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An experimental study of hybridization between *Heracleum mantegazzianum* Somm. & Levier and *H. sphondylium* L. subsp. *sphondylium* (Umbelliferae)

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ABSTRACT

Experimental crosses were made on material of *H. mantegazzianum* and *H. sphondylium* subsp. *sphondylium* (Umbelliferae) obtained from south-eastern Scotland. The interspecific cross was successful, but only when *H. sphondylium* was the maternal parent. Self-pollination within an umbel was not usually successful because of protandry, but self-pollination of flowers of the primary umbel of *H. mantegazzianum* with pollen from the secondary umbel was successful. The progeny from these crosses were observed over four years. Hybrid crosses gave rise to intermediate progeny, which resembled putative hybrids from the field. *H. sphondylium* was perennial though not long-lived; *H. mantegazzianum* was monocarpic, taking three to five years to flower; longevity and flowering in the hybrid was generally intermediate.

INTRODUCTION

Putative hybrids between *Heracleum mantegazzianum* Somm. & Levier and *H. sphondylium* L. have recently been described in detail from several sites in south-eastern Scotland (Grace & Stewart 1978; Stewart 1979). These plants, morphologically intermediate between the presumed parent species, are not numerous, but can be found where *H. mantegazzianum* and *H. sphondylium* grow interspersed. A study of male meiosis at one mixed *Heracleum* site has demonstrated the certain hybrid nature of these plants, which are virtually sterile (Weimarck *et al.* 1979). The low fertility of the hybrids is probably due to differences in the karyotypes of *H. mantegazzianum* and *H. sphondylium* which cause segregational aberrations at meiosis in the hybrid. Although there was no evidence for introgression at sites studied in south-eastern Scotland, incidental occurrence of backcrossing is probable (Weimarck *et al.* 1979).

H. mantegazzianum was introduced from the Caucasus and subsequently became naturalized in Britain in the 1800s (Stewart 1979). Thus the geographical barrier between *H. mantegazzianum* and *H. sphondylium* has been reduced. Observations on flowering time and the pollen load of insect visitors at a mixed *Heracleum* site in Scotland (Grace & Nelson 1980) have shown that, although the species have a more or less distinct insect fauna, some insect species visit both species of *Heracleum* and so a small amount of pollen is transferred between them.

The work reported in this paper was designed to determine whether hybrids could be synthesized by experimental transfers of pollen between the parent species.

MATERIALS AND METHODS

Experimental crosses were made on individuals of *H. mantegazzianum* and *H. sphondylium* subsp. *sphondylium* obtained from several sites in south-eastern Scotland (Table 1). The plants were removed from the field in March or early April 1977, before the rosette of leaves had reached 0.5 m diameter, planted in 0.18 m³ plastic tubs containing the plants' own soil and brought to Edinburgh. Less than 50% of the transplants produced suitable flowering shoots. Some remained in a vegetative state (none of the hybrid transplants flowered) and some were badly damaged by the larvae of *Depressaria pastinacella* Duponchel (Parsnip Flat-bodied Moth) which lays its eggs on unopened umbels of *Heracleum* (Thompson & Price 1977; Thompson 1978). Plants used for experimental crosses were moved into a cool glasshouse early in June. Floral development was observed on the

TABLE 1. ORIGINS OF PLANT MATERIAL MENTIONED IN THE TEXT.
Overall, less than 50% of transplants survived and fewer flowered

Site name and number of transplants	Grid reference	Code numbers of plants used in experimental crosses
Farfield (20)	36/262.632	21,22,24-26,29,31,32,36-39
Hopetoun (10)	36/093.788	41-45, 48-50
Park Burn (7)	36/308.678	40
Riddell (10)	36/519.247	51
Roslin (10)	36/270.627	
Stobs (10)	36/506.100	2,5,7

primary and secondary umbels of the plants in the glasshouse (umbel nomenclature follows Lovett Doust (1980)).

Flowers for experimental crosses were emasculated as petals unfurled, using fine forceps to strip off anthers before they had dehisced. To prevent accidental pollination, umbellets of *H. mantegazzianum* and umbels of *H. sphondylium* were enclosed in paper bags made of lens tissue (Shepherd 1975) sealed on three sides with 'Sellostic' or 'Pritt' adhesive and tied at the open end. Flowers were pollinated after an interval of one to three days by gently brushing a dehiscent anther across the receptive stigma surface.

For each type of cross at least 70 flowers (140 stigmas) from a primary umbel were used. *H. mantegazzianum* had sufficient flowers in the single terminal umbel for at least one of each of the four types of cross:

1. Self: using pollen from the same plant as the stigma.
2. Outcross: using pollen from a different plant of the same species (intraspecific cross).
3. Hybrid: using pollen from a plant of a different species (interspecific cross).
4. Control: flowers emasculated but not pollinated.

Since *H. sphondylium* could accommodate only one cross and control in a primary umbel the type of cross was allocated at random to individual flowering shoots from the same plant. Pollen for outcrosses was obtained from primary umbels cut from *H. sphondylium* growing at Roslin and *H. mantegazzianum* of Park Burn provenance, grown outside the Department of Forestry and Natural Resources, University of Edinburgh. Self-pollination, using pollen from secondary umbels, was attempted with *H. mantegazzianum* only.

Dried mericarps were harvested and stored at room temperature. For seed counts, mericarps were passed over a light table and those with at least 2/3 by volume of developed endosperm were scored as 'seed set', as, when dissected, such individuals contained apparently healthy embryos.

All seed from the experimental crosses was set out to germinate on sterile agar plates at 2-5 °C in the dark (Stewart 1979). At two-week intervals plates were checked and seeds which had the tip of the radicle exerted were counted as germinated and removed to seed trays on the glasshouse mist bench to develop cotyledons. Three seedlings of each of the self and outcrosses and five seedlings of each of the hybrid crosses were grown on to young plants and transplanted to a cultivated field at Farfield (Table 1) in the summer of 1978.

A record was kept of the number of plants flowering, vegetative or dead from 1979 to 1982. The height of each plant was measured at one-week intervals from 30th May to 1st August 1979, and the number of rays counted on plants flowering in 1980.

