less bushy plants are found on the larger stones and on the occasional pieces of rock. . . . The association extends from just above low-water mark down into 3 or 4 fathoms." In summer Dictyota dichotoma, Brongniartella byssoides, Ceramium species are largely represented, while later on Polysiphonia nigrescens and Ectocarpus species appear in autumn. These details are closely applicable to the conditions along this part of the southern coast, both as regards nature of substratum and species. Further, the eighty-four species listed do not belong to a rocky habitat, i.e., they are not strictly saxicolous. The alga in that case would be of a different character and include encrusting species, soft or calcareous; and others with long, leathery fronds, stout stalks, and strong, often branched, holdfasts, as Rhodymenia palmata, Laminaria digitata, Halidrys siliquosa, etc. Such vegetation forms another type growing on rocky coasts, e.g., Guernsey, West Cornwall, Hebrides, etc.

In consideration of the distinctive features possessed by the species examined, it may be assumed that the driftweed in the vicinity of Worthing is a product of wide extent along the neighbouring shores. Little, if any, has travelled from far distance. Some weathered samples were found; but the practice of repeatedly returning the drift to the sea would account for their battered appearance.

**Notes on the Species.**

RHODOPHYCEAE. Most of the specimens were fragmentary, especially *Ceramium rubrum*. Those with stout fronds were entire, such as *Chondrus crispus, Furcellariafastigiata, etc.* Small or filamentous kinds were often intact, e.g., *Ceramium tenuestrum, Brongniartella byssoides*. *Rhodymenia palmata* and *Phycodrys rubens* were each represented by a small portion of a frond.

The presence of *Chorda Filum* indicates a similarity to the Channel Vegetable noted by Cotton (1912), which, he says "resembles that of quiet bays." Warming (1920, p. 168) has pointed out how the long unbranched fronds show special adaptation in accordance passive resistance to the undulatory movements of water in conditions of moderate calm and shelter.

**Phaeophyceae.** *Chorda Filum* was remarkably abundant and often bore various epiphytes, as *Ectocarpus confusoides, Ceramium tenuestrum,* etc. Some propagula of *Sphacelaria cirrhosa* were observed to be germinating and producing the parenchymatous bases of the plants.

*Fucus vesiculosus*. One receptacle indicated this species. A fairly large plant belonging to the genus was so denuded that the species could not be determined.

*Halidrys siliquosa*. Two pods had probably been washed up by the tide from a distance. Fronds were entirely absent.

*Laminaria saccharina*. One frond was found among the driftweed examined, very filthy, and overgrown with *Ectocarpus* sp.

**Chaetomorpha intestinalis** and *Cladophora sericea*, with a small amount of *Ulva lactuca*, are the prevalent species. Their appearance in undue amount is connected with the presence of freshwater, and indicates brackish conditions. The Arun at Littlehampton, the Adur at Shoreham, and a stream at Ferring are responsible for much of this growth.

According to Cotton, *Cladophora sericea* (May Fog or Flannel weed) has the reputation of producing a most pungent smell on decay.

**Offensive Smell.**

The offensive smell arising from the driftweed is due to natural pollution of the coastal waters. The decay of a large amount of seaweed fouls the water in a similar way to that of sewage by producing albuminoidal and ammoniacal nitrogen. These compounds act as fertilizers, resulting in a luxuriant and vigorous growth. Conditions are aggravated by returning the driftweed to the sea; for the accumulating products increase in offensiveness and in manurial potency. Marine vegetation will absorb nitrogen with avidity, and, if the latter be present in some form in seawater, the result will be an intensified algal growth. Many and varied are the uses to which driftweed may be applied; but this consideration is more the concern of the manufacturing chemist than the botanist.

The simplest way of disposing of the weed is to cart it inland, there to be dried and burnt, and the ash disposed of to farmers.
In Guernsey the weed is placed on frames or racks and dried in the open. A drying machine is also used, heated by the burning weed.

Any efforts to destroy the growing alge should be regarded with grave hesitation. It is not known to what extent such a proceeding would affect the balance of nature.

The effect of living green algae in purifying freshwater has to be considered. Seaweeds give shelter for spawn, and food for small molluscs and crustaceans, which, in their turn, serve as food for fish—so that seaweeds form the basis of animal life in the sea.

A total reorganisation of the method of sewage disposal of seaborne towns is suggested—for two reasons. In view of the nitrogen content increases likewise.

The effluent has a nutrient value for vegetation, owing to its abundant nitrogen, and may encourage an unwanted excessive growth of small molluscs and erustacea, which, in their turn, serve as food for fish—so that seaweeds form the basis of animal life in the sea.

of putting a sewage effluent, no matter how harmless or sterile, into the sea is to be delayed. Secondly, the most “harmless” effluent has a nutrient value for vegetation, owing to its abundant nitrogen, and may encourage an unwanted excessive growth of algae.

These notes are merely tentative. Further work on the subject is needed, e.g., a survey of the sea-floor. The relative positions and areas of the various plant-communities should be mapped. Analyses of the seawater at different times of the year might show whether, with the seasonal increase of population, the nitrogen content increases likewise.

My best thanks are due to Mr. A. Gepp and to Mr. Geoffrey Tandy both of the British Museum (Natural History) for suggestions, kind help, and interest in the writing of these notes.

List of Algae thrown up at East Preston 6 September, 1937.

**MYXOPHYCEAE.**

Dierocarca rosea Batt.
Spirulina subsalsa Oersted
Calothrix confervicola Ag.

--- aeruginea Thur.

**CHLOROPHYCEAE.**

Enteromorpha intestinalis Link
--- var. bullosa Le Jolis
--- compressa Grav.
Ulva lactuca v. latissima DC.
Bolboodon piiferum Pringsh.
Cladophora Hutchinsiae Harv.
--- utricularis Kütz.
--- aegilops Kütz.
--- glaucescens Harv.
--- recluse Harv.
--- albida Kütz.
--- refracta Arech.

**FUCOIDAE.**

Desmarestia aculeata Lamour.
Litosiphon pusillus Harv.

Asperococcus fistulosus Hooker
Ectocarpus confervoides Le Jolis
--- fasciculatus Harv.
--- granulosus Ag.
Sphacealaria cirrhosa Ag.
--- var. fusca Holm. & Batt.
Cladophyllum spongiosum Ag.
--- verticillatus Ag.
Stypocoleum scoparium Kütz.
Myrionema strangulans and var.
--- punctiforrum Holm. & Batt.
Chorda filum Steach.
Laminaria escharina Lamour.
Fucus vesiculosus L.
--- serratus L.
Halidrys siliqua Lyngb.
Adenocystis pusilla Born.
Dicyota dichotoma Lamour.
Taonia atomaria J. Ag.

**FLORIDEAE.**

Goniolithon elegans Le Jolis
Erythromichia carnea J. Ag.

NOTES ON THE DRIFTWEED AROUND WORTHING

Purpura umbilicalis Kütz.
--- viviparum Daviesii Nag.
--- compressus Batt.
--- tenuisculptus Batt.
--- crispa Steach.
--- membranifolia J. Ag.
--- pilosa Fries
--- purpureum Batt.
--- bifida Kütz.
--- confervoides Grav.
--- palmata Grav.
--- pusilla Harv.
--- coccinum Lyngb.
--- ramosum Batt.
--- rubens Batt.

Hydrolytrum Woodwardii Kylin
--- inermis incruste Batt.
--- dasyplyta Ag.
--- caeruleum J. Ag.
--- elongata Grav.
--- nigroecne Grav.
--- byssoides Bory
--- fuscicula Batt.
--- tenue Grav.
--- rubrum Ag.
--- fastigiata Lamour.
--- membranaceum Foil.
--- rupestris Ellis & Sol.

List of Epiphytes on Algae thrown up at East Preston.

Peronospora rosea Batt. on Cladophora sp.
Spirulina subsalsa Oersted
Calothrix confervicola Ag. on Ceramium rubrum.
--- aeruginea Thur.
--- piiferum Pringsh. on Ceramium tenue Grav.
--- utricularis Kütz. on Cladophyllum spongiosum.
--- piliferum J. Ag. on Ceramium rubrum.
--- v. fusca Holm. & Batt. on various algae.
--- strangulans Grav. and var. punctiforme Holm. & Batt. on Ulva lactuca var. latissima.
--- pusilla Born. on various algae.
--- elegans Le Jolis on Ceramium rubrum and Oxytactum purpureum.
--- carnea J. Ag. on Ceramium rubrum.
--- viviparum Daviesii Nag. on Ceramium rubrum.
--- compressus Batt. on Ceramium rubrum.
--- membranaceum Foil. on Phyllophora membranifolia.
--- rubens Ellis & Sol. on Cladophyllum spongiosum.

REFERENCES.


NEW GENERA IN UMBELLIFERAE.

BY C. NORMAN, F.L.S.

The two genera described below, occurring as they do each in an area extremely remote from the other both geographically and botanically, have none the less one feature in common—the unusual development of the involucral bracts. And that they are so completely unlike each other may serve to show how great is the possible range of development of these organs.

CHLAENOSCIADIUM, gen. nov. juxta Centellam Linn. referendum. Calycis dentes obsoleti, petala ovata apice inflexo. Fructus didymus, ambitu sub rotundatus tuberculato-rugosus, a latere valde compressus basi cordatus; juga inconspicua (vel absentia!). Umbello composito paucifloro. Involucrum phyllo maxima glumacea primum flores omnino celantia (sicut species Compositarum) demum explicientia. Herba caespitosa caulibus multis floreis; folia simplicia angusta, flores albii.

Species 1, from the Coolgardie district of Western Australia.

Chlaenoscladum Gardneri, sp. nov.

Herba perennis sericeo-pubescent, caespitosa; caules plurimi ±10 cm. longi tenues plurumque prostrati. Folia basalia lineolare lanceolata acute ±5X·5 cm. versus basim manifeste attenuata, margine remote dentata vel rarius integra; folia caulina sessilia lanceolata acuminata ±1 cm. longa.

Umbello composito breviter pedunculato foliis caulinae oppositis radiis 3 crassis, complanatis vix ·5 cm. longis; umbellulae 5-floro, flores omnes fertiles brevissime pedicellati. Involucrum phyllo 6, rigida conspicua ±8 mm. longa, tria lati-, tria angustolanceolata acuminata: involucellorum 3 eis involucro consimilia sed minora flores multo superantia.

Fructus (immaturus) a latere valde compressus, aureus, tuberculato-rugosus; styli sat longi e disco depresso orientes.

Western Australia; between Yellowdine and Bronti, Coolgardie District C. A. Gardner s.n. (type; State Herb. W. Australia; Brit. Mus.). This interesting genus belongs to the Hydrocotyloideae-Hydrocotyleae-Hydrocotylinae group of Drude’s classification, and seems nearest to the South African genus Centella, some species of which have well-developed but very different involucral bracts of both kinds and somewhat similar leaves, e.g., Centella capensis (L.) Domin.

In Schoenolaena Bunge (in Drude’s Hydrocotyloideae-Hydrocotyleae-Xanthosiinae group) the development of the involucral bracts is almost identical, but the fruit and leaf characters are widely different, so that perhaps the similarity of the bracts,
admittedly a most striking feature, may be accounted for on the assumption that similar causes may produce similar effects in allied plants, rather than by assuming that such similarity necessarily indicates generic identity. In our plant the umbels are much reduced, but in addition to the flowers of the umbellules there are a few subsessile on the somewhat swollen apex of the peduncle. The fruit unfortunately not truly ripe is of a rich golden colour.

Mr. Gardner has drawn my attention to the fact that though occurring in the hot arid country round Coolgardie this plant was in full flower in December—the height of summer.


Species 1, from Sikkim and the Chumbi valley.

Pleurospermopsis sikkimensis (C. B. Clarke), comb. nov.


Sikkim: Kankola; Yeumtang, J. D. Hooker (Kew); Yakla, C. B. Clarke 9798 (Kew); Jongri, J. D. Hooker (Kew), C. B. Clarke 26207 (lecto-type of _Pleurospermum sikkimense_ C. B. C., Kew); 26164 (Kew); 26179 (Brit. Mus.); T. Anderson 620 (Brit. Mus.), Cheumsanthang; Ribu and Rhomoo 6688 (Kew), Akthang; Ribu and Rhomoo 6621 (Edinburgh); Chumbi Valley: Yatung Hobson s.n. (Kew); Mee rik la King's Collector 638 (Kew).

In Records Bot. Survey of India, iv. 376 (1913), Sir W. W. Smith gives the following localities in Sikkim, where he collected specimens:—Changu, Tosa, Ningbil, and Gnatong. These specimens are in Calcutta and have not been seen.

I do not think that this plant is admissible as a _Pleurospermum_, even on the widest interpretation of that genus, the fruit bears but little resemblance to that of _Pleurospermum_, but is much closer to that of _Ligusticum_ (L. scoticum), from which the remarkable involucels clearly exclude it. Nor are they the involucels of _Pleurospermum_. In that genus they are
always flaccid, with age shrivel, and are more or less deciduous, on old plants often completely so.

In *Pleurospermum* they are stiff, almost prickly, strongly persistent if not accrescent and of a different form, and more numerous than is usual in *Pleurospermum*.

It is true that *Pleurospermum Candollii* (DC.) C. B. Clarke bears much outward resemblance to our plant, especially in the leaves; but it seems to me that the involucels in *P. Candollii* and the fruit so far as it is known are those of *Pleurospermum* in the wide sense. It is quite extraordinary how difficult it is to get specimens of this common plant with fruit that is even approximately ripe.

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**CREPIS FOETIDA AND FOUR CLOSELY RELATED SPECIES.**

BY E. B. BARCOCK.

*Crepis foetida*, the Stinking Hawksbeard, has long been recognized by European botanists as an extremely variable or polymorphic species. Numerous subspecific forms have been named and described, many of them as “species.” In fact a monotypic genus (*Rodigia*) was erected by Sprengel in 1820 for the disposition of a species which I find it necessary to merge with *foetida*. As a result of extensive studies on herbarium material, examination of the chromosomes in numerous cultivated strains, and hybridization experiments involving various subspecies and strains, I have concluded that *C. foetida* sens. lat. is a Rassenkreis in the essential meaning of that term, although the present distributional areas of the subspecies of *C. foetida* overlap to a greater extent than is apparently implied in the definition of Rensch.*. A plausible explanation of the origin and present status of this Rassenkreis is suggested by the following hypothesis:

1. Three closely related species were involved: *C. foetida* L. (including the southern form, *C. glandulosa* Guss.), *C. rhoeadifolia* Bieb., and *Rodigia commutata* Spr.
2. Preceding or during the period of differentiation of these species they became geographically isolated: *C. foetida* in southwestern Europe; *C. rhoeadifolia* in the Caucasus region; and *C. commutata* in Asia Minor.
3. Eventually all three spread until they met in western Asia Minor or the Balkan Peninsula, and, through hybridization, gave rise to the intergrading forms connecting them into a Rassenkreis.

(4) Meanwhile each of the original species becomes polymorphic through mutation, so that many local races exist.

5. The combined result is an extremely variable complex of minor variations caused by gene mutations and intergrading forms resulting from hybridization.

Thus for taxonomic purposes it is necessary to treat the three original species as subspecies of a single inclusive species. There is already good precedent for doing this with respect to *C. foetida* and *C. rhoeadifolia*. The inclusion of *C. commutata* as a subspecies is supported both by the study of specimens collected in the wild and by cytologic and genetic investigation.

During the course of these studies two new, well-marked, and geographically separated species have come to light, namely, *C. eritreensis* and *C. Thomsonii*. These species show affinity with *C. foetida* sens. str. in certain respects, and with *C. foetida commutata* in others. It can hardly be questioned that they all evolved from the same ancestral stock. The evidence from morphology, cytology, and genetics on which these conceptions are based will be presented in a later paper.

Two other species, long since described, but as yet comparatively little known, are included in this paper—*Crepis Schlimperi* Sch. Bip. is closely related to *C. eritreensis*, and *C. Bureiana* Boiss. is closest to *C. Thomsonii*.

The purpose of this paper is to place on record the present taxonomic treatment of these five species.

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**Key to the Species.**

Involucere cylindric or campanulate; outer involucral bracts lax and more or less conspicuous in fruiting heads; marginal achenes subterete or, if subcompressed, not unequally so dorsally and ventrally.

Corolla in marginal florets 12-18 mm. long or, if smaller, the inner florets without reddish purple ligule-teeth; anther-tube usually 3-4 mm. long; inner achenes 10-15-striate .......... *C. foetida*.

Corolla in marginal florets 7-10 mm. long, the ligule-teeth on all the florets reddish purple; anther-tube about 2 mm. long; inner achenes 10-20-ribbed.

Involucere cylindric or turbinate in fruit, the inner bracts becoming carinate but not strongly enclosing the marginal achenes; achenes monomorphic, long-beaked.

Plant 1-3 dm. high, the whole plant hispid with setiform hairs; inner involucral bracts 15-20; corolla-tube 5 mm. long; style-branches 1 mm. long; achenes reddish brown, coarsely beaked; endemic in Abyssinia .......... *C. Schlimperi*.

Plant 2.5-5.5 dm. high, the whole plant hispidulous with fine soft hairs; inner involucral bracts 12 or 13; corolla-tube .4 mm. long;
CREPIS FOETIDA L., Sp. Pl. ii. 807 (1753) (sens. lat.).

Annual, rarely biennial, or short-lived perennial (?) herb, 1–5 dm. high, ± hispid; cauline leaves oblanceolate, dentilcate to bipinnate, petiolate; cauline leaves elliptic, ovate, lanceolate or linear, sessile, auriculate, runcinate to deeply pinnatifid with linear lobes, ± incised near the base; stem erect, branched above or from near base, branches strict, divaricate, decumbent or prostrate; few- or many-headed; peduncles somewhat inflated or constricted at the base, branches strict, divaricate, decumbent before anthesis; heads medium to large, many-flowered; involucral bracts broadly campanulate, the inner bracts broader, the longest 4–7 mm. long, 2-seriate, petiolar, ciliate but not paleaceous; pappus 4–7 (mostly 5–6) mm. long.

CREPIS FOETIDA subsp. vulgaria (Bisch.), comb. nov.—Crepis barbata Mill., Gard. Dict. ed. 8. n. 2 (1768), non L.; Picris foetida Lam., Pl. Fr. ii. 108 (1778); Barthaussiae foetida F. W. Schmidt, Samml. Phys. Aufs. i. 283 (1795); Wibelia graveolens Gaert. Mey. et Scherb., Fl. Wett. iii. 144 (1801); Hostia foetida Moench, Meth. Suppl. 221 (1802); Barthaussia graveolens Link, Enum. Hort. Berol. ii. 290 (1822); Crepis foetida Link, ex Buch., Phys. Bes. Canar. 147 (1825), non DC.; C. graveolens Schrad., ex Steud., Nom. ed. 2. i. 436 (1840); Anisodoris foetida Fisch. et Mey., Ind. Sem. Petropol. 32 (1835–42); Wibelia foetida Sch. Bip., Cich. n. 64 (1841); Crepis foetida B. occidentalis a. borealis Webb. et Berth., Phyt. Canar. ii. 438 (1896–97); C. foetida a. vulgaris Bisch., Beitr. 252 (1851); Hirsucodes foetidum O. Kurtze, Ges. i. 346 (1891); C. foetida var. typica Hae., Conspl. Fl. Græc. ii. 216 (1902).

Western, central, and southern Europe to Crimea; and, including all the forms listed below, Egean Archipelago, Crete, and Cyprus; Asia Minor, Syria, and north-western Persia.

O. foetida vulgaria:


f. pinnatifida (DC.), comb. nov.—Crepis glandulosa β pinnatifida DC., Prod. vii. 158 (1838).—Sicily.

f. Candollei (Spr.), comb. nov.—Barthaussia Candollei Spr., Syst. ii. 657 (1826); DC., Prod. vii. 158 (1838).—Natural habitat unknown; authentic spec. in Herb. DC. ex hort.
CREPIS FOETIDA AND FOUR CLOSELY RELATED SPECIES

C. foetida rhoeadifolia:

f. byzantina (DC.), comb. nov.—Barkhausia byzantina DC., Prod. vii. 158 (1838).—Constantinople.


f. hispidissima (Koch), comb. nov.—Barkhausia rhoeadifolia var. hispidissima Koch in Linnae., xxii. 685 (1850).—Caucasus.

f. subdivisa (Schur), comb. nov.—Barkhausia foetida var. subdivisa Schur in Verh. Naturf. Brünn, xxxvi. 208 (1897).—Czechoslovakia.


Crepis foetida subsp. commutata (Spr.), comb. nov.—Rodigia commutata Spr., Neu Endl. 1. 273 (1820); Seriola commutata Less., Syn. 131 (1832); Barkhausia hirta Koch in Linnae., xxiii. 687 (1850); Crepis brachypappa Bornm. in Beih. Bot. Centralb. xxii. 118, t. 19 (1814).

Cret, Ægean Archipelago, eastern Greece, southern Bulgaria, Asia Minor, northern Syria, and eastward to western Persia.

C. foetida commutata:


f. bulgarica (Vel.), comb. nov.—Rodigia bulgarica Vel., Fl. Bulg. 262 (1891); R. commutata var. bulgarica (Vel.) Stoj. et Stef., n. herb.

f. graecis (Freyen et Sint.), comb. nov.—Rodigia graecis Freyn et Sint. in Oest. Bot. Zeit. xiv. 259 (1894).—North-west Asia Minor.

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Crepis eritreensis, sp. nov.
Herba annua 2·5–5·5 dm. alta; planta tota hispidulosa; folia caudalicia oblanceolata, denticulata vel dentata, gradatim attenuatæ in petiolum alatum; folia caudina inferiora similium vel pinnatifida, alia sessilia lyrato-pinnatifida subaquitecta; caulis erectus superne ramosus, rami elongati stricti corymbosi, vel ad basim ramulos, rami divaricati arcuati vel stricti, ramuli ultimi cum 2–3 capitulis nutantibus; pedunculi 1–5 cm. longi; capitula mediorum ad maturitatem erecta circa 60-flora; involucra turbinata 7–10 mm. longa; squame exteriores circa 11 inaequales lineares virides ad apicem purpureae; squame interiores 12–13 aequalis lanceolatae acute ventraliter pubescentes ad maturitatem carinate et spongioso-ineressatas; receptaculum areolatum cilatum; corolla 10 mm. longa, ligula 6 mm. longa 1·25 mm. lata flavo in dentibus purpureis; tubus 4 mm. longus glabrescens; antherae 2 mm. longe; rami styli 1·75–2·5 mm. longi; achenes uniformia exteriores breviores omnino ad maturitatem obscure fusca 8–11 mm. longa, corpus 3·5 mm. longa abrupte attenuata in rostro tenuissimum circa 15-costatum, costæ tenues dense spongiculatae pappus flavidus 4–5 mm. longus 2-seriatus tenuissimus ex involucro fructifero exserto persistens.

Southern Eritrea from 800 to 1400 metres altitude.


Crepis eritreensis is closely related to C. Schimperi Sch. Bip., of Abyssinia, but the two differ significantly in many characters. Although they occupy rather closely adjacent areas, apparently they are confined to different altitudes. Furthermore, C. Schimperi flowers during autumn and winter, whereas C. eritreensis is a spring-flowering plant. These two species have as their nearest relatives C. Thomsonii and C. foetida.

Crepis Thomsonii, sp. nov.
Herba annua, 0·5–3·5 dm. alta; caudex brevissimus attenuatus in radicem ligneam; folia caudalicia rosulata oblanceolata ramosa vel pinnatifida petiolata parce hispidula; caulina similia vel lanceolata sessilia subfasciata laciniata ad basim; caules numerosi ascendentes vel semidecumbentes, rami pauci elongati pedunculati vel cum 2–4 capitulis glauco-purpureis; capitula magna multi-fiora virginea nutantia; corolla 7–9·5 mm. longa, ligula circa 6·8 mm. lata flavo in dentibus purpureis, tubus 3–4·5 mm. longe pubescentis; corolla 2 mm. longa; rami styli 0·75–1·25 mm. longi; achenes fusca 20-costata biiformia, marginalia 5·5–7·5 mm. longa valde compressa lateraliater attenuata in rostro erussum ventraliter valde spiculata, interiora 7·5–12 mm. longa fusiformia paululum tetragona attenuata in rostrum tenue; pappus flavidus 5·5–6·5 mm. longis 2-seriatus tenues persistens.

Northern and north-western India, especially submontane Punjab; Afghanistan and Baluchistan.


Crepis Thomsonii was confused with C. foetida by C. B. Clarke (Comp. Ind. 252 (1876)) and J. D. Hooker (Fl. Brit. Ind. iii. 393 (1885)). But it is very distinct from C. foetida in both flowers and fruits; and the distributional areas of the two species are separated by a region (eastern Persia) where a related but still more distinct species, C. Burensiana, occurs.

Many of the available herbarium specimens of C. Thomsonii are deparnurate forms. Only the more typical specimens are cited above.


Annual herb, 1–3 dm. high, hispid with yellow setiform hairs; caulinae leaves oblanceolatae, dentate to pinnately partite, petiolate; caulinae leaves similar or sessilis; stem erect, branched above or from near base, the branches long, mostly 1-furcate, 1·5–10 cm. long; heads nodding before anthesis, erect in flower and fruit, about 60-flowered; involucrum cylindric-turbinate, about 10 mm. high, 5 mm. wide; outer bracts 10, linear, dark green; inner bracts 15–20, lanceolate, becoming carinate and dorsally thickened, ventrally pubescent towards tip; receptacle areolate, ciliate; corolla about 10 mm. long; corolla-tube 5 mm. long; anther-tube 1·8 mm. long; stylo-branches 1 mm. long, yellow; achenes reddish brown, about 10·5 mm. long; achenes 0·75–1·25 mm. wide, monomorphic but unequal in length, gradually attenuate into a rather coarse beak equal to the body, about 15-ribbed; pappus yellowish, 5–6 mm. long, completely extruded, persistent. (Barkhausia Schimperi Sch. Bip., ex A. Rich., Voy. Abyss. i. 466, 1847; Hieracodes Schimperi 0. Kuntze, Gen. i. 346 (1891)).

Central and northern Abyssinia, 1600–2200 m. alt.; hills, fields, and waste places; abundant around Abba Gerima in 1862.
The type-collection is Schimperi iter Abyss. Sect. i.: plantae Addiscenses, 295. The plants are somewhat variable in size and habit as a result, no doubt, of variations in local environmental conditions. They are more robust under cultivation (cf. spec. in Herb. Hort. Berol.), but they retain the distinctive features of leaves, habit, and inflorescence.

Crepis Schimperi is closely related to C. eritrensis, but it is clearly distinguished from it by the hispid indumentum, especially on the involucrure; by the fuscate, two-headed branches and longer peduncles; by the copious, longer, yellow pappus; by the reddish brown achenes, which are shorter, relatively wider, and more coarsely beaked, with the beak equal to the body; and by various characters of the flowers and leaves. Apparently the two species are isolated geographically, but even if they are not so isolated they appear to be restricted to different altitudes. C. Schimperi ranging from 1600 to 2200 m., whereas C. eritrensis occurs between 800 and 1400 m. Furthermore, C. Schimperi produces its flowers during autumn and winter, whereas C. eritrensis is a spring-flowering plant. All these conditions, taken together, seem to assure practically complete, if not complete, isolation of the two species. Living material of C. Schimperi has not been available for experimental investigation.

Crepis Burenniana Boiss., Fl. Orient. iii. 823 (1875).

Annual herb, 0-5–3 dm. high, more or less tomentose and gland-pubescent; cauline leaves oblanceolate, runcinate to lanceolate, sessile, pinnatifid, petiolate; cauline leaves oblong to lanceolate, sessile, auriculate-amplexicaul, dentate; stem erect, divaricately branched from near the base or above the middle; peduncles 2–8 cm. long, slender below, wider near the head; heads nodding before anthesis, erect in flower and fruit, many-flowered; involucre globose-turbinate, 10–12 mm. high and about as wide, densely pubescent with long eglandulose hairs, canescent-tomentose, shortly gland-pubescent; outer bracts inconspicuous, sometimes very short, sometimes one-third as long as the beak; inner bracts between the navicular inner bracts in fruit; inner bracts about as long as the beak; achenes stramineous or yellowish, dimorphic; the marginal achenes about 5 mm. long, strongly compressed, with the dorsal part thin or almost alate; achenes, convex, smooth, whitish or yellow; inner achenes 7–11 mm. long, terete, fusiform, attenuate into a slender paler beak equal to or longer than the body, 10–15-ribbed, ribs narrow, extruded, persistent. (Crepis Kotschyana Boiss., Fl. Orient. iii.)

OBRIBIARIES.

FREDERICK JANSON HANBURY
(1851–1938).

FREDERICK JANSON HANBURY was born at Stoke Newington on 27 May, 1851, and died at East Grinstead on 1 March. He was the eldest son of Cornelius Hanbury and grandson of the Cornelius Hanbury who in 1795 had entered into partnership with William Allen in the famous pharmaceutical business of Allen and Hanbury. F. J. Hanbury was educated at the Friends' School, Grove House, Tottenham. After an apprenticeship, and studying at the College of the Pharmaceutical Society (1871–2) he joined the family business and worked with his father and his cousin, Daniel Hanbury; from 1916 he was Chairman of the firm. Quite early he became interested in flowering plants, and there is a note by him in this Journal for 1871 recording the finding of 

Galium tricorne at Stoke Newington.

In the following year he was awarded the silver medal of the Pharmaceutical Society for the best herbarium of British plants; he collected seven hundred specimens in one year.

A note in the Journal for 1873 states that he had begun to gather material for a flora of Kent, apparently at the suggestion of Henry Trimen, who, for four years previously, had completed (with W. T. Dyer) the scholarly 'Flora of Middlesex.' From this date, during many years, most of his leisure was spent in the personal investigation of the plants of the county, but with increasing pressure from a successful business he had eventually to seek the collaboration of the Rev. E. S. Marshall; the 'Flora of Kent' was published in 1897, and immediately took its place as one of the best of our country floras. He contributed many notes to this Journal, principally on new Kent records, Scottish plants.
Charles Francis Massey Swynnerton was born on 3 December, 1877, in India, where his father was Senior Chaplain to the Indian Army. He was educated at Lancing, and went out to Southern Rhodesia at the age of nineteen to learn farming. While there he became interested in the birds and plants of Mashonaland and also studied mimicry in insects. Later he turned his attention to tsetse flies and in 1921 pointed out the possibility of reducing this terrible scourge by controlling the particular types of vegetation in which they breed. Shortly afterwards he was appointed Game Warden of Tanganiky Territory, the main part of his work being directed to the tsetse problem; in 1928 a Tsetse Research Department was founded with Swynnerton as Director. After this he himself paid less attention to the taxonomic side of botany, as he had a botanical taxonomist on his staff, but he remained convinced that the only hope of success in controlling the tsetse was to regard the problem as an ecological one with an equilibrium which can be upset if due attention is paid to the part played by vegetation. The results obtained by Swynnerton and his staff were described in 'The Tsetse Flies of East Africa' 1936. Some of his botanical collections were enumerated in 'A Contribution to our Knowledge of the Flora of Gazaland,’ which appeared in the 'Journal of the Linnean Society' for 1910. The genus Swynnertonia (Asclepiadaceae) is named in his honour.

Bernard Dearman Burtt was born at York, 14 June, 1902, the son of Dr. Arthur H. Burtt, lecturer in Botany at Reading University. He was educated at The Friends’ School, Ackworth, going then to University College, Aberystwyth, and afterwards to Reading. After working for a time at Kew as a temporary botanist he assisted his relative, Dr. J. Burtt Davy, in the preparation of the ‘Flora of the Transvaal.’ In 1926 he was appointed a District Reclamation Officer in Tanganiky and shortly afterwards joined the staff of the Tsetse Research Department as Survey Botanist. Here he found full scope both for his energies and his interests. His whole heart was in collecting, and it was a great disappointment to him when he was unable to obtain leave to join the British Museum Expedition to Ruwenzori. He was an excellent collector, but although he always made voluminous notes he was not sufficiently interested in the literature of the subject to enjoy writing; he made an excellent collaborator. In the ‘Kew Bulletin’ for 1934 he wrote an account of a botanical reconnaissance of the Virunga volcanoes; he had made a collection of 455 plants from the eight volcanic peaks. The genus Commiphora was of importance in his tsetse work, and he wrote an account of the Tanganiky species in 1935, rectifying some of the old species and describing five novelties.

He collected many species new to science and the epithet Burttii will ensure the recognition of his excellent field-work. One
of the most interesting of his discoveries was a new genus of Comnaceae, named Burtia in his honour. It is a low shrub with flowers like cherry blossom and constitutes a portion of the great thicket area in the Singida district.

When he left England a few weeks ago he was full of schemes for immediate and for future work. He was always a welcome visitor in the Department of Botany, not perhaps more for the botanical treasures he always brought than for his hearty cheerfulness and lovable personality.—E. G. B. & J. R.

ALEXANDER ZAHLBRUCKNER
(1860–1938).

On 8 May, 1938, the death occurred in Vienna after a short illness of Dr. Alexander Zahlbruckner, former Director of the Vienna State Museum of Natural History.

Born in 1860 in St. Georgen near Pressburg (Bratislava), he was educated there, and at the University of Vienna, where the degree of Doctor of Philosophy was conferred upon him in 1883. Three years later he entered the botanical section of the Vienna State Museum of Natural History as scientific assistant. In 1918 he was appointed Director of the Museum, retiring in 1922.

Although it is in lichenology that Zahlbruckner's name shines so brightly, from time to time he also published important contributions to phanerogamic botany, his work on the systematy of the Lobeliaceae deserving special mention. His published works, however, deal mostly with lichenology in its systematic and floristic aspects. It may safely be said that Zahlbruckner achieved an intimate acquaintance with the lichen-flora of almost every region of the world where lichens have been collected. The results of these studies are contained in about one hundred papers published between 1886 and 1936, and the classification of lichens which he framed in Engler and Prantl's 'Die Natürlichten Pflanzenfamilien' (1898–1907, 2nd ed. 1926) is likely to hold the field for many years to come. The greatest gratitude of all lichenologists is due to him for his enormous work 'Catalogue Lichenum Universalis,' a conspectus of all lichen-genera, species, varieties, and forms published since the time of Linnaeus; its publication, which started in 1921, was completed in 1934 in nine volumes. Bringing, as it does, order into the previous chaos of incredibly involved synonymy, it is one of the greatest gifts ever made to the science of lichenology. Zahlbruckner also edited the second edition of Rabenhorst's 'Kryptogamenflora von Deutschland, Oesterreich und der Schweiz,' having for this purpose obtained the co-operation of eminent European cryptogamic botanists; the work is still in progress. Mention must also be made of the important exsiccate, 'Lichenes raciores exsiccati' and 'Cryptogamae exsiccatae,' which he issued from 1884 onwards.

Of a kindly and retiring nature, and ever willing to place his immense knowledge at the disposal of others, Dr. Zahlbruckner left to all who had the privilege of personal acquaintance with him a vivid impression of geniality combined with an apparently unlimited capacity for arduous scientific research and organisation. Lichenologists in all parts of the world deplore the death of one of the greatest of their number, and will pay enduring homage to his memory.—I. M. L.

BOOK-NOTES, NEWS, ETC.

LINNEAN SOCIETY.—The 150th Anniversary of the foundation of the Linnean Society was celebrated on 24–27 May. Owing to the number attending the meetings, the sessions were held in the rooms of the Royal Institution. The opening meeting was at 3 o'clock on 24 May. A loyal message was sent to H.M. the King, and a letter was read from H.M. the Queen expressing a wish to become an honorary member of the Society. After welcoming the guests the President alluded to the fact that to mark the centenary of the Society an annual award of a Linnean Medal had been instituted; the medal for this year was handed to Professor Sir Wentworth D'Arcy Thompson.

In his Address Mr. Ramsbottom pointed out that in studying the work of Linnaeus it must not be assumed that his opinions remained unchanged throughout the whole of his career; incidental observations must be interpreted in their relation to the particular subject under discussion; and we must guard against reading into some isolated sentences the germ of a theory formulated at a later date. The Mosaic account of the creation led to the deduction by some of the doctrine of the fixity of species, but several of the early Fathers of the Church did not regard it as conveying scientific as distinguished from moral and spiritual truth. Linnaeus enunciated the doctrine in his 'Philosophia Botanica,' 1751: "Of the species of plants we reckon so many as there were different forms created in the beginning by the infinite Being: and these forms, according to the appointed laws of generation, have always produced offspring like themselves." But 'Philosophia Botanica' was simply a collection of didactic aphorisms written for Linnaeus's pupils. When we turn to the series of dissertations of his pupils over which he presided we find that so early as 1744 he had discussed the possibility of new species of plants arising by hybridization, and this subject was constantly before him in his work on hybridisation undertaken to prove the sexuality of plants. Thus in
1761 he questions if "a genus is nothing else than a number of species sprung from the same mother of different fathers."

"But whether all these species be the offspring of time, whether in the beginning of all things the Creator limited the number of future species, I dare not presume to determine." In 'Species Plantarum,' 1753, there are many notes which show the trend of Linnaeus's thoughts. Thus after describing four species of *Scorpiurus* he adds: "It is beyond doubt that all these formerly arose from a single species."

Linnaeus's system of nomenclature and his sexual system of plants gave such security in the working out of the vast accumulation of collections that all attempts to introduce a natural system which Linnaeus regarded as the primum et ultimum of botany were resisted. Linnaeus's ideas and later developments were outlined up to 1858, when, in the rooms of the Society, the famous communications of Darwin and Wallace were read.

At the end of the Address the keys of two of the three cases in which the Linnaean herbarium came to England were handed to Professor R. E. Fries; the one case to go to the Swedish Linnaean Society, the other to the Linnean Museum at Hammerby.

The following morning there was a symposium (to which the address on the previous day served as an introduction) on "The Concept of Species from the Time of Linnaeus to the Present Day"; the principal speakers were Sir Edward Poulton, Professor E. W. MacBride, Sir Arthur Smith Woodward, Professor Ø. Winge, and Dr. K. Jordan. This was followed on Thursday morning by a symposium on "Geographical Isolation and Species Formation"; here the principal speakers were Dr. Julian Huxley, Professor P. A. Buxton, Dr. E. Fischer-Piette, Dr. B. Rensch, and Professor C. Skottsberg.

A dinner was held on 25 May and a reception on 26 May. Visits and excursions occupied the afternoons and 27 May.

'Mycopathologia.'—This new quarterly is edited by R. Ciferri and P. Redaelli, and published by W. Junk, now of the Hague. The periodical is to be devoted entirely to fungi pathogenic to man and other animals, a branch of mycology more neglected in this country than almost anywhere else. The editors belong to the active Italian school and are both well-known authors. The first number contains 80 pages with eight papers and a Bibliographia Mycopathologica; the papers are in English, French, and Italian, and deal with many aspects of the subject, from nomenclature to allergy in *Monilia* and yeast infections. The annual subscription is 18 Dutch Florins.

Erratum.—The publisher of Professor G. W. Robinson's "Mother Earth" is Thomas Murby and Co., not Thomas Murphy and Co., as given on p. 117.
For some years past I have been accumulating mosses from several parts of tropical East Africa, and it seems desirable to put on record some of the more interesting of these. In the following list I have described the unpublished species, and have recorded some of special interest or rarity, or marking an extension of distribution.

The collections include:

(a) Several made by various collectors and sent from Kew for determination. The collectors include P. Chandler, W. J. Eggeling, Dr. Geilinger, P. J. Greenway, etc.

(b) Uganda and Kenya mosses collected by the late R. A. Dummer, mostly at high altitudes.

(c) Large collections made in Kenya Colony and Uganda by P. G. Balbo, and sent for determination from the Istituto Missioni Consolata at Turin, with a few collected by P. B. Favaro at Egoji, Kenya Colony.

(d) A collection made by Prof. J. H. Priestley and Miss L. I. Scott in 1930, in Kenya Colony.

(e) The mosses collected by Dr. G. Taylor during the British Museum Expedition of 1934–35.

(f) Mosses collected by Miss M. S. Budd in Uganda.

The types of the new species are in my herbarium; and also,

(a) in Herb. Kew; 

(c) at the Istituto Missioni Consolata, Torino; 

(d) in the Herbarium of Leeds University; 

(e) in Herb. Mus. Brit.


Sphagnaceae.

Sphagnum Pappeanum C. M. var. sparsiforme Warnst.—Kinangop, Aberdare Mts., Kenya Colony, 4300 mm., 3 Jan. 1909; coll. G. Balbo (330, 334, 352). Rocks in heath forest, just above stream, Namwamba Valley, Ruwenzori, Uganda, 3300 m.; coll. G. Taylor (2986). A very robust form, with stems a foot long, and 3 cm. across the frond, the branches 1 cm. long and more, prettily coloured with orange-brown and red.

Journal of Botany.—Vol. 76. [August, 1938.]
Sphagnum macromolliusum Dix., sp. nov.


Folia ramea 2 mm. longa, 0-75 mm. lata, sicca adpressa vel leniter patula, ovato-lanceolata, nullo modo acuminata, apice lato, 3-4-dentato, limbo angustissimo, uniseriato, integro, circundata. Pori superficie dorsali sat numerosi, magni, ventrali perpauci. Cellulae chlorophyllosae fere ad basin fibrillose, aporose vel fere aporose.

This species belongs to a small group of which only two other species are known, viz. S. crassilatinum eand S. truncatum Warnst., the distinguishing feature of which is that the pores of the cells of the branch-leaves are numerous and catenate on the ventral surface of the leaf. In both these species the branch-leaves are broadly ovate, little inflected in the upper part, and broadly pointed to truncate with several apical teeth. In the present plant the upper margins are strongly involute, so that the leaf tapers to an acute narrow point.

ANDREAEACEAE.

ANDREARIA KILIMANDJARICA Par.—This interesting and remarkable subspecies was collected on Ruwenzori, 4500 m., by L. Hauman in 1932; comm. T. Herzog (800).

POLYTRICHACEAE.


POLYTRICHUM SUBFORMOSUM Besch.—Morogoro Distr., Uluguru Mts., 1500 m., Tanganyika Territory, 22 May 1933; coll. B. D. Bartt (4716). Virunga Mts., near Bihungi, 2500 m., Uganda, 1933; coll. W. J. Eggeling (934). Limuru, Kenya Colony, 5 Jan. 1908; coll. G. Balbo (105). The 3 stems with inflorescences one above the other are a conspicuous feature of the species; one stem of 4716 has as many as six of these annual inflorescences.

FISSIDEN'TACEAE.

FISSIDENS PSEUDO-RUFESCENS C. M.—Along Kangheta, 1500 m., Karama, Giombene, Kenya Colony, 12 Nov. 1921; coll. G. Balbo (9, 10). Faughci Valley, 1900 m., near Falls, Mufindi, Tanganyika Territory, 1 April 1934; coll. G. Balbo (4, 28).


FISSIDENS CRATERIS Dix., sp. nov.

§Bryoidium. Pusillus; caulis 4-5 mm. altus, plumosus, 6-7-juga. Folia siccitate paucis crispa-falcata, inferne minuta, mediante oblonga, vel oblongo-lanceolata, acuta, apiculata, ubique limbatata, limbidio lamina vaginantibus valida; costa validiscula, band sinuosa, sepiusa percurrent; lamina dorsalis anguste decurrent. Cellulae 7-8 µ, hexagonae, parietibus angustis; lavisimae, chlorophyllosae. Folia superiora nunc medians similia, plerumque autem multo longiora, angustiora, anguste acuminata. Dioicium videtur. Seta brevis, 5-7 mm., infra thecam paulo dilatata. Theca erecta, minuta, operculata circa 1-5 mm. longa. Exothecii cellulae breviter rectangulares, seriate, parietibus sat crassis. Operculum breviter conico-rostrate, rectum.

A small species, distinguished by its leaves little crisped when dry, the dorsal lamina narrowly decurrent, and especially by the minute erect capsules. F. brachycalyon Broth. has cells 10 μ wide, the stem shorter, 4-juga, the seta longer, and the lid acuminate. Here it is shortostate only, and usually rather obtuse.


Fissidens rugifolius Dix., sp. nov.

§ Bryoidium. E robustioribus Sectionis. Caulis 1 cm. alta, regulariter plumosus, foliis versus summum caulem sensim longioribus, siccos flexuosos, crispo-falcatis, supra forider corrugatis; costa angustissimo, substantia gummosa, subcatenulata, circa 2 mm. longa, e basi distincta, et foliorum apice subcuneatae.

Fissidens thallangae Dix., sp. nov.


Fissidens pachyloma Dix., sp. nov.

§ Pachylomadidium. F. pachyloma C. M. et F. pachyloides

Varde affine; differt foliis siccos forider crispatis, etiam madidis

TROPICAL EAST AFRICAN MOSSES

nepe falcatis, multo brevioribus et latioribus, nullo modo acuminatis, late acutis vel subobtusis, nonnunquam obtusis, costa sub apicem soluta, limbidio rufo supra multo minus valido, haud apicem attenuans. Lamina vaginans circa dimidium folii longitudinem sequans.


A very distinct plant with broadly pointed, almost obtuse leaves, and with a much less stout border than the African species, much crisped when dry and often strongly falcate when moist. A single interrupted row of larger hyaline cells usually occurs on each side of the nerve.

Fissidens longelimbatus Broth.—Tusu, Gasongoro, 2300 m., Kenya Colony, 2 Aug. 1908; coll. G. Balbo (54).

Grimmiaceae.


Grimmia longicaulis Dix., sp. nov.


Fructus ignotus.


A tall lax plant, in many ways of Barbuloid habit and structure, but the hyaline points to the leaves though short are quite distinct, while the supra-basal cells with sinuose walls are quite Grimmioiid. The upper are very small and dense, incrassate with minute lumen, and very irregular in outline.

DICRANEACEAE.

DITRICHUM PALLIDUM Hampe.—On damp rocks, 3200 m., Ruwenzori, Uganda, 7 Jan. 1935; coll. G. Taylor (2988 a).

New to Africa. A very interesting new example of the distributions of palaeartic plants on the high ground of tropical Africa; the distribution of the species as given by Brotherus is the Central European plain and montane country, Caucasus, Japan, and North America.

TREMATHODON AFRICANUS Wager.—Bank of ditch, Kampala, Uganda, 1015 m., Mar. 1936; coll. F. Chandler (1575). I cannot separate this from the African and Rhodesian plant.

TREMATHODON INTERMEDIUS var. nanoWed. & Duby (syn. T. Pechuelii C. M.).—Fuaghi Valley, Mufindi, Tanganyika Territory, near falls, 1700 m., 20 Mar. 1934 (46). Ibidem, near falls, 1900 m., 28 Mar. 1934 (30).

T. Pechuelii is the same as this, and I think it is best considered a variety of T. intermedius.

DICRANELLA HETEROMALLA (Hedw.) Schimp.—Tusu, Kenya Colony, ad jugum Gasongori, 2500 m., on ground, 12 Aug. 1908; coll. G. Balbo (81). Another palaeartic species new to the African continent, though known from the Atlantic Is.

DICRANELLA CAMERUNIÆ (C. M.) Dus.—Crater, in subforest, Mt. Longonot, 2500 m., Kenya Colony, Mar. 1922; coll. R. A. Dummer (5053).


DICRANELLA kenyae Dix., sp. nov.


Dioica. Flos 3 terminalis, polyphyllus, magnus. Seta pallida (ataque fusca), circa 1 cm. alta; theca erecta vel suberecta, parum asymmetrica, fusco-rubra, etate paulo microstoma, leniter plicata; operculum longe, suboblique rostratum. Peristomii dentes irregulariter fissi, striolati, dense trabeculati.


A distinct species in the yellow colour, comose leaves, with long, flexuose, solid, quite entire subula abruptly contracted from the sheathing, very distinct base. The capsules are very slightly asymmetric, with small, scarcely oblique mouth.

DICRANELLA grandisopra Dix., sp. nov.

Fusescens; strictæ; caulis aequaliter foliosus, folia rigide divaricata, e basi vaginante late oblonga sat raptim in subulam contracta; subula sensim angustata, supra tensis, flexuosa, aspera, minute subdenticulata; costa lata, male delimitata, partem superiorem subulam e fere omom occupans; cellulae partis vaginantis lineares, majusculæ, pellucidae, subulae partis inferioris anguste lineares, partis superiæ utroque latere 1-2-seriate, parva, breviter rectangulares, pellucidae. Setæ circa 1 cm. alta, vetustate fusca; theca (vetusta) nigrescens, suberecta, paullo asymmetrica, plicata; peristomii dentes infra fortiter longitudinaliter striolati, supra grosse papillosi. Spori magni, 20–25 μ, granulosi.

Hab. Giombene, Kenya Colony, 8 Nov. 1921; coll. G. Balbo (205). In some respects like Dicranella kenyae, described above, but darker in colour, more rigid, leaves not comose, base less distinct, with longer aeration, subula gradually tapering, not so fully occupied by the nerve, subdenticulate, often markedly denticulate at apex; and particularly distinct in the large spores.

HOLOMITRIUM AFFINE Card. & Thér. var. OBTUSIFOLIUM (Besch.) Thér.—Epiphytic, Mulange, Uganda, 1250 m., Dec. 1911; coll. R. A. Dummer (5623). Ibidem, Sept. 1919 (4236 e).

The plants of this group have been much divided and subdivided, on perhaps rather slight grounds, but the present is a very extreme form, with broadly spatulate leaves widely rounded at apex.

DICRANOMATA BILLARDIERI (Schwaegr.) Par.—Ruwenzori, Congo Belge, circa 3000 m. in Ericetum; July–Aug. 1932; coll. L. Hauman, comm. T. Herzog (44).

CAMPYLOPUS SERRICUSISIS Thér. & Varde.—On rocks in exposed places on mountain top, 1800 m., Mt. Mwapwa, Dodoma Prov., Tanganyika Territory, 29 Aug. 1930; coll. P. J. Greenway (2431).

This agrees well with Verdoorn, M. Sel. et Crit. 12, only being a shorter denser growth, with nerve more longly excurrent. Forming an intermediate link, both geographically and structurally, it suggests a doubt whether the species be really distinct from C. delagoae (C. M.) Par.

CAMPYLOPUS DICRANOIDES Thér. & Nav.—Near Kampala; Uganda, 1926; coll. Miss M. S. Budd (1, 2).

A marked plant, which at the time I recognized as a new species, and gave it a herbarium name equally expressing the Dicranoid appearance. Since then, however, the same plant has been described from Ruwenzori by Thériot & Naveau in Bull. Soc. Roy. Belg. 15 (1927), under the above name.

CAMPYLOPUS TAYLORI Dix., sp. nov. §Eucampylopus. Atrichi. Caules dense compacti, radiculis obriti, circa 4 cm. alti, supra flavo-virides, inferne nigrescentes; folia substricta, subrecta, sicca parum mutata, a basi convoluta sensim angustata, subula aut brevi, stricta, aut longior, sub-capillaceae, integra vel apice 1-2-denticulata. Costa lata, circa 3/5 folii latitudinem implens, cellulis ventralibus magnis, parietibus tenuibus, quam duces multo majores; dorso laevi. Cellulis basilares rectangulares, juxta-costales 2-3-seriebus laxae, inde angustatae, marginales angustissimae, limbus pernotatum instrumentae; alares paucae vel nullae, superiores minuta. Theca equalis vel subequalis; calyptra haud visa.


Distinguished by its slender, very compact, neat habit, the wide nerve, markedly bordered leaves, and almost total absence of distinct alar cells. C. Lavardei Thér. has slightly developed auricles and is without the marginal band of narrow cells. C. paludicola Broth. has a narrower nerve, small but developed auricles, the subula denticulate at margin, and the border of narrow cells much less or scarcely developed: (the description says that the cells are narrowed towards margin, but the figure does not depict them thus).

In Dr. Taylor's gathering two forms are shown, one fruiting, with longer, much more finely subulate leaves, the other sterile, with the subula much shorter and more rigid; but structurally the two seem identical.

Atractylocarpus flexifolius Dix., sp. nov.

A congeneribus africanis different habitu, caulis mollibus flexuosos, caespites molles, sericaces, virides, sat humiles instrumentibus; folis valde flexuosis, apice falcatis, undique divaricatis, nullo modo strictis vel erectis; praedolongis, 1 cm. vel usque ad 1-25 cm. longis, e basi convoluta nitida capillaceae, apice dentato, aline aut integris aut sapsius longe infra apicem minute sed distincte sat distanter denticulatis. Costa lata, tenuis, sectione cellulis bistritatosae homogeneae exhibens. Setae 2-2.5 cm., pallide rubrae. Theca ellipticae, brevis, depressula macrostoma, nigrescens, striata; operculum acuillum; peristomium generis, pulchre rubrum, valde irregulariae sed bene evolutum. Spori parvi, 12-14 μ.


As in most of the species of this genus there is little structural difference in the leaves from the leaves of the allied species, but the habit and foliation are entirely different. In the other African species they are either comparatively short subulate, erect, and appressed, or if longer rather strictly falcate. Here they are soft, flexuose, and widely spreading when dry, or (in no. 3000) strongly falcate-circinate, but still soft and very flexuose in the subula. This too is frequently, perhaps normally, finely and distantly denticulate for some distance downwards.

Atractylocarpus capillifolius Dix., sp. nov.

Densae caespitosis, nigrescentis, nitidae; caulis condensati, erecti, perdenasfolius, supra divis, apice penicillati. Folia e basi convoluta sat cito capillaceae, strictae, usque ad 1 cm. longae, apice pluridenticulatae, infra plerumque integrae, carina parvisima distanter denticulatae. Costa sat angusta, apud basin circa 1/7 folii latitudinem aequans. Seta brevissima, circa 1-5 cm., raro 2 cm. Theca vetusta angusta, atro-fusca.


Near to Metecria alticulata Broth. and M. Navawana Thér., but with much longer, finer subula than the former, and very different from the latter in habit and colour, the tips of the branches being very conspicuously penicillate, and all the leaves more or less erect and appressed.

Leucorhaceae.

Ochrobyrum obtusissimum Dix., sp. nov.

Ab omnibus congeneribus different foliis apice late rotundatis, aut omnino obtusi ait, sapsius, minute apiculatis. Apex acutellatus. Cellulae chlorophylleneae sectione apud basin hypercentricae, superne centricae.

Fructus ignotus.

The different gatherings vary somewhat in form of leaf, no. 2539 having shorter broader leaves than the others, but all agree in the widely rounded cuculate apex, much more obtuse than the S. American O. obtusifolium (C. M.) Mitt.


New to the African continent. A small species, with habit of Ochroberyum.

Calympéraeæ.

Calympéres obtusatum Thér. & Nav.—On Phoenix reclinata, edge of forest patch, Entebbe Road, Uganda, circa 1200 m., June 1937; coll. P. Chandler (1600). Magi, 800 m., Usambara, 10 Aug. 1922; coll. Dr. Geilinger (1281).

Pottiaeæ.

Hymenostomum brachypelma (C. M.) Par.—Kenya Colony, coll. G. Balbo; Karama, Giombene, along Kanghata, 12 Nov. 1921 (9). Associated with F. pseudorufescens C. M. Rather curiously, these two species were associated when originally described. Mogina, 1350 m., on rocks, 23 May 1911 (28). Forest, Giombene, 10 Jan. 1920 (145). Giombene, 2000 m., 8 Nov. 1921 (105). Nyeri Hill, 29 July 1929 (310).


Trichostomum ruwenzorense (Broth.) Broth.—Rocks along Seka, Kenya Colony, 23 Jan. 1908; coll. G. Balbo (316). Mufundi, Tanganyika Territory, coll. G. Balbo; Fuaghi Valley, near falls, 1900 m., 1 April 1934 (4 b); ibidem, 1700 m., 3 April 1934 (73); ad cortices arborum 1900 m., 16 April 1934 (63); 1900 m., 3 Sept. 1933 (11). Nos 11 and 73 are in fruit, which I believe has not been described. Seta circa 5 mm., very thin, pale. Capsule small, cylindric, 2 mm. long or rather more, lid rostrate, about half the length of the capsule; orifice red, with persistent annulus. Teeth orange-colour, in length about one-third the width of the orifice, filiform, rigid, irregularly connected, not papillose.

Trichostomum decurvifolium Dix., sp. nov.

Humile, sordido-viride; caulis paucum mm. altum; folia patula, siccum arcelato-decurva; 3-4 mm. longa, late oblongo-lingulata, ubique fere equilata, apice rotundato, subobtuso, cum costa excurrens robuste longe apiculata. Costa validus, fusca, excurrens. Cellulae superiores minuta, perobscurae, parietibus leuibus, per totum folium fere similis, paucus tantum basiales majores, rectangulares, pellucide.

Cetera ignota.


A small plant, with leaves arcuate in a semicircle when dry, so that the upper part is usually pointing downwards. The leaves are somewhat like those of T. brachydonium Bruch, but more lingulate, almost obtuse with a strong apiculus or cusp at the apex; they are specially marked by the absence of any distinct leaf-base, the leaf being neither widened nor narrowed at the basal part, and the basal cells while distinct occupying only a small part (one-tenth to one-eighth) of the length of the leaf.

Timmiella brevidens Dix., sp. nov.

Caulis brevisissimus. Folia generis, sed apice parce, leniter tament denticulato.


Hab. Musandrama, Uganda, 1926; coll. Miss M. S. Budd (10).

Nearest, perhaps, in the peristome, to T. flexieta, but distinct in the exannulate capsule, which, with the inflorescence, separates it from all the other species of the genus. The teeth are quite distinct from those of all the other species of the genus, not being filiform, but flattened below, and divided into two unequal crura, which are more or less united in all the lower part, without any visible basal cylinder. They are, in fact not at all the normal teeth of Timmiella, but rather of Trichostomum or Didymodon; but the leaf-structure is exactly that of Timmiella.


Var. nov. angustata Dix. & Varde. Folia apice angustiore, subacuto; cellulae paulo minorores.
Epiphytic in forest, 1200 m., Mulange, Uganda, Sept. 1919; coll. R. A. Dummer (4240).

This differs markedly from the type in having the leaves narrowed above, and the smaller cells, which in the type are 6-9 μ in diameter, but here 6 μ, while the basal cells there are 15 μ wide, here 12 μ.

*Tortella syrrhopodontoides* Dix., sp. nov.


*Hab.* Chania Falls, Thika, Kenya, 26 Aug. 1929; coll. Prof. Priestley and Miss Scott (34 a).

A very striking delicate species, with very fragile, extremely long and narrow, loriform leaves, the lamina flattened out with the nerve occupying often a third of its width throughout. The basal hyaline cells ascend for a short distance only along the margins, often not quite so conspicuously as usual in the genus, but often quite markedly. The pale wide bases and much contorted laminae when dry give the plant much the appearance of a *Syrrhopodon*.


*Leptodontium gambaragarae* Negri.—Kinangop, 4000 m., Kenya Colony, 20 Feb. 1910; coll. G. Balbo (570). E descr. this must certainly be Negri’s plant. It is rather close to *L. pungens* (Mitt.) Par.

(to be continued.)

The type-species is *Trachydium Roylei* Lindl. * (Royle Illust. 232 (1835)), based on a plant collected by Royle in the Pir Panjal Pass in Kashmir. It is usually seen as a stemless plant with what appear to be a number of simple umbels arising from the crown. This appearance, however, is deceptive; the plant is not really stemless, though frequently the stem hardly emerges above the ground, and what appear to be simple umbels are the very long rays of a large compound umbel. This stemless habit is not at all uncommon in the alpine umbellifers of the Himalaya and neighbouring ranges, but has no taxonomic significance.

* I have taken the specimen in the Lindley Herbarium, Cambridge, as the type.
It may be due to the severe climatic conditions of the very high altitudes at which alone the plants that adopt it are found. Usually specimens with well developed stems will be met with—the result perhaps of less arduous conditions.

The fruit of Trachydium is very remarkable and will be best understood from the figure.

The plant is confined to the Western Himalayas, so far being known only from Kashmir and Kumuan. It is possible that it may occur also in the ranges to the north and north-west of Kashmir, but it is not known from the Eastern Himalaya nor from China.

From the first the genus was completely misunderstood, the authors of the 'Genera Plantarum' (i. 884 (1867)) most surprisingly including Haplosciadium Hochst. and Eremodacium Bunge in Trachydium. Boissier, in 'Flora Orientalis' (ii. 929 (1872)), apparently influenced by the 'Genera Plantarum' (though he very rightly retained Eremodacium as distinct), transferred to Trachydium three species which he had originally referred to Rumia, viz., T. depressum, T. Kotschyi, and T. elbrusense. Of these (I have not seen the last) all that may be confidently stated is that they do not belong to Trachydium sensu Lindley, though the fruit is not unlike. They probably represent an undescribed genus.

Clarke, in the 'Flora of British India' (ii. 671 (1879)), dealt with five species, T. Roglei and his four new ones, viz.:—T. novem-jugum, T. dissectum, T. hirsutulum, and T. obtusiusculum. As will be seen from the figures of fruits, all differ widely from that of the type-species, and all four must be transferred to other genera.

Thus:

\[ T. \text{ novem-jugum} \ C. \ B. \ Clarke = \text{Chamaesium novem-jugum}, \text{comb. nov.} \]
\[ T. \text{ dissectum} \ C. \ B. \ Clarke = \text{Schultzia dissecta}, \text{comb. nov.} \text{ (see note at end).} \]
\[ T. \text{ hirsutulum} \ C. \ B. \ Clarke. \text{ This I believe to be only a burnt-up and stunted specimen of } T. \text{ obtusiusculum}. \]
\[ T. \text{ obtusiusculum} \text{(DC.) C. B. Clarke} = \text{Physospermopsis obtusiuscula}, \text{comb. nov.} \]

Of the many species described since Clarke's account was published the following belong to Chamaesium and Physospermopsis respectively:


\[ T. \text{ Delavayi Franch. in Bull. Soc. Philom. sér. viii. vi. 110 (1894)} = \text{Chamaesium novem-jugum} \text{ (C. B. Clarke) Norm.} \]
\[ T. \text{ spatuliferum W. W. Smith in Notes Bot. Gard. Edinb. vii. 210 (1914)} = \text{Chamaesium spatuliferum}, \text{comb. nov.} \]
\[ T. \text{ viridiflorum Franch. loc. cit. 111} = T. \text{ affine W. W. Sm. in Bot. Survey India, iv. 374 (1913)} = \text{Chamaesium viridiflorum}, \text{comb. nov.} \]
\[ T. \text{ Markgrafianum Fedde ex Wolff in Fedde, Rep. xxvii. 304 (1930)} = \text{Chamaesium Markgrafianum}, \text{comb. nov.} \]


\[ T. \text{ rubrinervis Franch. loc. cit. 112} = \text{Physospermopsis rubrinervis}, \text{comb. nov.} \]
\[ T. \text{ Forrestii Diels in Notes Bot. Gard. Edinb. v. 291 (1912)} = \text{Physospermopsis Forrestii}, \text{comb. nov.} \]
\[ T. \text{ Kingdon-Wardii Wolff in Fedde, Rep. xxvii. 124 (1929)} = \text{Physospermopsis Kingdon-Wardii}, \text{comb. nov.} \]

The remaining species not referred to above are listed below. Wherever possible the amended generic position is indicated, but new combinations are made only where this is reasonably certain.

In doubtful cases the genus (sometimes with an alternative) only is suggested. Nevertheless I do not doubt that even these plants should be excluded from Trachydium. It is generally easy to say what a plant is not; it does not follow that one can

* The type-sheet, in addition to specimens of T. obtusiusculum, comprises three specimens of Potentilla coriandrifolia Don.
say what it is. Especially is this true of Umbellifers, which are so often collected without fruit adequate for exact determination. The following species are imperfectly known:--

*T. tibetanicum* Wolff in Fedde, Rep. xxvii. 122 (1929); based on Forrest 1906. The specimen of this in British Museum is quite immature, but a plant collected by Ludlow at Gyantse which I think is conspecific has fruits which, though far from ripe, suggest that it might be a *Trachydium*.
*T. trichotatum* Wolff, loc. cit. 125.
*T. Wolfiannum* Fedde ex Wolff, loc. cit. 122.

The following species are excluded:--
*T. fusco-purpureum* Hand.-Mzt. Symb. Sin. vii. 711 (1933), said to be doubtfully distinct from *T. purpurascens*, q. v.
*T. garhwalicum* Wolff, loc. cit. 124=Chamaesciadium garhwalicum, comb. nov.
*T. hispidum* Fr. in Bull. Soc. Philom Paris, sér. viii. vi. 113 (1894)=Chamaesciadium or *Ligusticum*. (This very common plant is never collected with ripe fruit. Why?)
*T. napiferum* Wolff in Acta Hort. Gothob. ii. 300 (1906). Wolff himself thought this might belong to *Tongoboa*!
*T. purpurascens* Fr. loc. cit. p. 112= *Pleurospermum nanum* Fr.? (Neither a *Trachydium* nor a *Pleurospermum*; genus doubtful.)
*T. Soulei* de Boiss. in Bull. Soc. Bot. France, lxxiyii. 422 (1906); "voisin du T. purpurascens"—the description of the fruit excludes *Trachydium*.

Thus, if the foregoing account be accepted as substantially correct, the conclusion is reached that *Trachydium* remains a monotypic genus. The following specimens having more or less ripe fruits may be cited as typical; all are in Herb. Kew:—

Kashmir: *Falcomer 494, 495*; *Tragbol, C. B. Clarke 29267*; *Tilai, C. B. Clarke 30668*.

Kumaun: *Milam Glacier, Strachey and Winterbottom 6*.

NOTE.—*Schultzia dissecta* (C. B. Clarke) Norman.

This differs from *Schultzia crinita* (Pall.) Sprung., to which it is very close, in having fewer and much less finely divided involucres and fewer involucres, which appear to have a tendency to fall. The following specimens must be referred to *S. dissecta*.

Baltistan: *Chatpahni nala, Duthie 13892*; *Karpuchu Valley, Duthie 11056* (both Herb. Brit. Mus.), also the specimen in Herb. Wallach from Kumaun to which a reference was made in *Journal of Botany* lxxv. 96 (1937).

I take this opportunity of thanking the authorities at the Cambridge Botany School and at Kew for the loan of many specimens, and of expressing my indebtedness to my friend Mr. A. H. G. Alston for his help and encouragement.

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**TWO QUEENSLAND IXORAS.**

**By F. Raymond Fosberg.**

During work on the Rubiaceae collected by the Mangarevan Expedition of the Bishop Museum (see Fosberg, Bishop Mus. Oce. Pop. xiii. no. 19, 1937) the question arose of which of the two species named *Ixora triflora* had priority. Both were said to have been published in 1866. The fascicle of Seemann's 'Flora Vanitennisc' in which *Ixora triflora* (Forst.) Seem. was published is dated April 2, 1866. Inquiry at Kew resulted in the information that volume iii. of Bentham's 'Flora Australiensis,' in which *Ixora triflora* was published in 1866.
Ixora triflora R. Br. was published, though dated 1866, really did not appear until January 5, 1867, giving Seemann's species clear priority.

Since Ixora triflora R. Br. is closely related to other species of Ixora sect. Phyleilema I thought it best, before renaming it, to examine any available material to make certain that it is distinct. Several sheets were borrowed from the herbaria of the Botanic Garden, Brisbane, the Arnold Arboretum, and the Bishop Museum, Honolulu. Thanks are here expressed to Dr. C. T. White, Dr. E. D. Merrill, and Mr. E. H. Bryan, in charge of these collections respectively, for the privilege of examining this material. In all, three collections were examined, with several sheets of two of them, which had been credited to this species.

These specimens were found to represent two entirely distinct species, the I. triflora of R. Brown, here renamed I. queenslandica, and another species so different that it is a matter of some doubt whether it is correctly placed in the genus Ixora. Original descriptions of both are presented below to facilitate comparison.

Ixora queenslandica Fosberg, nom. nov.

Ixora triflora R. Br. in Benth. Fl. Austr. iii. 416, Jan. 5, 1867 (in part).

Non Ixora triflora (Forst.) Seem. Fl. Viti. 133, April 2, 1866.

Small tree, branchlets glabrous, slender, internodes up to 2-5 cm. long; leaves obovate to elliptic, blunt-obtuse at apex, coriaceous, glabrous, petiole 4-6 mm. long; stipules only slightly connate, ovate, firm but with a noticeable thin wing at each side, strongly carinate toward the apex, not so near the base, back very strong and slightly incurved, sharp or blunt, the whole stipule up to 4 mm. long, caducous; cyme of 3 sessile or subsessile flowers, the central one with a pedicle about 1 mm. long, peduncles up to 22 mm. long; bracts almost orbicular, cordate, apex rounded, petiole less than 1 mm. long, but lower 5 mm. of mid-rib thickened (as in I. Setchelli), bracts up to 2 cm. long and wide; hypanthium glabrous, 1-5 mm. long; calyx about 1 mm. long, rather sharply but remotely denticulate, slightly ciliate; corolla-tube 10-13 mm. long, or less in some of the specimens, 0-8 mm. thick, the four lobes up to 8 mm. long, 2 mm. wide, oblong-lanceolate, acute, somewhat contorted in bud; anthers up to 4 mm. long, linear-lanceolate, acuminate, sagittate at base, attached in the sinuses of the corolla, filaments less than 1.5 mm. long; style filiform, up to 18 mm. long, exerted 4-5 mm., upper 1-5 mm. thickened and bifid.

Moore (Journ. Bot. lixiv. 216, 1926) gives the following information not available on the specimens before me: “corolla white; fruit subglobose, 6×5 mm.”


Although I was unable to borrow the type material of Brown’s species I think there is little doubt that the Tryon specimens are identical with it, as they were compared by Moore (see Journ. Bot. lixiv. 216) and considered identical.

As originally described I. triflora R. Br. represented a confusion of the Ixora material with specimens of Diplospora inverovoides. This confusion was pointed out by Spencer Moore (loc. cit.), and the species as here renamed includes only I. triflora R. Br. as limited by him, not in the original sense as published by Blunt.

It is difficult with the present lack of material of most of the species of Ixora sect. Phyleilema to make any suggestion as to the relationship of I. queenslandica with any of the other species. Certain similarities with I. Setchelli Fosberg are probably merely the result of parallel development. When more complete collections are available from Melanesia and the Papuan area relationships in this section of Ixora may become more obvious.

Among collections distributed by the Arnold Arboretum is a plant collected by L. J. Brass in Queensland, labelled “Ixora triflora R. Br.” Dr. C. T. White suggested that this plant might represent a different variety. Open flowers and fruits are not present on the specimens, but careful dissection and examination of the flower parts shows features possessed by no other Ixora known to me. There is some doubt that it even belongs in this genus, but in the absence of fruit it would be wise to set up a new genus for it, and the aspect and most other characters are those of an Ixora.

Ixora biflora Fosberg, sp. nov.

Frutex, folia elliptica vel oblonga vel obovata acuminata, hypanthium glabrum tarde hirtellum, corolla glabra 4-loba: antherae lata oblonga 1-2 mm. longa in alabastris dehiscentes.