RESULTS

FLORAL DEVELOPMENT

H. sphondylium flowered from 19th June to 11th July 1977, *H. mantegazzianum* from 28th June to 4th July 1977. The development of individual hermaphrodite flowers of *H. sphondylium* and *H. mantegazzianum* is illustrated in Fig. 1. Most flowers opened in the early morning, anthers dehiscent

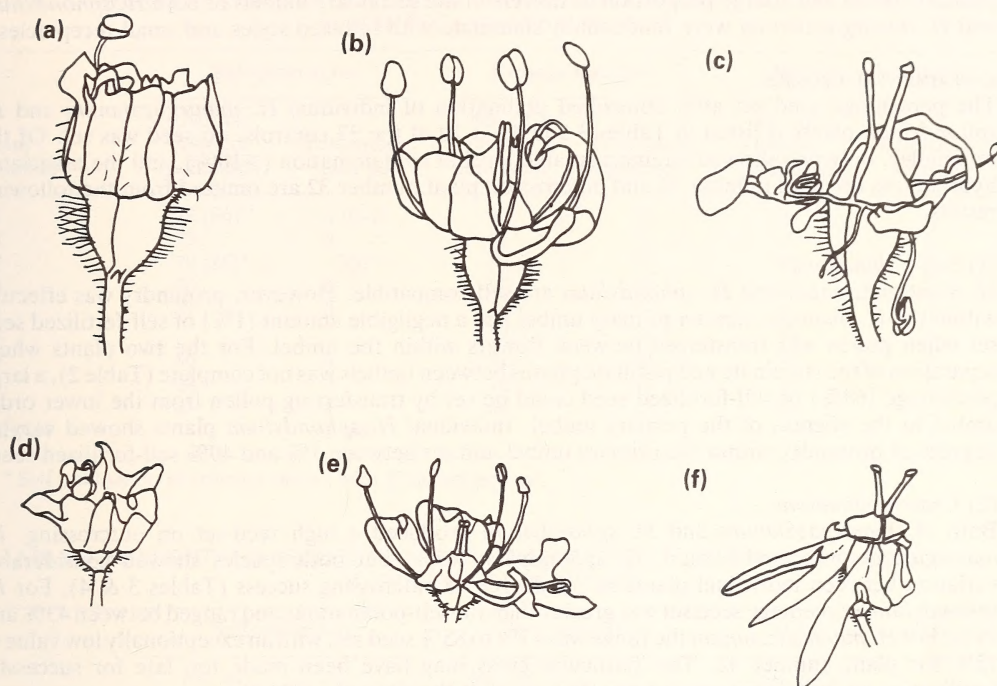


FIGURE 1. Floral development in *H. mantegazzianum* (a-c) and *H. sphondylium* (d-f). The three stages, from left to right, are buds (a & d), dehiscence (b & e) and receptive stigmas (c & f). Style lengths and standard deviations: *H. mantegazzianum* 2.11 ± 0.49 mm, *H. sphondylium* 1.58 ± 0.23 mm.

between 7 and 9 a.m., and filaments had collapsed by the following day. Individual flowers opened in sequence from the outer flowers of outer umbellets to the central flowers of central umbellets, usually over five days. This staminate phase of the umbel was followed by an interval of one to three days before all flowers became receptive across the umbel on the same day. While the flower was receptive the stigma and indumentum surface were moist; after fertilization the surfaces dried out, and the fruit began to elongate. Flowering in the primary umbel was followed by flowering in secondary umbels, and then in tertiary umbels. The length of the staminate phase and the interval of flowering between different order umbels in the experimental plants are shown in Table 2. Although there appeared to be complete protandry within an umbel, the staminate and pistillate phases on some plants overlapped between primary and secondary umbels. Flowers in the centre of the

TABLE 2. DURATION IN DAYS OF STAMINATE PHASE AND INTERVAL BETWEEN FLOWERING IN PRIMARY AND SECONDARY UMBELS (MODE AND RANGE) AND NUMBER OF PLANTS WITH OVERLAP BETWEEN STAMINATE AND PISTILLATE PHASES IN DIFFERENT UMBELS

	<i>H. sphondylium</i>	<i>H. mantegazzianum</i>
Number of plants observed	23	9
Duration (days) of staminate phase in primary umbel:	4,5 (3-7)	5 (3-6)
Interval (days) between staminate phase in primary and secondary umbels:	3 (0-7)	2 (1-4)
Number of plants with overlap between staminate phase in the secondary and pistillate phase in the primary umbel:	2	2
Number of plants with overlap between staminate and pistillate phase in separate primary umbels:	11	0

primary umbel and a large proportion of flowers in the secondary umbels of both *H. sphondylium* and *H. mantegazzianum* were functionally staminate with reduced styles and small receptacles.

EXPERIMENTAL CROSSES

The percentage seed set after controlled pollination of individual *H. mantegazzianum* and *H. sphondylium* plants is listed in Tables 3 and 4. In 20 of the 37 controls, no seed was set. Of the remainder, only two showed an unacceptable level of contamination (>10%), and the associated hybrid cross on plant number 34 and outcross on plant number 32 are omitted from the following results.

(1) Self-pollinations

H. mantegazzianum and *H. sphondylium* are self-compatible. However, protandry was effective within the *H. mantegazzianum* primary umbel and a negligible amount (1%) of self-fertilized seed set when pollen was transferred between flowers within the umbel. For the two plants where separation of the staminate and pistillate phases between umbels was not complete (Table 2), a large percentage (68%) of self-fertilized seed could be set by transferring pollen from the lower order umbel to the stigmas of the primary umbel. Individual *H. sphondylium* plants showed varying degrees of protandry within the primary umbel and set between 1% and 40% self-fertilized seed.

(2) Cross-pollinations

Both *H. mantegazzianum* and *H. sphondylium* produced a high seed-set on outcrossing. *H. mantegazzianum* set 64% seed, *H. sphondylium* 67%, but both species showed considerable variation between individual plants in the degree of outcrossing success (Tables 3 & 4). For *H. sphondylium* percentage seed set was greater than for self-pollinations and ranged between 43% and 99%. For *H. mantegazzianum* the range was 47% to 85% seed set, with an exceptionally low value of 15% for plant number 42. This particular cross may have been made too late for successful fertilization as the stigmas were drier than usual at the time of pollination.

(3) Hybrid pollinations

The hybrid cross with *H. mantegazzianum* stigmas set only 2% seed overall, a level which could not be declared statistically greater than that of the unpollinated controls. Ultimately, these seeds gave rise to mature plants that were indistinguishable from the maternal parent, and so it was concluded that the 2% seed set had indeed been the result of accidental pollination. Thus, these individuals will not be considered further. In comparison, the hybrid cross with *H. sphondylium* as female parent was successful, and overall a 23% seed set was obtained (Tables 3 & 4). Despite the variation between individual plants, a statistical analysis of the seven *H. sphondylium* plants with all three treatment types showed that the difference in seed set attributed to cross type was significant ($F=18.43$, $P<0.001$). For *H. sphondylium* it was possible to set more seed from a hybrid pollination than by selfing within the primary umbel, although the greatest amount of seed was set by cross-pollination.

(4) Seed germination

Nearly all seed set by *H. sphondylium* plants had germinated after 22 weeks (Table 5). There was no distinct difference between the final germination percentages for seeds from any one cross type or plant provenance, as the number of seed germinating from any one seed batch was very variable. However, seed from the hybrid cross began germinating 2 weeks earlier at 9 weeks and continued more rapidly with a maximum at 17 weeks.

H. mantegazzianum seed began germination earlier, at 7 weeks, and reached a maximum at 15 weeks. Overall, only about half of the experimentally-produced seed germinated.

SURVIVAL AND GROWTH OF THE FIRST GENERATION FROM EXPERIMENTAL CROSSES

The first generation of hybrids from the *H. sphondylium* $\times$ *H. mantegazzianum* cross was easily distinguished. The plants were larger, with more rays in the primary umbel (Fig. 2), and grew more rapidly than *H. sphondylium* (Fig. 3). In stem diameter and number of rays they were indistinguishable from the presumed hybrids described elsewhere (Weimarck *et al.* 1979). Many of the hybrids showed structural weakness and abnormal flower development with sterile anthers,

TABLE 3. PERCENTAGE SEED SET AFTER CONTROLLED POLLINATION OF INDIVIDUAL *H. MANTEGAZZIANUM* PLANTS

Plant Number	Self-pollination		Cross-pollination		Hybrid pollination	
	No. of flowers pollinated	Percentage seed set	No. of flowers pollinated	Percentage seed set	No. of flowers pollinated	Percentage seed set
41	72 (96)*	6 (64)*	57	85	108	1
42	75	0	81	15	88	0
43	79 (86)*	(73)*	81	72	90	0
44	75	0	80	69	88	1
45	77	0	80	56	81	1
48			82	76	79	0
49	86	0	92	83	81	0
50	84	0	76	47	71	0
51	83	4	84	77	83	15
MEAN		1 (68)*		64		2

* Self pollination of primary umbel with 2° umbel pollen

TABLE 4. PERCENTAGE SEED SET AFTER CONTROLLED POLLINATION OF INDIVIDUAL *H. SPHONDYLIIUM* PLANTS

Plant Number	Self-pollination		Cross-pollination		Hybrid pollination	
	No. of flowers pollinated	Percentage seed set	No. of flowers pollinated	Percentage seed set	No. of flowers pollinated	Percentage seed set
2					114	51
5			98	67		
7	224	3				
21	243	5	158	55	80	10
22	122	10	78	78	78	4
24	138	8	100	48	133	18
25	150	4	88	99	118	38
26	349	30	211	70	240	24
29			124	70		
31	110	1	98	59	98	13
32	114	33			163	17
35	110	6			97	9
36	100	25			75	47
37			80	88	83	13
38	125	14	92	77		
39	83	29			150	22
40 (1)	128	40	88	43	84	23
MEAN		16		68		22

TABLE 5. TOTAL GERMINATION (PERCENT) AFTER 22 WEEKS AT 2 °C

	Self	Outcross	Hybrid
<i>H. sphondylium</i>	91	91	73
<i>H. mantegazzianum</i>	27	59	—

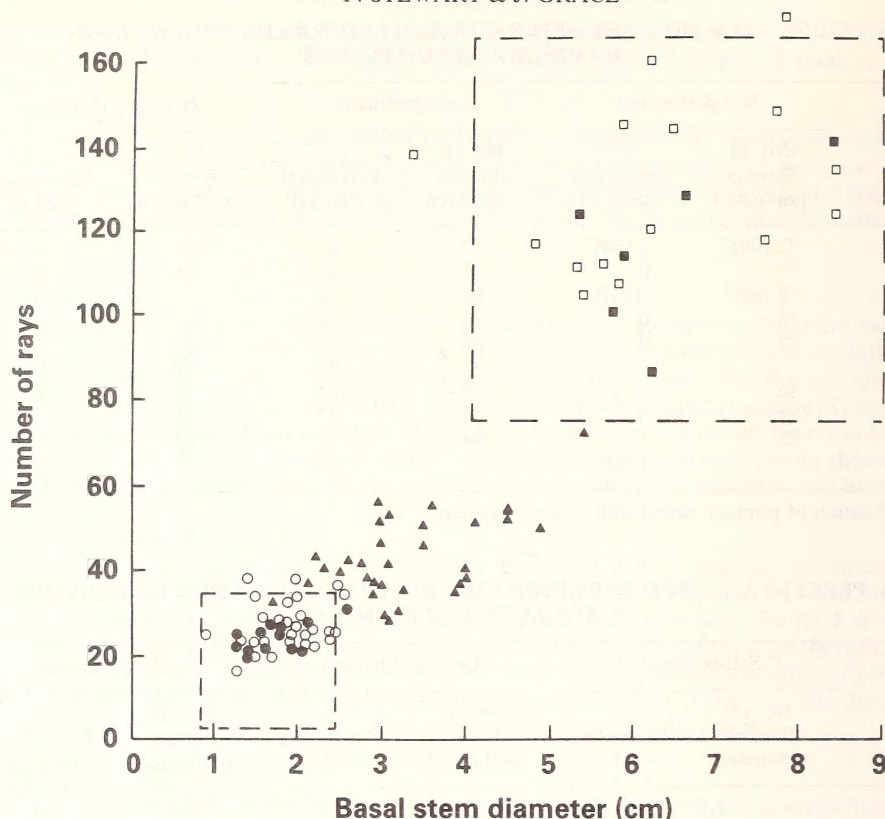


FIGURE 2. Scatter diagram to show relationships between different types of cross. ■, *Heracleum mantegazzianum* selfed; □, *H. mantegazzianum* outcross; ●, *H. sphondylium* selfed; ○, *H. sphondylium* outcross; ▲, hybrid cross with *H. sphondylium* the maternal parent. The large rectangles made of broken lines denote the range of stem diameter and number of rays recorded in the field from pure populations of *H. sphondylium* and *H. mantegazzianum*.

stunted styles and contorted developing fruit, in contrast with *H. sphondylium* and *H. mantegazzianum* which flowered normally. The hybrids survived at least as well as the selfed and outcrossed progeny, though they had a greater tendency than *H. sphondylium* to remain vegetative, with most individuals remaining vegetative for one or more years out of four (Fig. 4). *H. mantegazzianum* flowered in its third, fourth or fifth year and generally died afterwards. Most hybrids did not die after flowering (Fig. 4).

DISCUSSION

HYBRIDIZATION

An entry in Stace (1975) and the previous notes of McClintock (1973) provide the only published description of the hybrid *H. mantegazzianum* × *H. sphondylium*. Reference to a probable hybrid in the field was made by Praeger (1951) for Ireland, and Perring & Walters (1964) for two sites in Cambridgeshire; Kent (1975) listed several sites for the putative hybrid in Middlesex, where M. G. Collet and R. K. Brummitt recorded the hybrid along the banks of the River Brent near Ealing in 1962 and 1967. Specimens collected in 1969 by P. H. Davis and C. W. Muirhead, from a mixed *Heracleum* population growing in the centre of Edinburgh, were sent to the Russian authority I. P. Mandenova and were returned with the comment "Il est bien probable que c'est une forme hybride". Possible hybrids have also been collected by R. K. Brummitt from a colony near Heathrow