“Shrub about 4 ft. tall,” branchlets cylindrical, glabrous, woody almost to the tips, internodes up to 3-5 cm. long, frequently under 1 cm. on branchlets; leaves oblong to elliptical or slightly obovate, acuminate, “thin and soft, paler on under surface,” up to 9 cm. long and 4 cm. wide, glabrous, base contracted, petiole 6 mm. long; stipules broadly ovate, not carinate except at apex which is prolonged into a sharp beak, the whole 4 mm. long; ultimate branchlets much condensed with imbricate bracts and their stipules, producing an appearance of terminal leafy buds, from which the corollas project singly or in pairs between a pair of leaf-like bracts, ovate, acuminate at apex, 1.5 cm. long, up to 8 mm. wide, obtuse at base, with a slight winged petiole less than 1 mm. long, the imbricate bracts sur-
rounding the flowers thin, pale green, elliptical, sharply acuminate, about 1 cm. long, 5 mm. wide; flowers terminal, single or paired, sessile; hypanthium about 1·5 mm long, glabrous at first, but after shedding of corolla becoming woolly-hirtellous; calyx about 1·5 mm. long, membranous, cup-shaped, irregularly lobed, minutely fimbriate-ciliate, otherwise glabrous; corolla white, glabrous, not known except from buds almost ready to open, still closed, showering the inside with pollen; style completely represented only by a circular scar on an ovary which had undeveloped in the buds at this stage, represented only by a small base and slightly funnel-form at throat, conical prominence on the disk, but evidently deciduous, as it is not found in the Bishop Museum. The sheet of I. biflora in the Brisbane herbarium is the only one at hand, the more mature ovaries are on that in the Bishop Museum. The sheets in the Bishop Museum and the Arnold Arboretum may be considered bototypes.

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NOTES FROM THE BRITISH MUSEUM HERBARIUM.

By E. G. Baker, F.L.S.

Hibiscus shirensis Sprague & Hutch. subsp. nov. bocarangaensis. Saffrotex ramosus usque ad 1·5 m. alt. Rami brunneo-pubescentes. Folia ovata vel rhomboideo-ovata brunneo-tomentosa, margine serrata, 20–40 mm. longa, 12–35 mm. lata; petiolis 3–10 mm. longis. Flores rubri axillares. Bracteola lineari-lanceolata 4·5–5·5 mm. longa 1·3–1·8 mm. lata. Calyx 8–10 mm. longus, dentibus acutis. Capsula 10–11 mm. alta; seminibus gossypinius.

"Près du Rocher Nofiri sur un rocher de granit haut de 15–20 m. et nu dans une fente du rocher. Hauteur 1·50 m. Fleurs couleur saumon."

This plant differs from the typical H. shirensis by the bracteoles, which are distinctly broader, and by the calyx-lobes.

Albizia (Eualbizia) Egglengil, sp. nov. Arbor circ. 40 pendas ad A. glabrescentem Oliver et A. Warneckeii Harms accedens. Differt primo intuito foliis diversis. Pinnas 3–4 iugae; foliis 7 jugis glabris oblique rhomboideis apice acutis, basi late cuneatis, membranaceis, nervo medio subcentrati, 2–5 cm. longis, 1·2–2·2 mm. latis; petiolulis brevibus ±2 mm. longis. Inflorrescencia 6–10 mm. longa. Pedunculi axillares paniculati. Flores pedicellati. Calyx ±3 mm. longus dentibus brevibus. Petala superne lanceolata, 4–5 mm. longa. Legumen ±2 cm. longum, ±4 cm. latum, 10–12 spernum, stipitatum.

Albizia (Eualbizia) Egglengil, sp. nov. Arbor circ. 40 pendas ad A. glabrescentem Oliver et A. Warneecakei Harms accedens. Differt primo intuito foliis diversis. Pinnas 3–4 iugae; foliis 7 jugis glabris oblique rhomboideis apice acutis, basi late cuneatis, membranaceis, nervo medio subcentrati, 2–5 cm. longis, 1·2–2·2 mm. latis; petiolulis brevibus ±2 mm. longis. Inflorrescencia 6–10 mm. longa. Pedunculi axillares paniculati. Flores pedicellati. Calyx ±3 mm. longus dentibus brevibus. Petala superne lanceolata, 4–5 mm. longa. Legumen ±2 cm. longum, ±4 cm. latum, 10–12 spernum, stipitatum.

Two Queensland Ixoras satisfactorily. At present neither can be placed in any of Brumekamp's subgenera.


"Small leaved Albizia. Young leaves yellowish pink. A small umbrella-shaped tree 40 ft. high."
The leaflets of this plant are in 4-7 pairs; they are obliquely rhomboid, pointed, base cuneate, 2-5 cm. long, 1-2.2 cm. broad. The central nerve is subcentral with 10-12 lateral nerves. The flowers are pedicellate, the calyx is ±3 mm. long, teeth triangular, acute, ±0.5 mm. long; the petals are 4-5 mm. long. It differs from A. glabrascens Oliver by the pointed leaflet etc.

Pinnae 1-2 jugate. Leaflets 4-6 pairs obliquely oblong rhomboid, obtuse .................. A. glabrascens Oliv.
Pinnae 3-4 jugate. Leaflets 4-7 pairs, obliquely rhomboid, pointed ..................... A. Eggerlingii, sp. nov.

ERYTHRINA Eggelingii, sp. nov. Arbor ad E. tomentosa R. Br. accedens usque ad 40 ped. alt. Folia trifoliolata, petiolis armatis, foliolis terminalibus rhomboideis 6-7 cm. longis, 6-7 cm. latissimis, subtus cinericeo-tomentosis foliis lateralis insequilatere ovatis 5-7 cm. longis 5-6 cm. latissimis, petiolos in specimen nostro 8-9 cm. longis. Flores in spicas pedunculatas dispositos. Pedunculus cinericeo-tomentosi 11-16 cm. longi. Calyx cum laminis 30-35 mm. longus, linearis 20 mm. longis. Petalos ignotos.

Hab. UGANDA: Lamogi, Keyo Gulu, 4045 (type in Herb. Mus. Brit.) "Savannah tree to 40 ft. Flowers coral-red. Leaves tomentose, the petiole armed."

This species is allied to E. tomentosa R. Br. of which the type is at South Kensington. It differs in several important particulars. The tomentum is of a different colour, cinnereous, not reddish brown. The petiole is strongly armed and the terminal leaflet is of a different shape. The laminis of the calyx are longer, 20 mm.

In some respects it is allied to E. sudanica Bak. fil., but in former is distinguished by the long lobes to the calyx.

ERYTHRINA Caffra Thunb. var. nov. mossambicensis. Arbor bulbosus. Folia trifoliolata, foliolis terminalibus triangulato-ovatis glabris, 5-11 cm. longis, 6-8 cm. latissimis. Calyx bilatilatis 6-10 mm. longus. Vexillum 40-50 mm. longum. Legumen moniliforme, longe stipitatum, 3-6-spermum cum stipe 7-11 cm. longum, 1-10 mm. latum.


"Arbusto simples na base e forte de 2 a 3 m. de alt. Flores cor de salmão. Planta medicinal indígena. Da casca fazem uma maceração contra dores de ventre. Floresta aberta. Bara."

This differs from typical E. caffra Thunberg by the rather different shape of the terminal leaflets and by the pod, which is more longly stipitate and 3-6-seeded, stipes 35-50 mm.

STUDIES OF BRITISH POTAMOGETONS.—III.

By J. E. DANDY, M.A., AND G. TAYLOR, D.SC.

III. POTAMOGETON RUTILUS IN BRITAIN.

POTAMOGETON RUTILUS Wollf, is an ally of P. Friesii and P. pusillus (P. panormitanus) in the series Potamogon retaillata, characterized by closed (tubular) stipular sheaths. It is easily separated from P. Friesii by the more slender habit with narrower leaves which are gradually attenuate to a fine-pointed apex and are usually only three-nerved. From P. pusillus it is most conveniently distinguished by the stipular sheaths, which are firmer in texture, stronger-nerved, and more persistent than in Linnaeus's species, with a tendency to become fibrous in age; they are tubular only towards the base. Judged from the available records over its area of distribution, P. rutilus is rare and local in its occurrence. Hagström ( Crit. Res. 93-94), who did not then recognize it as a British plant, recorded it from Sweden, Denmark, Finland, Germany, Poland (then part of Russia) †, central Asia (Pamir), and North America. Fernald, however, in Mem. Gray Herb. iii. 14 (1932) pointed out that Hagström had confused an endemic American plant with the European P. rutilus, and in the same work (p. 59) gave the distribution of Wolfgang's species as "northern Britain, Holland, France and Scandinavia eastward to the Pamir".*

The first published record of P. rutilus from Britain was by Lees, who, in his 'Flora of West Yorkshire' (1888), p. 418, reduced Wolfgang's species to a variety of P. pusillus and referred to it as a plant collected at Dringhouses, Mid-west York. We have examined the specimen upon which this record was based and find that it is referable to the common P. Berchtoldii ("P. pusillus" Auct.), a species with open stipular sheaths. It is clear that Lees completely misunderstood P. rutilus.

The next mention of P. rutilus as a possible British plant was made by A. Bennett in Journ. Bot. xxxiii, 24 (1895). He remarked that in the Berne Herbarium was a sheet of specimens, labelled "Pota mogeton pusillum. Ely, Cambridgeshire, 25 July, 1825" (Henslow, 1825)*, part of which were "true pusillus" (probably meaning P. Berchtoldii †) and part P. rutilus. The specimens were not mixed, and Bennett therefore suggested that a label might have been lost. We have not seen this sheet and are thus unable to confirm Bennett's determinations, but if genuine P. rutilus is really on the sheet there can be no doubt that his suggestion about a missing label is correct, for there is no other evidence that P. rutilus has been collected in Cambridgeshire,

* See the first of these notes (supra, pp. 90-92).
† The type of the species came from the vicinity of Vilna, now in Poland.
‡ We have seen material of P. Berchtoldii from Ely.
although the county has been thoroughly explored for Potamogetons by Fryer and others. In the same note Bennett referred sceptically to the record from West Yorkshire, remarking that the description given by Lees “will apply to several forms of *P. pusillus*”; his scepticism, as we have seen, was justified.

In 1900 Bennett (in Journ. Bot. xxxvii. 65, t. 407) claimed to have established the certain occurrence of *P. rutilus* in Britain. The plate which was published to illustrate his paper was drawn from specimens mounted on a sheet presented by J. A. Power to the Holmesdale Natural History Club and subsequently bequeathed to the British Museum with C. E. Salmon’s herbarium in 1930. This sheet bears specimens of *P. pusillus* (named *P. rutilus* in Bennett’s hand *) mixed with *P. pectinatus*, and the localities “Coventry Canal Atherstone” (Warwick) and “Marl Pits Fradley Staffordshire” are written in the right-hand bottom corner. At the end of the same paper (p. 67) Bennett also recorded *P. rutilus* from Anglesey (Llyn Coron, 1892, J. E. Griffith) and East Sussex (ditch near Rye, July 1898, T. Hilton), and added that he had other specimens from the Orkneys which might belong to the species but were insufficient for determination. We have examined all the plants concerned in these records and find that, like Power’s specimens, they are referable to *P. pusillus*.

By 1915 it had been recognized that the plants from Sussex and the Midlands were not *P. rutilus*, for when Bennett dealt with that species in the last part of Fryer & Bennett’s *Potamogetons of the British Isles* (pp. 82-83, t. 54 †) he restricted its distribution in the British Islands to “England: Anglesea, Scotland: Orkney?” The Anglesey locality, Llyn Coron, came to be regarded by British botanists as the *locus classicus* for *P. rutilus* in this country, and they visited the lake year after year in search of a species which apparently was never there. The plant which they gathered, i.e., *P. pusillus*, could have been obtained with much less trouble in many other parts of the country ‡. Meanwhile the Orkneys continued to be regarded as a doubtful station for *P. rutilus*, until in 1924 Druce (in Bot. Soc. & Exch. Club Brit. Is. vii. 217) definitely recorded the species from Loch of Ayre, Holm, Mainland, on the basis of specimens collected by H. H. Johnston (Ref. 1997 in 1922). Again, however, the plant is merely *P. pusillus*. Johnston’s specimens are identical with another Orkney plant, collected by J. W. H. Trail in Loch of Stenness, Mainland, on which Bennett based his *P. pusillus var. rigidus* in Scot. Naturalist, vii. 25 (1883).

In 1921 Druce (op. cit. vi. 152) recorded *P. rutilus* from the Shetlands with the remark: “New to Scotland, unless indeed Bennett’s *P. pusillus*, var. *rigidus* is the same thing.” Bennett’s variety, as we have already pointed out, is referable to *P. pusillus*, but Druce’s own specimens from the Shetlands (Bardister and Tingwall Lochs) are the genuine *P. rutilus* and thus his record of the species from the Shetlands is authentic. Druce, however, was not the first to collect *P. rutilus* in the Shetlands. The credit belongs to Beeby, who gathered specimens in Bardister Loch in 1890 and recorded them in Scot. Naturalist, xi. 30 (1891) as *P. pusillus var. rigidus* on the authority of Bennett, who evidently took a wide view of this variety. Beeby’s specimens were collected nearly half a century ago, but their true identity has not hitherto been recognized. Druce (tom. cit. 528) in his ‘Flora Zetlandica’ merely included Beeby’s plant in parentheses under the name *P. pusillus var. rigidus*, with the remark that it required confirmation as it might be either *P. pannomitanus* or *P. rutilus*.

Druce’s ‘Comital Flora’ (1932), p. 317, gave *P. rutilus* as occurring in four vice-counties: Anglesey (52), Caithness (109), Orkneys (111), and Shetlands (112). We have already dealt with the plants from Anglesey, the Orkneys, and the Shetlands. The record from Caithness was based, we are informed by Dr. R. W. Butcher, on material collected by him in July 1928. By his courtesy specimens have been sent to the British Museum; they are referable to *P. pectinatus*.

More recently, in Bot. Soc. & Exch. Club Brit. Is. x. 845 (1935), *P. rutilus* has been recorded from Stirling and Lanark on the authority of determinations made by Pearsall. The Stirling plant (Grangemouth, 1934, G. Taylor) is *P. trichoides*, as pointed out in the second of these notes, pp. 170-171 supra. The Lanark plant (Glenbuck Reservoir, 1934, G. Taylor) is *P. pusillus*. To summarize, *P. rutilus* as a British plant is known only from the Shetlands. The British records from counties outside the Shetlands are erroneous and refer to four different species: *P. pusillus* (Sussex, Warwick, Stafford, Anglesey, Lanark, Orkneys), *P. Berchtoldii* (York), *P. trichoides* (Stirling), and *P. pectinatus* (Caithness).
No attempt has been made to obtain up-to-date information concerning certain critical genera. This should have been seriously collected for a few years and the results sent to specialists, so that at least the broad lines of the modern position could be given. But Rhinanthus has a mere seven lines under R. minor, whereas I collected a Rhinanthus at Meathop this June, and found it to be R. stenophyllus (Schur) Druce. Similarly, no attempt has been made to deal with Thymus, Taraxacum, Centaurea nigra, and Cheno-podium album forms, etc. The great Herbaria have not been properly consulted, e.g., the specimen of Cypripedium in Herb. Mus. Brit. is not dealt with, and certainly that rarity requires better treatment than it gets.

Many records are given for Orchis praetermissa Druce, some as "type," but from my experience I suspect that they will all prove to be the var. pulchella, which is best placed, as Mr. Pugsley has done, under O. purpurea. Is there any O. praetermissa in the County? Has the material been verified by any expert? Have the specimens of Funaria muralis been seen by Mr. Pugsley? In view of the rarity of that species (most records being erroneous) they cannot otherwise be accepted, and if they have been verified by Mr. Pugsley the fact should have been stated. Is the Hieracium aurantiacum really H. brunneococceum Pugs. or not? Why is Saxifraga platypetala Sm. "Incognit."; and what exactly does this "Incognit." signify? One of the objects of such a Flora should be to get all such doubtful or even questionable records properly verified and checked.

Certain definite errors exist. The Seneio is not S. integrifolius (L.) Clairv., but S. spathulatifolius (Gmel.) DC. [really subsp. maritima (Syme), comb. nov., and not the typical plant]. The nomenclature is sometimes peculiar, the earlier name being given as a synonym of the later, e.g., Carex filiformis L. under C. lasiocarpa Ehrh., Claytonia sibirica L. as a synonym (which it is not) of C. asinoides Sims. Other names are quite contrary to present day Rules of Nomenclature, e.g., Juncus sylvaticus Reichard, which is a homonym of J. sylvaticus Huds. = Luzula sylvatica (Huds.) Gaud.

I make these criticisms as examples because it would have been better had they been prevented before publication by proper consultation of experts, who are generally willing to give assistance. Had this been done in MSS. stage errors and slips would be mostly eliminated. It is not that the work has been careless. It is good (except for the map, which is poor and even lacks the subdivisions used), so far as it goes. It is a generally sound compilation and a useful addition to the botanical library, but after such a great amount of labour has been put into it a little wider co-operation could have made it much better. — A. J. W.
Wild Flowers in Britain. By Robert Gathorn-Hardy. 8vo, pp. viii, 120, endpieces, 100 photographs, 4 colour lithographs and text-figs. B. T. Batsford, Ltd.: London, 1938. Price 8s. 6d.

Popular books on botany are not attractive as a rule, usually because either they are written in a sloppy manner or with a disdain for academic botany both old and new. The present book is certainly attractive if only on account of the hundred photographs, many of them magnificent, as is to be expected from Messrs. R. M. Adam and E. J. Bedford, who are responsible for most of them. There are also over twenty line-drawings, which, though mostly good, are not of the same standard as the majority of the photographs; and four colour lithographs which, though decorative, are disappointing.

The text is such as can be read as an arm-chair essay. There is a good deal of sound botanical observation written in a personal style likely to appeal to those with little or no previous botanical knowledge, giving the joy of the search for the more attractive rarer plants and the botanical pleasures to be derived from the hedge-row, the riverside, the woodland, the sea-shore, and the mountains.

The book is said to be written by an amateur for amateurs, and it should appeal to a wide public.

The author states that "In the early 1850's a piece of Elodea from the Oxford Botanical Gardens fell into the Cherwell" and so accounts for the beginning of what became for some time a source of navigable water-ways. A conflicting story is that it escaped from the Cambridge Botanic Garden into Vicar's Brook and thence to the Cam, and, causing trouble to the barge-men, was named by them Babingtonia damalis. The first reliable record is from near Market Harborough, October 1847, but equally interesting as its spread and gradual subsidence would be to learn the method of its arrival in this country.

One or two other problems arise from what the author writes which suggests that his matter is stimulating; there are very few slips. The general get-up is excellent, except that when the brightly coloured jacket is worn the cover is too light for reasonable handling.


Mycologists will greet with pleasure the signs of renewed vitality in the 'Kryptogamenflora der Mark Brandenburg.' The first and second parts of the Ascomycetes appeared in 1907 and 1911 respectively. Part 3 deals with the Sphaerellaceae, and is by W. Kirschstein. It is to be hoped that the remaining parts of the volume will now be pressed forward, for we are sadly in need of an up-to-date treatment of most groups of Pyrenomycetes. So far as one is able to judge from descriptions alone, the work appears to be well done. It follows the usual scheme with a key to the genera and keys to the species. Fourteen genera are treated—four are new. Plectosphaerella is a new name for Ascospora; Batschiella a new genus differing from Guignardia in having coloured spores; Mycetodea a new genus with eleven species formerly mostly placed in Leptosphaeria, but distinguished from Saccobacterium by coloured spores; Thysospora a new genus (monotypic) distinguished from Pleospora by coloured spores, and Jaapia (monotypic) differing by multiporous ascii. The main part of the work is the treatment of Sphaerella with 111 species, ten of which are new. The name Sphaerella is used instead of Mycosphaerella under the impression that Sphaerella is a conserved name by the International Rules. None of the names in the lists of fungi have yet been voted on and the result of Sphaerella v. Mycosphaerella is still in abeyance. The name Jaapia has been applied to one of the new genera to commemorate the well-known Mark collector Otto Jaap—an unfortunate lapsus for the name has been used by Bresadola for a well-characterised resupinate Basidiomycete.


Dr. Verdoorn has followed his excellent 'Manual of Bryology' with a similar work on the Ferns. Aided by twenty-one collaborators he deals with the group from many different aspects. The book has sections on morphology, anatomy, mycorrhiza, galls, cytology, ecology, classification, etc., each by a different author. It is quite the most comprehensive work on the subject and forms an indispensable work of reference for every botanical library.

In a short review like the present it is impossible to mention every section, but it is worth noting that Dr. Christensen here propounds his views on a new classification, a great improvement on the current one of Prantl, as he takes up many of the ideas put forward by Bower and other morphologists and reduces them to a system.—A. H. G. A.

This book is written primarily for those engaged in teaching physics, there is a mass of information in it which will make it a useful vade-mecum for a botanical laboratory. Thus, for example, the first chapter—the care of laboratory equipment—is one of general applicability. Of the fourteen chapters those on Cements, lutes, and solvents, Glass-blowing and glass-working, Optical projection of lantern-slides, and Soldering of metals, contain much which botanists will find helpful; the other chapters deal mainly with physical apparatus. There are several useful tables.

The book is written in a clear style with sufficient theory to make the practice intelligible. The index provides a necessary short-cut to the information needed.

The British Mycological Society Transactions, xxi, parts iii. and iv., contains several important papers. F. K. Sparrow describes some Chytrideaceous fungi from North Africa and Borneo. Miss D. Lloyd records two years' continuous observation on Blastocladiella Ericssoni. C. G. Dobbs gives a valuable account of the life-history and morphology of Dicranophora falcata. H. D. Gordon has determined that the beetle Carabodes flavum is responsible for eating the spores of dry fungi in the laboratory and herbarium. Y. S. Sabet describes the growth of Penicillium egyptiacum a peritheium-forming species from soil. S. P. Wiltshire treats with thoroughness the original and modern conceptions of the genus Stemphylium. B. B. Mundkar records Ustilago sorosporoides from India, and T. Petch provides a welcome monograph of the British Hypocreales.


The parts of this valuable work are appearing at present with refreshing speed. The most recent number begins the treatment of Leguminosae by Willi Christiansen. The genera treated are Lupinus (3 spp.), Agropyrum, Laburnum (3 spp.) Oryctes (9 spp.), Sarothamnus, Ulex, Cytisanthus, Geniella, Genista (7 spp.), Ononis (7 spp.), Trigonella (3 spp.), Melilotus (5 spp.), Medicago (8 spp.), and Trifolium (29 spp.). The fact that so many Leguminous plants are of economic importance makes the present part of particular value.

BOOK-NOTES, NEWS, ETC.

Midland Naturalists' Union.—Representatives of Natural History Societies in the Midlands, meeting in the rooms of the Birmingham Natural History and Philosophical Society on June 15th, unanimously decided to form a Midland Naturalists' Union, membership of which is open to Natural History, Archeological, and similar Societies in the counties of Monmouth, Hereford, Worcester, Warwick, Leicester, Rutland, Nottingham, and Lincoln.
It is intended to organise an Annual Congress, several Field Meetings, and in the larger towns a number of lectures during the winter months. A list of lecturers willing to visit Societies, a panel of referees for specimens, and information in the various groups of plants and animals and other branches of Natural History and Archaeology, and a system of lantern-slide exchange among members, are also being organised. It is felt that the Union will facilitate co-operative work among the Societies as well as bringing workers into touch with others in their own branches of the subject. Further information may be obtained from the Hon. Secretary, G. Brian Hindle, 55 Newhall Street, Birmingham.

Dr. Alexander Eig, lecturer in Applied Botany at the Hebrew University in Jerusalem, has recently died at the age of 43. Dr. Eig was born at Minsk, Russia, and went to Palestine before the war, and when the British army advanced through the country he joined the 41st Royal Fusiliers. He wrote many papers on the flora of Palestine and compiled a Hebrew botanical dictionary.

The Sociedad Mexicana de Historia Natural intend to celebrate the centenary of the cellular theory which was founded by M. J. Schleiden and T. Schwann by publishing a special volume containing "papers relating to problems of the cellular theory and kindred subjects." Biologists of all countries are invited to contribute. Schleiden-Schwann Medals will be awarded to the two most meritorious contributions, one of them being reserved for a resident of the Mexican Republic. January 31, 1939, is the final date for the acceptance of papers.

L'Abbé Bourdot.—Subscriptions are asked towards the cost of placing a commemorative plaque and medallion of the centenary of the cellular theory which was founded by M. R. d'Astis, 79, boulevard Saint-Marcel, Paris (13e).

Erratum.—For O. tuberosus × arvensis read C. tuberosus × acuasis. I have never seen the former hybrid. [With regard to the latter, I took from Silbury Hill a root of apparent O. acuasis and grew it on in my garden, and it developed a strong resemblance to C. tuberosus × acuasis; but the root was destroyed when I left Bloxham. It might be worth while following up the clue.] It is doubtful if pure C. tuberosus now grows at Avebury; cultivation has shown that the apparently pure plant I gathered there was really the hybrid with acuasis.—H. J. Riddelsdeell.

Erratum.—For Chlaenosciadrum in legend to fig. 1, p. 199 of this volume, read Chlaenosciadium.

Didymodon (Erythrophyllum) sublingulatus Dix., sp. nov.

Dense cespitosus, terrestris, 1 cm. altus vel paulo ultra, supra sordide viridis, infra rufescens. Folia laxiuscula disposita, madida patula, sicca crispata, 2 mm. longa, 0-3–0-35 mm. lata; e basi haud vel vix latiore oblongo-lingulata, carinata, late acutata, marginibus omnino planis, ad apicem argute, subspinulose denticulatis, apiculo longo hyalino coronatis. Costa sat valida, dorso carinata, supra obscura, sub apice desinens. Cellulae superiores 6–1.5 μ, obscure, papillosae, subquadrate, infra medium folium minus obscure, sensim majores, suprabasales magna, subquadrate, subpellucidae, parietibus sub瞿nassatis; basales laxae, hyaline, longe rectangulares, parietibus tenues.

Fructus ignotus.

Hab. Bamboo forest, Musandama, Uganda, 1926; coll. Miss M. S. Budd (5).

A well-marked species in the broad leaves, scarcely widened at base, plane margins, acutely toothed apex with pellucid teeth and long hyaline apiculus. The basal area of the lamina which descend at margins to near the insertion.

Fructus ignotus.

Hab. On rocks by river, 1950 m., Buliganya, Uganda, 1928; coll. Miss M. S. Budd (29).

rather like D. strictifolius Dix. & Varde, of S. India, but with more distant smaller leaves and a marked hyaline apiculus.

It is very distinct from all the other African species. It may, of course, possibly be a Barbula; but it is very unlikely.


The geographical interest of this plant is equalled only by the complexity of its synonymy! It was collected by Schimper in Abyssinia, "in alpe Deggen altitud. 12,000", 3 Mart. 1840, and described by C. Müller in the ‘Synopsis’ as Pottia longirostris Hampe. (It was issued in the ‘Musc. Abyssin.’ as Gymnostomum longirostre, and Hampe had probably written to C. Müller criticising this and suggesting Pottia as its generic position.) P. longirostris has not been recorded elsewhere. The Mt. Elgon plant agrees exactly with Schimper's specimen. But it also agrees exactly with the South American Tortula limbata Mitt., collected by Jameson "in summo monte Pichincha," and not found since.

It is therefore known from three summits, one in the Andes, one in Central Africa, and one in Abyssinia, all at altitudes of over 3500 m. I do not know if there is any parallel in the remarkable case of geographical distribution among flowering plants; it is only paralleled among mosses, I think, by Aongstroemia julacea (Hook.) Mitt., recorded only from Mt. Everest, at just above 6000 m. (the highest known station for any moss), from four stations in Natal, ranging from 2000 m. to 3000 m., and from one or two of the highest Andes.

As to the correct name for the plant—the true position is in Tortula §Zygotrichia; but this was not recognized at first owing to its having the most unusual character, for the genus, of being entirely without peristome. It was on this account placed in Gymnostomum by Bruch and Schimper, and in Pottia by Hampe.

The South American plant was named Gymnostomum Jamesoni by Taylor in 1848, but this was invalidated under Tortula by the earlier homonym T. Jamesoni Mitt. Mitten therefore altered it to Barbula limbata in 1851, and to Tortula limbata in 1809.

The Abyssinian plant was described as Pottia longirostris in the ‘Synopsis’ in 1849, and this gives the earliest valid specific epithet. Paris (Index Ed. ii. v. 47) credits Brothers with the combination Tortula longirostris, but this is an error; Brothers only writes " Wahrscheinlich gehört auch Pottia longirostris Hamp. aus Abyssinia hierher," and this cannot be considered the creation of a new combination, which must be attributed to Paris. The synonymy will therefore stand thus:—

Tortula longirostris (Hampe) Par. Ind. ed. ii. v. 47 (1906).


Barbula limbata Mitt. in Kew Journ. of Bot. iii. 154 (1851).


Tortula tanganyikae Dix., sp. nov.

§Syntrichia. Sat robustus, humilis, atro-rufescens. Caulis brevis, simplex, conoso-foliaceus, folia subpatentia, sieva fortiter incurvata, nervo doro nilenre, 3–4 mm. longa, e basi vix latiore, ad insertionem contracta, inaurifius, subrevoluta, acutissima. Margines infra revoluti, superne plani, ad summum apicem subdenticulati. Costa ebrinula, fusca, superne sensim angustata, subpercrens. Marginales seriebus pluribus minores partem breviusculam folii subclavata, elliptical, attingentes. Praldital costam et folii apicem inveniuntur. A very marked species in the rather unusual form of the leaves, shortly and widely, rather abruptly acuminate from a broad abrupt apiculus, margins plane, leaves bordered with narrow border in compact colonies, of the type of T. cardotii Thér. & Nav. from the Belgian Congo is perhaps the nearest, but has leaves not acuminate and scarcely acute, with the nerve excurrent in an abrupt apiculus, margins plane, leaves bordered with narrow cells, and is a much smaller plant.

Cinclidotus pontinaloides (Hedw.) P. Beauv.—Tusu, Gasongori, 2280 m., Kenya Colony, 2 Aug. 1908; coll. G. Balbo (301). In Africa known only from Algiers.

Orthotrichaceae.


Leptodontopsis macrocarpa Dix., sp. nov.

Stirps robusta, elata, caulisibus 5–6 cm. altis, rigidis, pararamosis, cespites magnos, altos, instrumentibus. Folia confertissima, haud fragilia, e basi suberecla leniter squarrosa, sica subtorquata, divaricata; circa 4 mm. longa, e basi erecta pallida obtusata, superne 0-8 mm. lata, longe lanceo-lata, sensim angusto acuminata, acutissima. Margines plani, apud apicem irregulariter eroso-denticulati. Costa angustiscula, in cuspidem peracutam, excurrens. Cellulae ellipticae vel subrotundae, perincrasatitae, distinctae, dense papillosae, basales omnès angustissime lineares, pelliculoide, laves.

Seta nonnullum lateralis, 2–2.5 cm. alta; theca magna, depectorculata 4 mm. longa, e collo distincto elliptico-cylindrica, microstoma, orificio plicato, gymnostoma. Calyptra longa. Spore 22–25 μ, muriculati.


Much more robust than L. fragilifolia Broth., with larger sporophyte etc. Differs from L. elata Dix. in the broad leaf-base, widening upwards, and very narrow acumen.


§Zygodon. Gracilis; sordide pallide viridis, caspitosus. Species distincta foliis integerrimis, sensim breviter acuminatis, margine uno latere late recurvo, cellulis distinctis, incrassatis, papillosis, 8–11 μ latis; propagulis pernumerosis, minuatis, paucicellularibus, subellipticus vel subrotundus, obtusiis, 35–40 μ longis, raro 50–55 μ. Inflorescentia dioica videtur. Seta pallida, circa 5 mm., theca obovata vel elliptica, majorascula, plicata; operculum rostratum, curvatum, peristomum nullum. Spore 18–24 μ; annulus vix evolutus.


Especially distinct in the minute subrotund gemmae, perhaps the smallest of any species, of the type of Z. crosus. I have found no trace of peristome, in a capsule from which I removed the operculum, and I think there is no doubt that it is truly gymnostomous.


Funariaceae.

Physcomitrium spatulatum C. M.—Crater, 2500 m., in subforest, Mt. Longonot, Kenya Colony, Mar. 1922; coll. R. A. Dummer (5046 d).

Exactly the same as the South African plant.
**Tropical East African Mosses**

**Splachnaceae.**


*Tayloria limbata* Dix., sp. nov.
Gracilis, mollis, circa 2 cm. alta. Folia laxiuscula, siccis valde contracta, mollia, 3-5-4-5 mm. longa, e basi decurrente paullo angustiore late longe oblongo-lanceolata, longe tenerer acuminata, marginibus inferne angustissime recurvis, supra planis, valde irregulariter, distantier, argute, saxo fortiter denticulatis. Costa sat angusta, longissime excurrens. Cellulae laxe, 22-25 μ irregularae, elongato-hexagone, hexagono-rhomboideae, rectangulares, etc., infra sensim majores, laxiores, rectangulares, rectangular, and often actually widely rectangular, seems clearly to show it is not a Bryoid moss. The leaves are much contracted, upper areolation, not rhomboid but irregularly hexagonal, irregularly isodiametric, parietibus crassis, valde dermica, cellulis exothecii inulro; dentes :flavi, ubique loniter trabeculati ; endostomii membrana circa 1/3 altitudinem dentium sequans ; processus dentibus aequali, papillosi, flavidi, linearae, haud perforati, irregularae ; cilia 0. Spori 18 μ, aurantiaci. 


The structure of the fruit, the plane margins, etc., separate this from all the African species. *W. decurrens* Ren. & Card. has strongly decurrent leaves, a differently formed capsule, etc. *W. grammophylla* (C. M.) differs in the autoicous inflorescence, smooth outer teeth, and carinate rimose processes. *W. Heribaudi* (Ren. & Card.) has quite different fruit, as in *W. chryso-blasta* Thér. & Nav.

*Brachymenium speirocladum* C. M., forma.—Disused ant-hill, Lake Nabugabo, Uganda, circa 1200 m., July 1937; coll. P. Chandler (1723). Ibidem, on root of tree in forest (1728).

I name this with some doubt, as the border is extremely narrow and the leaves are almost entire. In other characters, however, including the fruit, it agrees.

*Brachymenium variabile* Dix.—Karema Hill, 1800 m., Kenya Colony, 8 Nov. 1908; coll. G. Balbo (255).


*Anomobryum compressulum* (C. M.) Broth.—Rocks on road to Butandika, near stream, Uganda, 1928; coll. Miss M. S. Budd (21). Trees along the Karamayo Road, circa 2000 m., Sabei, Uganda, 1928; coll. Miss M. S. Budd (23 a). Chania Falls, Thika, Kenya Colony, 26 Aug. 1929; coll. Prof. Priestley and Miss Scott (30).

*Anomobryum filiforme* (Dicks.) Husn.—Kenya Colony, coll. G. Balbo; viz. along Kagongoine, 12 Feb. 1915 (40); along Massoiwa, 20 Aug. 1908 (64).

*Anomobryum latifolium* Dix., sp. nov.

Robustum, elatum, rufescens, subnitidum. Caules 2-3 cm., densifolia ; folia erecto-patula, siccis appressa, contracta, valde carinata, 1-5 mm. longa, latissime oblongo-ovata, cockleariformia, apice cucullato-inflexa, acuta. Costa inferne pervalvis, pulchre rubra, superne sensitum attenuata, sat longe sub apice soluta. Cellulae superiores breves, parve, regulariter rhomboideae, circa 3×1, 12-15 μ latae, parietibus firmis ; inferne pallio elongate, parum latiores, haud laxae, inferior tantum anguste rectangulares, parietibus rubris, incrasatis. 

Cetera ignota.
Hab. Tusu, Kenya Colony, on rocks, 2280 m., 20 Aug. 1908; coll. G. Balbo (375).