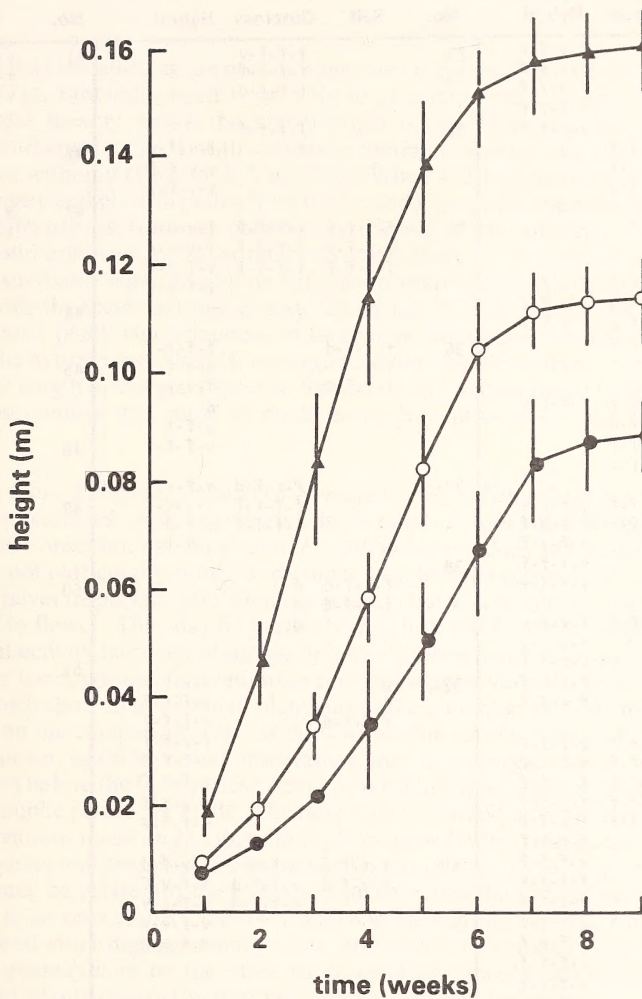


FIGURE 3. The growth in height of *H. sphondylium* progeny which flowered in 1979. $\blacktriangle$, interspecific hybrids; $\circ$, outcross; $\bullet$, selfed. Bars denote 95% confidence limits.

(Stace 1975) and by D. McClintock from Coldstream in south-eastern Scotland. Also in Scotland, records have been made at the Black Isle (Muirhead 1974), Caithness (McClintock 1973) and in Morayshire (McCallum Webster 1978). We have found putative hybrids of *Heracleum* at most sites where the species grow together (Grace & Stewart 1978). They are nearly sterile and intermediate in all characters measured, including certain microscopic features of the leaf surface (Weimark *et al.* 1979; Arora *et al.* 1982). The work reported in this paper shows that hybrids may be artificially synthesized with remarkable ease, as long as *H. sphondylium* is the maternal parent, and that these hybrids are indistinguishable from presumed hybrids in the field.

The incidence of hybrids of *Heracleum* species in the field is low in relation to the ease with which they may be synthesized. This is mainly due to the extremely selective foraging behaviour of insects (Grace & Nelson 1981), a clear case of ethological isolation, similar to that reported in *Antirrhinum* (Mather 1947) and *Papaver* (McNaughton & Harper 1960). The low incidence of hybrids, together with their low fertility, probably accounts for the lack of any marked introgression, and means that

No.	Self	Outcross	Hybrid	No.	Self	Outcross	Hybrid	No.	Self	Outcross
2			f-v-f-v f-v-v-f f-v-f-f v-f-f-f v-v-f-f	29		f-f-f-v f-f-f-f f-f-f-d		41	v-v-f-d v-v-f-d v-v-v-v v-v-f-d	v-v-f-d v-v-f-d v-v-v-v
5		f-f-f-f f-f-f-f f-v-f-v		31		f-f-f-f d	f-v-f-v v-v-f-f v-v-f-f	42		v-v-f-d v-v-f-d
7	f-f-v-d f-v-f-d			32	f-f-f-f v-f-f-v f-f-f-f	f-f-f-f f-f-f-f f-f-f-f	f-v-v-v f-v-v-v v-f-f-v v-f-v-f	43	v-v-v-v v-v-f-d v-v-f-d	v-v-f-d v-v-f-d v-f-d v-v-f-d
21	f-f-f-f f-f-f-d	f-f-f-f f-f-f-d f-f-f-d f-f-f-f	f-v-f-v f-v-f-f f-v-f-f	36	f-f-f-d f-d f-f-f-d		f-f-f-f v-v-f-f f-v-v-f d v-f-f-f v-f-f-f	44		v-f-d v-f-v-d
22	f-f-f-f f-f-f-v	f-f-f-f f-f-f-d f-f-f-f f-f-f-v	v-f-f-f	37		f-f-f-d f-f-f-f f-f-f-f	v-f-v-v f-v-v-f v-f-v-f	45		v-v-v-f v-v-f-f v-v-f-d
24	f-f-f-f f-f-f-f	v-v-f-f f-f-f-v	v-f-v-v v-f-v-f v-f-v-f v-f-f-f v-f-f-v	38		f-f-f-d f-f-f-d d d d		48		v-v-f-d v-v-f-d
25		f-f-f-f d	f-v-v-v f-v-v-v v-f-f-f f-f-f-f f-v-f-f	39	d d f-f-f-d		v-v-f-f f-f-f-f v-f-f-f f-v-f-f v-f-f-f v-f-f-f	49		v-v-f-d v-v-f-d v-v-v-f
26	f-f-f-f d d	v-f-f-f f-f-f-f f-f-f-f f-f-f-f f-f-f-f f-f-f-f f-d	v-f-f-f v-f-f-f f-v-f-f f-f-f-f f-v-f-f f-f-f-f v-f-f-f f-f-f-f v-f-f-f f-f-f-f v-f-f-f f-f-f-f v-f-f-f v-f-f-f v-f-f-f	40	f-f-f-f f-v-f-d	v-f-d v-f-f-d f-f-f-d	f-v-f-d f-f-v-f v-f-f-v f-f-v-d	50		v-f-d v-f-d v-f-d
								51		v-v-v-f v-f-d v-f-d

FIGURE 4. Observations on the flowering of progeny 1979–1982. Plants 2–40 were *H. sphondylium*, 41–51 were *H. mantegazzianum*. v, plant remained vegetative; f, plant flowered; d, plant dead. Thus v-f-f-d, for example, would mean that the plant was vegetative for one year, flowered for two years and then died.

hybridization cannot in this case be considered to be very significant in evolutionary terms. There can, however, no longer be any doubt as to whether hybrids do occur.

It remains of great interest to see whether hybridization can occur between the numerous other *heraclea* found in the Caucasus, which, like *H. sphondylium* and *H. mantegazzianum*, all have a diploid chromosome number of 22 (Grossheim 1967). The cytogenetic and chemotaxonomic relationships between the European subspecies of *H. sphondylium* are already under investigation (Weimarck 1978; Weimarck & Nilsson 1980).

Heracleum is not the only genus in the Umbelliferae in which an experimental cross has been successful at the interspecific level. McCollum (1975) has made crosses between *Daucus carota* and *D. capillifolius*, and also between *D. gingidium* and the cultivated carrot (McCollum 1977). These crosses, along with the several reports of putative hybrids in other umbelliferous genera (Stace 1975)

suggest that the view expressed at two successive international conferences, that "hybridization is almost unknown in the family" (Bell 1971; Heywood 1978), should now be abandoned.

BREEDING SYSTEMS

Most members of the Umbelliferae are protandrous, the exceptions being *Hydrocotyle*, *Sanicula* and *Erigenia* (Bell 1971). Protandry itself is unlikely to guarantee outcrossing, as pollination by the anthers of adjacent flowers within the umbel might occur. However, the entire umbel of *H. sphondylium* is nearly protandrous, with stigmas becoming receptive only after most of the anthers on the umbel have withered (Proctor & Yeo 1973). When self-pollination was achieved, as in the pollination of primary umbels with pollen from the secondary umbels, the seed set was quite high and germination as effective as from an outcrossing. However, the progeny displayed inbreeding depression: they did not grow as tall as the outcrossed progeny, were more often dead after five years, and those surviving were often puny with few flowering stems per plant. It seems that self-pollination involving the secondary umbel may be unusual, though of great potential importance in the case of a founder plant which happens to be remote from other sources of pollen.

The failure of the hybrid cross when *H. mantegazzianum* was the maternal parent may result from the excessive style length of the giant species. Similar cases are mentioned in Stace (1975), and the rather limited observations that could be made in the present work support this view.

LONGEVITY

According to the *Flora Europaea* account of *Heracleum*, *H. sphondylium* is a biennial or a short-lived perennial, whereas *H. mantegazzianum* is biennial, monocarpic, or perennial (Brummitt 1968). The present observations show that *H. sphondylium* does not usually display biennial behaviour, and is not particularly short-lived—more than half the plants survived for five years. *H. mantegazzianum* never displayed 'true' biennial activity, but was usually monocarpic, taking three, four or five years to flower. This may be partly the result of the rather exposed nature of the site, since true biennial activity has been observed previously when material was planted in a sheltered plot. On the other hand, casual observations in the wild suggest variable longevity. There are now several studies which show that 'biennial' plants may take a number of years to complete their life cycle, depending on the competitive relationships within the plant community (Holt 1972; Werner 1975). It is also known, again by casual observation, that *H. mantegazzianum* will flower a second time if it is cut down before the flowers have opened, as often happens when half-hearted attempts to eradicate it from public places are made. The only other recorded information on flowering in the genus is the observations made on *H. sibiricum* by Rabotnov (1956): this species remains vegetative for one or more years and then blooms sporadically, dying after 13 to 15 years.

The life cycle may be related to the ecological niche which the species occupy. In Britain, *H. mantegazzianum* is an opportunist, rapidly colonising bare ground on river banks after a flood, producing much seed with a high germination rate, and rapidly becoming locally dominant (Clegg & Grace 1974). *H. sphondylium*, on the other hand, produces fewer seeds which germinate over a longer period, and plants co-exist with other species at a relatively low population density, for example in ruderal habitats (Way 1979), and in certain tall-herb communities on mountains (McVean & Ratcliffe 1962).

The longevity of the hybrid is surprising, as many individuals are mechanically unstable and consequently display somewhat contorted or even prostrate forms of growth. Observations at Kale Water in southern Scotland suggest that the hybrid in the field is not particularly long-lived: most of those sampled by us in 1977 have now (1982) gone and others have appeared.

HYBRIDIZATION AND WEED CONTROL

Heracleum mantegazzianum is a troublesome weed, which is spreading both in Britain (Clegg & Grace 1974) and in North America (Morton 1978). Not only is it invasive, but also its sap causes photosensitization of human skin to ultra-violet components of solar radiation. This results in painful burns, a condition known as phytophotodermatitis (Drever & Hunter 1970). The active principles of the sap are 6, 7- furocoumarins, known as psoralens (Eichstedt Nielsen 1971). Although the weed can be adequately controlled using a commercial herbicide based on glyphosphate, it has been suggested that *H. mantegazzianum* could be 'hybridized out of existence' by encouraging gene exchange between *H. mantegazzianum* and *H. sphondylium*. It now seems unlikely that this could

ever be achieved. Quite apart from the considerable difficulty of obtaining a suitable pollen vector, and the uncertainty regarding the phototoxicity of the hybrid sap, the unilateral compatibility reported in this paper is not in the desired direction. The outcome of massive random pollen transfers would be to transfer genes from *H. mantegazzianum* to *H. sphondylium* and not vice versa, hence exacerbating the problem of phototoxicity, and perhaps causing unwanted evolutionary change in a familiar native plant.

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Further new species of *Taraxacum* from the British Isles

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ABSTRACT

Nine new species of *Taraxacum* (Compositae) are described from the British Isles. Five of these, *Taraxacum ardlense*, *T. cambricum*, *T. celticum*, *T. luteum* and *T. subbracteatum*, are placed in section *Celtica* Sahlin, *T. edmondsonii* and *T. berthae* are placed in section *Naevosa*, *T. serpenticola* in section *Spectabilia*, and *T. sarniense* in section *Palustria*.

INTRODUCTION

Since the publication in *Watsonia* of 'New species of *Taraxacum* from the British Isles' (Richards 1981), studies of the genus both here and on the continent have produced some valuable clarifications. The recent publication of two new sections, *Celtica* Sahlin (Sahlin 1984) and *Hamata* Øllgaard (Øllgaard 1983), together with the elucidation by us of five British species new to science in the section *Celtica*, suggest an opportune moment to publish these species and thus highlight some of the advances made. Four other new British species are also published below and provide a further opportunity to refer to current sectional designations within the former section *Spectabilia* Dahlstedt (1930) as treated in the *Taraxacum Flora of the British Isles* (Richards 1972a).

It was clearly recognised in Richards' *Flora* that Dahlstedt's section *Spectabilia* constituted a heterogeneous group of species. Christiansen (1942) had previously subdivided *Spectabilia* s.l. into four sections and these are listed by Richards, though not used. Of these sections *Macrodonia* is rarely used and appears to be of little value. Section *Naevosa* is now recognised by us as a most useful taxon; the species tend to be northerly in distribution and all have spotted leaves. Two species published here, *T. edmondsonii* and *T. berthae*, belong to this section. Christiansen's *Euspectabilia*, as Richards pointed out (Richards 1972b), should properly be known as *Spectabilia* Dahlst., as *T. spectabile* Dahlst. is clearly the type species. (*T. serpenticola*, described in this paper, belongs to this section). The remaining Christiansen section, *Crocea*, is retained for a distinctive group of arctic species which has a few representatives on Scottish mountains.