Very distinct from all the African species, in habit coming near to some robust Himalayan forms. When moist the habit is not particularly Anomobryoid, but in the dry state the appressed, narrowed by the incurving of the margins, are very remarkable. It is one of the most robust of the African species.


This has turned up in numerous localities, and seems to keep its characters well, but has not yet, I believe, been found fruiting.


Epiphytic in tree heath zone, 3200 m., Namwamba Valley, Ruwenzi, Uganda, 10 Jan. 1935; coll. G. Taylor (3092).

A pretty little species with leaves in form and structure quite Weberoid.

B. usambaricum Broth. has a short turgid capsule and revolute margin. The capsule here is remarkably narrow and elongate.

Bryum leptotorquescens C. M.—Buliganya, on rocks by river, 1900 m., 1928; coll. Miss M. S. Budd (24 b).

Agrees well with Dusen, no. 208.


The St. Thom plant has more acute and cuspidate leaves, but the Cameroon plant (234, Herb. Besch.) agrees quite well.

Bryum rectitheca Dix., sp. nov. §Alpiniformia. Habitus et color B. alpini robustioris. Folia angusta, e basi sensim leniter angustata, ad apicem latissima, inde cilo brevisimo angustata et longissima cum costa crassae excurrentis cuspidata. Margines ubique fere revoluti; cellulae brevior rhomboideae; costa porrecta, rubro-fusca, versus apicem parum angustata, longe crasse excurrens.

Seta circa 2 cm. alta; theca saturate purpureo-fusca, sicca undulata vel suberecta, Brachymenioidae; e collo longissimo pernato clavato-elliptica, circa 4 mm. longa, microstoma, operculo conico, acuto, nitidum. Peristomii dentes inter se remoti, opaci, lanceolati, aurantiaci, lati marginati, dense lamellati, linea media valde angulata. Endostomum plus minusve adherens, male evolutum; processus lineares, irregularis, vix pertusi. Exotheci cellulae parvae, valde irregularia, parietibus crassissimis.


Leaves much more robust and less concave than in B. convolutifolium Dix. It is very near to the South African B. Wilmsianum C. M., but that appears always to have broader leaves.
rather laxer cells, and a shorter and wider capsule. Sim unites it with *B. subconcauifolium* Par., which he says is recorded from Mt. Elgon, but that, whatever it is, is an unpublished species. The leaves here are rather marked in their apical form. They are scarcely lanceolate, generally tapering gradually from the base to a rather wide apex, which is then abruptly and very shortly contracted and forms with the excurrent nerve a stout, often long, cuspidate point.

**Bryum microdentum** Dix., sp. nov.

§ *Rosulata.* A congeneribus facile distinctum foliis haud rosulatis, per caulem *equaliter dispositis*; folia sat parva, 3–4 mm. longa, superne 1 mm. lata, e basi multo angustiore obovato-spathulata, marginitibus inferne revolutis, superne anguate limbatis, dentibus parvis, haud arythis preditis. Costa ad basin valida, supra multo attenuata, in cuspideam integram brevem *sppus* erectam excurrens. Cellulae parvae, paretibus tenuibus, marginales 2–3-seriibus lineares, incrassates, limbum angustum distinctum formantes.

Cetera ignota.


Sufficiently distinct in the leaves arranged equally along the stem, not rosulate, with rather narrow border and small, not very acute teeth.

**Bryum spiralinolium** Dix., sp. nov.

§ *Rosulata.* *B. microdonto* supra descripto *habita et foliorum dispositione* simillimam, sed foliiis longioribus, laxis, marginitibus perangustate revolutis, limbo valde tenui, dentibus longioribus, acutioribus, *subepinulosis.* Folii siccis in se fortiter spiraliter torquata, et circa caulem leniter contortae.

Fructus ignotus.

*Hab.* Chania Falls, Thika, Kenya Colony, 26 Aug. 1929; coll. Prof. Priestley and Miss Scott (43).

The resemblance of this and the last species in the non-rosulate, equally distributed leaves is curious, and rather disconcerting. The toothing of the leaves, however, is so different that they cannot be united. The border here, too, is much stronger, not only by the more numerous rows of cells but by their being much more incrassate. It is rather notable, too, in that it seems constantly narrow at the extreme apex of the leaf, then much stronger (circa 4-seriata) or more), just above the widest part of the leaf, then narrowed again towards the base.

The leaves of *B. microdonto* show an approach to the remarkable cork-screw-like twisting in the dry state as shown here, but not nearly so markedly.

**Rhodobryum Preussii** (Broth.) Par.—Damp rocks among herbage, 3200 m., Namwamba Valley, Ruwenzori, Uganda, 7 Jan. 1935; coll. G. Taylor (2061).

**Rhodobryum minutirostratum** (C. M.) Broth.—Kenya Colony; coll. G. Balbo; viz., near Mogoro, 1300 m., on ground, 8 Nov. 1921 (286); Giombene, forest, 1850 m., near Koghio, 8 Feb. 1921 (365); Ighembe, 8 Nov. 1921 (615). Mufindi, Tanganyika Territory, 1800–1900 m., 1934; coll. G. Balbo (34, 59, 74).

**Rhodobryum plano-roseum** Dix., sp. nov.

*Habit* *R. rosi* sed paullo minus; *pallide viride.* Folia comallia *latissime obovato-spaltulata,* 7–8 mm. longa, superne 4 mm. lata, apiicie rotundato-acuta, cum costa excurrens cuspide acutissima denticulata terminata; margines omnino *plani,* et medio folio conferte, argute, mediocriter spinuloso-zentati. Costa ad insertionem validissima, citro attenuata, breviter excurrens. Cellulae sat parvae, latere hexagono-rhomboideae, marginitibus 2–3-seriibus angustissimae, limbum angustum, sepe male definitum instruentes. Cetera ignota.

*Hab.* Forest thicket near L. Nabugabo, Uganda, circa 1000 m., July 1937; coll. P. Chandler (1722).

Well marked in the rather short, small, very widely spathulate leaves, with quite plane margins. An undescribed species from Nyasaland has leaves with a similar outline, but with revolute margins.

**Bartramia angustissima** Dix., sp. nov.

**Vaginella.** Humilis, densifolia, viridi-aurantiaca. Folia siccis atque madida stricta, subrecta, 5 mm. longa vel paullo ulter, o basi oblonga, albescente, nitida, *sensim* angustata, *angustissime longissime* ligulato-subulata, acutissima, marginitibus ubique planis, superne conferte denticulatis; costa sat angusta, ubique distincta, plerumque breviter excurrens. Cellulae superiores opaece, sed haud obscurae, breviter lineares, paretibus pellucidis, quaque *papilla* spiculosa praestat ad apicem superiorem praclita; cellula basilares omnes lineares, pellucidae, leves, juxta-costales sat latae, marginales seriebus pluribus angustiores, limbum latum male notatunm instruentes.

*Fructus* ignotus.

*Hab.* On tree ferns, 2500 m., Kampala, Uganda, 1928; coll. Miss M. S. Budd (30).

Although certainly belonging to the Section *Vaginella,* this differs from all species known to me in the very narrow base, little wider than the lower part of the lamina, into which it tapers quite gradually—the form of the leaf is in fact almost that of *B. pomiformis,* but the structure is quite different. The TROPICAL EAST AFRICAN MOSSES 259

**BARTRAMIACEAE.**

**Bartramia angustissima** Dix., sp. nov.
plane margins, very long and narrow leaves, and the high spiculose papilla are also marked characters.

**Philonotis Marangensis** Broth.—Numerous localities in Kenya Colony and Uganda. On rocks in stream, Amami, Lukongo R., 800 m., S. Usambaras, Tanganyika Territory, 13 Nov. 1935; coll. P. J. Greenway (4153). A highly variable plant. A very striking form, possibly worthy of specific rank, was collected by Prof. Priestley and Miss Scott at Nyanyuki, Mt. Kenya, in Cedar forest (6), with very rigid stems, densely matted with tomentum, the leaves rather distant, rigidly appressed and incurved when dry, so as to be somewhat spirally ciliate.

**Philonotis Microthamnia** Broth.—On road cutting, 1375 m., Kilembe, Ruwenzori, Uganda, 19 Dec. 1934; coll. G. Taylor (2610).

**Philonotis Mauritiana** Aongstr.—Kampala, Uganda, 1200 m., Mar. 1936; coll. P. Chandler (1555).


In Smithsonian Miscell. Colls, 69, no. 2, p. 20, I have expressed a doubt whether *B. auronitens* is really specifically different from *B. Stuhlmannii*. I have no hesitation now in uniting them. Negri, it may be recalled, himself speaks of their close relationship, distinguishing *B. auronitens* by the larger size, scarcity of tomentum, and fewer marginal cells in the alar region. From an examination of numerous specimens I am convinced that these characters are in no way correlated; the tomentose stems, for example, are by no means always associated with the more robust habit, and the basal marginal cells may vary very considerably and irregularly.

**Correction**: On p. 223 for grandisopora read grandispora.

**Explanation of Plate 614.**

Fig. 1. *Dicranella kenya*. a, leaf, × 8; b, cells of sheathing part, × 50.
Fig. 2. *Ochrolechia obtusissima*. a, †, leaf-apex, × 40.
Fig. 3. *Tricholeciun decurrefolium*. a, leaf, × 10.
Fig. 4. *Leptodonium rhynchophorum*. a, †, leaf-apices, × 20 (a, normal leaf, †, proboseis form).
Fig. 5. *Timmiella brevibus*. a, leaf-apex, × 40. b, part of peristome, × 40.
Fig. 6. *Didymodon subtilicollis*. a, leaf, × 20.
"Ulmus fructu membranaceo." By reference to Tournefort's 'History of Plants,' ii. (1732) 357, the three varieties can be identified as follows, since they were taken from Goodyer's descriptions in Gerard's 'Herbal,' ed. ii. (1633) —

1. \( U. \) glabra Huds. (non Mill.), \( U. \) montana Bauh. Pin. 427.
2. \( U. \) nitens Moench.
3. \( U. \) stricta Lindl. var. Goodyeri Melville.

Tournefort mentioned two other elms, one of which is the \( U. \) campestris et Theophrasti Bauh. Pin.

The favourite, "d. U. pumila, corticis fungoso. Pluk. Almag. 393," remains obscure, as the only additional information given by Pluknet is "foliis parvis glabras." The reference to Bauhin's 'Finix' (1623) appears to refer to \( U. \) nitens Moench. on the general evidence of Bauhin's own bibliography and the fact that he mentions a second species, \( U. \) montana. An examination of the bibliography given under the latter species considered in relation to that of the first species strongly supports the view that \( U. \) glabra Huds. is intended. Theophrastus also mentioned two elms, one of low-lying country, the \( U. \) campestris of Latin editions of his works, and the other of hilly country, the \( U. \) montana, which appears to correspond to Bauhin's \( U. \) montana. There is nothing in the description of \( U. \) campestris of Theophrastus against its identification as \( U. \) nitens Moench. or some closely related form. Some of the other authors referred to under Bauhin's first species appear to rely on Theophrastus for their information, but where any conclusion at all can be drawn from such indefinite descriptions it is favourable to the view that \( U. \) nitens Moench. or some closely related form was intended. In the final reference of the 'Species Plantarum,' Dodoens (7) gives a figure and a description that suggest \( U. \) nitens Moench. rather than \( U. \) glabra Huds. or any other species.

To sum up, this examination of the references of the 'Species Plantarum,' nos. 1, 2, 3, 4, 5 confuse \( U. \) nitens Moench. and \( U. \) glabra Huds., and sometimes other elms as well. If the cross reference to the 'Hortus Cliffortianus' were eliminated from nos. 2, 3, and 5, the evidence is mainly in favour of \( U. \) nitens, and references 6 and 7 appear to refer to this species only.

Another Linnaean publication that must be taken into account is the 'Flora Anglica' (1754), compiled by one of Linnaeus's pupils, I. O. Grufberg. The reference "468-l" on p. 13, under "Ulmus campestris," is to Ray's 'Synopsis Stirpium,' ed. iii. (1724), which was used as a basis for this work. Ray's first elm is the 'Ulmus vulgarissima folio lato scabro. Ger. Emac.,' and Goodyer's description in Gerard's 'Herbal,' ed. ii., is repeated unchanged. There can be no doubt, therefore, that the 'Flora Anglica' refers to \( U. \) procera Salisb. It is uncertain whether Linnaeus ever saw a specimen of this species, but even had he done so it is probable that he would have included it with the equally distinct species \( U. \) nitens Moench. and \( U. \) glabra Huds. under his \( U. \) campestris.

The specimen of \( U. \) campestris in the Linnaean Herbarium has been examined, and there is no doubt that it is a form of \( U. \) glabra Huds. It consists of a small branch bearing young expanded leaves and full-grown fruits. The indumentum of the leaves and shoot, the very short petioles, the well-developed auricle at the base of the lamina, and the shape of the fruit all agree very well with \( U. \) glabra Huds. var. scabra Lindquist. The leaf-shape and serrature also are very similar on the lateral short shoot, but the terminal more elongated shoot has some leaves with a single larger tooth ('cornicle') on the shoulder on either side of the mid-rib, as in the var. coronata Rehder. Though such cornicles are common on juvenile and epicormic shoots of several varieties of this species, the presence of fruits shows that the branch is adult, and therefore it may represent the latter variety.

The 'Hortus Cliffortianus' at the British Museum (Natural History) has been consulted also, but \( U. \) campestris L. is not now represented in it. The only Linnaean specimen seen is therefore unquestionably a form of \( U. \) glabra Huds.

Linnaeus often made manuscript notes in personal copies of his books, and these sometimes throw extra light on the species concerned. In his copy of the 'Species Plantarum,' ed. i., he wrote against \( U. \) campestris "Norland" and "a Lapponia," both of which were crossed out, and also "ab Uplandia," and "a Cadiz in Spain. He may have seen either this or \( U. \) nitens Moench. From Cadiz in Spain he may have seen either this or \( U. \) nitens Moench.
Although the specimen in the Linnaean Herbarium is a form of *U. glabra* Huds., this evidence of Linnaeus's views cannot stand alone, but must be considered in relation to his published writings on the subject. The above examination has shown by the bibliography cited that he refers to the following elms:—*U. glabra* Huds., *U. nitens* Moench, *U. stricta* Lindl. var. *Goodyeri* Melville, and *U. procura* Sallab. In his treatment of the elms Linnaeus was far less critical than several of his predecessors, notably Goodyer. By failing to distinguish more than one European species of elm he was directly responsible for later confusion in the application of the name *U. campestris*. In the circumstances it was natural that botanists in each country should interpret as the Linnaean species their own common species of elm. Thus over the greater part of Europe *U. nitens* Moench, or some variety or hybrid of it came to be regarded as *U. campestris* L. This is obvious from the following representative bibliography in which the name is used in this sense:—

Coste, Fl. France, iii. 251 (1906).
Grenier & Godron, Fl. France, iii. 105 (1855).
Schinz & Koller, Fl. Schweiz, i. 153 (1905).
Archangeli, Fl. Ital. ed. 2, 186 (1894).
Borg, Fl. Malta, 102 (1927).
Heukelum, Fl. Nederland, ii. 59 (1909).
Ibiza, Fl. Espanola, ii. 16 (1907).

Comparatively few botanists have interpreted *U. campestris* L. in the sense of *U. glabra* Huds., among them the following:—

Pallas, Fl. Rosae, i. 75 (1784).
Liljebland, Fl. Svenska, ed. 3, 154 (1816).

British botanists differ from their colleagues on the continent in not using the name *U. campestris* for *U. nitens*, the great majority applying it to *U. procura* Sallab. In this they follow the usage of the 'Flora Anglica.' The following may be cited:—

Moss, Camb. Brit. Fl. ii. 94, t. 102, 103 (1914).
Jackson, New Fl. & Silva, ii. 221, t. 80 (1930).
Butcher & Strudwick, Further Ill. Brit. Plants, 310, fig. 328 (1930).

A few early British botanists, confused apparently by Miller's treatment of the elms in the ‘Gardener's Dictionary’ (1785), interpreted *U. campestris* in the sense of *U. minor* Mill. sec. Henry; of these the following are the more important:—

Smith, Engl. Fl. ii. 21 (1824).

The evidence from the works of Linnaeus is too confused to enable any decision to be drawn as to which species he intended for *U. campestris*, if indeed he did not intend to include all European elms under this name. There can be little doubt that he was most familiar with *U. glabra* Huds. in his native Sweden, and this is the tree represented in his herbarium. Among the references cited in his works there is a preponderance in favour of *U. nitens* Moench, and this fact is reflected by the interpretation of *U. campestris* L. as *U. nitens* by the majority of continental botanists. This use of the name, coupled with its other applications detailed above, provides a permanent source of confusion and error.

The case for considering *U. campestris* L. a nomen ambiguum has already been stated briefly by Stearn and Gilmour (Kew Bull. 1933, 503). The more extended examination of the evidence given here endorses the view expressed by them. The name *U. campestris* L., owing to its use with different meanings for more than a century, has become a permanent source of confusion and error. It is urged, therefore, that it should be rejected as a nomen ambiguum, under Article 62 of the International Rules of Botanical Nomenclature.

**CATENELLA NIPAE USED AS FOOD IN BURMA.**

BY F. BOERGESSEN.

A short time ago I received for determination from Professor L. P. Khanna, University College, Rangoon, a parcel containing alge about which he wrote: “This plant is very common along the Kyauk coast. The plant is eaten by the natives—either raw or boiled.” The sample consisted of a dark grey, almost black, material composed of grains more or less connected in short or long chains. When examined with a lens it was easily recognizable as *Catenella*, and by a more thorough examination was found to be *C. Nipae*. The sample consisted mainly of this plant; other mangrove algae were in so small quantities that they must be considered nothing but contamination. As it seemed to me most interesting to know not only the exact locality, but also how it was collected and prepared, I wrote to Professor Khanna asking for detailed information and, if possible, a fresh sample which had not been cleaned. Professor Khanna has already been so kind as to send me this interesting communication:—“I bought the parcels from Amherst, Martaban, from a shop which was selling prepared dishes. Each packet costs a little over one penny. I was informed that it grows on rocks along Martaban coast. It is not cultivated. The dried J. Bot. Vol. 75. | September, 1938. |
specimens are soaked in water overnight—in the next morning it is well washed."

About the way it is used Professor Khanna writes as follows—"Some like it raw mixed with the oil of *Sesamum indicum* L., salt, powdered fruit of *Capsicum annuum* L., fried rhizome of *Zingiber officinale* Roxb., onion (*Allium Cepa* L.), and garlic (*Allium ursinum* L.). Some boil it for an hour and then mix it with above ingredients."

It is a well-known fact that in the East many algae are eaten or used as medicine (cf. von Martens, 1866, p. 137, Suringar, 1872, and Kjellman, 1897, p. 22). In the recent paper by C. K. Tseng (1935) there is a fairly long list of species, used either as food or as medicine; but in none of these is there any mention of *Catenella* or other mangrove alga. Sauvageau, in his well-known book 'Utilisation des Algues marines,' has gathered much information about the uses of algae; but *Catenella* is not mentioned among those which serve as food.

It appears that the algae of Professor Khanna's sample were gathered in the large estuary of the Salwin River, where mangrove algae may be supposed to grow in especially favourable conditions. These gatherings are also interesting because we know so little from that locality. At any rate I have not found it among the many mentioned in Miss Erika Post's paper on the *Bostrychia-Caloglossa* Association (1937).

List of Species found in the Collection.

**Catenella Grev.**


As mentioned in the introduction, this is the alga (fig. 1) which is the real object of the gatherings, which the natives try to get free of other algae and pollutions.

To judge from its dark violet colour and vigorous growth it must be presumed to have been living in favourable conditions. Joints with tetrasporangia occur now and then. By means of the characteristic haptera described by Miss Post (1937, p. 60) it is now fairly easy to distinguish this species from the related *C. impudica*, the haptera in *C. Nipae* being the ends of the joints, while in *C. impudica* these are independent organs developed at the constrictions between the joints.

**Caloglossa** (Harv.) J. Ag.


Only small pieces were found of this plant, which seems to be rare, but easily recognizable. It fixes itself by means of rhizoids growing out everywhere from epidermal cells on the underside, either in small groups or placed singly. They are free, not coherent, and end in a small disc. In one of the pieces tetrasporangia were present. They occur in dense groups on both sides of the mid-rib and are developed in proliferations from the edge of the thallus.

2. Caloglossa leprieurii (Mont.) J. Ag. 1876, p. 409; Post, 1937, p. 49.—Delesseria Leprieurii Mont. 1840, p. 196; J. Ag. 1852, p. 682.

f. typica Post 1937, pp. 47 & 51.

A few small pieces were found. In one of them tetrasporangia were present. The broad parts of the thallus reach a breadth of little more than 1 mm. One piece was not much constricted and approaches f. continua Okam.


Of this interesting variety I found two quite small pieces; fig. 2 shows one of them. The stem is not yet much developed. Compared with Kützing's figure the shape of the segments is not so ellipsoidal, but more oblong-rectangular with broadly rounded corners. The breadth of the segments is rather variable, the broadest I have seen was a little more than 1 mm.

**Bostrychia Mont.**


Of the species found mingled with *Catenella Nipae* fragments of *Bostrychia radicans* were most often met with, either loose or fastened by its numerous haptera to *Catenella*. The haptera are not only present on the decumbent creeping filaments but are also often developed from nearly every apex of the filaments (f. hapteromanica Post). The haptera consist of a bundle of rhizoids at the ends of the branchlets. The plant seems to be able to form haptera whenever an apex of a branch comes near to a suitable substratum.

The ramification is distichous, but often poor with long distances between the branches. The thallus has no cortical layer, and is of variable thickness; the thicker branches are about 110–120 μ thick, the filaments decreasing slowly upwards to about 40 μ in the uppermost ends. Cross-sections of the thallus show a variable number of pericentral cells. I have met with six to nine. A longitudinal section shows that the central cell is about double as long as the pericentral cells.
Fig. 1.—Catenella Nipae Zanard. Habit of a plant. × 3.

Fig. 2.—Caloglossa Leprieurii (Mont.) J. Ag. var. Hookeri (Harv.) Post. Outlines of a small plant. × 12.

Fig. 3.—Bostrychia radiata (Mont.) Mont. a, part of the thallus; b, filament with stichidia; c, d, apices of branchlets growing out to haptera. a, b, × 33; c, d, × 225.

Fig. 4.—Bostrychia tenella (Vahl) J. Ag. Part of a branch with branchlets. × 200.
The few stichidia that I have met with are terminal on rather elongated branchlets; their shape was obovate-elongated, tapering abruptly upwards. They have five to six tetrarospangia in each tier. The largest stichidium found was 165 µ broad and 400 µ long.


Of this species (fig. 4) I found only two small bits. According to her definition of this species and that of Bostrychia Binderi Harv. I suppose that Miss Post might refer the specimens to the last-mentioned species (cf. Harv., 1847, p. 68, pl. 28) as the branches of last order are short; but there is this peculiar to the last-mentioned species are short and polysiphonous right up to their summits, most of them are more or less monosiphonous, several of them quite monosiphonous, composed of a single row of as many as twelve to fourteen cells (fig. 4). As stated above, the branches are rather short (about 100 µ long or a little more). It is on old parts of a plant that these observations are based.

For my reasons for referring these specimens to B. tenella see Boergesen, 1937, p. 351.

Besides the above-mentioned Rhodophyceae some filaments of a Chaetomorpha (most probably C. tortuosa) were found. The filaments were about 44 µ broad, and the length of the cells about 60 µ. A small piece of an Enteromorpha and a few filaments of Cyanophyceae were also seen.

List of References.

Agardh, J. G. 1852. 'Species Genera et Ordines Algarum ...' ii pars 2. Lundae.
—- 1937. 'Contributions to a South Indian Marine Algal Flora—II.' Journ. Indian Bot. Soc. xvi. 311-357.
Harvey, W. H. 1847. 'Nereis Australia ...' London.
—- 1837. 'List of Dr. Harvey's Friendly Island Algae.'
Euglena mutabilis Schmitz (fig. 1, D–H). This little-known species has elongate cells (68–100 by 7–8.5μ) with the posterior end drawn out into a long blunt process. The vast majority of the cells observed were highly metabolic and lacked a flagellum. However, about a dozen specimens possessing flagella were observed on one occasion in the Leg-of-Mutton Pond; these showed no metaboly *. When creeping over the substratum the individuals frequently attach themselves by their posterior ends for longer or shorter periods. The periplast shows very delicate spiral striations which may appear longitudinal in much elongated specimens (fig. 1, E, G). The oblong nucleus is usually situated in the posterior half (fig. 1, E), while the stigma lies near the base of the reservoir of the vacuolar system. The numerous paramylon granules are often very small; the larger ones are distinctly rod-shaped (fig. 1, D, H). There are two to four chloroplasts (sometimes more) which are usually devoid of pyrenoids and have the shape of elongate ribbons with more or less lobed, and sometimes incised, margins.

The individuals I have examined resemble those described by Schmitz (4) except that pyrenoids are usually absent and there is a spirally striated periplast. The striation, however, is very delicate and easily overlooked. Moreover, in mud containing this species which was placed in a 0.05 per cent. Benecke solution there appeared specimens with clearly marked naked pyrenoids (fig. 1, H). There can, therefore, be little doubt that the alga found is identical with *E. mutabilis* Schmitz. Skuja (5), who was uncertain whether his specimens were *E. mutabilis* Schmitz, and Huzel (7) were likewise unable to find pyrenoids in their specimens, but noted the delicate spiral striation of the periplast.

Mainz (6) established a species, *Euglena Klebsii*, which was founded on *E. intermedia* (Klebs) Schmitz var. Klebsii Lemm. (see 2, p. 129). The variety differs from *E. intermedia* in its smaller dimensions and in the possession of small paramylon granules. *E. intermedia* has numerous discoid chloroplasts without pyrenoids and possesses a flagellum. *E. Klebsii* Mainz agrees with *E. mutabilis* in almost every respect, the flagellum being occasionally present, especially in young cultures. Schmitz was doubtful about the occurrence of a flagellum in *E. mutabilis*, nor did Skuja or Huzel observe one in their specimens. *E. Klebsii*, on the other hand, differs from *E. intermedia* var. Klebsii, and agrees with *E. mutabilis* in having only a few ribbon-shaped chloroplasts which sometimes possess naked pyrenoids. Other points of agreement are the small, apparently rod-shaped * paramylon granules, the pronounced metaboly, the general lack of a flagellum, and the fact that it occurs in highly acid waters. It therefore appears probable that *E. Klebsii* is identical with *E. mutabilis*. The presence of pyrenoids or a flagellum seem to be variable features in *E. mutabilis*. While *E. Klebsii* is probably identical with *E. mutabilis*, there is no evident justification for regarding *E. intermedia* var. Klebsii as synonymous with either *. I have observed specimens which appear to be identical with *E. intermedia* var. Klebsii.

*E. mutabilis* (including *E. Klebsii* Mainz) has been recorded from Germany (4, 6, 7), Latvia (5), and the Belgian Congo (8), and is probably a frequent form in moorland and other acid waters. Mr. Scourfield has shown me his drawings of a species of *Euglena* found in Epping Forest which appears to be *E. mutabilis*. The

* Mainz’s description of these as “ seifenstückformig ” gives no accurate idea of their shape, but his figure points to their being rod-shaped.

† It is to be noted that the nomenclatural type of *E. Klebsii* is *E. intermedia* var. Klebsii. The fact that Mainz misidentified his species leads to confusion, which, however, is lessened by his failure to recognize that he was dealing in all probability with *E. mutabilis*.
The specimens here described were found in temporary pools among the bracken, on drying mud at the edge of the Pen Ponds, and in the Leg-of-Mutton Pond. Where the alga was present in quantity the pH of the water was always less than 5 and acid humus was abundant. I have also observed the alga in small pools in Sphagnum-moors at Fox House, near Sheffield, and near High Wray, Westmorland.

**Phacus alata** Klebs var. *latviensis* Skvortzow (fig. 2, A & B). This species is characterized by the two flat wing-like expansions of the cell (34-37·5 by 29-31·5 μ) which form an angle with one another (fig. 2, B). In other respects the structure is similar to that of *P. pleuronectes* (O. F. Müll.) Duj. There is a short oblique posterior spine and the surface of the periplast shows longitudinal striations. There are commonly, but not always, two large paramylon grains, one apposed to each "wing." My specimens are much larger than those recorded by Klebs (2), and approach those found by Skuja (9) which were referred to *P. alata* var. *latviensis* by Skvortzow (10).

Specimens of this alga occurred in all the ponds.

**Phacus aenigmatica** Drezepolski (fig. 2, C-G). The flattened cells (19-25·5 by 8·5-10 μ) are irregularly subrectangular, with the posterior end prolonged into an oblique spine. The firm periplast is spirally striated and the flagellum is approximately the length of the cell. The eye-spot, situated near the anterior end, often shows a lens-shaped outer region. The oval nucleus is usually located posteriorly. There are numerous discoid chloroplasts which assume a polygonal form when closely packed together. According to Drezepolski (21) three large paramylon granules are characteristic of the species, but in the individuals I have studied this was very rare; usually a number of small ones were present.

The species occurred sparsely in the Pen Ponds and a small stagnant pond. I have observed it in a small lily pond in Kew Gardens. It has been previously recorded from Poland (11), Latvia (5), France (12), and Germany (7), and is probably of widespread occurrence, especially in the littoral regions of lakes and ponds.

**Phacus agilis** Skuja (fig. 2, H-K). This, the smallest known species of the genus, has hitherto been recorded only from the littoral plankton of Latvia (9) and from France (12). The cell (13-17·5 by 8·5-11 μ) has roughly the shape of a coffee-bean with a longitudinal groove traversing the whole length of the ventral surface. The posterior end terminates in a short blunt point. I have been unable to observe the fine striations of the periplast described by Skuja (9). The flagellum is as long as, or somewhat longer than, the cell, which, during movement, rotates about its long axis. The prominent eye-spot lies to the side of the point of insertion of the flagellum. The two parietal chloroplasts are placed one on each side of the groove. There are usually two large paramylon grains shaped like watch-glasses and apposed to the lateral margins of the cell, but smaller ones may occur also.

This organism was found occasionally in the Leg-of-Mutton Pond, the Pen Ponds, and a small stagnant pond. It was also observed in a pond near Rivelin Dams, Sheffield, in November 1936 and in a small pond in Kew Gardens. It is probably widespread in ponds containing much vegetable detritus.

The author's grateful thanks are due to Professor F. E. Fritsch, F.R.S., for advice and criticism.
ADDITIONAL NOTE ON QUEENSLAND IXORAS

By L. Fosberg.

After the manuscript of the article on "Two Queensland Ixoras" (Journ. Bot. Ixxxvi. 233-237, 1938) was submitted for publication, Mr. C. T. White was kind enough to send for my examination two additional recent collections of *Ixora biflora* with the suggestion that one of them might represent a new variety. This turned out to be so, and the variety Fleckeri is described below and also a varietal name is given to the typical form.

One of the collections, Mossman Gorge, Queensland, June 20, 1937, Flecker 3509 seems identical with the type of the species, and, fortunately, bears a mature fruit, from which the following may be added to the description of the species: fruit "bright scarlet," somewhat flattened, slightly grooved on the flat sides, bearing a large calyx scar at apex, subseisile, 11 mm. high, 13 mm. wide, 6-7 mm. thick when dry, surface when dry rugulose-papillose, subtended by two or more persistent bracts, these not, or only slightly, accrescent.

*Ixora biflora* Fosberg var. **typica** Fosberg, nom. nov.

This is the typical form of the species as described on p. 235.

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ADDITIONAL NOTE ON QUEENSLAND IXORAS

**Ixora biflora** Fosberg var. **Fleckeri** Fosberg, var. nov.

Folia oblongo-lanceolata acuminata, hypanthium persistens glabra, calyx valde 4-dentatus.

Differing from var. *typica* in having oblong-lanceolate acuminata leaves up to 9 cm. long and 2.5 cm. wide; hypanthium not becoming hirtellous, but remaining glabrous, calyx margin not fimbricate-ciliate, but glabrous and prominently 4-dentate; fruit maturing later, those on specimen young and green, about the size of small peas.

Specimen seen: Queensland, Mossman Gorge, jungle at intake, June 20, 1937, Flecker 3521 (type, Brisbane Herb.).

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THE TYPIFICATION OF ASPLENIUM FONTANUM (L.) BERNH.

BY T. M. C. TAYLOR, B.A., M.Sc., PH.D.

A recent examination of the specimens of *Polypodium fontanum* in the Linnaean herbarium revealed that they do not represent *Asplenium fontanum* in the sense of modern authors, nor is the latter covered by the diagnosis of *P. fontanum* in 'Species Plantarum' (ed. 1). In view of these facts it is felt desirable to bring forward reasons that justify the continued use of the epithet *fontanum* for designating this species of *Asplenium*, and it also becomes necessary to select a proper type.

The following is quoted from 'Species Plantarum,' ed. 1, 1089 (1733):

"*fontanum* 33. *Polypodium fontanum* sub-bipinnata lanceolata foliis subrotundis, stipite levii.


*Habitus P. fragilis, et Foliola arctica, minus profunde subdivisa, punctis floriferis majoribus, prodeuntibus non ex squama subrotunda, sed ex rima s. valvula linearis, oblonga, alba.*"

From the above it is apparent that the *Polypodium fontanum* of Linnaeus consisted of two elements:

(1) A. Synonyms:


B. Specimens:


(2) Specimens:

Two fully developed, but unlocalized plants marked “33 fontanum” in Linnaeus’s handwriting (in Herb. Linn. prop.).

Of these two elements 1A probably represents Asplenium fontanum as reference to ‘Tabernaemontanus’ will show: that 1B also represents this same species is stated on the authority of Juel, Symb. Bot. Upsal. ii. 134 (1936), who writes: “XX 38 ‘Filicula fontana minor Bauh. In Gallo Provincia’ Asplenium fontanum (L.) Bernh.”

A careful examination of the specimens preserved in the Linnaean herbarium makes it quite clear that element 2 is Woodsia glabella. In fact, the sheet is annotated “W. hyperborea!” in the handwriting of Sir J. E. Smith.

The arguments in favour of selecting one of these elements, instead of the other, as typifying the epithet fontanum are itemized below:

1. Reasons for selecting element 1 (A. fontanum).

   (a) The epithet fontanum was taken from ‘Tabernaemontanus.’

   (b) The only figure cited (although indirectly) is also from ‘Tabernaemontanus.’

   (c) Linnaeus had identified as Polypodium fontanum the specimen named Filicula fontana minor in Burser’s herbarium.

   (d) The description of the sora, quoted above in the note following the geographic distribution, applies only to A. fontanum.

2. Reasons for selecting element 2 (W. glabella).

   (a) The specimens in the Linnaean herbarium written up by him in 1753 (vide Jackson, ‘Index to the Linnaean Herbarium,’ 120, 1912) represent W. glabella.

   (b) The diagnosis applies in part to W. glabella alone, namely the words “fronde sub-bipinnata” and “foliolis subrotundis.”

   From the foregoing facts the rationalization of the situation appears to be (a) that Linnaeus was familiar with the Filicula fontana minor of Bauhin and with its various synonyms; (b) that he identified correctly as his own Polypodium fontanum a specimen in the Burser herbarium named Filicula fontana minor; (c) that he misidentified his own specimens and based his diagnosis upon them. The note, quoted above, indicates an attempt to reconcile the two elements, while the somewhat detailed description of the indusium shows that he had certain features of the Asplenium element clearly in mind.