Although we have used the designation 'Celtica' informally among ourselves for some time, the formalisation of this section by Sahlin means that almost all the species previously lumped in section *Spectabilia* s.l. are now treated more meaningfully in four sections, viz. *Spectabilia* Dahlst., *Naevosa* Chr., *Crocea* Chr., and *Celtica* Sahlin. The impetus for the creation of section *Celtica* is not new. Indeed Richards (1972a, p. 45) recognises a category 'a' which constitutes the nucleus of the section. The *Celtica*, as the name suggests, are of western European distribution, the majority of the species being British or Irish. The concept of the section *Celtica* has broadened somewhat over time and has enabled a clarification of the hitherto confused boundary between some members of *Spectabilia* s.l. and section *Taraxacum* (*Vulgaria* s.l.). An added bonus has been the transfer of some species from the unwieldy section *Taraxacum* to *Celtica*.

We feel that it is worth noting here that the creation of the new section *Hamata* Øllgaard, a group which certainly has some affinities with the *Celtica*, accomplishes a similar delimitation of boundaries and a reduction in the size of section *Taraxacum*. The 20 or so species in this new section have for

some time been considered as sufficiently distinct morphologically to warrant this split. It is gratifying to note therefore that recent cytological investigations (Mogie & Richards 1983) provide further justification, by the revelation that these species possess an all-but-unique karyotype.

DESCRIPTIONS OF NEW SPECIES

1. *Taraxacum ardlense* A. J. Richards, **sp. nov.** (Plate 1A)

Planta mediocris vel alta, haud robusta. Folia adscendentes vel erecta, obscure viridia, supra praesertim in nervo mediano aranoseo-pilosa, interlobia subtus maculata, supra praesertim prope nervo mediano irregulariter maculata; lamina sublonga, angusta, ad 290×40 mm; lobi laterales 3–4, subdistantes, subcrispatis, proximaliter haud dentati, in apicem acuminatam subfiliformem abientes; lobus terminalis mediocris subsagittatus acutus, breviter mucronatus, integer vel in margine uno vel ambo simpliciter subdivisus; petiolus et nervus medianus subpurpureus intertextus viridi rubroque. Scapus sub anthesi foliis dimidio brevior vel ea aequans, omnino sparse aranoseo-pilosus, viridis sed ad basim saepe purpureus. Squamae exteriores patentes vel subrecurvatae, $8\text{--}12 \times 2.5\text{--}4.5$ mm, vix marginatae, supra pallide virides saepe purpureo-suffusae, subtus obscure virides, subpruinosae. Calathium obscure luteum, $35\text{--}45$ mm in diametro, ligulis stria cinereo-purpurea subtus notatis, purpureo-dentatis; styli subsordidi, sparse polliniferi. Corpus achenii 4 mm longus, stramineo-brunneus, ad apicem breviter spinulosus, alibi rugosus, in pyramidem conicam 0.6 mm longam abiens; rostrum 10–11 mm longum; pappus albus.

Plant medium-sized to tall, not robust. Leaves ascending to erect, dark dull green, aranose-pilose above, especially on the midrib, the interlobes blotched dark below, with irregular dark marks above, especially around the midrib; lamina rather long and narrow, to 290×40 mm; lateral leaf-lobes 3–4, rather distant, somewhat crisped, but untoothed proximally, ending in an acuminate, subfiliform apex; terminal lobe of medium length, subsagittate, acute, shortly mucronate, entire or singly subdivided on one or both margins; petiole and midrib dull purple with interwoven green and red strands. Scape from half length of leaves to equalling leaves at flowering, sparsely aranose-pilose throughout, dull green but often purplish at base. Exterior bracts spreading-recurved, $8\text{--}12 \times 2.5\text{--}4.5$ mm, scarcely bordered, pale green, often suffused purplish above, dark green beneath, somewhat pruinose. Capitulum deep yellow, $35\text{--}45$ mm in diameter; ligules striped grey-purple, ligule teeth purple; styles faintly discoloured; pollen present but sparse. Achene body 4.0 mm, straw-brown, shortly spinulose at apex, rugose throughout, with conical cone, 0.6 mm; rostrum 10–11 mm; pappus white.

HOLOTYPE: Enochdhu, East Perth, v.c. 89, GR 37/062.625, beside bridge over the River Ardlie, A. J. Richards, 22/5/1982 (OXF). Isotypi: **herb. A. J. Richards**, **herb. C. C. Haworth**. Also: field records in several sites between Enochdhu and Kindrogan Field Centre at 37/055.630. Northumberland, v.c. 68, near Great Ryle, GR 46/01, G. A. Swan, 16/5/1982 (**herb. A. J. Richards**).

T. ardlense was first detected on a B.S.B.I. field meeting in the vicinity of Kindrogan Field Centre, where it was locally frequent, but it was not detected elsewhere in the region during this meeting. However, it soon became apparent that a specimen collected in Northumberland the previous week, and unidentified, belonged to the same species, and thus it is apparently widespread, although scarce, in northern Britain. Its closest relatives are in section *Celtica*, and morphologically it falls between *T. raunkiaerii* and *T. subbracteatum*. It is distinct from both these in the longer and more recurved exterior bracts, the longer achenes and the leaf-shape. Although the leaves are similar to *T. raunkiaerii* in colour, texture and shape, the lateral leaf-lobes are fewer and more distant, and the terminal lobe more sagittate than in that species.

2. *Taraxacum cambricum* A. J. Richards, **sp. nov.** (Plate 1B)

Planta mediocris, haud robusta. Folia adscendentes vel erecta, viridia, in nervo mediano glabrescentes, emaculata, late oblanceolata, ad 200×50 mm; lobi laterales 2–4, patentes vel subrecurvati, lati obtusi, haud dentati, convexo-sigmoidei, margine distali recti vel concavo-angulosi, margine proximo convexi, saepe dente uno magno munito; lobus terminalis mediocris,

longitudine latitudinem aequans, obtusus submucronatus galeatus integer, quam alia pars folii paulo angustior; petiolus alatus, interdum late alatus, cum nervo mediano roseus vel purpureus, viride intertextus. Scapus folia plerumque superans, aranoseo-pilosus, denique glabrescens, pallide viridis apice roseo. Squamae exteriores erectae, inferiores patentes, 8–13 × 2–3.5 mm, vix marginatae, supra pallide virides, subtus atrovirides atque valde pruinosa. Calathium luteum, 40–45 mm in diametro, ligulis planis stria atrocinerea subtus notatis, luteo-dentatis; styli sordidi, polliniferi vel raro epolliniferi. Corpus achenii 3.8–4.0 mm longus, fulvo-stramineus, ad apicem rugosus, alibi laevis, in pyramidem conicam 0.6 mm longam abiens; rostrum robustum, 6–7 mm longum; pappus albus.

Plant medium-sized, not robust. Leaves ascending to erect, bright green, glabrescent on midrib, not spotted or blotched, broadly oblanceolate, to 200 × 50 mm; lateral leaf-lobes 2–4, patent to slightly recurved, broad, obtuse; the distal margin not toothed, convex, sigmoid, straight-sided or concave-angled; the proximal margin convex, occasionally provided with a single large tooth; terminal lobe medium-sized, about as long as broad, obtuse, but slightly mucronate, helmet-shaped, entire, slightly narrower than the rest of the leaf; petiole winged, sometimes broadly so; petiole and midrib deep pink or purple, with interwoven green strands. Scape usually exceeding leaves, aranoseo-pilose at first, glabrescent, pale green but pinkish at apex. Exterior bracts mostly erect, the lowest ± spreading, 8–13 × 2–3.5 mm, scarcely bordered, pale green inside, blackish green and heavily pruinose outside. Capitulum mid-yellow, 40–45 mm in diameter; ligules flat, striped dark grey, ligule teeth yellow; styles discoloured; pollen present or rarely absent. Achene body 3.8–4.0 mm, fulvous straw-brown, rugose at the apex, the rest smooth, with conical cone, 0.6 mm; rostrum stout, 6–7 mm; pappus white.

HOLOTYPE: Aberporth churchyard, Cardiganshire, v.c. 46, GR 22/256.511, 55 m, *A. O. Chater*, 5/4/1980 (OXF). Isotypus: NMW. Since recorded in a number of sites, and now known in the following vice-counties: 40, 42, 46, 50, 55, 58, 70 and 109.

T. cambricum was first discovered in Wales, hence the name, and is now known in three separate areas in the principality, but has also since been discovered in Shropshire, Cheshire, Leicestershire, Cumberland and in the north of Scotland, in Caithness. Thus, it may well prove to be widespread, although rather uncommon in central and northern Britain. *T. cambricum* is closely related to *T. adamii*, *T. gelertii*, *T. britannicum* and *T. praestans* in section *Celtica*. It has a distinctive leaf-shape with broad, obtuse lateral lobes bearing convex proximal margins, and an obtuse, helmet-shaped terminal lobe. Thus the leaf has neither the long, subdivided terminal lobe of *T. praestans*, nor the regular, recurved lateral lobes of *T. britannicum*. The lateral lobes of *T. adamii* and *T. gelertii* are usually acute, and more strictly deltoid, and neither species can be said to have a helmet-shaped terminal lobe. The achene is diagnostic, being considerably longer than in all these species except *T. gelertii*. In the latter, the achenes have many large spines and are rugose throughout. In common with *T. britannicum*, the achenes of *T. cambricum* are nearly smooth even at the apex, but they are much longer than in the former. The name *T. cambricum* should not be confused with the now obsolete name *T. cambriense* A. J. Richards (1972a, p. 98) for which the correct name is now *T. lancastriense* A. J. Richards.

3. *Taraxacum celticum* A. J. Richards, sp. nov. (Plate 1c)

Planta mediocris, haud robusta. Folia adscendentes vel erecta, viridia, in nervo mediano glabrescentes, emaculata vel interlobia subtus maculata, oblanceolata, ad 240 × 55 mm; lobi laterales 4–5, basi deltoidei lati 1(–3) dente vel lobulo acuto magno distaliter muniti, in apicem patentem vel irregulariter dirigentem acutum anguste lanceolatum margini recti e basi abrupte contracti; lobus terminalis brevis trilobatus edentatus, sublobo centrali obtuso mucronato sublobi lateralibus brevibus subacutis plerumque prorsum dirigentes ad angulum abrupte concavum inserto; petiolus alatus, interdum late alatus, cum nervo mediano roseus vel purpureus, viride intertextus, cum nervo mediano saepe distaliter viridescens. Scapus sub anthesi foliis brevior vel ea aequans, sub calathium aranoseo-pilosus viridis vel roseo-suffusus. Squamae exteriores patentes vel suberectae, 9–12 × 3–4 mm, emarginatae vel vix marginatae, supra purpureo-suffusae, subtus obscure virides, purpureo-suffusae subpruinosa. Calathium luteum, 30–40 mm in diametro, ligulis planis stria

atrocinereo-violacea subtus notatis, purpureo-dentatis; styli obscuri, epolliniferi vel sparse polliniferi. Corpus achenii 3.5–3.8 mm longus, pallide brunneus, ad apicem breviter spinulosus, alibi laevis, in pyramidem conicam 0.4 mm longam abiens; rostrum 10 mm longum; pappus albus.

Plant medium-sized, not robust. Leaves ascending to erect, bright green, glabrescent on midrib, somewhat blotched on interlobes beneath, oblanceolate, to 240×55 mm; lateral leaf-lobes 4–5 with a broad deltoid base provided with 1(–3) large acute teeth or lobules distally, and a patent, forward-pointed or irregularly directed, entire, acute, narrowly lanceolate, $\pm$ straight-sided process abruptly contracted from the base; terminal lobe short, trilobate, not toothed, the central process $\pm$ obtuse, mucronate, abruptly concave-angled to the short subacute, often forward-pointing lateral processes; petiole winged, sometimes broadly so; petiole and midrib deep pink or purple with interwoven green strands, the midrib often becoming green distally. Scape shorter than or equalling leaves at flowering, aranose-pilose below capitulum, green or suffused pink. Exterior bracts spreading (–erect), $9\text{--}12 \times 3\text{--}4$ mm, unbordered or scarcely bordered, suffused purple inside, dark green suffused purple outside, somewhat pruinose. Capitulum mid-yellow, 30–40 mm in diameter; ligules flat, striped dark grey-violet, ligule teeth purple; styles dark; pollen absent, or sparsely present. Achene body 3.5–3.8 mm, pale brown, shortly spinulose at apex, the rest smooth, with conical cone, 0.4 mm; rostrum 10 mm; pappus white.

HOLOTYPE: Llanafan Bridge, Cardiganshire, v. c. 46, GR 22/685.714, south-facing grassy roadside bank 150 m west of the bridge, 70 m, *A. O. Chater*, 28/4/1979 (OXF). Isotypus: NMW. Since recorded from several sites, and now known in the following vice-counties: 42, 46, 48, 50, 51 and 58.

T. celticum has yet to be found away from central and northern Wales, and the Welsh borders. Although the sectional name *Celtica* was coined by C.-I. Sahlin before this species was detected, it seemed useful that a typical member of the section from Atlantic areas of the British Isles be given the name *T. celticum*. In the event, the discovery of this species provided an ideal opportunity, not least because, morphologically, it occupies a central position in the section and is typical of it. *T. celticum* is intermediate between *T. nordstedtii* and *T. gelertii*, and also shows features of *T. cambricum*. It lacks the characteristic short, purple-brown striped ligules and erect bracts of *T. nordstedtii*, and has longer achenes, but closely resembles some more dissected leaf-forms of that variable species. The achenes are similar to those of *T. gelertii* in shape and size, although the spines are less robust; however the exterior bracts of *T. celticum* are less long and broad than those of *T. gelertii*, and are suffused purple to an unusual extent in this section. The narrow, forward-pointing lobes with large lobules, and the trilobate terminal lobes are distinctive. Despite the forward-pointing teeth of the terminal lobe of *T. gelertii*, the latter can never be said to have a trilobate terminal lobe, and the leaf as a whole is much less dissected.