That he, himself, was aware of the inadequacy of the diagnosis is emphasized by the insertion, in the second edition of his ‘Species Plantarum,’ p. 1590 (1763), of the words “argute incisis” in the description of the pinnae, so that the diagnosis now covers both elements. In this same edition he also added a reference to Adiantum filicinum durium crispum minimum Barreli. I.c. t. 432, fig. 1 (1714), which represents Asplenium fontanum.

In consequence, when the arguments pro and con are considered, there appears ample justification for the continued use of the epithet fontanum in its long-accepted sense as designating a species of Asplenium, and the logical lectotype is the specimen in the Burser herbarium identified by Linnaeus as his Polypodium fontanum. This species is therefore correctly cited as Asplenium fontanum (L.) Bernh. in Schrad. Jour. 1799, p. 314—Polypodium fontanum L. Sp. Pl. p. 1089 (1753), quod partem typicam. Lectotypus: Filicula fontana minor CB., n. 38 in vol. xx. Herb. Burser.

The writer wishes to express his appreciation to Dr. T. A. Sprague for advice and suggestions in connexion with the foregoing discussion.

BOOK-NOTES, NEWS, ETc.

Botanists, especially, will wish to congratulate Sir Albert Seward, V.-P.R.S., on his election as President of the British Association for the meeting to be held next year at Dundee.

Horti sici of pre-Linnaean age are still fairly numerous in Britain, but ancient collections of the bulkier parts of plants that were used by pharmacists in the compounding of their medicinal remedies are now of great rarity.

At the exhibition of Scientific Objects arranged for the British Association by the Philosophical Society of Cambridge, three considerable collections of Materia Medica were on view. The best-documented of these collections is associated with John Francis Vigani, the first Professor of Chemistry in Cambridge. It includes about 290 botanical specimens, classified as Flowers and Fruits, Seeds, Nuts, Woods, Bark, Roots, Juices, and Balsams, mostly obtained in 1704 for a London apothecary, Francis Porter, whose contemporary bills are still extant in Queens’ College. Other specimens came from Henry Colchester of the Maiden’s Head in Cheapside.

A few of the labels give further information. ‘Flores Stoechadoes’ were derived e horto Chel, obviously the Apothecaries’ Garden at Chelsea. Two or three specimens are noted as being contributed by Richard Bradley, who was elected to the Professorship of Botany in 1724. A number of seeds of garden
vegetables in one of the drawers probably also came from Professor Bradley, a great horticulturist in his day.

Still older is a second collection in a finely designed cabinet that belonged to Dr. Addenbrooke and is now in St. Catharine's College. An included bill is dated 1645 and the greater number of the plants may in all probability be referred to the third quarter of the seventeenth century. This collection of about 140 specimens has recently been rearranged.

The third collection is on a larger scale. It was obtained by Dr. William Heberden to illustrate his lectures on anatomy. It comprises some 300 vegetable specimens, listed in a catalogue written in 1751. Dated additions to the collection were made in 1742, three years after Heberden took his Doctor's degree from St. John's College.

The specimens included in such collections supply clues, indeed the only clues, to the identity of the plants whence contemporary herbalists derived their remedies. They have therefore great historic value.

Full lists of the plants have been published in Gunther’s ‘Early Science in Cambridge,’ pp. 472-94.—R. T. GUNTER.

OBITUARY.—E. M. Nelson, one of the foremost workers in botany, died on July 20 at the age of 87. For many years he was closely associated with the Royal Microscopical Society and the Queckett Microscopical Club and was the recognized British authority on the theory of the microscope; many improvements in construction which he suggested were patented by others, with the consequence that his name was not so prominent as it would otherwise have been. He added much to our knowledge of the structural details of diatoms.

The numerous vegetable poisons of Africa have been referred to by travellers from earliest times. Scientific information on the subject is very scattered, and G. Cufodones has therefore done a most useful service in gathering it together in a review in ‘Scientia,’ ser. 3, xxxii. (1938), 1-5.

N. B. BAGENAL has written a short account of “Thomas Andrew Knight, 1759-1838” in the Journ. Roy. Hort. Soc. lviii. (1938) 319-324. No general aspect of the growth of plants seems to have been without interest to this eminent horticulturist and botanist. He is best known for his work with which he began the study of the “phenomena observable during the conversion of a seed into a plant”, but he also did valuable work in raising new hybrids of fruits and vegetables, and experimented on the connexion between the root of wheat and that of barberry. “In the domain of practical horticulture the originality and range of his investigations are positively staggering.” A full biography of this remarkable man might well be sponsored by the Royal Horticultural Society, of which he was president from 1811 to 1838.

PLANTAE NOVÆ TIBETICÆ ET BHUTANICÆ IN HERBARIO MUSEI BRITANNICI.

By Heinrich Handel-Mazzetti.

Androsace rhizomatosa Hand.-Mzt., sp. nov.

In rhizomatæ crasso et longo, interdum pluricipite, petioliis mortuæ griesës cineto singularis vel fasciulata (necon cespitosa?). Folia rostrata numerosa, ambitu orbicularia, profunde cordata, fere ad tertium vel quartum infernum 3-partita, partibus late cuneato-obovatis ad medium c. lobatis, herbaceæ, satureae viridæ, utrinque breviter strigillo-pilosæ: petioli laminæ 2-4-plo longiores, evaginati. Scapus et rostræ singularis, foliæ superæs. Umbella densæ, bracteæ herbaceæ, purpureæ, basi paulum saeacií prodíctæ. Calyx obconicus, c. 3 mm. longus, ad medium vel paullo profundius in lobos ovatos, obtusos fissus, enervius. Corolla pallide et centro intensiœ roseæ, viridiflav–oculata (æ collectoribus), c. 8 mm. diametro, lobis obovatis, rotundatis vel levâvììssem emarginatis, annulo humilīi 10-crenato. Anthere vix apicibus emersæ. Stylus inclusus. (Capsula ignota.)

Typus.—Folia 5-10 mm. longa, ambitu orbicularia, versus quartum infernum 3-partita, partibus extimis 2-, mediis 3-partitis, lobis lânceolatis et ellipticiæ acutæ: ; petioli pilis tenuissimis articulatis patulis mox brunnescentibus hirti. Scapus 4-10 cm. longus, folia pluræ superæs, inferne ut petioli, superne brevissime et accumbenter pilosus. Umbella 2-5-flora, bracteæ ovato-lanceolata, ut pedicellis iis c. duplo longioræ ad 5 mm. longi calycesque purpurei brevissime striéllatio-pilosæ.

BHUTAN CENTR. : Ritang, Tang Chu, 4300–4600 m., common where found, growing in open rocky grass slopes, in large clumps, 7. vi. 1937 (Ludlow et Sherriœ no. 3208).

Var. maior Hand.-Mzt., var. nov.

Multa maior, foliis 14–4 cm. diametentibus, saepe vix ad tertium infernum partitis, partibus ad medium triöblis, lobis iterum saepe irregulariter 2–5 lobulatis lobulis ovatis. Indumentum toto plante brevissimum, crispulum et in inflorescentia hirtellum. Scapus foliis sessüque usque duplo longior. Umbella usque ad 20-flora, pedicellis usque ad 14 mm. longis, ad 5-plo longioribus quam bracteæ lanceolata. Calyx fere glaber, viridis.

BHUTAN CENTR. : Tang Chu, 3850 m., common in clearings in bamboo and Abies forest, 4. vii. 1937 (Ludlow et Sherriœ no. 3375, typus). Tang Chu, Ritang, 4000–4330 m., on steep open grassy slopes and banks, 6. vi. 1937 (Ludlow et Sherriœ no. 3195).

Species affinis A. geraniifoliae Watt, quæ differt rhizomato nullo, foliis minus profunde partitis partibusque multo minus lobatis. No. 3375 a typo speciei distinctissimis, no. 3195 autem ei paulo propior.

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Diagnosis l. c. 267 et 280 sub nomine A. bisulce data descriptione sequente supplenda. In radice paliari surculis permissa dense crassis fuscis saepeque dentutatis pulvinus usque ad 10 cm. latos et altos formans. Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans. Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans. Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans. Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans.

Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans. Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans. Folia paulum dimorpha, anguste linearis, acutes, basi non dilatata, costosis, fuscis longis, altis formans.
Aster albezensis Wall. var. glandulosus Hand.-Mzt., var. nov.


Aster hypoleucus Hand.-Mzt., sp. nov.

Fruticulcus cespitosus, et rhizomate erossos in verticillis truncos lignosis multos mox decumbentes et multiramosos edens. Ramuli hornatinii simplex vel furcati, erecti, ad 10 cm. longi, tenuissimi, rigidi, primum angulati, densissu foliati. Folia oblonga, usque ad 13 × 3 et 15 × 2 mm., acuta vel rotundata, longe mucronata, basi subpetiolato-angustata, integra vel cum dente uno altere sinec suo mucronat, coriacea, margin revoluta, supra atro calamula subglabra, subitus ut rami albo-tomentosa, subtecta, inferiora minora patula. Pedunculi singuli (usque terni), ad 3 cm. longi, glabriusculi, foliis ad subulas reductus perpaucis obsit, monocephali, annotini lignescentes toti persistentes haud increassati. Involucris calathiformis ova 8 mm. lati phylla haud numerosa, imbricata, c. 4-seriata, extima ovato-lanceolata intimus linear-lanceolatis ad 5 mm. longis 4–5-plo breviora, onnia c. ¾ mm. lata, stramentig, nervo tenui et externa into fere spadicea, margin anguste membranaceo his illis foliati. Flores radii c. 13, ligulis linear-glumoblongis c. 4 mm. longis ½ mm. lati obtusi minute tricrenatis, e sicco albis. Flores disci involucrum vix superantes, tubo subduplo breviora quam limbus anguste infundibularis basi pilosus ultra ½ in lobos lanceolatos fissus. Pappus creber, corolla fere longior, uniseriatus, albus. Achaenias (nondum maturissima) compresse oblongo-obovoidae, ecostata, dense pilosa.


Aster Sherrifianus Hand.-Mzt., sp. nov.

Caulis usque ad 1–20 m. altus (e collectoribus), cuitis pars superior tantum aestem, validus, elevato-multisiratus, dense foliatis, ut inflorescentia dense et brevissime fulvice glandulosus-velutinus et hic illic pilis patulis longioribus albis instructus, superne corymboso-multiramosus, ramis erectopatulis, inferiori-
bus dense, summis apice tantum foliatis, omnibus apice cymoso oligocephalis. Folia patens, lanceolata, ad 8 cm. longa, ad 1 cm. lata, acuta, basi rotundata sessilia, antice remote paucidenticulata, herbacea, intem viridissima, infra strigose-brevipilosa, subitus magis hirta pilis hic illo fascicolatis et minute sessil-glandulosa, summa etiam brevissima glanduloso-pilosa; costa subitus prominua, nervi pauci, obliqui, tenissimi. Pedicelli 1-3 cm. longi, tenues, ebracteolati. Calathia in corymbum densum 25 cm. latum composita. Involucri late calathiformis, ore c. 1 cm. lati phylla haud numerosa, lanceolata, vix 1 mm. lata, intima ad 7 mm. longa, cetera paulo breviora, accumbentia, omnia acutissima, subtruncatis, dimidio anteriore et nervo tenui purpureo-fusca, marginine indistincte membranaceo, parce puberula, costa nervisque falcato-triangularibus vel pallide albo-viola. Flores radii ad 30, ligulis linearibus ad 12 mm. longis apice subditatis ad 14 mm. latissimis vix crenulatis, pallide lavandulaceis vel pallide coeruleo-violaceis vestitus, involucri phyllo herbacei.

Anaphalis acutifolia Hand.-Mzt., sp. nov.

In rhizomate crasso repente pluricaulis, laxiusculae cespitosa, Anaphalis acutifolia Hand.-Mzt., sp. nov. (Wall.) DC.; AUSTR.: BHUTAN: A. Larium (Hand.-Mzt.), sp. no. 12328 multo maiora quam describitur, versus 50 cm. alta, panicula stricta composita calathius ultra 30, ramis inferioribus 10 cm. longis. Nullum dubium est, quin omnes ad unam candelam speciem pertineant.

Senecio Rambottomi Hand.-Mzt., sp. nov.

Radix ignota. Caulis erectus, 60 cm. altus, validus, tenuiter striatus, purpureae, vix araneosus, acqualiter dissipifolius, apice in corymbum densissimum 10 cm. latum dense et brevissime glanduloso-glanduloso-sericeo-viola. Flores radii ad 30, ligulis linearibus, ad 60 cm. longis, pappi pilis filiformibus. Flores disci involucra paulo longiores, e sicco radicibus ignoto. Specimen ad speciei typum pertinens. K. Ward no. 12258 multo maiora quam describitur, versus 50 cm. alta, panicula stricta composita calathius ultra 30, ramis inferioribus 10 cm. longis. Nullum dubium est, quin omnes ad unam candelam speciem pertineant.

Senecio drakensis Marg. et Shaw var. nodiflorus (Chang) Hand.-Mzt., comb. nov.

Ligularia petiolaris Hand.-Mzt., sp. nov.

Caulis (cuius pars inferior deest) ultra 30 cm. altus, crassus, fustulosus, parvisimae, brevissimae, araneosae, dense foliatus. Folia anguste cordato-ovata, usque ad 16 X 12 cm., acuta, angulis basalibus rotundatis, ubique, apicem versus sinuato- tantum, praesertim lamina transverse elliptica dentata et cauda ea longiore integra albo-araneosa, venarum reti densiusculo subtus tenuiter prominuo, constantia, brevipetiolata. Racemus simplex, polycephalus, inconspicuus triangulares dilatatis, summa pauca sensim diminuta, petiolis inferiorum laminis indistincte membranaceo-marginata, facie sparse et margino Bracteolae minutis lanceolatis, pedicellis nunc nutantibus c. 2 mm. longis.

Juniior densissimus 8 cm. longus, furfuraceo-puberulus, bracteis breviores. Involucri campanulati phylla 5, oblongo-lanceolata, pariis radiatis 5-7-floris, pappo saltem initio albo.

Styli rami antice velutini, apice triangulari-subtruncati. Pappus erubet, rufus, corolla paulo brevior.


Inflorescentia eiusque partes eadem ac in L. Mortoni (C. B. Cl.) Hand.-Mzt., comb. nova (Senecio Mortoni C. B. Cl., Comp. Ind. 1876) 208) foliis diversissima. Ligularia Kingiana (W. W. Sm.) Hand.-Mzt., comb. nov. (Senecio Kingianus W. W. Sm. in Journ. As. Soc. Beng., n. ser. ix. (1911) 71, non S. Kingii Rybd. 1910) ex descriptione differt caulibus, foliis basalisibus angustis cordatis, minutius dentatis (!), nervis subus velutinis, vaginis foliorum caulinarum eodem modo denticulatorum valde dilatatis, cauliis radiatis 5-7-floris, pappo saltem initio albo.

Saussurea Kingii J. R. Drumm. ined.

In radice palari unicaulis, probabiliter biennis. Caulis crassus, succosus, jam supra basin et totus diffuso longiramosus, 3-10 cm. altus, ramis inferioribus eo longioribus foliis bracteatis, foliis rosularibus hornotinis sub anthesi vivis, ceterum aphyllos, ramis tantum medius folio singulo concaule coextendo omnibusque foliis nascantibus, calathia bracteatis prreditis, illis circum cinereo araneoso-tomentosis. Folia ambitu lineato-lanceolata, usque ad 10 cm. longa et 2 cm. lata, obtusa, basi petiolato-pointa, tota irregulariter et remotae linnetaphitarit, partibus patulis ovatis rhachi aquilatis sinus angulato-dentatis, dentibus crasse mucerono-opiculatis, lobulis parvis interjectis, crassae, marginibus partiis reflexis crispa, supra saturate viridissimum floccosam, subitus preter costam latiusculam cinereo-tomentosam. Calathia in caulibus ramosorumque apicibus paucis glomeratos paucuitar singula, late campanulata, involucris c. 8-10 mm. longis et aquilatis vel angustioribus, basi rotundatis. Phylla paucis, subaequilongas, exteriora latera ovata cum appendicibus stipitatis beccaeis spatulatis mucronato-dentatis, cinereo-araneosa, inferiora sensim ovato-lanceolata integra, acutissima, partim purpurea, sericea. Pappus nullus. Flores numerosi, purpurei, involucro sessilis.

Corolla limbus tubo tenui aquilongus; lobi illius parte angustis campanulatis duplo longiores. Antherae caudae in lamam alludam laceratae. Pappus setae exteriores paucae caduce aliquse sublevae setis interioribus albis plumosis basi brunneis plus duplo breviores. Achenia araneosa, transverse irregulariter et parce rugosa et superne gibbosa.

Species et habitus et characteribus involuci valde peculiaris.

Tibet Austr.: Sanga Chöling. Abundant on dry stony scrubby slopes, 3350-3650 m., 1935 (K. Ward no. 12356).

Jurinea Wardii Boiss. (Dolomiaea macrocephala DC.—Jurinea m. Benth., non DC.), que proxima, differt foliiorum lobis acutis, calathis seseulilongioribus, involuci phyllis multo longius acuminatis, margine et partim dorso serrulato-asperis eorumque nervo mediano inferne arguto prominuo eti tempi, pappo fulvo.

BOLOCEPHALUS Hand.-Mzt., gen. novum.

(Compositae—Omnarea—Carduinae.)

Radix perennis, palaris (?), crassa, monoechala (sempur ?), collo vaginis atrobruneis marcescentibus cineta et foliiorum multorum fasciculo et caulibus centralis terminata. Folia ambitu oblonga, 12-20 cm. longa et c. 5-7-plo angustiora, acuta fere ad costam runcinato-pinnatifida, basi longa petiolato-divaricata, in vaginas remote foliata, sub umbellata, c. 3-7 cm. longa, in bracteis singulis, glabra, omnia levia, coriacea, partibus numerosis, imbricata, c. 4-seriata, sub glabra, bowo clavata, inflorescentia acaulis, in fasciculos pluribus, omnibus vaginis mortuis permultis late linearibus.
THE FLOWERING OF CORYLUS AVELLANA LINN.

By F. RILSTONE, A.L.S.

It is a well-known fact that the earliest yellow catkins of the hazel are conspicuous for some time before the first pistillate flowers can be found. Very noticeable, too, is the great disparity that exists between the flowering times of individual bushes. The earliest may be yellow with catkins early in January (or even in December of the previous year), and produce their crimson pistils by the end of January or early in February, while on other bushes the catkins remain entirely undeveloped until March.

At first sight this looks as if it may be a natural arrangement to secure cross-fertilization, each succeeding batch of catkins pollinating the stigmas of somewhat earlier-flowering bushes. The following records of observations carefully made over a three months' period in 1938 show that the explanation is not quite so simple.

Attention was especially directed to four bushes, "A," "B," "C," and "D," which grew along a stretch of about a hundred yards by a stream in a sheltered valley two miles inland from the north coast of Cornwall and at about 150 feet elevation.

The bush labelled "A" was chosen because it was the first in the neighbourhood to display its crimson stigmas. My sister, Miss M. J. Rilstone, has kept watch on the flowering of hazel bushes in the neighbourhood for several years past, and this particular bush has always been the first to open its pistillate flowers, usually during the first few days of February. This year the first were seen on January 31. The bush was then, and had been for some time, covered with masses of fully extended yellow catkins. But, though fully extended, these catkins were still immature. Not an anther was open and not a grain of pollen had been shed. The same thing had been noticed in previous years; always the first pistillate flowers of the year were open before the catkins began to produce pollen.

By February 12, this bush had numerous pistillate flowers, and pollen was being shed freely. Ten days later the catkins were shrivelling and turning brown, and the early pistillate flowers were discoloured, but throughout late February and March fair numbers of fresh pistillate flowers could be found, especially in the topmost branches, and small quantities of pollen were produced by a very few late-developing catkins lower down the bush.

Bush "B," with slender rather pendulous twigs, behaved peculiarly. On January 31 it presented as great a display of extended catkins as bush "A" but, as in that, the anthers were still unopened and no pollen had been shed. In a few days, however, pollen was being produced, but no pistillate flowers could be found. When, at the end of February, all the catkins had ceased pollen-production and had turned brown, and still no trace of a stigma could be seen, it looked as if the bush must be barren. March, however, brought the pistillate flowers, which were produced plentifully during the first half of the month.

Bush "C," about 30 feet from "A," will serve as an example of the prevalent late-flowering type of plant. On January 31, like the majority of the bushes in the neighbourhood, it was still in the winter state with all its catkins small and rigid. Not until February 22 were a few, perhaps half a dozen, partly extended catkins found. The first pollen was seen on March 3, when no pistillate flowers could be found, but a week later pollen was abundant and stigmas fairly numerous. By the end of the month both pistillate flowers and catkins were over.
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means for S.W. England range from January 29 in 1926 and 1934 to February 12 in 1930, and in the exceptional year 1929 to February 22. The extreme dates for S. Ireland are January 24 in 1934 and February 14 in 1936.

Apart from the exceptional date of February 1 in 1934, the means for N. Scotland vary from February 18 to March 10, and those for E. Scotland from February 10 to March 11, while those for N.E. England, omitting the exceptional date of January 30 in 1923, range from February 8 to March 3.

THE CHAROPHYTE COLLECTING TOURS OF THOMAS BATES BLOW.

BY G. O. ALLEN.

FINDING the opening lines of a proposed paper by the late Mr. James Groves on "Charophyta collected by Mr. T. B. Blow in Southern Europe and Tunis" has suggested to me that a brief sketch of the many tours all over the world made by this energetic botanist, mainly in quest of Charophytes, would be of considerable interest.

Systematic accounts by Groves have appeared in the pages of the Linnean Society's Journal on the Charophytes Mr. Blow collected in the West Indies, Ceylon, and Madagascar (Bot. xxxi. 1898; xli. 1922; and xlviii. 1928), but they by no means cover all his remarkable activities in this line.

In his obituary notice on his brother Henry, James Groves has recorded that 1874 was an important year for them. It was then that through the medium of the exchange columns of 'Science Gossip' the brothers got into correspondence with a number of British botanists, including Mr. Blow. As long ago as that he was styled "one of the most ardent of field botanists," and it was his enthusiasm that led them to extend their botanical horizon. If the Groves brothers had good reason to be grateful to Blow, it was they in turn who aroused his deep and lasting fondness for the Characeae, the study of which group they started in 1877.

The first time T. B. Blow began collecting far afield for the brothers was on the occasion of his visit to British Guiana and the West Indies in the winter of 1894-5, British Guiana itself, though a promising-looking spot, and several of the islands, produced no Charophytes at that season, but in Antigua and Trinidad several were forthcoming, including one then considered new, Nitella dictyosperma, of which there is an illustration by Henry Groves described subsequently by James as "among the best representations of this genus which have been produced." There is little doubt that James Groves influenced
by some later determinations by Nordstedt from that region eventually came to regard this plant as best referred to *N. oligosperma* Br.

The next Charophyte expedition was a brief visit to Ceylon in the autumn of 1895. This was productive of a particularly delicate new species, *Nitella leptodactyla*, which was beautifully depicted by Miss Mary Groves. It was on specimens collected then that Groves decided to elevate Nordstedt's *N. pseudo-flabellata* Br. forma *macrosa* to specific rank as *N. macrosa*. No less than thirteen species were gathered in under three weeks' hunting then with a subsequent fortnight in January 1898.

Mr. Blow then moved on in December to Western Australia and also visited South Australia, New South Wales, Victoria, and the Northern Territory. Including a short visit to New Zealand in March 1896, over one hundred and twenty gatherings of Charophytes were made in this area, eighty of these being in Western Australia.

The collection comprised over twenty-five species, the most noteworthy being *Nitella gloeostachys* Br., *N. micropylla* Br., *N. myriotricha* Br., *N. leptodactylis* Br., *N. loddonensis* Br., *N. congesta* Br., *N. Stuartii* Br., and a fine range of *N. gelatinosa* Br.: *Chara mucropogon* Br., *C. australis* Br., *C. leptopitys* Br., *C. Preissii* Br., and *C. Drummondii* Br.

Early in May of that year Blow moved on to Japan, where, by the third week of June, some forty more gatherings were made, which included *Nitella laxa* Allen, *N. battachospermia* Br., *N. pulchella* Allen, and *N. Stuartii* Br. Some plants were also collected on the way home at Singapore and Penang.

In November of the following year (1897) his pioneer work on Bee-keeping took Mr. Blow a month's visit to Tunis, where a small but important collection of Charophytes was made, the most interesting amongst them being *Tolypella hispanica* Nordst., *Chara squamosa* Desf. (*C. gymnophylla* Br.), and *C. galioides* DC.

1898 saw another visit to the far East, collections being made for a fortnight in Ceylon, and continued in Japan during a stay there from February to December. In January 1899 for a month Blow made his first gatherings in India, continuing them on a further visit in 1908, though this latter was primarily a photographic trip.

January 1914 found him in Spain, when he was successful in finding amongst others *Tolypella hispanica* Nordst., *Chara galioides* DC., and *C. robustans* Br.

Strenuous hospital work in France made Charophyte hunting out of the question during the War years.

Between 1920 and 1923 numerous visits were paid to the Continent, for the most part to countries bordering on the Mediterranean, where close on a hundred gatherings were made, which, as Groves has remarked in MS., "represented notable extensions of the known distribution of several species." The countries included France, 1920–1; Portugal, 1921; Majorca, 1922; Spain, 1922; and Italy, 1922–3. About twenty-two species were obtained including *Nitella capillaris* Gr. & B.-W., *N. hyalina* Ag., *Tolypella hispanica* Nordst., *Lamprothamnium papulosum* Gr., *Chara canescens* Lois., *C. rudis* Br., *C. imperfecta* Br., *C. galioides* DC., *C. tomentosa* L. and *C. fragifera* Dur.

Early in 1924 Blow started off on perhaps the most venture-some of all his trips, viz., to Madagascar, a country where very few Charophytes had been collected before—a fact which is hardly surprising seeing the hitherto inaccessible nature of most of the island. He was, however, fortunate in having obtained from the French Colonial authorities through Sir John Piliter, a prominent Englishman in Paris, very special introductions which rendered his travels much easier and were in fact invaluable.

When after several days' journey by slow trains he reached the capital and was showing his papers, he was informed that, though they knew he had arrived at Tamatave, they had been searching for him for a week, and that the Governor-General, Mons. M. Olivier, wished to see him. Mr. Blow accordingly paid him a visit and was told that on stating his itinerary he would be helped everywhere. A dearth of porters on one occasion was remedied by the temporary release of some prisoners from the local jail.

The principal object of this visit was to investigate the theory that the presence of Charophytes was inimical to Mosquito larvae. A very large collection was made, 384 specimens in 104 gatherings. This local enquiry, combined with subsequent thorough laboratory investigations on his return, led him to conclude that without doubt there was no substance in the theory.

From among the seventeen species collected, Groves described five as new—and also three new varieties—all of *Nitella*, the species being *N. inaequalis*, *N. graciliformis*, *N. sphaerocephala*, *N. vermiculata*, and *N. Blowiana*. The last-named, as Mr. Blow has described to me, was a most remarkable plant from its being so heavily enveloped in mucus, one specimen which would be but a few grains when dried, weighing two to three ounces when fresh. The fact that the dried plants were supplemented by a considerable amount of material in formalin, was a great help in the satisfactory study of these specimens. Without such material much time has often to be spent in detaching and preparing portions which in the end may not prove suitable for determining the species.

Blow also collected a few Charophytes in Istrià in 1928, and in Corfu in 1929. Amongst the latter were two gatherings of a particularly large plant with the habit of *Chara hispida* L., the countries included France, 1920–1; Portugal, 1921; Majorca, 1922; Spain, 1922; and Italy, 1922–3. About twenty-two species were obtained including *Nitella capillaris* Gr. & B.-W., *N. hyalina* Ag., *Tolypella hispanica* Nordst., *Lamprothamnium papulosum* Gr., *Chara canescens* Lois., *C. rudis* Br., *C. imperfecta* Br., *C. galioides* DC., *C. tomentosa* L. and *C. fragifera* Dur.

Early in 1924 Blow started off on perhaps the most venture-some of all his trips, viz., to Madagascar, a country where very few Charophytes had been collected before—a fact which is hardly surprising seeing the hitherto inaccessible nature of most of the island. He was, however, fortunate in having obtained from the French Colonial authorities through Sir John Piliter, a prominent Englishman in Paris, very special introductions which rendered his travels much easier and were in fact invaluable.

When after several days' journey by slow trains he reached the capital and was showing his papers, he was informed that, though they knew he had arrived at Tamatave, they had been searching for him for a week, and that the Governor-General, Mons. M. Olivier, wished to see him. Mr. Blow accordingly paid him a visit and was told that on stating his itinerary he would be helped everywhere. A dearth of porters on one occasion was remedied by the temporary release of some prisoners from the local jail.

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298 THE

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obtained,”

States

new species closely allied to the West Indian

they constituted an immensely important

of collecting of these plants to appreciate the labour and skill

to the Groves Charophyte herbarium which was bequeathed to

the British Museum in 1933.

A NEW CARIBBEAN SPECIES OF CROTALARIA *

By Harold A. Senn, M.A., Ph.D.

While examining a collection of species of Crotalaria from

Colombia, in conjunction with Mr. E. P. Killip of the United

States National Herbarium, attention was directed especially
to a specimen collected by Purdie in 1844. This proved to be a
new species closely allied to the West Indian Crotalaria lotifolia L.
Since this species was established on a specimen from the mainland
of South America, which region is not treated in my forthcoming
revision of the Crotalaria species of North America, Central
America, and the West Indies, it may be well to record it here.
The species may be characterized as follows:—

Crotalaria Purdiana, sp. nov.

Frutex vel suffrutex, erectus, accedens ad C. lotifolium; caulibus teretibus dense fulvo-pilosis; stipulis submollibus; folulis trifoliatis, supra hirtellis, subtus adpresso-pilosis, foliolis ellipticis

* Contribution No. 500, "Botany and Plant Pathology," Science Service, Department of Agriculture, Ottawa, Canada. (Continuing the Series of the former Division of Botany.) This species was studied during the tenure of a United States National Research Council Fellowship in Botany at Harvard University.

A NEW CARIBBEAN SPECIES OF CROTALARIA

obtusis vel mucronulatis, foliolo terminali 4-2-8-2 cm. longo, 2-2-3-8 cm. lato, lateralisibus 3-6-5-0 cm. longis, 1-8-2-9 cm. latis, petiolo angulato, 5-5-9-1 cm. longo; racemis sessilibus axillari-ibus, 4-8-floribus, pedicellis brevibus, circa 4 mm. longis; bracteis

minutis setaceis, bracteolis obsoletis; calyce campanulato, dense piloso, tubo circa 4 mm. longo, lacinias lanceolatias 5 mm. longis; vexillo dorse glabrato praeter pilosam costam, circa 1-4 cm. longo; carinato subrotundato brevi attenuato; leguminibus immaturis oblongis, basi attenuatis, dense sericeo-pilosis.

Colombia: Santa Marta, Manoca, Purdie s.n., Sept. 1844, type in the Gray Herbarium, Harvard University, isotype in the Herbarium of the Royal Botanic Gardens, Kew.

Cura: Habana Prov., Batabanó, Ekman 12621, in palm savannas behind the manglares (Herbarium of Field Museum of Natural History, Chicago).

This species and the closely related Crotalaria lotifolia L. are

American representatives of the subsection Oliganthae Baker f.,
Section Eucrotalaria Baker f. (Journ. Linn. Soc. xlii. 241-452, 1914) of this large pantropic genus. Both Crotalaria lotifolia L. and C. Purdieana Senn are characterized by short axillary racemes and basally attenuated legumes. In C. Purdieana there is a definite common peduncle bearing 4-8 flowers, whereas in C. lotifolia the common peduncle is very short or almost lacking and only 1-3 flowers are borne in each axil. The former species has

definitely larger leaves than has C. lotifolia and the leaves are

pilose above as well as below, whereas in C. lotifolia the upper

surface is glabrous. The type-specimen on which the above

description was based bore only immature legumes. The other

specimen cited had mature glabrate legumes similar to those of

C. lotifolia.

I am grateful to those in charge of the Herbaria cited above

for the loan of specimens and to Mr. Killip for the opportunity

of examining his assembled Colombian material.

AN ENUMERATION OF THE AFRICAN SPECIES OF

ELEPHANTOPUS L.

By W. R. Philpston, B.A.

The discovery that Elephantopus mollis Kunth was frequent in collections from Africa and that it had previously been confused with E. scaber L. lead to the examination of all the material of this genus from Africa in the herbaria at the British Museum and Kew. The distributions of these two species, which scarcely overlap, are shown in the map. All the African material of E. scaber was found to fall under Hoffmann's variety plurisetus,
which is here treated as a subspecies, since it differs constantly, though only slightly, from the Asiatic material. Within the subspecies two well-defined varieties, each with a limited distribution, are recognized. Plants collected by Kassner on the shores of Lake Mweru and by Carson south of Lake Tanganyika probably represent undescribed species related to E. scaber, but the material is too incomplete to base new species upon.

Two species previously described (namely, E. Glossweilleri S. Moore and E. vernonioides S. Moore) are regarded as synonymous with E. senegalensis Oliv. & Hiern and E. multisetus O. Hoffm. respectively.

The sub-tribe Elephantopeae was first proposed by Cassini and was maintained by Lessing and De Candolle. Bentham, in his revision of the Compositae in ‘Genera Plantarum’, divided his Vernoniaceae primarily into Euvernoniaceae and Lychnophoreae, and included in the latter sub-tribe not only genera clearly related to Lychnophora, but also the Elephantopeae and the Rolandraeae. The older arrangement seems preferable, for when the Rolandraeae and especially the Elephantopeae are removed from the Lychnophoreae, a group of genera remains which is extremely closely related to the Stilpnopappeae and to Vernonia itself.

The sub-tribe Elephantopeae deserves the distinction of a sub-tribe because of their characteristic glomus of small heads and also the corolla which is asymmetric in all the species, being deeply cleft between the lobes nearest to the centre of the receptacle, a structure which is all but unique in the tribe. This character is found elsewhere in the tribe in the extremely isolated genus Stokesia. I have also found asymmetry of the corolla in the African monotypic genus Pseudo-Elephantopus, which on the sum total of its characters is nearly related to Erlangaea, but is further exceptional in the tribe in having a sub-two-seriate involucre. Both these genera have many-flowered and discrete heads, but the recent genus Hystrichophora Midd. resembles Elephantopus not only in the asymmetric corolla, but in having rather few-flowered heads aggregated into glomerules, and also in its habit. This genus certainly seems to belong to the Elephantopeae.

Several genera have been proposed in the sub-tribe, but most are superfluous. The only species with a two-seriate pappus is placed in Elephantois (South America). Two species with a characteristic habit and inflorescence, and with two of the pappus-setae elongated and variously twisted form the genus Pseudo-Elephantopus (one, Pseudo-Elephantopus Funckii (Turcz.), comb. nov.; previously placed in a separate genus Spirochaeta). Elephantopus angustijolius (South America). Two species previously placed in a separate genus Orthopappus, but a study of the African species reveals such diversity in the pappus that it is best to retain it in Elephantopus.


Perennial pilose herbae, with leafy or scapiform stems. Leaves sessile, pinnately nerved, with entire or dentate margins. Glomerulia solitary or disposed on stiff peduncles in a corymb, and surrounded by leaf-like bracts. Heads few-flowered, with few and narrow involucreal scales. Corolla 5-cleft, asymmetric, being more deeply cleft on the inner side. Anthers auriculate, auricles of adjacent anthers fused. Style branches filiform, pilose, especially below their union. Achenes cylindrical, 10-ribbed, pilose, often glandular between the ribs. Pappus uniseriate, setae 5-6, usually long with wider bases, rarely short, and in one (South American) species forming a crown. Receptacle small, naked.

* Pseudo-Elephantopus Rohr in Nat.-Selsk. Kjob. ii. 214 (1792) (later misspelt Pseudoelephantopus). Rohr did not make a specific combination and Dahl, t. c. 216, who described the species of Rohr’s genera in this paper, identifies the genus with Elephantopus spicatus Aubl. The combination Pseudoelephantopus spicatus was first made by Glesson in North Amer. Fl. xxxiii. 109 (1922), which is here corrected to Pseudo-Elephantopus spicatus (Aubl.) Glesson.

Distribution.—Tropical Asia; Tropical Australia; Tropical Africa; Madagascar; America from the southern United States to north-temperate South America.

Type-species, *E. scaber* L. Species in Africa 7.

**Key to the African Species.**

A. Pappus of 5–15 bristles or scales, inflorescence a branched corymb or scapitose (rarely small plants with a single glomus).

B. Inflorescence a branched corymb.

C. Pappus of bristles dilated below, tips of corolla lobes glabrous.

D. Lower leaves crowded to form a rosette, pappus bristles gradually dilated below; low scapoform herb with the involucral bracts appressed-pilose ..................

DD. Lower leaves separated by short internodes, pappus of fine bristles abruptly dilated at the base; usually tall branched and leafy herb with the involucral bracts glabrous and shining or puberulous ....

CC. Pappus of about 10–12 narrow scales, tips of the corolla lobes hairy.

E. Involucral bracts uniformly tomentose...

EE. Involucral bracts with tufts of hairs at their apexes, glabrous and shining below ...............

BB. Inflorescence spicate ....

AA. Pappus of about 40–50 bristles, glomera terminal solitary, subtended by numerous involucral bracts which are several times longer than the heads and resemble the foliage leaves.

F. Leaf-sheaths inconspicuous

FF. Leaf-sheaths dilated ..................


I have examined the specimen of this species in the Linnaean Herbarium. As it was in Linnaeus's possession when he wrote the 'Species Plantarum,' and since his description is original, this specimen must be taken as the type. It is an Old World plant, for he has written "*Ind. or.*" on the sheet. The specimen has a rosette of leaves and a scapoform inflorescence. The citations following the description refer not only to this species but also to the New World species *E. carolinianus* Willd. and *E. tomentosus* L.

The material of this species, which I have examined from Asia, has achenes with a pappus of five or rarely six setae. The African material equally constantly has achenes with more than five setae, most frequently with from seven to ten. I regard the Asiatic material as *E. scaber* subsp. *typicus* (Koster), stat. nov. (Koster var. *typicus* Koster in Blumea, i. 458 (1935)). The African material falls under Hoffmann's variety *plurisetus*, which I regard as a subspecies.

2. **E. mollis** (O. Hoffm.), stat. nov.


**Belgian Congo**: Katanga; Elisabethville, Rogers 10136 (BM, Kew); Elisabethville, *Hirschberg* 74 (Kew); Kipiala, Kassner 2528 (BM, Kew).

**Tanganyika**: Lindi Province; Lindi, *Schlieben* 6294 (BM), Iringa Province; Mbeya District, Thompson 789; Davies 170 (Kew); Iringa, *Emson* 550 (Kew); Uhehe, Goeze 772 (BM).

**Nyasaland**: Blantyre; Shire Highlands, Buchanan 53 (Kew). Without precise locality, Buchanan 475 (BM).

**Northern Rhodesia**: Bataoka District; Pemba, Rogers 8577 (Kew). Luangwa District; Broken Hill, Rogers 8116; Mummba, Macaulay 634 (Kew). Solwezi District; Milne-Redhead 551 (Kew).

**Southern Rhodesia**: Mzoe District; *Eyles* 256 (BM), Salisbury; Dept. of Agriculture 2479 (Kew).

**Angola**: Huila; Wetschek 3389 (BM, Kew). Cuanza Norte; Pungo Adongo, Wetschek 3387 (Kew), Benguela; Cacunda, Gossweiler 4259 (BM). Bie; Ganguela, Gossweiler 3345 (BM, Kew). Lunda; Dala, *Exell* and Mendonça 1420 (BM).

**Portuguese East Africa**: Niassa District; *Torre* 53 (BM); Gomes e Sousa 1353 (Kew).

**Var. hirsutus** var. nov. a subsp. *plurisetus* tantum differt rami dense erecti tomentosis, et squamis involucri pilis densis appressis obtectis.

**Tanganyika**: Rungwe District; Davies 473 (type, Kew); Kyimbila; *Stoke* 1282 (Kew).

**Nyasaland**: North Nyassa District; Kondowe to Kawuga, Johnston 359.

**Var. brevisetus** var. nov. a subsp. *plurisetus* tantum differt pappi setis brevioribus, 1·5–2·5 mm. longis.

**Uganda**: Western Province; Masaka-Mbarara road, *Maitland* 827 (type, Kew).

**Kenya**: Nyansi Province; Kisii, *Coryndon Museum* 5390 (Kew).

**Tanganyika**: Bukoba District; Kamachumu road, *Hauser* 2178; Bugungi, at 6000 ft., *Chambers* 61 (Kew).


**Sierra Leone**: Scott Elliot 3880 (BM; Kew); Thomas 3056, 5821 (Kew); *Deighton* 292 (Kew).
THE AFRICAN SPECIES OF ELEPHANTOPUS L.

6. E. SENEGALENSIS (KLATT) OLIV. & HIERN IN OLIV. FL. TROP. AFRI. III. 299 (1877).


**French West Africa**: Senegal; **Heudelot 646** (type, Kew).

**Sierra Leone**: Mussia, **Thomas 2659** (Kew).

**Southern Nigeria**: Lagos, **MacGregor 158** (Kew).

**French Equatorial Africa**: Oubanguï-Chari; Haute-Kotto, Zalinga, **Le Testu 3332** (Herb. Le Testu).

**Uganda**: Eastern Province; Serere, **Chandler 940** (Kew).

**Angola**: Cuanza Norte; Samba Caju, **Gossweiler 8478** (BM).


**Belgian Congo**: Lisambo, **Laurent s. n.** (type, Bruxelles).

**Angola**: Cuanza Norte; Capijongo, **Gossweiler 7461** (BM).

These last two species are very distinct within the genus, having not only a distinctive pappus but a very striking habit quite unlike that of any other species.

I wish to express my gratitude to the Director of the Jardin Botanique de l’État, Bruxelles, for the loan of the type-specimen of **Elephantopus multisetus** O. Hoffm.
ON THE OCCURRENCE OF A HERMAPHRODITE PLANT OF EMPETRUM NIGRUM L.

BY KATHLEEN B. BLACKBURN.

It has been known for a long time that hermaphrodite forms of the normally dioecious Crowberry occur, and such plants are so common in Greenland that Lange referred to them as 'forma hermaphroditica'.

In 1927 Hagerup investigated these plants from northern areas and came to the conclusion that they were sufficiently differentiated from the dioecious Empetrum nigrum, by chromosome number as well as morphological characters, to be considered as a separate species under the name Empetrum hermaphroditum (Lange) Hagerup.

Since this time there has been a tendency to assign all the hermaphrodite individuals found sporadically in Britain to Hagerup's new species. The discovery of another example on the hills near Edmondbyers, Co. Durham, has made it possible to test whether this is always justifiable.

Careful examination showed that in vegetative features this plant was indistinguishable from the neighbouring male and female individuals, whereas E. hermaphroditum is more robust and upright in habit. It also showed rooting procumbent branches which E. hermaphroditum is definitely stated not to do. The flowers had three stamens, as in the male, instead of the six figured by Hagerup, but this may not be significant since he also gives a diagram of a dimerous flower with only two. Again, my specimen showed more scales on the flowering shoot than the two bracteoles in his floral diagrams. The elongated style, both drawn and described, was certainly not present, but, as the few flowers examined were young ones opened precociously in autumn, this difference does not necessarily carry much weight. As described for E. hermaphroditum the withered stamens persisted beneath the ripening fruit, but even in the male plant they can still be seen in the autumn, so this must be considered as a descriptive rather than a diagnostic feature.

The last remaining and most important character to be tested was the chromosome number. Hagerup reported the gametic number of E. nigrum to be 13 and that of E. hermaphroditum 26, and he correlated the change in sex-conditions with the change in number of chromosomes—in other words, he thought that the new species, with its different characters, arose as the result of the chromosome doubling. In my material the authors


OBTUARY.

JOHN FREDERICK BAILEY.

The late Mr. J. F. Bailey, a son of the famous F. Manson Bailey, was born at Brisbane on 5th August, 1866, and died at his home at Burania, Brisbane, on the 16th May, 1938.

He was one of the most prominent figures in Australian horticulture. In 1889 he was appointed assistant to his father, then styled Colonial Botanist, and remained with him until 1905, when he was appointed Director of the Botanic Gardens, Brisbane, in succession to Mr. Phillip MacMahon. In 1915, on the death of F. M. Bailey, he was appointed Government Botanist in addition to his other post. He retained these positions until 1917, when he was appointed Director of the Botanic Gardens, Adelaide, South Australia.

On his retirement, he conducted the gardening page of the 'Brisbane Telegraph.' He was an active member of many Australian horticultural societies, and frequently acted as judge at the larger metropolitan flower shows.

In his earlier days, as Assistant to Colonial Botanist, Brisbane, he wrote several articles on economic botany in the 'Queensland Agricultural Journal,' and during his brief regime as Government Botanist (1915–1917) wrote several contributions to the Queensland Flora, mainly in conjunction with the present writer. During his term as assistant to his father he made several extensive collecting trips to different parts of Queensland. The results of two of these he published: the one called 'Plants of the Rabbit-infested Country, Bulloo River, South Queensland,' in the Report of the Seventh Meeting of the Australasian Association for the Advancement of Science, Sydney, 1898; the other a 'Report on the Timber Trees of the Herberton District, North Queensland,' published in the 'Queensland Agricultural Journal' for October 1899. This latter is an exceptionally good report, and is the basis of our knowledge of the botany of the timber trees of this forest-rich area.

C. T. WHITE.
REVIEW.


The absence of a Flora of Sussex, comparable with the existing Floras of the adjacent counties, was brought to the notice of the South-Eastern Union of Scientific Societies in 1927 by the late Dr. A. B. Rendle, and after some preliminary work had been done, Lt.-Col. Wolley-Dod undertook to produce a new Flora in consultation with a committee of the Botanical Section of the Union. The best of our County Floras, such as White’s ‘Flora of Bristol,’ have been written spontaneously by men who combined a good general knowledge of systematic botany with the zeal and patience which the investigation of the innumerable and often tedious details of such works entails; and in this light the committee was fortunate in securing the services of Lt.-Col. Wolley-Dod, whose botanical knowledge was not confined to the British Flora and who was already resident in the county. After seven years’ labour, which has necessarily been heavier than for previous similar Floras owing to the elaboration of further critical groups and the recent changes in nomenclature, a satisfactory and comprehensive work has been published.

The introduction is adequate and of much interest. There is a full account of the seven sections into which the county is divided, with lists of their most notable species. The divisions are constructed to coincide with the natural topography, but it may be found inconvenient that three of these should overlap the boundary between Watson’s two vice-counties 13 and 14. Mr. H. B. Milner contributes a chapter on the geology of the county, which is carefully and thoroughly done. The accompanying geological sketch-map, however, is hardly satisfactory, and a map with the different formations printed in colours, such as appears in the Floras of Kent and Surrey, would apparently have warranted a little extra expenditure. The Botanologia or Historical Summary is concise but comprehensive, and there is evidence here, as throughout the book, that literature and herbaria have been adequately consulted. The comparison of the flora with those of the adjacent counties shows a rather remarkable equality in the total numbers of species. A special small chapter is wisely introduced for casual aliens, but a large number of species of almost similar status appears in the Flora proper.

On turning to the body of the book the thoroughness of Lt.-Col. Wolley-Dod’s work is quickly seen. The nature of the habitats of every species is stated with unusual accuracy, and very few can be questioned. Lithospermum arvense, said to grow in similar places to L. officinale rather than in corn-fields, is almost a solitary example. A special feature that has been introduced, not found in any other Flora, we believe, is the “first notice” in addition to the “first record” of each species. In the investigation of literature and herbaria it was discovered that evidence of the occurrence of very many species existed of earlier date than the first published record, the majority of these first notices (over 300) appearing in the manuscripts of William Markwick (1739-1813), now in the Hastings Museum. An account of these manuscripts was printed in this Journal in 1933 (pp. 348 sq.). Interspersed throughout the text are frequent extracts from pre-Linnaean and other early works, often of much interest, as are also the occasional paragraphs wherein the editor expresses his own opinion on points of taxonomy. The latest accounts of critical genera are usually followed. In Rosa the editor is in his own domain; Rubus is written chiefly by Rev. H. J. Riddelsdell; Hieracium is less satisfactory owing to the group having been less intelligently treated by former experts. The Pansies are placed under two unnumbered aggregate species, Viola tricolor L. and V. arvensis Murr., subordinate to which are twelve numbered segregate species. One wonders whether all of these are worthy of specific rank. The two Valerians, V. Mikanii (Syme) and V. sambucifolia Mikan, are treated as three species, as proposed by Drabble in B. E. C. Report, pp. 249 etc. (1933). No stations are given, however, for two of them, and further work on the Sussex forms is clearly required. The same might also be said of the Thymes, which follow Ronniger’s arrangement, but with few localities under the segregate species. In several genera some of the varieties admitted seem rather trivial. It is curious that Valerianella carinata is recorded in the Flora for the first time.

In spite of the general excellence of the work it is inevitable that a few points should be open to criticism. The period of flowering of Stellaria neglecta is given as 4–9, but surely this plant, unlike S. media, produces only one generation annually and is normally dried up before midsummer. The editor has doubts about his records of Gentiana campestris and G. baltica, which are certainly critical forms that have not been satisfactorily separated in Britain. The latest name for G. ungulata Agardh var. praecox Towns., i.e. G. anglica Puzel., has not been adopted, owing, it is understood, to an oversight. The status given for several species might be disputed. Are Chrysanthemum segetum and Artemisia Absinthium naturalised aliens, while Anthemis Cotula and Artemisia vulgaris are natives? The status of Asparagus in Sussex is another problem. One or two errors appear due to lack of co-ordination between the editor and the committee. Such is “Orchis incurvata” L. for “O. latifolia” L. on page 430,
formation of a dikaryophytic mycelium (i.e., the male and female nuclei are paired, but not fused); (4) Gametophytic, i.e., haploid mycelium, cannot cause infection; parasitic mycelium is always dikaryophytic; (5) Saprophytic mycelium is usually haploid, dikaryophytic mycelium tends in culture to revert to the haploid condition.

Rubus Echinatus Lindl.—The only specimen which is to be found under this name in Lindley's herbarium has been kindly lent me by the Professor of Botany, Cambridge. It is quite unmistakably the R. echinatus of Rogers, and the name antedates Mueller's discr.pus. In Lindley's writing, at the bottom of the sheet, occur at the left-hand corner the words “43. Hale end Forster. R. rhamnifolius”; and at the right corner “R. echinatus.” Lindley's description of R. echinatus is very poor when compared with good modern work; but the specimen settles conclusively the identity of Lindley's species, as the Curator of the Cambridge University Herbarium tells me that there is no competing specimen. Mueller's name therefore does not replace Lindley's for this plant.—H. J. Riddelsdell.

Mr. A. H. G. Alston, Assistant-Keeper in the Department of Botany, left England on September 24th. He is to attend the First South American Botanical Assembly which is to be held at Rio de Janeiro Oct. 12–19 and will then go by way of Trinidad to La Guaira. From thence he will cross Venezuela and pass via Bogota through Colombia to Buenaventura on a botanical expedition. Mr. Alston will pay particular attention to Ferns, and hopes to obtain data to trace out the relation between the fern flora of Trinidad and that of the mainland. He will be away from the Museum about eight months.

The British Mycological Society Transactions, vol. xxiii. parts 1 & 2, has accounts of the Spring foray held at Tunbridge Wells and the Autumn foray at Killarney (1830), with full lists of the species; descriptions of two new records of Agarics from Killarney by A. A. Pearson; “Mycetozoa found during the Killarney Foray” by G. Lister; the Presidential Address by F. G. Gould on “The Esthetic Appeal of the Larger Fungi” which is a popular account of attractive species; “Agarics. New Records and Observations,” by A. A. Pearson, which contains descriptions of many of the species of Russula recently distinguished on the continent, and other agarics including two new species, Tricholoma Inocybeoides and Mycena uracea, illustrated by a coloured plate; “Studies in the Genus Ustulina with special reference to Parasitism.—II. Spores—Germination and Infection,” by W. H. Wilkins; “Some Fungi on the Yew,” by E. O. Callen, describing Sphaerulina Taxi (Cooke) Masse,

NOMENCLATURE.—The Committee of the Taxonomy and Nomenclature section of the Seventh Botanical Congress to be held at Stockholm, 1940, have appointed Dr. T. A. Sprague, Royal Botanic Gardens, Kew, to act as "Rapporteur général" for the discussions on nomenclature. Motions dealing with nomenclature for consideration at the congress should be sent to Dr. Sprague before July 1, 1939. Motions must be presented in the form of additional articles or amendments to the International Rules, and should be drafted as briefly as possible. At least 100 printed copies must be presented.

According to Art. 74 of the International Rules, any additions or modifications made at the Amsterdam Congress will come up for confirmation at Stockholm. The Article reads:

"These Rules can be modified only by competent persons at an International Botanical Congress convened for the express purpose. Modifications accepted at one Congress remain on trial until the next Congress, at which they will receive sanction, unless undesirable consequences, reported to the Executive Committee, show need for further amendment or rejection."

The wording is not satisfactory, but it is to be noted that the only method to obtain reconsideration of any modification accepted at Amsterdam is by bringing objections to the notice of the executive committee. It would be best, therefore, for notice of these to be sent to Dr. Sprague with suggestions for amendment, preferably in the form of a definite motion.

THREE NEW SPECIES OF TULIPS.

By A. D. Hall, K.C.B., F.R.S.

The species of tulips here to be described have been observed before, and specimens of them may be found in herbaria, but they have not been identified or separated from the general mass of related material. They afford interesting examples of the help to taxonomy that is afforded by cytological examination.

Tulipa Aitchesonii, sp. nov.

One of the earliest species of Tulipa to be recognised was T. Clusiana, which was described by Clusius ("Cursus posteres, Rarioum plantarum," Antwerp, 1611) under the name of T. persica; as the name indicates, he had received bulbs from some eastern source. A native of Persia, Irak, etc., it was early taken into cultivation and has become naturalised in the south of France and other Mediterranean countries. Its spread has doubtless been assisted by its marked habit of putting out stolons, which leave offshoot bulbs a foot or more away from the parent. Newton (1927) found this species to be pentaploid, the only example in Tulipa of so high a degree of polyplody. A little later some bulbs which had been collected on the Chitral Relief Expedition proved to belong to a tetraploid form of T. Clusiana, and though they almost disappeared from cultivation they were found again in some material sent home by Colonel J. W. Thomson Glover from Chitral and the Swat Valley. Morphologically the tetraploid species T. chitralensis is barely to be distinguished from T. Clusiana, but in this new material, and especially in some further bulbs collected by Colonel R. Schomberg in Darasistan, specimens occurred which approximated T. chitralensis to the well-known T. stellata, also a tetraploid, described by Hooker from the Himalayas in 1827. In T. Clusiana and the typical T. chitralensis the flower possesses a deep purple basal blotch with filaments, anthers, and pollen of the same colour; in T. stellata the corresponding features are all yellow. In the new material alluded to, various intermediates occur—e.g., blotches of all degrees of indefiniteness, or a yellow blotch and filaments associated with purple anthers and pollen, all the other features of the plant being identical. Now T. stellata is accompanied by a well-known variant with a yellow ground-colour instead of white, usually known as T. chrysantha—not, however, the T. chrysantha of Boissier. These appear to be the commonest tulips of the hill country from Afghanistan and the Hindu Kush to Kashmir. Aitcheson (J. Linn. Soc., Bot. xviii. (1880), 103) writes of the yellow form, as seen on his journeys with the
by Blatter (J. Bombay Nat. Hist. Soc. xxxvii. (1934), 420) as T. porphyro-chrysantha may be identical, but, as neither the character of the bulb nor the chromosomes were stated, the identification is uncertain. It is noteworthy that the diploids have all been derived from great elevations, the polyploids are abundant in lower and generally cultivated localities. Similarly, in southern Europe the diploid T. australis is a plant of the hill ranges, the corresponding tetraploid T. silvestris is a weed of the vineyards.

Diploid. Bulb nearly spherical, 1-1.5 cm. diameter. Tough brown tunica, from the apex of which a tuft of wool protrudes. Leaves 2-4, closely set on stem, half erect or flat on ground, 8-10 cm. long by 0.5-0.8 cm. broad, glabrous, purple on edge, sometimes very undulate. Stem, short slender pedicels above ground, 3-5 cm. long. Flowers usually 1 or 2, opening widely to a star, perianth segments equal, 3-4 cm. long, 1.5-2 cm. broad, bluntly pointed; backs of outer segments coloured with red; ground-colour yellow with no basal blotch. Filaments, anthers, and pollen yellow. Ovary greenish with a small yellow stigmatic surface. The ground-colour may be white, with a purple basal blotch of more or less intensity and purple filaments and anthers. Capsule nearly cylindrical, blunt end.


Species diploides.

Tulipa ferruginea, 1-1.5 cm. diametro; tunica externa brunnea, duarte, supra lanata. Folia 2-4, approximata, suberecta, vel prostrata, 8-10 cm. longa, 0.5-0.8 cm. lata, glabra, interdum undulatissima, margine purpurea. Caulis brevis, gracilis, supra terram 3-5 cm. longus. Flores plurimque 1-2, stellato-patentes. Tepala aequala, 3-4 cm. longa, 1.5-2 cm. lata, obtusa, lutea, emaculata, exterio dorso rubra. Filamenta antherae pollinis flavae. Ovarium viride, stipitane parvo flavo. In floribus allis tepala alba ad basim purpuracae, filamenta antheraeque purpureae. Capsula ferre cylindrica, obtusa.


Typus: Herbarium, Kew.

z. Subspecies cachemiriana, subsp. nov.

A form from Kashmir characterised by upright glaucous leaves and a central stem up to 15 cm. carrying two or three flowers on short pedicels, the terminal flower often coloured as it emerges from the ground. No red colour on the backs of the outer segments, all parts of the flower pure yellow.

Foliis erectis glaucis, caulibus usque 15 cm. alto floribus duos vel tres pedicellis brevibus gerentibus, floribus luteis concoloribus, flore terminali et terra emergente luteo, insignis.

Habitat: Kashmir.

Typus: Herbarium, Kew.
Tulipa Bakeri, sp. nov.

The second tulip is again one that has long been in cultivation. *T. saxatilis* Sieber ex Spreng. was known to the early herbalists, as the Cretan tulip and Parkinson ("Paradisus," 1629) writes of "the Tulip of Caudia" as rarely flowering in this country. In the wild state it is confined to species to be triploid. This finding is in harmony with the behaviour of the species--its stolomferous habit, its stenhty, and its larger size than the other members of the same group.

For a triploid one must presume a diploid origin, but the *T. cretica*, Eriostemones and found in the highlands of Crete, however, among some bulbs collected by Newton in 1890, it was evidently not the typical bulbs observed. Recently, among some bulbs collected by Mr. G. P. Baker, V.M.H., in Crete and grown by him as *T. saxatilis*, flowers were observed that were evidently not the typical *saxatilis*.

Mr. Baker presented one of these bulbs to the John Innes Horticultural Institution where it has now flowered for two years and can be recognized in which he found it was *Asomatus*, 25 km. south of Crete. In the Kew herbarium there is a specimen collected by Dorfler from Crete, "Viano propo Christos," which appears to be this species, though there is another *Hogari*--an untenable attribution.

The third new species to be described is a triploid. It is a member of that large confused section of the Leistomones named by Baker Eriobulbi, tulips which possess within the tunica a thick felt of wool round the bulb proper. They constitute the typical scarlet tulips of the Near East--Asia Minor, Syria, Palestine, Itrak, Persia; two species have for a long time been naturalised in Italy and the south of France.

A large number of species have been described, but they shade off so insensibly one into another, and exhibit so much variation, even in the specimens collected in the same locality, that they may be regarded *sensu lato* as a single species for which the name *T. oculus-solis* St. Amans is the earliest. While the differentiation of species within the group is almost a matter of judgment and convenience, certain forms may be definitely picked out because they are triploids. Newton ascertained the triploid nature of *T. praecox* Tenore, a species morphologically quite distinct and exactly characterised by Tenore's diagnosis, though the subject of much confusion in Floras and Herbaria.

A second triploid occurs in Syria, common on the mulberry terraces near Beyrout; this again is morphologically distinct.
and unmistakable, though my identification of it with *T. aleppensis* cannot be otherwise than conventional, so imperfect are herbarium specimens of *Tulipa* for purposes of diagnosis.

Some years ago Mr. M. T. Dawe, then Director of Agriculture in Cyprus, sent to the John Innes Institution several collections of Tulip bulbs from that island. Among them was a diploid of the *oculus-solus* group which was afterwards described by Dr. Stapf as *T. cypria*, with a distinct wine-purple perianth. Another form for several years did not flower but multiplied very rapidly, continually putting out stolons and producing more small bulbs instead of growing to flowering size. They have flowered and, as was expected from the stoloniferous habit, are triploid; they are quite distinct from both *T. praecox* and *T. aleppensis*. I have called the species *T. Veneris*. It must remain a question whether it is legitimate to assign specific names to the various triploids which may arise from the same diploid species, differing from one another because of the variation in the diploid individuals from which they have started. The justification is that the triploid species is an unmistakable and invariable individual. The instructed eye will never hesitate to pick out a specimen of *T. praecox* or *T. aleppensis* or the newly recognised species here described, but a chance diploid member of this *oculus-solus* group collected in Palestine or Persia may leave the systematist in continued doubt as to which species or subspecies it belongs.

**Triploid.** *Bulbus* up to 3 cm. in diameter, with a papyraceous brown tunicle, within which a thick coat of felted wool encloses the bulb. *Stema* about 20 cm. above ground, glabrous, carrying four leaves, the lowest of which starts 2–3 cm. above ground-level. *Leaves* lanceolate, the lowest about 16 cm. × 3 cm., successively narrower and more pointed, glaucous, with a few short hairs on edges. *Bud* upright, green. *Flower* campanulate, opening widely. Perianth segments about 8 × 4 cm., the outer ones pointed and somewhat longer and narrower than the inner ones, which are rounded; colour a light scarlet inclined to orange, the inner segments showing a faint median stripe; the basal blotches are deep olive, almost black, pointed, extending to about one-half the length of the segment and broadly margined with yellow; the blotch shows through on the backs of the segments. The *filaments* are black, the anthers black and a little shorter than the filaments. *Pollen* yellow. *Ovary* green, marked with red on the three angles, tapering to a small red stigmatic surface. *Capsule* rarely if ever formed. Flowers in early April.

**Cyprus.**

*Species* triploidea.

*Bulbus* usque 3 cm. diametro; *tunica* exteriora brunnea, papyracea, intus dense lanata. *Caulis* supra terram cincte

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**THE REV. WILLIAM CRAN AND HIS SCIENTIFIC WORK.**

**BY G. LISTER.**

The contributions of the late William Cran, B.D., to our knowledge of *Mycetozoa* are so valuable that it is well that some account of his work should be put on record, together with a brief notice of the man himself. He was born at Lesmoir, near Rhynie, Aberdeenshire, in 1854. After taking the degree of M.A. at Aberdeen University in 1880, and later that of Bachelor of Divinity in Edinburgh, he went in 1883 as instructor to the Wesleyan seminary, Coke College, in the island of Antigua, West Indies, and there he remained for fifteen years. With his keen love of nature, he delighted in examining through the microscope many kinds of animal and vegetable life, and thus became interested in the study of *Mycetozoa*, or *Myxomycetes*, the beauty of whose sporangia and whose remarkable life-history greatly attracted him. In 1886 he sent a small collection of *Mycetozoa* to the Botanical Department of the British Museum, which was forwarded to my father for identification. In this way a correspondence started which was carried on at first with my father, and later with myself, which lasted for over thirty years; it not only proved of much interest scientifically but led to the establishment of a real friendship between us. An account of the fifty-two species collected in the West Indies by Mr. Cran was published by my father in a paper entitled "Mycetozoa of Antigua and Dominica" (Journal of Botany,
April 1898, pp. 113–122, Tab. 385; all the species enumerated were new records for those two islands.

In 1898 Mr. and Mrs. Cran returned to Scotland. Two years later he was appointed Congregational Minister to West Hill, Skene, Aberdeen, a position he held until he retired from active duty in 1930. Most faithfully did he fulfil his professional duties. With his wide sympathies and genial disposition, he carried on a fine educational work among the members of his congregation. To some of his young people he taught bookkeeping and shorthand. His knowledge of Greek and Latin enabled him to read the classics for the sheer joy of the literature. He was always ready to share the pleasure of his varied interests with others, whether as an archeologist, as a musician (he was an excellent violinist) or as an ardent student of nature.

For many years his chief hobby was the study of Mycetozoa, with which, as he once wrote to me, "most of the purple patches of my life have been associated." So effectively did he search for these organisms that he was able to record 119 species in the county of Aberdeen and just over the border into Kincardine. Most of them were obtained in the neighbourhood of Skene and near his old home at Rhynie, though many other parts of the county were explored on his holidays. In the "Mycetozoa Journals," which he kept from 1913 to 1922, he describes his experiences and gives lists of the species found in each locality. In reading them one realizes what zest and perseverance he pursued his studies. On returning home, his finds, many of them very minute species, would be carefully examined and beautiful permanent microscopic preparations, in glycerine jelly or balsam, made of the most interesting. Of the species found (a list of which is appended below), four were new for Scotland. Possibly the moist climate of the county of Aberdeen favours the growth of arboreal Mycetozoa*, but his remarkable success in finding twenty-four species on living trees, a habitat which has been little investigated elsewhere, was no doubt largely due to his perseverance, enthusiasm, and unusual powers of sight.

From 1918 onwards Mr. Cran devoted much time, with valuable results, to the study of the minute creatures wonderfully preserved in the Rhynie Chert, an ancient deposit of Middle Devonian age, the results of which have been incorporated in papers published by specialists. In 1925 he suffered a grievous loss in the death of his devoted wife, a loss which he bore with Christian fortitude. The following year an accident which he made little of at the time limited his activities. He wrote in September 1926, "I have not been on the warpath once all this year; a slight accident to my knee resulted in considerable disability in walking, so I had to confine myself to necessary duties; but I am improving; the work is however going forward." In 1931 he left Westhill and moved to the little village of Findhorn near Forres. I continued to receive cheerful letters from him, but he felt his powers were failing. He died June 28, 1933, leaving to his friends the remembrance of a beautiful and strong character and of a delightful comrade.

I am indebted to the Rev. C. T. Rae, who knew Mr. Cran well, for the notes he has kindly sent me on his friend's influence in his parish and on his classical attainments.

List of Mycetozoa found by the Rev. W. Cran in the Counties of Aberdeen and Kincardine.

("New" denotes that the species or variety was first found by Mr. Cran. NB. denotes a new record for Britain, NS. a new record for Scotland.)

*Craniumya fruticulosa (Muell.) Maibr. Abundant, summer and autumn.

Badhamia capsulifera (Bull.) Berk. Kirkville, Skene, Nov. 1916.

B. versicolor Lister. New. Arboreal. Found first at Rhynie, Aug. 1899, and occurring both there and near Skene frequently from July to December most years up to 1924. Widely distributed throughout the northern hemisphere.

B. utricularis Lister. Arboreal: found frequently near Westhill and Lesmoir, in summer, autumn, and winter from 1899 to 1920.

B. affinis Lister. NB. Arboreal: found frequently near Westhill and Lesmoir, not well developed.


B. macrocarpa (Ces.) Rost. NS. Lesmoir, Sept. 1917.

B. decipiens (Curtis) Berk. NS. Kirkville, Skene, Aug. 1912, on a living tree.

B. foliicola Lister. NS. Around Lesmoir, on straw and old thatch, summer and autumn, 1913, 1915.

P. auriscalpium (Bull.) Pers. Lesmoir, Sept. 1916, and occurring both there and near Skene frequently from July to December most years up to 1924.


P. globiferum (Ces.) Rost. Tilliefourie, Sept. 1917.

P. viride (Bull.) Pers. Rhynie, Ballogie, etc.; frequent.

P. aequivoca (Fries) Rost. Near Westhill and Lesmoir, Aug. to Sept., not uncommon.


P. aureum (Schum.) Rost. Lesmoir, Aug. 1915 on grass stalks; Tilliefourie, Aug. 1917.

P. viride (Bull.) Pers. Rhynie, Ballogie, etc.; frequent.

P. aequivoca (Fries) Rost. Near Westhill and Lesmoir, Aug. to Sept., not uncommon.

Diderma hemisphericum (Bull.) Hornem. NS. Lesmoir, July to November.

D. effusum (Schwein.) Morg. Craig, Sept. 1913; Westhill, Aug. 1915.

D. Chondriderma (de Bary & Rost.) G. Lister (syn. D. arboreum G. Lister & Petch). NB. Arboreal, frequent in late summer and autumn, Westhill and Lesmoir.

D. spumarioides Fries. Craig and Lesmoir, autumn.


D. Trevelyani Fries. Near Lesmoir, not infrequent in summer and autumn.


Didymium difforme (Pers.) Duby. Frequent in autumn Westhill and Lesmoir.

D. incrassatum Lister. NS. Westhill, Jan. 1921.

D. trachysporum G. Lister. NS. Lesmoir, May and Aug. 1913, on old thatch.

D. Caulus (Bull.) Rabenh. Frequent and widely distributed in summer and autumn.

D. melanoporum (Pers.) Macbr. Frequent.

D. nigipes (Link) Fries. Frequent.

D. zonatus Lister. Lesmoir, July 1923.

D. equamulosum (Alb. & Schwein.) Fries. Frequent.

Muclago spongiosa (Leyss.) Morgan. Lesmoir, July 1899; Westhill, July 1920, a large growth on garden rubbish; Finzean by Aboyne, Sept. 1922.

Lepidodermatigrinum (Schrad.) Rost. By Loch of Skene, Oct. 1912


Collodroma oculatum (Lippert) G. Lister. NB. Arboreal. First found near Westhill, Oct. 1910, since obtained from Kildrummay, Aug. 1914, from Ballogie near Aboyne, from near
the Loch of Skene, and at Durris in September and October. Before the Scotch gatherings made by Mr. Cran, this inconspicuous species was known only from sporangia which appeared on cultures of dead fir wood brought from Hallstatt, Upper Austria, by the late Christian Lippert; it was described by him as Didymium ocellatum, sp. n. in 1894: it has since been obtained from many parts of England, from Wales, Norway, Germany, Switzerland, Portugal, New South Wales, Japan, and New England.


T. contorta (Ditm.) Rost. Frequent.
Var. inconspicua (Rost.) Lister. Westhill, Aug. 1921.
T. lutescens Lister. NS. Craig, Nov. 1916, on living elm bark.
T. decipiens (Pers.) Macbr. Abundant in summer and autumn.
T. Botrytis Pers. Abundant.
Var. munda Lister. Craig, Nov. 1911; Lesmoir, Sept. 1916; Westhill, April 1912.
Var. flavicoma Lister. Lesmoir, May 1913; Westhill, Feb. 1913, April 1914.
H. leiodrifica Lister. NS. Balloge, Oct. 1913; Craig, Sept. 1915; Tilliefourie, June 1917.
A. cinerea (Bull.) Pers. Abundant, summer and autumn.
A. denuudata (L.) Wetst. Not uncommon in summer and autumn.
A. incrassata Pers. Abundant in summer and autumn.
A. nutans (Bull.) Grev. Not uncommon, July to September.
P. corticales (Batsch) Rost. Frequent.
P. vernicularis (Schwein.) Rost. NS. Lesmoir, Aug. 1917, July 1918; Westhill, 1923.
Margarita metallica (Berk. & Br.) Lister. NS. Often arboreal.
Most of these gatherings are the var. plasmodiocarpa R. E. Fries.
D. corticatum Lister. NB. Not uncommon; the first British gathering was from Rhynie in Oct. 1899.
D. nivalis (Meylan) G. Lister (syn. Lamprodermopis nivalis Meylan). NB. On an ash twig, Kirkville, March 1912.

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M. Ch. Meylan’s type found in the Jura Mountains in May 1909 and the repeated gatherings he has made since were all on turf near melting snow. He does not consider that the species should be regarded as a Dianema, on account of its having the threads of the capillitium somewhat thicker near the base, and more slender and anastomosing upwards.

Prototrichia metallica (Berk.) Mass. NS. Not unfrequent from autumn to spring; sometimes arboreal.

A CENTRAL REPOSITORY FOR TYPE-SPECIMENS.

By F. R. Fosberg.

Type-specimens are the basis of stability in botanical nomenclature and one of the main factors in taxonomic interpretation. This fact has come to be recognized in the International Rules and is realized, I think, by all taxonomists of any experience whatever. It must also have occurred to many what a catastrophe to the science of botany it would be if one of the major herbaria, or, for that matter, some of the smaller ones, were to be destroyed or seriously damaged in any way. Modern militarism has thoroughly demonstrated its irresponsibility and utter disregard for the welfare of humanity, and its willingness to destroy anything in its path to gain a military objective. The current war in Spain should be given careful consideration by all who place the welfare of the science above the welfare of the individual. The state of war is an emergency and all sense of peaceful inclinations, will receive no special consideration whatever. The state of war is an emergency and all sense of human values is lost.

With world politics in its present unsettled condition and armaments piling up in all of the major nations, it seems time for systematic botanists and others interested in the science to give some thought to the safeguarding of the precious type-specimens on which our nomenclature rests.

A plan calculated to accomplish this end is here presented for the consideration of the botanical public. It is not claimed that this is the best possible plan. It is expected that this or any similar plan will be bitterly opposed by all who place the prestige of their own institutions above the welfare of the science of botany. The suggestion is merely made to stimulate thought and discussion, and with the idea that if it is considered of sufficient importance it may be brought up for discussion at the 1940 international congress at Stockholm. Perhaps by this means something practical and acceptable to all botanists may be evolved and put into operation.
Briefly, my suggestion is this. That a modern central herbarium be established for the housing of all types in a locality sufficiently remote from densely populated centres, industrial areas, or points of strategic importance, to be reasonably safe from destruction in case of any war whatever. This herbarium should be administered by a director and board of regents appointed by the international botanical congress.

If there were a reasonable degree of unanimity among botanists as to the desirability of such an institution, a fund for establishing and endowing it could doubtless be built up by requests to the various research foundations, national research councils, and even to the governments of the important nations. Institutions with a large number of types to be cared for would likely be willing to contribute certain sums for annual running expenses. Gifts from private individuals with an interest in botany would probably not be entirely lacking. An international association of systematic botanists might be organized to promote the welfare of the central herbarium, with small dues to go to maintenance and service.

The administration of this herbarium should, I think, be placed in the hands of a salaried director, appointed by the international congress for a term of five years, subject to renewal at the discretion of the congress. He should be assisted and advised by a council or board of regents of six members, also appointed by the congress, who would have the power, by a two-thirds majority vote, to veto any action of the director that they considered detrimental to the welfare of the institution or the collections housed there.

Facilities should be provided for working and for inexpensive living for visiting botanists who wished to work on the collections housed in the herbarium. Loans of types to accredited institutions would naturally be permitted. Photographs of types would be made at the request of institutions or individuals and distributed at as small a cost as possible. A working collection of specimens other than types and historically important specimens should be maintained, the specimens in so far as possible compared with the types, both for use of resident and visiting botanists and for loan to those interested in special groups. This would prevent shipping damage to more important specimens in all cases where a carefully compared specimen would serve in place of a type. This collection might be built up by the distribution, by exchange, of specimens checked against types, to institutions in all parts of the world. In this way a great service to botany would result at the same time that the central collection was being built up.

The library, necessary in connection with any herbarium, would, in time, naturally become a repository for rare and important works, as well as a very complete collection of all documents of interest to systematic botanists. A self-supporting photostating or microfilm copying service could be established in connection with the library. Also, a natural outgrowth of this would be a universal bibliographic and abstracting service for systematic botany. A probable result of the maintenance of such a library would be that many of the extensive private libraries (and also herbaria) might be kept together by bequest of the owners, rather than dispersed at their deaths.

Choice of a location for such an institution should only be made after careful deliberation and study of all factors involved and perhaps only after consultation with military men of several different nations. The place must be remote from any possible military route or battle-ground. Yet it must be reasonably accessible to botanists, without entailing too much travel expense. The climate must not be so extreme in either cold or heat as to discourage botanists from visiting the institution and working there. The region should, if possible, be interesting botanically.

Needless to say, deliberation on this subject should be carried on in an atmosphere free as possible from all national or regional feeling. Switzerland, with its record of hundreds of years of peace, would be a logical choice as a location for such a herbarium if it were not situated in the midst of potentially antagonistic powers. Certain localities in Scandinavia, or perhaps Iceland, would seem likely to remain peaceable, though perhaps the winter climate might be a deterring factor. Sparsely inhabited areas in the southern Rocky Mountain region of the United States might give reasonable safety combined with a moderate climate.

Perhaps the most important question of all, after that of finance, would be that of the status of the types and other historical specimens housed in this herbarium. Of course, some institutions might be willing to give their specimens outright, in the interests of botany, but the majority would probably want to see how the plan worked, before losing control of their specimens. This very reasonable desire might be satisfied in either of two ways. The specimens might be deposited on permanent loan. Or an institution might endow or provide a table and herbarium cases sufficient to house the number of specimens of historical importance in its possession, and make this unit a department of its own herbarium. Its collection would not, however, be maintained in these cases as a unit, as this would be a source of confusion and extra labour for everyone. This would make possible the participation of institutions where the loaning of specimens or of types is forbidden.

Needless to say, the construction and maintenance of such a herbarium could benefit by the hundreds of years' experience and the mistakes and successes of all other herbaria combined. Working out of details could be left to the first director and his
advisory council, who would, naturally, welcome suggestions from experienced persons the world over.

This plan is not presented under any illusion that it is perfect. It seems workable. The benefits that would result to the science of botany would seem to outweigh, by far, any conceivable detriments. If worked out properly it should insure reasonable safety for type-material as long as civilization itself will last, or at least as long as types are necessary to the stability of botanical nomenclature.

University of Pennsylvania.

Since the above was written definite news has been received of the deliberate and total destruction of at least two of the largest universities in China, and of some damage by bombs to a third. What happened to their botanical collections, or, for that matter, to the botanists, is not known. Certainly the promising start that the Chinese have made in systematic botany is seriously retarded.

In Europe the most serious crisis since the world war has just been passed. The days during which war seemed practically inevitable must have made many botanists wonder why some such scheme as that presented above was not put into effect long ago. The settlement reached, though peaceable, seems little more than a truce that will enable the powers to build up their military strength still further. No thinking person should be deceived into thinking that a permanent peace has been achieved.

The history of the past year has demonstrated beyond a doubt the desirability of taking some action similar to that outlined above, also the danger entailed by delay and procrastination. By good fortune the herbaria of Great Britain, France, Vienna, Paris, and the various German institutions, rich in type-material, escaped exposure to war for the present, but who can predict what may happen next time international politics reaches a boiling point?

THE IXORA SPECIES OF BURMA AND THE ANDAMAN ISLANDS.—ADDITIONS AND EMENDATIONS.

By C. E. B. BREMEKAMP.

Since the appearance of my paper on "The Ixora Species of Burma and the Andaman Islands" (this Journal, 1937, pp. 108-111, 169-175, 290-296, 295-298, and 318-326) the Herbaria of Dehra Dun and Maymyo have sent me, by the intermediary of Mr. C. E. Parkinson, some more material. It comprised three species, Ixora villosa Roxb., I. merguensis Hook. f., and

I. undulata Roxb., which so far were known to me from the description and from incomplete material only, and which, therefore, occupied a rather dubious position in my classification, one species, I. oxyphylla Wall. ex G. Don, which was not yet known from this area, six entirely new species, and one new variety. I. Finlaysoniana Wall. ex G. Don, a garden plant of unknown origin, was represented by slightly aberrant specimens collected in the Andaman Islands; it is not impossible that these specimens were wild.

I. villosa Roxb., l.c. p. 295, was put by me in the neighbourhood of I. Brunonis Wall. ex G. Don. It appears now that this species belongs to another series of the section Brachypus—namely, to the series Subpaniculatas. The specimen I have seen was collected in the District Upper Chindwin at Naisatmyaing, alt. 300 m., by Po Chin, 5890 Maymyo Herb.

I. undulata Roxb., l.c. p. 324, tentatively referred to the subgenus Pavettoides, section Amphorion, possesses articulated inflorescences and belongs therefore to Eu-Ixora, where it will find a place in the section Otoabactrum. One of the specimens I have studied was collected in Upper Burma, Bhamo Division, alt. 130 m., by G. E. S. Cubitt, 608 Maymyo Herb. ex Herb. Hort. Cal.

I. merguensis Hook. f., l.c. p. 297, must be referred to the subgenus Pavettoides: neither the branchlets of the inflorescence nor the pedicels are articulated, and the bracts are often ascending on the branchlets and pedicels. It comes probably nearest to I. brunescens Kurz, and may provisionally be included in the section Amphorion: from the other members of this section, however, it differs conspicuously by the large size of the flowers. Another remarkable feature is the sessile anther: so far as I know, it is the only species of Ixora in which the filaments are completely absent. The specimens studied by me were collected at Leikpok Chang, Mergui District, by Mr. Braybon's collector, 135 Maymyo Herb. and 136 Dehra Dun Herb. and at Theinkun Chang, Thebya, by O. E. Parkinson, 1923 Dehra Dun Herb.

I. oxyphylla Wall. ex G. Don, Gen. Syst. iii. 572 (1834), is a species nearly related to I. subessilis Wall. ex G. Don: in fact, several authors consider the two species as identical. In my opinion, however, Don was right in keeping them apart: I. oxyphylla differs from I. subessilis in its distinctly ciliate, not merely tapering, leaves, its glabrous, instead of puberulous, inflorescences, and in the smaller size of the bracteoles, which are shorter than the ovary, and not about twice as long. Both species are apparently common in Assam, but of I. oxyphylla I have now seen a specimen collected in Upper Burma, Kachin Hills, by Shaik Mohim, s.n. Herb. Dehra Dun ex Herb. Hort. Cal.

22
Entirely new are:


*Folia* glabra petiolo 15 mm. longo; lamina lineari-oblongolata 24 cm. longa et 5-5 mm. lata, caudata et mucronata, basi acuta, utrimque opaca, sic. brunnescentes, nervis utroque latere costae circ. 17 patulis et utrinque prominulis, venulis nonnullis et costa orientibus nervis parallelis, alii subdense reticulatis. *Stipulae* usque ad medium connate, late triangulares et in aristam parte libera pauro breviorem exuentes. *Inflorescentia* sublaxa, glabra, floribus circ. 75 pedunculis 2-5 mm. longis, basi internodiio aquilungo, foliis rudimentariis munito precessus; internodium basale axis 7 mm.; internodia basalia ramulorum lateralis 7-14 mm.; internodia ultima ramulorum 3-5 mm.; pedicelli flororum lateralium eiusque triadis 5 mm.; pedicelli floris centralis ebracteolatus.

*Folia* petiolo crasso puberulo 12 mm. longo; lamina elliptica 32 cm. longa et 13-14-5 cm. lata, acuminata, basi acuta an subobtusula, subcoriacea, sic. brunnescentes, utrimque opaca, supra glabra, subprisum nervis scabrido-puberulis, nervis utroque latere costae 17-18, venulis laxe reticulatis utrinque sed prorsum prominulis. *Stipulae* usque ad medium connate, dimidio superiore late ovato-triangulares et in aristam parte libera bis longiores exuentes. *Inflorescentia* pedunculata, subpaniculata, puberula, floribus circ. 700 pedunculis 5-7 cm. longis, basi folios ordinarius munitus; internodium basale axis 7 cm.; internodia basalia ramulorum infinorum 7-8 mm.; internodium secundum axis 4-5 cm.; internodia basalia ramulorum junct longeris 5 mm.; internodia alia multo breviora, ultima usque ad 1 mm. decretencia; pedicelli flororum lateralium 1 mm. haud superantes; ramuli infinis foliis sessilibus 1-7 cm. longis et 1-2 cm. latis, ramuli junctae decundi folios 1-0 cm. longis et 0-6 cm. latis, ramuli alii bracteis linearibus et anguste triangularibus a 10 mm. usque ad 3 mm. decretentibus suffulti; bracteole flororum lateralium basi ovarii insertae, 2 mm. longae. *Flores* ovario calyceaque puberulis. *Calyx* lobis oblongis obtusis 1-4 mm. longis. *Corolla* tubo 15 mm. longo, lobis obtusis 4-5 mm. longis et 1-6 mm. latis.

*Hab.* UBER BURMA: District Myitkyina, Kintuhum, alt. 600 m., leg. E. M. Buchanan, 88 Maymyo Herb., "fl. April, vern. : sa-kläri."

**Ixora javanica** (BL.) DC. var. nov. *grandiflora*; typus: varietatis: R. N. Parker, 2744 Herb. Dehra Dun. Floribus majoribus (corolle tubo 5-3 cm. longo, lobis 9-11 mm. longis et 4-5 mm. latis) salmoneis a typo recedit.

*Hab.* TINASSERIM: District Mergui, Yaungwa range, alt. 450 m., leg. A. Rodger, 956 Maymyo Herb., "fl. March."

**Ixora javanica** sp. nov.; typus: *E. M. Buchanan*, 88 Maymyo Herb. Ad *I. Butterswickii* Hole vergens, sed foliis ellipticis, subitis puberulis, panicula brevius pedunculata et ulteriore ab ea faciliter distinguenda.

Entirely new are:

*Folia* petiolo crasso puberulo 12 mm. longo; lamina elliptica 32 cm. longa et 13-14-5 cm. lata, acuminata, basi acuta an subobtusula, subcoriacea, sic. brunnescentes, utrimque opaca, supra glabra, subprisum nervis scabrido-puberulis, nervis utroque latere costae 17-18, venulis laxe reticulatis utrinque sed prorsum prominulis. *Stipulae* usque ad medium connate, dimidio superiore late ovato-triangulares et in aristam parte libera bis longiores exuentes. *Inflorescentia* pedunculata, subpaniculata, puberula, floribus circ. 700 pedunculis 5-7 cm. longis, basi folios ordinarius munitus; internodium basale axis 7 cm.; internodia basalia ramulorum infinorum 7-8 mm.; internodium secundum axis 4-5 cm.; internodia basalia ramulorum junct longeris 5 mm.; internodia alia multo breviora, ultima usque ad 1 mm. decretencia; pedicelli flororum lateralium 1 mm. haud superantes; ramuli infinis foliis sessilibus 1-7 cm. longis et 1-2 cm. latis, ramuli junctae decundi folios 1-0 cm. longis et 0-6 cm. latis, ramuli alii bracteis linearibus et anguste triangularibus a 10 mm. usque ad 3 mm. decretentibus suffulti; bracteole flororum lateralium basi ovarii insertae, 2 mm. longae. *Flores* ovario calyceaque puberulis. *Calyx* lobis oblongis obtusis 1-4 mm. longis. *Corolla* tubo 15 mm. longo, lobis obtusis 4-5 mm. longis et 1-6 mm. latis.

*Hab.* UPER BURMA: District Myitkyina, Kintuhum, alt. 600 m., leg. E. M. Buchanan, 88 Maymyo Herb., "fl. April, vern. : sa-kläri."

**Ixora symphoranta** sp. nov.; typus: M. Kyaw, 10827 Maymyo Herb. A speciebus aliis series *Subpaniculatae* inflorantes dense globosa faciliter distinguenda.

*Fruticulis* circ. 1:2 m. altus, ramis primum scabrido-puberulis, indistincte biauleatis. *Folia* petiolo crasso puberulo 4 mm. longo; lamina oblonga an anguste obovata 14-19 cm. longa et
Ixora maymyensis, sp. nov.; typus: Fathieh Din, 6177 Maymyo Herb. Ad I. spectabilis Wall. ex G. Don vergens, sed foliis supra nitidulis nervos crassiores exhibentibus, corolla lobis brevioribus ab ea recedens.

Fruite ramis novellis glabratis, veteribus cortice luteo-brunneo nitidulo vestitis. Folia petiolo crasso 10–15 mm. longo; lamina anguste elliptica ad internum oblongolata plerunque 15–18 mm. longa et 4–8–7 cm. lata, apice subobtusa, basi acuta, subcoriacea, supra nitidula, subtus opaca, sicc. olivacea, nervis utroque latere costa 12–14 supra prominulis et subtus prominetibus, venulis laxe reticulatis supra distinguendis, subtus prominulis. Stipulae subtruncatae breves in aristam vaginae equilongam an ea paulo longiorum exuenlentes. Inflorescentia plerunque longe pedunculata, puberula, floribus 150–300; pedunculus 4–15 cm. longus, basi foliis brevius petiolatis et brevioribus, basi rotundatis an subtus munitus et internodio brevi an satia longa (0–3–7·5 cm.) praecessus; internodia basalia longae et ramulorum infinorum 2·2–6·5 cm.; internodia altera peripheriam versus gradatim longitudine decrescentia; pedicelli plerunque subnulli et floribus inde glomerati; ramuli pedicellisque omnes bracteis angustissimis supinibus sulfuli; bracteolae florum omnium triangulares, ovario pauro breviores. Flores graciolores. Ovarium pedunculatum. Calyx lobis ovatis obtusis 3 mm. longis. Corolla rosa extus intusque glabra, tubo 10–15 mm. longo et 3–3·5 mm. diam., lobis obtusis 3·5–5 mm. longis et 1·2 mm. lati.


Note.—A specimen with immature flowers, collected by A. Rodger, 580 Maymyo Herb., in the North Shan States, Gohtoe Gorge, alt. 500–600 m., may belong to this species; the label describes it, however, as a tree.

I. Finlaysoniana Wall. ex G. Don is known as a garden plant only. In the neighbourhood of Rangoon it is apparently a very popular one, for from no other place have I seen so many specimens. This might mean that it has been grown here for a very long time, and if so the place from whence it was originally introduced would probably not be far off. Its nearest allies, I. multibracteata and the species described above under the name I. tunicata, are endemic in the same region. The plant is grown now in all tropical countries, and very little variability; this is probably due to the fact that it is propagated as a rule (perhaps always) by cuttings. In this connection it is noteworthy that the only two specimens which I have seen from the Andaman Islands (Rongat Island, leg. Kirat Ram, 3787 Herb. Dehra Dun,
and Peel Island, leg. C. G. Rogers, 226 Maymyo Herb.) show a slight deviation from the common form: the leaves, which in the latter are always obtuse or subacute, are in these specimens distinctly acuminate. The labels give us no information with regard to the habitat of the plant, but the absence of evidence lends probability to the supposition that they grew wild, and that the Andaman Islands, therefore, might be the native country of this species.

**A NEW IXORA SPECIES FROM ASSAM.**

**By C. E. B. Bredekamp.**

Among the Ixora material which I received from the Forestry Institute, Dehra Dun, I found also a new species collected in Assam. It belongs to the Series Subsessiles of the section Brachypus:

*IXORA goalparensis*, sp. nov.; typus: *Upenderanath Kanjilal, 5758 Herb. Dehra Dun. 1. subsessili Wall. ex G. Don et I. oxyphylla Wall. ex G. Don valde affinis, sed calyces lobis multo longioribus ab eis faciliter distinguenda.*

**Fluctex** 0·5--1·5 m. altus, ramis novellaribus gracilibus glabris, verticillatis; petalis corice griseo nitidulo vestitis. *Folia* petiolo circa 5 mm. longo; lamina lanceolata vel oblonga, caudato-acuminata et longius mucronata, basi acuta, subcoriacea, glabra, utrumque opaca, sicco griseo-brunnea, nervis utroque latere costae 7-9 subitus prominentes, venulis paucis supra plerumque vix distinguendis, subitus prominentis. *Stipulae* ovato-triangulares in aridum vagums multo longiorem exuentes. *Inflorescentia* subssessilis nutans, haud rare a ramo axillari in positione pseudo-axillare coacta, ramulis pedicellisque coccineis et venulis 'paucis supra pedicelli florum circ. 45; internodia basalia axis et ramorum usque ad 4 mm. longa, alia peripheria versus gradatim longitudine decrescentia; pedicelli florum omnium subaequilongi, usque ad 1 mm. longi; ramuli infimi folis linearisibus sessilibus 1 cm. longis, ramuli ali bracteis angustissimis triangularibus suffecti; bracteola florum omnium angustissimae triangularibus, calyces lobis subaequilongis. *Flora* gracilis. *Ovarium* Ovulare coccineum. *Calyx* coccineus tubo 0·1 mm. alto, lobis 4·2 mm. longis, basi 0·4 mm. latis, acutissime excentibus. *Corolla* alabaster acuta, alba, tubo 17--20 mm. longo, 0·7 mm. diam., lobis acutis 3·5 mm. longis et 1·5 mm. latis. *Stamina* filamentos 0·5 mm. antheris 3·5 mm. longis. *Stylus* parte extorta stigmatibus 1·5 mm. longis comprensibis 4·5 mm. longa.


**THE OCCURRENCE OF ORCHIS SIMIA LAMARCK IN KENT.**

**NOTES ON THE OCCURRENCE OF ORCHIS SIMIA LAMARCK IN KENT.**

**By B. J. Brooke.**

In his 'Monograph and Iconograph of Native British Orchideae' (p. 167) Colonel Godfrey, referring to the distribution of *Orchis simia*, writes: "Apparently now confined to Oxfordshire, formerly found in Berkshire. There is a single record for Kent, the Rev. S. L. Jacobs having found it near Chilton, which, if not an error of identification, must have been due to a wind-borne seed."

To anybody familiar with the recorded history of *O. simia* in Kent the last sentence must seem rather surprising. Hanbury and Marshall, in their 'Flora of Kent' (1889), give several localities for the plant, including the Chilton station referred to by Colonel Godfrey; they note, however, that it is "very rare, probably extinct." In most of the nineteenth-century Floras Kent is explicitly mentioned as one of the counties for *O. simia*, in addition to Oxfordshire and Berkshire. Babington, Sowerby, and Anne Pratt are unanimous on this point. Hooker ('Student's Flora of the British Islands') classifies *O. simia* as a subspecies of *O. militaris*, and includes Kent in a list of counties which apparently refers to both plants; though since it is generally agreed that true *O. militaris* has been "long extinct in Kent" (Hanbury and Marshall) one is perhaps safe in assuming that the Kentish reference is here intended to apply more particularly to the "subspecies" *simia*. More recently G. C. Druce ('British Plant List', 1930) gives four vice-counties for *O. simia*, two of them "unconfirmed"—the doubtful pair being presumably East and West Kent, and the other two Oxford and Berks.

From the above references it will be apparent that *O. simia* has, rightly or wrongly, been long associated with Kent. The opinions of earlier authorities have doubtless been perpetuated, without proper confirmation, by a number of more recent writers; but there would seem to be some reason for believing that *O. simia* (or something very like it) has occurred at one time or another in this county. How is it, then, that Colonel Godfrey has been able to dismiss so many records as apocryphal?

The probable answer to this question is hinted at in Colonel Godfrey's own words, already quoted. The single record which he tentatively accepts as authentic was very probably (he...
implies) an "error of identification." Whether or no the Rev. S. L. Jacobs was mistaken, it is a fact that many such reputed records for O. simia in Kent have turned out to be abnormal or variable forms of Orchis purpurea Hudson, which is frequent in some parts of the county. Mr. John Jacob, of Dover, tells me that he found, many years ago, what he believed to be a Kentish plant of O. simia which he identified—as he thought—from the plate in Anne Pratt's 'Flowering Plants of Great Britain.' He found it, moreover, near Chilton, where it had previously been recorded by his near-namesake. Mr. John Jacob's plant, however, was pronounced by the Kew Herbarium to be only a form of O. purpurea. Subsequently a number of reputed "Monkey Orchids" from Kent were examined by Mr. Jacob, and the result was always the same.

A similar confusion has often occurred in connection with O. militaris, which has sometimes been reported (though on less trustworthy evidence) from Kent. The close structural similarity of the subgeneric group Militares, coupled with the tendency of all three species to produce variable and quasi-intermediate forms, is doubtless sufficient to explain the prevalence of such confusion, at least among casual botanizers. Indeed, in the dried state some of these forms are capable of deceiving the expert—for example, the var. pseudo-militaris Druce of O. purpurea, which, as Colonel Godfrey remarks, is "repeatedly mistaken for O. militaris when dried." Even in the living state some of the Kentish forms of O. purpurea bear a marked resemblance to O. militaris; less easy to account for, however, is the confusion between O. purpurea and O. simia, which may be said to represent the widest divergence within the group, O. militaris itself being intermediate, roughly speaking, between the other two species. It seems likely that other botanizers besides Mr. John Jacob (among them, possibly, the Rev. S. L. Jacobs himself) have been deceived by the extremely inaccurate coloured plates of O. simia in some of the illustrated Floras. I have never myself seen any form of O. purpurea which could conceivably have been mistaken for the true O. simia, though certain narrow-lipped albino forms might pass for the representations of O. simia in Sowerby's 'English Botany,' Anne Pratt's 'Flowering Plants,' and other less reliable works. O. purpurea is certainly very variable, and though hardly to be confused with true O. simia may possibly approach the Oxfordshire form of the plant, which presumably is the one usually illustrated in English Floras. Certainly, lacking more definite evidence on the point, Colonel Godfrey might well be sceptical about the occurrence of O. simia in Kent.

I am able to record, however, that the true O. simia was found in Kent as recently as 1923. It occurred on an open grassy slope on the chalk, a few miles from Canterbury, and was originally discovered in 1920, in the same station but quite independently, by two botanizers, one of them a friend of mine. Only four or five plants were found, and of these not more than two flowered simultaneously. In 1923 I was fortunate enough to see one of these in situ; since that year, however, Orchis simia seems to have vanished completely from the district; nor have I heard of any other authentic Kentish station for it.

A dried specimen of the Canterbury plant is now at Kew, where it was identified, in the fresh state, as the true O. simia. Three other dried spikes are in my possession; a floret from one of these was kindly examined for me a short time ago by Colonel Godfrey, who confirmed the original identification. It is somewhat surprising—assuming that the specimen sent to Kew was carefully preserved and labelled—that this record was not made available to botanizers at an earlier date. Since, however, it appears to have been overlooked, it is perhaps worth while to record it here, if only for the purpose of vindicating the long-disputed claim of O. simia to a place in the Kentish Flora. It is to be hoped that this very rare orchid may reappear in future years in the original station or in some other part of the county.

Colonel Godfrey separates the Oxfordshire Orchis simia from the continental type under the title var. macra, which was Lindley's specific name for the British plant. Lindley himself considered it altogether distinct from the continental O. tephro-santhos *, and Colonel Godfrey shares his opinion, giving as the distinguishing features of var. macra its "darker, more grey-green leaves, more cylindrical spike, bluer lip-segments, broader mid-lobes with smaller spots, and whiter spur." It might be expected, therefore, that the O. simia which occurred in Kent would be identical with the Oxford plant; such, however, was not the case. In the Kentish specimens the spike was short and tufted, not cylindrical, the lip more acutely divided than in var. macra, the mediastinum short and nearly as narrow as the lip-segments, which themselves were abnormally long and slender, with a marked tendency to curl. In colour, too, the Kent plants showed a striking difference from var. macra, the lip being of a deep, almost uniform crimson (not bluish, as in macra), becoming paler only at the base; the sepals and petals pale rosy pink or nearly white (again without the violet tinge typical of macra), streaked and stippled with light crimson

* Dr. Druce, however, in his 'Flora of Oxfordshire' (1927), wrote: "Notwithstanding this positive expression by Dr. Lindley, British Botanists do not now separate O. macra from O. simia even as a variety." It seems probable, from this rather non-committal statement, that Druce had not himself compared living specimens of the Oxfordshire plant and the continental type. In any case, there seems little reason, in the light of Colonel Godfrey's careful observations of both plants, to doubt the claim of O. macra to varietal status.
markings. In fact the Kentish plant seemed—rather surprisingly—to approach, in colour and general appearance, the true continental O. simia, though it differed from the type—as from var. macra—in the darker tint and abnormally slender divisions of the lip*. Lindley gives as a further distinctive feature of O. macra “the exceedingly large cells of the tissue of the lip, which project and have a watery appearance, as if the whole surface were covered with crystalline warts; the lip is moreover destitute of the hispid line which invariably runs through its centre in all the varieties of militaris or tephrosanthis I have examined.” I am unable to state positively whether the Kent plant possessed these features or not; unfortunately no detailed description was made, at the time, of the living plant, and I have had to rely for the above notes on dried specimens and by a drawing of one spike, not found by me, however, tells me that the continental hybrids between the two plants bear no marked resemblance to the Kentish form of O. simia. One can only conclude that the Kentish O. simia was perhaps nearer than is usual to the common ancestor from which it and Aceras derive.

* According to Colonel Godfrey O. simia probably arose from the same stock as Aceras anthropophora, which its lip somewhat resembles. In the Kentish O. simia this resemblance was more than usually noticeable, especially when dried specimens of the two species were compared. Aceras was very abundant in the Canterbury station of O. simia—a fact which might lead one to suspect a hybrid strain in the latter. Colonel Godfrey, however, tells me that the continental hybrids between the two plants bear no marked resemblance to the Kentish form of O. simia. One can only conclude that the Kentish O. simia was perhaps nearer than is usual to the common ancestor from which it and Aceras derive.

to assume that the two British forms of O. simia so far recorded—the Kentish and the Oxonian—are peculiar to their respective counties*. Unfortunately Orchis simia, in whatever form, is now so rare in Britain that a comparative investigation of plants from different stations is almost impossible.

REVIEW.


Probably no one is more fitted by long study of the subject to write a complete treatise on Phytoplankton than Dr. Huber-Pestalozzi, and all freshwater algologists will be glad to learn that he is doing so. The first of the four parts in which it is to appear contains the general introduction, running to about 120 pages, and the systematic accounts of Cyanophyceae, Bacteria, and Fungi. The remaining parts are to contain systematic accounts of the planktonic members of other plant groups, and the fourth part will contain an appendix on geographical distribution, and also the bibliography, except that of Bacteria and Fungi, which follows their systematic treatment.

The introductory or general part is a complete yet concise summary of our knowledge of phytoplankton as a community and its relations to its environment. Amongst the matters discussed are the chemical differences in the various types of lake and the effect of these differences on plankton, and also the changes in the environment caused by the plankton itself. An account is given of the vertical and horizontal distribution of plankton, and also a full consideration of the mechanical problem of how the algae remain suspended. The author considers that the small size, and hence large surface: volume ratio which causes slow settling, and the continuous “microstreamings” in natural waters, are the most important factors.

The systematic part, however, is that which will prove of greatest interest and value to freshwater algologists interested in plankton. Workable keys are provided to the genera and species, an adequate description and figure of each species and variety is given, and also the geographical distribution. Not a great proportion of the figures are original, but most have been redrawn, and they are all extremely clear. Under a number of species also are given systematic and biological notes which

* There are no records, so far as I can gather, of the long-lipped, red-tinged Kentish form occurring in Oxfordshire.
will often be found useful. The treatment of the Cyanophyceae follows Geitler, and the keys and diagnoses are frequently taken with very little alteration from his work. There are certain minor differences, however, Microcystis pseudoflamentosa being reduced to a form of Microcystis aeruginosa to quote one example. The synonymy given is not very extensive, but that is not a disadvantage in a handbook as distinct from a monograph. Unfortunately only the authority of each species and synonym is given, and not the place or even the year of publication. This also is perhaps not a great disadvantage except where new combinations are proposed. Here, however, this lack makes them invalid. In a number of other respects also the International Rules of Botanical Nomenclature have not been followed. The one new species published, Anabaena Minderi, has a German diagnosis only, and is thus technically a nomen nudum. Also, although the Rules lay down that nomenclature in the Nostocaceae heterocysteae shall start from Bornet and Flahault's Revision (1886-1888) and in the Nostocaceae homocysteae from Gomont's Monograph (1893), Huber-Pestalozzi gives as authority for many of the genera and species of these groups authors dead many years before these works appeared. We have, for example, Anabaena Bory, 1822. This is comparable to citing Tournefort instead of Linnæus as the authority for Bellis. The author's general attitude to nomenclature is shown in his preface:—"It is fortunate that algalical nomenclature has maintained a steady stability (in contrast to the continuous name changes in Phanerogams, and above all Zoology), and that one has found amongst algalists well established names retained, even when others have claims of priority." This means that, although the work will be of great use for the determination of what a form is, it will then be necessary to make further researches, often laborious, before deciding whether that form should bear that name. Perhaps this would not trouble many freshwater algologists, as with few exceptions they seem either to be ignorant of the rules of nomenclature or else deliberately to ignore them. The difficulty of deciding the proper application of names is perhaps more difficult in the lower algae, where the specimens of the early authors are often useless or missing, and their descriptions, owing to their inadequate microscopic equipment, poor. There is for this reason a temptation to follow some later monographer, even when he has obviously misinterpreted some names, overlooked others, and taken up later homonyms and other invalid names. Some think that by doing this they will preserve a stable nomenclature, but the only way to ensure that a species is called by the same name, and a name refers to the same species, is to follow the rules.

It will be appreciated that the greater part of the last paragraph is not so much a criticism of the work under review as one of the contemporary school of freshwater algologists. That this work follows them does to some extent detract from its usefulness. In all other respects, however, it will prove an extremely welcome addition to the literature of freshwater plankton organisms.

R. Ross.


The distribution, ecology, and physiology of the lichens occurring in the north-west plain of Germany in the Oldenburg region were investigated. This region, of which the soil is a glacial alluvium, may be looked upon as one of the southernmost outposts of the Scandinavian lichen-tundras, others of a similar nature being found in East Prussia, Pomerania, and the Mark Brandenburg. The oceanic or "atlantic" influence in the region investigated is shown by the presence of many characteristic western European species, such as Buellia canescens, Bacomyces placophyllus, Lobaria laetevirens, Nephroma pusitanicum, Normandina pulchella, etc. As in many other areas, the lichens are markedly on the decrease; this is due partly to the growth of the forest at the expense of the more favourable heathy habitats, and partly to the ever-encroaching human colonization and cultivation. Probably the last traces of these rich lichen-outliers will have disappeared in a few years. Nevertheless there is in places a profuse vegetation of Cladonia species (C. sylvatica, C. rangiferina, C. timensis, C. impeza) on the more open pine-heaths, where the low pH value of the soil suits them.

The various lichen-associations observed, and their origin, are dealt with in considerable detail. As is usual on acid alluvial soils Lecidea granulosa and L. alginosa are the first colonizers of humus-containing and sandy ground respectively. The latter is often joined by Cornicularia aculeata (here called C. tenuissima). These prepare the way for the various Cladonias which form the climax of the lichen-associations.

Physiological observations with regard to the intake of moisture in the form of dew by Cladonias were made; those of the section Cladina were found to be capable of absorbing overnight 12-17 per cent. of their weight of water in the form of dew.

Vegetative propagation of the Cladonias occurs by fragmentation in dry weather. The fragments detached by mechanical agencies are disseminated by rain and wind. By the latter agency they are enabled to colonize thatched roofs, although
probably here the main source of colonization is from the peat-blocks, with which the angle of the roof is covered, down on to the Phragmites-thatch below. Cladonias on thatched roofs are exposed to more severe conditions than those growing on the ground, and consequently are subject to a number of morphological aberrations. Thatched roofs were found to be divisible into two types from the lichenological standpoint: those of dry and sunny aspect, which harbour Cladonia of the section Cenomyces, and those in more damp and shaded positions, upon which species of the subgenus Cladina (C. sylvatica, C. tenuis, C. mitis, C. impexa) attained flourishing development.

Of considerable systematic interest are the observations made on the phenomena of morphological convergence in many of the Cladonia species studied. These, illustrated by photographs of specimens from the herbarium of Dr. H. Sandstede, the pioneer of lichenological research in north-west Germany, show to what a remarkable extent species belonging to different sections of the genus may come to resemble each other under the influence of external conditions which may suppress or mask the distinguishing characters.

The excellent photographs convey a very good impression of the appearances of the various associations.—I. M. L.

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BOOK-NOTES, NEWS, ETC.

Pr. Ishwari Prasad Ramal, of Kasganj, Indis., "want to know" whether a modern botanist has achieved what has been done by them as printed on their note-paper with the heading "We Know." The list reads:

How to produce sweet mangoes from sour ones, as well as Kalmi mangoes from a Deshi (Country) tree by applying the branch of a Deshi instead of a Kalmi tree.

How to produce big and large fruits and flowers from small ones.

How to impart smell to the different kinds of fruits and flowers and also change their colours.

How to diagnose the different diseases of trees and plants and treat them on Ayurvedic lines.

How to grow, purify, and classify seeds.

How to protect plants from cold waves and water the different kinds of flowers, plants, etc.

How to test a piece of land, and turn a bad soil into a cultivable one.

How to grow twelve kinds of lemons of different tastes on one and the same tree in different seasons.

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ON SOME UMBELLIFERS FROM NAMAQUALAND.

BY R. S. ADAMSON.

The three plants referred to were collected on the Kamiesberg in Namaqualand at altitudes over 4500 ft.

Peucedanum Pearsonii, sp. nov.

Perennis, glabra multicaulis, sublignosa. Caules 40-70 cm., basi nudi medio foliosi, superne pauce ramosi. Folia glauca sessilia multifida 3-4-ternata, segmentis subulatis congestis micranthera superne sclerata dorse minute serrata. Peduncula umbellata longa, usque ad 25 cm., persistens superne ramosa. Umbella 6-8-radiata apice plana, radiis 3 cm. subaequilongis. Umbellulae multipedicellatae, pedicellis inaequalibus.


This plant is named in honour of the late H. H. W. Pearson, who rediscovered it (cf. Glover in Ann. S. Afr. Mus. ix. 4, 214 (1915)). Drège's specimen, which is the first collected, is incomplete and without flowers. The species has some resemblance to P. ferulaceum (Thunb.) Sond., but is readily distinguished by the habit, glaucous leaves, which are more condensed and have a flat-topped outline, the smaller number of longer and equal rays in the umbel, and the bright yellow flowers. The persistent peduncles which bear at their base the branches for the next season are a characteristic feature. In his notes Pearson says the plant can reach a height of five feet. None of the plants seen growing was more than half this.

Peucedanum Sulcatum Sond.

This species was collected on rocky ridges at 4500-5000 ft. on the eastern part of the Kamiesberg Range (Adamson 1518*; 1530*). Previously it was known only from Sonder's incomplete description (Fl. Cap. ii. 559 (1862)), which was based on specimens of Ecklon and Zeyher (2347). The new collections agree exactly with Sonder's type, but are more complete and have ripe fruit which Sonder had not seen.

In the living state the stem is cylindrical and very slightly striate; the sulcate appearance is due to drying. The plant is scapose and reaches 1 metre in height, with basal leaves which

* Duplicate in British Museum Herbarium.

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extend 30–40 cm. The leaves wither at or about the flowering period. The 30–40-rayed umbel is convex on top and enlarges very much in fruit. At flowering the rays are 8–10 cm., but reach 25–30 cm. when the fruit ripens. The fruit has a broad marginal wing 4–5 mm. wide. The mericarp with its wing measures 12–14 by 10–12 mm.

**Annessorhiza latifolia**, sp. nov.


**Some Cladoniae (Lichenes) of the British Dominions: S. Africa, Australia, the Antilles; with a dichotomous key to the species of the subgenus Cladina.**

By H. des Abbayes.

The Cladoniae dealt with here are from various undetermined collections of the British Museum. My thanks are due to Dr. Ramsbottom, Keeper of the Department of Botany, and Mr. MacKenzie Lamb, Assistant Keeper, for allowing me to study these collections. Some of the specimens found among them add to our knowledge of the species' geographical distribution, as for instance those referable to *C. multiformis* Merril., of which the occurrence in South Africa was completely unexpected.

In a monographic revision of the subgenus Cladina, which

*S. AFRICA.*


Antonamam speciem evidenter non constituit sed vix et si volumus, ut nomen *C. pycrenolada* in litteratura perpetuetur, sub speciem geographicam *C. impezae* sub tropicis et in hemisphario australi vigentem.


The general appearance of these two collections is exactly that of *C. impezae* Harm. *f. laxiscula* (Del.) Sandst.; in colour pale yellowish, KHO—, P—, KHO(CiO4Na)—yellow. Only the consistency of the surface of the podetia allows it to be separated.

**C. impezae** Harm. *Pycrenolada* (Gaud.) Nyl. *emend.* des Abb. *f. exalbescens* (Wain.) *emend.* des Abb. — *One may apply the name f. exalbescens* to decoloured specimens in which the yellow shade is hardly perceptible, and which are KHO(CiO4Na)—.


I have been able to verify the fact that the gelatine of the conidangia is colourless.


I am now preparing, I have seen fit to dismember the species *C. pycrenolada* (Gaud.) Nyl., as understood by Wainio. Although this work has not yet been published, I have made use here of the modifications which I have brought to bear on the interpretation of this collective species, and have employed the new name which I give to one of the species resulting from this dismemberment (*C. Sandstedtii*). Latin diagnoses accompany those species and combinations which are published for the first time.

In order to facilitate henceforth the determination of the species of the subgenus Cladina, in accordance with the new interpretations, I have appended a dichotomous key to all the species which it is now known to contain.

**I.—South Africa.**


Antonamam speciem evidenter non constituit sed vix et si volumus, ut nomen *C. pycrenolada* in litteratura perpetuetur, sub speciem geographicam *C. impezae* sub tropicis et in hemisphario australi vigentem.


The general appearance of these two collections is exactly that of *C. impezae* Harm. *f. laxiscula* (Del.) Sandst.; in colour pale yellowish, KHO—, P—, KHO(CiO4Na)—yellow. Only the consistency of the surface of the podetia allows it to be separated.

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I have been able to verify the fact that the gelatine of the conidangia is colourless.


2 A 2


The Deepwalls specimen is very typical and absolutely similar to specimens in my possession from America determined by Evans. Hitherto this species was known only from North America. Its presence in South Africa is very remarkable, and leads one to suppose that it may eventually be met with in South America.


II.—Australia.


III.—Antilles.

C. Sandstedi des Abb., sp. nov.—Thallus primarius non visus. Podetia tenuia circiter 0 mm., 3-0 mm., 6 (1 mm.) crassa, base axem sympodial dichotomis inaequalibus efficientia, summo dichotomis subaequalibus, raro trichotomiis, ramosa ; cespitoso-conferta ; circiter 5-10 cm. alta ; axillis integris vel raror forforatis ; ramulis ultimis tenuibus, vulgo rectiusculis diveriscatis que vel leviter undique deflexis predita ; tota albidum vel albido-cinerescens vel base emoriente nigricans et apicibus ultimis dilute-fuscescens ; escitata, sempellunnea, parte superiore sub-arachnoideo-tomentosa, parte inferiore verruculosa ; KHO+bene lutescentia ; paraphenylenediamina+bene rubescens ; amara gustu. Apothecia non visa. Conidangia fusco-nigrescentia, ovoidea, plus minusve base consticta, materiam cocineam continentia.

In memoriam satis revocaet habitu generali nee colore Cladoniae impezae Harm. paulo tenuiorem.


C. Impexa Harm. *Pyccoclada (Gaud.) Nyl. emend. des Abb.—Jamaica : near Cinchona, altit. 1480 m., on talus sheltered by bushes, coll. W. Harris, 1896. KHO—, KHO(CloNa)+ yellow, P—.

C. FURCATA (Huds.) Schrad. var. RACEMOSA (Hoffm.) Flk. f. FURCATOSUBLATA Hoffm. Zählb. Catal. no. 8808.—Jamaica, without indication of precise locality, coll. D. Bickmore, 1934. KHO+ yellow, P+-red. The podetia are slender, almost white, only slightly brown at the apices, completely devoid of folioles. The reaction KHO+yellow of this specimen forms a transition to *C. SUBRANGIFORMIS* Sandst.—Jamaica: near Cinhona, altit. 1480 m., coll. W. Harris, 1896. This shows the same reactions as the preceding specimen, but the plant is more robust and completely devoid of folioles. By the white colour and the robust character of the podetia this lichen approaches the var. *pinolutea* Flk., with which it might, strictly speaking, be united. I prefer, however, to place it with var. *racemosa* on account of the lack of folioles on the podetia, observing at the same time that it constitutes an intermediate condition. In the same way its reaction KHO+yellow forms a transition towards the subspecies *SUBRANGIFORMIS*.


**APPENDIX.**

*Olavis specierum omnium* Cladoniarum sub-generic Cladinae.


4 (3). KHO+lutescentia:

Note.—It is possible that C. signata Wain. may belong to the subgenus Cladina rather than to the subgenus Genomyces. The morphology and the structure of the podetia undoubtedly approaches that of Cladina. Wainio, however, attributes a squamose primary thallus to it. This species, originally described from Brazil, is white, and has the apices most divaricate, colourless gelatine in the contodiangia, and the following reactions: KHO—, KHO(ClONa)—, P+ red (taste bitter). If this species should be placed in the subgenus Cladina, it would come into the group of species with ash-grey or whitish ash-grey podetia, next to C. Sandstedei.

School of Medicine and Pharmacy,
Rennes (France).

LUZULA LUZULOIDES (LAM.), comb. nov.

By J. E. DANDY and A. J. WILMOTT.

In the course of checking some of the nomenclature for the forthcoming 'Flora of Devon' it became clear that the above new combination is required for the species commonly known as Luzula albida (Hoffm.) DC. or L. nemorosa (Pollich) E. Mey. The following synonymy, which includes all the relevant specific synonyms together with explanatory remarks, makes evident the unavailability of the existing names in use for this species under Luzula. It may be useful to add that Richter, in his 'Plante Europée,' vol. i. pp. 183-184 (1890), transposed the synonyms Juncus nemorosus a and J. nemorosus β from their correct positions under L. angustifolia and L. sylvatica respectively.

Luzula luzuloide (Lam.), comb. nov.

Juncus nemorosus Pollich, Hist. Palat. i. 332 (1776), excl. var. β.
Under this species Lamarck remarked "An Juncus nemorosus. Pollich." Since he was doubtful whether his own species was the same as Pollich’s the name J. luzuloide is legitimate.
Juncus angustifolia Wulf. in Jacq. Collect. iii. 56 (1789), nomen illegitimum. This name is illegitimate since Wulfen included J. nemorosus Pollich in the species. In any event Wulfen’s specific epithet could not be validly used under Luzula because of L. angustifolia Poir. (see below).
Juncus leucophobus Ehrh. Beitr. vi. 141 (1791), nomen illegitimum.
Ehrhart’s name is illegitimate because he included " Juncus nemorosus a. Pollich," meaning the type of J. nemorosus: Pollich had no variety a, but only a variety β appended to the species and distinguished from it by a varietal definition.

LUZULA LUZULOIDES (LAM.), COMB. NOV.

Juncus albïdis Hoffm. Deutschl. Fl. 126, t. 4 (1791).
Luzula albida (Hoffm.) DC. Fl. Franç. ed. 3, iii. 159 (1805), nomen illegitimum. This combination is illegitimate because De Candolle included both J. nemorosus Pollich and J. luzuloide Lam.
Luzula nemorosa (Pollich) E. Mey. in Linnaea, xxii. 394 (1849)—non L. nemorosa (Host) Baumg. Enum. Stirp. Transsilv. iii. 329 (1816). Baumgarten’s name was based on Juncus nemorosus Host, i.e. & Descr. Gram. Austr. iii. 64, t. 97 (1805), which was published as a new specific name having no connexion with J. nemorosus Pollich.

CORNISH MICRO-FUNGI.

By F. RILSTONE, A.L.S.

The Rust Fungi recorded below were collected by the late Dr. P. G. M. Rhodes and myself in various parts of east and west Cornwall, but chiefly in the large parish of Perranzabuloe in west Cornwall and about Looe and Polperro in east Cornwall. The records of Pyrenomycetes and of Fungi Imperfecti are supplementary to those published in this Journal in April 1935. Of the latter the Coelomycetes are arranged as in W. B. Grove's 'Stem and Leaf Fungi.' I am greatly indebted to Mr. Grove, Professor J. H. Miller, Dr. F. Petrak, and Herr H. Sydow for kindly naming difficult plants.

RUST FUNGI.


*Triphragmium Ulmariae* Wint.; on leaves of *Spiraea Ulmaria*, Polperro.


*Gymnosporangium confusum* Plowr.; teleutospores on bushes of *Juniperus Sabina* in garden, Lambourne, Perranzabuloe; acidia on *Crataegus monogyna* in the neighbourhood: a hawthorn hedge near the juniper was smothered in rust (*Boeselia*) and badly damaged by it.


*Melampsora Hypericorum* Wint.; on *Hypericum Androsaenum* in various localities.

*Melampsoridium Betulinae* Fock.; on *Betula*, Lamoran Woods on the Fall; Carnkief, Perranzabuloe; Trelawne, near Looe.
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**Pucciniastrum Agrimoniæ Trauz.**; on *Agrimonia*, Mount, Perranzabuloe. *P. Urecae Spec.*; on *Circaea lutetiana*, West Looe (Rhodes).


*M. Scolopendrii Syd.*; on Bonython Plantation (Rhodes). *M. Kriegeriana Magn.*; on *Lamiastrum* (probably *L. spinulosa*), Bonython Plantation (Rhodes). *M. Polystichi* (Wint.) Grove; on *Polystichum angulare*, Bonython Plantation (Rhodes).

**COELOMYCETES.**


Ventongimps a few pustules of what is evidently this species on small twigs of birch branches cut down and left lying. One pycnidium examined contained only pale yellowish spores, oblong-elliptical and about 20-25 μ long. In another the spores were dark brown and up to slightly more than 30 μ long, with a rather obscure central guttule. Many of these larger spores were narrowed at one end. I could nowhere find any trace of septum or constriction in the spores. *Otthia ambiosa* occurred on larger branches of a near-by tree.

*Microdiplodia monadicola* Rhodes; on *Ononis arvensis*, Looe (Rhodes).

*Diplodia ramosicola* Desm.; on dead leaves and twigs of *Euonymus japonicus*, Perranzabuloe and Polperro: this seems never to be abundant, just an occasional dead twig or fallen leaf will be covered with the pustules. *D. Pinastri* Grove; on dead leaves and branches of *Pinus sylvestris*: the large brown spores are often continuous, sometimes a gathering will be entirely so (*Sphaeropsis Pinastri* Sacc.), but in most pycnidia septate spores may be found. *D. malorum* Fuck.; abundant on old prunings of apple trees, Lambourne Hill: colourless and brown continuous receptacle.


*Hainesia Rubi* Sacc.; underside of leaves of *Rubus rusticus* with *Phragmidium violaceum*, Lambourne Hill.

*Diplodia subaeta* Grove; on *Psamnia arenaria*, Perranporth sand-dunes; previously recorded as *Hainesia subaeta*.

*Geosporium Robegei* Desm.; on leaves of *Carpinus Betulus*, near Perranzabuloe Church.


*Septomyza Tulasnei* von Hoehn.; frequent on recently dead branchlets of sycamore, Perranzabuloe.

*Cryptosporium Tam* Grove; on *Tamus communis*, Perranzabuloe.

*Melanconium apicarpum* Link; with *Melanconis Alni* on alder branches, Carnkief, Perranzabuloe. *M. Hederae* Preuss; on *Hedera Helix*, Perranzabuloe.


*Coryneopsis Rubi* Grove; on dead bramble stems, Perranzabuloe.

*Coryneum Kunzei* Corda; on *Quercus sessiliflora*, Lambourne Hill. *O. umbonatum* Nees; on *Quercus Ilex*, Callestick, and on *Q. Cerris*, near Perranzabuloe Church.

*Scoleosporium Fagi* Lib.; on twigs of beech, Callestick.

*Pestalotia neglecta* Thum.; on dead leaves of *Euonymus japonicus*, Perranzabuloe and Polperro; previously recorded as *Pestalozzia Gregii* Desm.

*Steganosporium pyriforme* Corda; on *Quercus Ilex*, Perranzabuloe.

**HYPOMYCETES.**

*Ramularia plantaginea* Sacc. & Berl.; on *Plantago lanceolata*, Perranzabuloe. *R. macrospora* Fres.; a troublesome disease on Canterbury Bells, Perranzabuloe (Beckley) and Polperro. *R. purpurascens* Wint.; on leaves of *Petasites fragrans*, Perranzabuloe. Mr. Grove told me that he had seen the round purple-bordered spots very frequently in Cornwall, as at Fowey, but only rarely was the *Ramularia* actually present on the underside of the leaf.


**PYRENOMYCETES.**

*Erysiphe Heraclei* DC.; on *Heracleum* and *Angelica*, Perranzabuloe.

*Uncinula Aceris* (DC.) Sacc.; on sycamore leaves, Perranzabuloe.

*Sporaria Roumegueri* Sacc.; on old fragments of wood in a field near Perranzabuloe Church.
Herpotrichia macrotricha (B. & Br.) Sacc.; on dead stems of bramble, Lambourne Hill: the tomentum on which the perithecia are situated is apparently produced only where the dead wood is lightly buried in loose soil or leaf-mould.

Melanomma Pulvis-pyrius (Pers.) Fuck.; on apple wood, Lambourne Hill.

Othia ambiens Niesl. (det. Petrak); on Betula, forming dark bands round the smaller branches, Ventongimps, Perranzabuloe.

Lophiosphaeria Fuckelii Sacc.; on dead bramble stems, rather common in Perranzabuloe.

Rosellinia byssiseda (Tode) Schröt.; on dead sticks of hazel and other wood where lightly buried in mould, Perranzabuloe.

Didymosphaeria futilis Rehm; on dead cuttings of rambler roses, Lambourne Hill. D. diplodioides (Cronan) Sacc.; on Eupatorium cannabinum, Lambourne Hill.

Leptosphaeria vagabunda Sacc.; on fragments of old wood lying on grass, field near Perranzabuloe Church.

Pleospora infectoria Fuck.; on dead culms of Cynosurus cristatus, especially the upper part, Perranzabuloe. P. vagans Niesl. (det. Sydow); common on the upper parts of culms of Dactylis glomerata, Perranzabuloe.

Gnomonia cerastis (Riess) Ces. & De Not.; on petioles of dead sycamore leaves, Lambourne Hill.

Valsa ambiens (Pers.) Fr.; on Crataegus monogyna, Lambourne Hill.

Eutypa heteracantha Sacc. (det. Petrak); on Ligustrum, Buddleia, and Sambucus, Lambourne Hill.

Eutypella Brunandiana Sacc. (det. Sydow); on Ribes nigrum, R. rubrum, and R. Grossularia, Lambourne Hill. E. Prunastri Sacc. (det. Sydow); on dead plum branches, Lambourne Hill.


NOTES ON TWO SAGINAS.

BY F. R. ELLISTON WRIGHT.

(Plate 615.)

It is now sixty years since Mr. W. B. Boyd discovered Sagina Boydii Buch.-White, and to-day many botanists regard it almost as a myth.

To reawaken some interest in S. Boydii might lessen the risk of passing the plant by without notice. Now that so many more botanists visit the highlands of Scotland there is, I think, some likelihood that S. Boydii may be found again.

Although it cannot be proved that S. Boydii did not come from Switzerland, I think it is unlikely, for it is improbable that anyone interested in plants would send to England so distinct a looking plant, new and unknown, without any comment.
If the plant did not come from Switzerland, it almost certainly came from the Braemar district, with Ben A'an perhaps as the most likely hill, and here we have a very large area of hills, with some parts of them difficult of access, where a scarce and local plant might escape observation apart from some lucky chance.

The growth form of *S. Boydii* is similar to that of other plants seen on the higher parts of Ben A'an, and evidently suitable for existence on that cold wind-swept hill. The force of the wind there must be experienced to be believed. Over large areas none of the vegetation exceeds an inch in height.

If *S. Boydii* arose as a chance mutation, there is little likelihood that it would be found again; but I think it will be admitted that the plant varies in too many characters from any existing British *Sagina* for it to be a mutant. If it were a hybrid, it might be less likely to turn up again; but I cannot see sufficient evidence for it to be a possible hybrid of parents at present existing, quite apart from the rarity of undoubted hybrids in the genus.

It is well known that some hybrids, unusual forms of flowering plants, and especially ferns, only reproduce by apomixis or vegetatively. The sterility of *S. Boydii* is rather to be regarded as a replacement of sexual by vegetative reproduction, where conditions for seed formation and germination are unsuitable. This is frequently found in plants of the high hills; though many such plants, when removed to lower and more hospitable situations, may be induced to produce flowers. Everyone must have noticed how, on the highest ground, *Polygonum viviparum* has no flowers, only bulbils, whereas, as we see the plant on lower ground, it has more and more flowers on the spike.

*S. Boydii* varies in no such way. Even in my garden in Devonshire it grows in unchanged form. I have often seen rudimentary white petals in my cultivated plants too abortive to allow of any description of petal shape, and these rudiments may not be found in the plant growing in its natural habitat.

The excellent short description of *S. Boydii* in Babington's *Manual of British Botany* is sufficient for identification. The densely imbricate, short, fleshy, rigid, recurved leaves are unlike those of any other *Sagina*, and under cultivation with favourable conditions of soil and moisture, with protection from exposure, these leaves are unaltered (Pl. 615, fig. 1).

In spring, when active growth is taking place, the young leaves show along their edges and on their upper surface many minute "spinous" (glandular) outgrowths, somewhat similar to those seen on *S. procumbens* var. *spinosa* G. B., but in the latter plant they are rarely on the leaf-surface and are slightly longer and more attenuate. Later in the season these on *S. Boydii* are not noticeable. It is unlikely that these leaf-additions are the result of cultivation.

The sepals (Pl. 615, fig. 2) never open to any extent, more than a slight separation of their tips, just allowing a limited view of the white anthers, which crowd over the top of the immature capsule. The stamens are well formed, varying from five to the full ten. The pollen-grains have a normal appearance. The stigmas are ill-developed, quite rudimentary in some flowers (Pl. 615, fig. 3). The appearance of receptive tissue is only seen badly developed at their extreme ends. The central area between them on the flat top of the ovary is mainly occupied by those curious spherical, shining, apple-green bodies, which are very variable in number and size. These are probably related to those malformations often found in the remains of embryonic tissue left on the suppression of some organ which has become useless or obsolete (fig. 3a).

The undeveloped ovules are present with their usual attachment to the columella. They are never fertilized, so the capsule never develops, and very gradually, with the whole flower, withers away.

Cultivated here in Devon, flowers were plentifully developed in early May—none were produced after July.

Dr. K. B. Blackburn has found the chromosome count to be \(2n=22\), which places *S. Boydii* in the same group with *S. procumbens, subulata, saginoides, repens, and pilifera*.

The compact growth-form of *S. Boydii*, with the absence of any spreading branches which might form adventitious roots and give rise to daughter plants, as in the other British perennial Saginas, raises some speculation as to the possibility of the plant's means of dispersal. Parts of similar small plants can be detached
by violent hail-storms, or by wind, and carried for some distance by the same agencies.

*Sagina Reuteri* Boiss., material found in England which has been placed under this name, has been well described by W. H. Pearsall in *B. E. C.*, 1927. There are British botanists who consider that this English material may not be identical with the Spanish plants described by Boissier. From his original description, I see no real reason to indicate that our English plants are not the plant described by Boissier; but to obtain Spanish material to prove the point seems at present impossible.

Dr. K. B. Blackburn has found the chromosome count of English material to be 2n=12, which merely leaves *S. Reuteri* in the same group with *S. ciliata* and *apetala*.

It is worth repeating that the sepals are erect and close to the capsule, and that the two outer sepals, although hooded, with the tip of the hood turned in and slightly downwards, end in a small apiculus, a character commonly found in dwarf maritime forms of *S. ciliata*.

Ilfracombe plants found by Mr. C. P. Hurst, named by Dr. Druce as *S. Reuteri*, have since been referred to *S. ciliata*.

During the past three years I have had under cultivation English *S. Reuteri* from four different habitats in the British Channel area. Under conditions of shelter, sufficient moisture, and good soil, all plants have developed into *S. ciliata*.

I therefore propose to treat the plant as *S. ciliata* forms *Reuteri* (Boiss.), comb. nov.

**Explanation of Plate 615.**

Fig. 1.—*Sagina Boydii* Buch.-White. Cultivated May 28th. Nat. size.

Fig. 2.—*Ditto*. Flower and peduncle. X 24.

Fig. 3.—*Ditto*. Flower with sepals forcibly opened. Greatly enlarged.

A NOTE ON **HODGSONIA CPPNIOCARPA** RIDLEY.

**BY B. C. KUNDU, M.A.**

The genus *Hodgsonia* was first described by Hooker f. and Thomson (Proc. Linn. Soc. ii. (1853) 258), the type-species being *Trichosanthes heteroclita* Roxburgh ('Flora Indica,' p. 695 (1874)). Hooker f. (Illustr. Himal. Pl. pl. 1–3 (1883)) subsequently published a large coloured plate of *Hodgsonia heteroclita*, and made the following observations on its taxonomic relationships:

"Some of the botanical characters of the plant are most remarkable. The flower in all respects resembles that of a *Trichosanthes*, but the ovary and fruit wholly differ from that genus, and ally it more to the curious East African genus *Telfairia*. The placenta are decidedly marginal and the two collateral ovules, at the base of each side of the placenta, contract an adhesion and together form only one seed with two cells, and often two embryos, though one is frequently imperfect." These characters are quite sufficient to warrant its treatment as a distinct genus.

Ridley (Fl. Malay Pen. i. p. 843) described a second species, *Hodgsonia capniocarpa*, from some specimens from the Malaya Peninsula which had been referred to *H. heteroclita* by Hooker f. and Thomson. He distinguished it from *H. heteroclita* by (1) the hairy underside of the leaves, (2) the much smaller flowers with a much thicker calyx-tube and shorter lobes, and (3) the fruit. He remarked: "*H. heteroclita* has a pointed red fruit, thin-walled; that of this species is woody, velvety, grey, and quite flat on the top and base."

During my study of *Hodgsonia* I have found that the characters ascribed to *H. capniocarpa* by Ridley do not all hold good for the specimens determined by him as belonging to that species. The structure of the leaves of *H. capniocarpa* completely agrees with that of *H. heteroclita*, except in the nerves on the lower surface of the leaves being hairy. The calyx-tube has been described as 0·5 in. long and the corolla-tube 2 in. long (2·5 in. in the 'Flora of the Malay Peninsula'). Actually, the calyx-tube is never so short in a fully expanded flower; it is about 5 cm. long and dilated from the middle upwards. There is practically no corolla-tube. There does not appear to be any difference in the structure of the fruit of the two species. Ridley stated that *H. heteroclita* has a pointed red fruit, thin-walled. Roxburgh in his original description of *Trichosanthes heteroclita* and Hooker f. and Thomson in their description of *H. heteroclita* state distinctly that the berry is depressed-globose. The two fruits of *H. heteroclita* preserved in the Museum of the Royal Botanic Gardens, Kew, are depressed-globose. The longitudinal section of the fruit of *H. heteroclita* in the Kew Herbarium also proves that it is really depressed-globose, as described by Hooker f. I do not think that the fruit of *H. heteroclita* has a thin coat; the sections of the fruit preserved in the Kew Herbarium are taken from very young ones, as the seeds are quite immature and have not developed a hard testa. The two fruits preserved in the Museum appear to have thick coats. The fruit of both species are tomentose.

A key to the two species and an amended description of *H. capniocarpa* are given below:

**Key.**

Leaves glabrous on both sides, with conspicuous depositions of waxy substances in the arnoles of the veins on the under surface; calyx-tube 7·5–12 mm. long, dilated at the extreme apex; calyx-teeth 2·5–4 mm. long. *H. heteroclita* Hook. f.
Veins on the under surface of the leaves hairy, depositions of waxy substances not frequently found; calyx-tube 3-6 cm. long, dilated from near the middle upwards; calyx- teeth very minute .............. H. capniocarpa Ridley.

I have seen two Indian specimens, one from Lushai Hills, Assam, and the other from Chittagong, where the veins on the lower surface of the leaves are slightly hairy, but in all other respects they agree with H. heterocotila.

H. capniocarpa Ridley, in Journ. F.M.S. Mus. x. 135 (1920); Ridley, Fl. Mal. Penins. i. 843 (1922).

Large climber with very strong 2-3-fid tendrils. Leaves alternate, evergreen, coriaceous, palmately 3-5-lobed; petioles elongated, 2-5-7 cm. long; lobes acute or shortly acuminate, reticulations very conspicuous, nerves on the under surface of the leaves hairy. Peculiar axillary conical bodies present, one in the axil of a leaf. Male racemes woody, stout, growing to 15-18 cm. long. Calyx-tube about 5-6-5 cm. long, dilated from the middle of the tube, 1 cm. wide at the top when open; calyx-teeth very minute. Corolla gamopetalous, adnate to the calyx-limb; limb spreading, thick scurfy pubescent, 5 cm. across when open, fimbriate. Stamens 5, triadephous, anthers connate, extrorse. Female flowers solitary, axillary. Calyx and corolla as in 2. Ovary unicocular with 3 parietal placentas which are bivolute on both sides; style elongated; stigmas 3-lobed. Fruit very large, depressed-globose, velvety gray, woody. Seeds closely stuck together by pairs in six nuts and embedded in a firm oily pulp. Testa very hard and woody.

REVIEWS.


The great similarity between the Loganiaceae and that very large family the Rubiaceae has always been recognized by systematic botanists. The distinction, depending on the superior ovary in the Loganiaceae in contrast to the inferior ovary of the Rubiaceae, has sometimes seemed trivial when compared with the extreme similarity of the other floral and the vegetative characters. The approach of the two families to one another is most marked in the peculiar structure of the stipules between the opposite leaves, which is such a constant character of the Rubiaceae, and which is found in all but a single isolated group of the Loganiaceae.

A close investigation of the stipular structure is therefore of considerable systematic importance. Two main types of stipules are found in the Loganiaceae, which are termed the Couthoria-type and the Fagraea-type. The former is the most general, and it is this type which is so similar to the interpetiolar stipules of the Rubiaceae. The Fagraea-type shows more resemblance to the stipules found in the Tabernaemontaneae, a tribe of the Apocynaceae. In the Buddleioideae the stipules of opposite leaves do not unite, a circumstance so distinct as to support the view advanced by Solerader, on evidence of the structure of the vascular bundles, that this group must be treated as a subfamily.

It is reassuring to learn that the vascular structure to be found in plants so diverse in stature as the Australian Mitroasaces and the various species of Strychnos are in all essentials similar. The paper is divided into two parts, which deal respectively with the structure and morphology of the stipules and the vascular system of the vegetative shoot. At the end of each part the structures described are discussed in their relation to the systematic positions of the groups within the family, and of the family as a whole. There is undoubtedly good correspondence between the results of this anatomical investigation and those of systematicists, but the full value of the work will not be apparent until similar work has been undertaken in the related families of the Contortae and the Rubiaceae. The author mentions preliminary investigations in these groups; let us hope that they can be continued as comprehensively as the present work.

W. R. P.

La Mortola Garden. Hortus Mortolensis. Compiled with the assistance of S. E. Mario and C. L. Maurizio; introduction by Lady Hanbury. With 61 plates, including coloured frontispiece and two photographs; 2 charts and 2 maps. Oxford University Press. 28s.

This illustrated catalogue of the plants cultivated in the famous garden at La Mortola, Ventimiglia, Italy, is very lavishly produced. Sir Cecil Hanbury, who died during its preparation, had been engaged upon it for two years in collaboration with Lady Hanbury. There is a biographical sketch of Sir Cecil as a foreword, accompanied by a photograph. This is followed by a section headed “Sir Cecil Hanbury,” which consists of two biographical notes from ‘The Times’ and an account of the origin of La Mortola from ‘Country Life.’ Sir Thomas Hanbury bought the palazzo and some land in 1869. The botanical and scientific character of the garden owes much to his eldest brother Daniel, who made it a centre for the acclimatisation of plants from subtropical countries. Backed by the great limestone hills of the Mentone range, which keep off the cold winds of the Alps, the position and aspect of La Mortola, which now occupies
112 acres, are very favourable to gardening, and the climate is probably more temperate than that of any other part of the Riviera. The soil is very scanty and poor, and its calcareous nature is uncongenial to many plants. However, over sixty years of cultivation has given the garden a wealth of trees.

An alphabetical list of the contents of the garden was published in 1889, a systematic enumeration of about 3600 species in 1897, and 'Hortus Mortolensis' by Alwin Berger in 1902.

Thomas Hanbury died in 1907, and in 1920 Cecil Hanbury came into possession of La Mortola. It had been much neglected, chiefly owing to the War, and he and Lady Hanbury decided to remodel the garden.

The Introduction occupies 64 pages. It is written in the prolix light style affected by so many writers on horticulture. The list of Species (6300) is given under 'Hortus Mortolensis,' both genera and species being in alphabetical order with Family, authority, reference to figures, and growth symbols. This part occupies 138 pages and is followed by 20 pages of notes on species and garden notes. Here there is much interesting information, but it requires to be searched out. One of the features of La Mortola has always been the distribution of packets of seeds—in 1937, 18,000 packets were distributed.

There are 58 plates of views and plants, a seed distribution, and a rainfall graph, also two maps of the garden—1914 and 1937. The illustrations show the charm of the garden and its more interesting plants.

The title-page is without any author's name, and is of an unusual type. The cover bears the legend "In Memoriam C. H."

**BOOK-NOTES, NEWS, ETC.**

"I desire to correct an error in my paper on new species of tulips published in your last issue. Aitcheson and Aitchesonii should be Aitchson and Aitchisonii. The name commemorates James Edward Tierney Aitchison, M.D., F.R.S., who was an Edinburgh graduate and a member of the Bengal Medical Service. He was attached to the Afghan Delimitation Commission, and made considerable collections of plants, which are described in the Trans. Linn. Soc. (Botany), iii. 119 (1888)."

"The specific name Veneris, attached in the same paper to a tulip from Cyprus, was given to mark the ancient association of Cyprus with Aphrodite or Venus."—A. D. Hall.

Dr. Handel-Mazzetti points out that Saussurea Kingii Drummond (p. 289) had already been described by C. E. C. Fisher in Bull. Misc. Inf. Kew, p. 98 (1937).

**Correction.**—For L. Fosberg (p. 276) read F. R. Fosberg.
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For Classified Articles, see—Obituaries: Reviews. New genera, species, varieties, and names are distinguished by an asterisk.

Unsigned Reviews and Notes are by the Editor. The first two numbers of this volume were edited by Mr. I. H. Bidwell.

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