4. *Taraxacum luteum* C. C. Haworth & A. J. Richards, sp. nov. (Plate 2A)

Planta mediocris. Folia adscendentes vel erecta, cano-viridia, supra arenoseo-pilosa, emaculata, anguste oblonga, ad 200×30 mm; lobi laterales 4–5, saepe alternati, recurvati, anguste triangulares, in apices filiformes abientes, marginibus distalis sigmoideis vel rectis, integribus vel dentibus filiformis munitis; interlobia subcrispata, integres vel filiformiter dentata vel interdum dente uno angusto instructa; lobus terminalis aut mediocris triangularis aut magnus subdivisus dentibus angustis ad basim recurvatis instructus; petiolus longitudine ad dimidium laminae, exaltus, cum nervo mediano purpureus. Scapus sub anthesi folia $\pm$ aequans, sub calathium pilosus alibi sparse pilosus, viridis vel roseus. Squamae exteriores erectae vel ad involucrum adpressae, lanceolatae vel ovatae, $8\text{--}10 \times 2\text{--}4$ mm, vix marginatae, supra pallide virides, subtus virides nitente, ad apicem obtusum anthocyane suffusae. Calathium luteum, 35–40 mm in diametro, ligulis planis, subtus haud striatis-dentatis; styli exserti sordidi polliniferi. Corpus achenii 3.5–3.8 mm longus, stramineo-brunneus, ad apicem paucis spinulis recurvatis instructus, alibi laevis, in pyramidem latam 0.4 mm longam abiens ad basim conicam; rostrum 10–11 mm longum; pappus albus.

Plant medium-sized. Leaves ascending to erect, dull grey-green, aranose-pilose above, unmarked, narrowly oblong, to 200×30 mm; lateral leaf-lobes 4–5, frequently alternate, recurved, narrowly triangular and tapering to a filiform apex; distal margin sigmoid or straight and entire or with a few

filiform teeth; interlobes somewhat crisped, entire or with filiform teeth and occasionally with a single narrow long tooth; terminal lobe either medium-sized and triangular or large and subdivided with a number of narrow, recurved teeth towards the base; petiole to 1/3 length of leaf, unwinged, petiole and midrib purple. Scape $\pm$ equal to leaf length at flowering, pilose below capitulum, otherwise sparsely clothed, green and pink. Exterior bracts erect to adpressed, lanceolate or ovate, 8–10 $\times$ 2–4 mm, scarcely bordered, pale green inside, glossy and green outside, suffused with anthocyanin towards the obtuse tip. Capitulum yellow, 35–40 mm in diameter; ligules pure yellow and totally lacking any stripe; styles exerted, discoloured; pollen present. Achene body 3.5–3.8 mm, straw-brown, a few narrow recurved spinules at the apex, the rest smooth, with broadly based cone, conical, 0.4 mm, rostrum 10–11 mm; pappus white.

HOLOTYPE: Egremont, Cumberland, v.c. 70, GR 35/019.102, grassy roadside banks on Egremont to Wilton road, C. C. Haworth, 20/5/1980 (OXF). **Isotypi:** BM, herb. A. J. Richards. Known at several other sites in the west of v.c. 70. Also recorded from Brecon, v.c. 42, two sites in Banff, v.c. 96, and Co. Londonderry, v.c. H40.

T. luteum is unique among British dandelions in its lack of a ligule stripe, a feature which renders this species at once both striking and instantly recognisable. The species appears to be widespread in western Cumberland, but very scarce and scattered elsewhere.

The leaf shape somewhat resembles that of *T. ardlense* but, apart from the ligule difference, the totally different bracts, erect to adpressed here as opposed to spreading to recurved in that species, renders them distinct. Moreover, pollen is abundant in *T. luteum* and scarce in *T. ardlense*.

5. *Taraxacum subbracteatum* A. J. Richards, sp. nov (Plate 2b)

Planta parva vel mediocris, haud robusta. Folia prostrata vel adscendentes, obscure viridia, in nervo mediano glabrescentes, interlobiis subtus vulgo maculatis, supra rariore maculatis, anguste oblanceolatis, ad 280 $\times$ 50 mm, saepe crispata; lobi laterales 4–6, subrecurvati subbreves, margine distalo sigmoidei, integres vel acuminate 1(–3) dentati; lobus terminalis brevis, galeiformis vel subtrilobatus, apice subacuto mucronato, integri vel unidentato; petiolus anguste alatus, longus ad quartam vel tertiam partem folii, cum nervo mediano subpurpureus viride intertextus; nervus medianus distaliter saepe viridescens, nervi secundi etiam interdum purpurei. Scapus foliis brevior vel sub anthesi ea aequans, omnino aranoseo-pilosus, omnino vel non nisi ad apicem roseus. Squamae exteriores patentes (vel suberectae), valvatae, 8–11 $\times$ 3–4 mm, vix marginatae, supra pallide virides vel subpurpureae, subtus obscure virides, vix pruinosa. Calathium obscure luteum, 30–40 mm in diametro, ligulis planis, stria atrocinnereo-violacea subtus notatis, purpureo-dentatis; styli obscuri polliniferi. Corpus achenii 3.0–3.3 mm, stramineo-brunneus, apic breviter spinulosis, alibi laevis, in pyramidem conicam brevem 0.3 mm longam abiens; rostrum 10 mm longum; pappus albus.

Plant small to medium-sized, not robust. Leaves prostrate to ascending, dark green, glabrescent on the mid-rib, usually blotched on interlobes beneath and occasionally blotched on interlobes above, narrowly oblanceolate, to 280 $\times$ 50 mm, often crisped; lateral leaf-lobes 4–6, somewhat recurved, rather short, the distal margin sigmoid, entire, or with 1(–3) acuminate teeth; terminal lobe short, helmet-shaped to weakly trilobate, the apex subacute, mucronate, lacking teeth, or with 1 tooth; petiole narrowly winged, 1/4 to 1/3 length of leaf; petiole and midrib purplish with interwoven green strands; the mid-rib often becoming green distally; secondary veins also sometimes purple. Scape shorter than leaves, or equalling leaves at flowering, aranose-pilose throughout, pinkish throughout, or towards the apex. Exterior bracts spreading (-suberect), valvate, 8–11 $\times$ 3–4 mm, scarcely bordered, pale green or tinged purple above, dark green beneath, scarcely pruinose. Capitulum deep yellow, 30–40 mm diameter; ligules flat, striped dark grey-violet, with purple ligule teeth; styles dark, pollen present. Achene body 3.0–3.3 mm, straw-brown, shortly spinulose at apex, the rest smooth, with conical cone, 0.3 mm; rostrum 10 mm; pappus white.

HOLOTYPE: Brill, Buckinghamshire, v.c. 24, GR 42/65.14, field margin, 170 m, A. J. Richards, 5/5/1969, ut *T. hamatiforme* Dahlst. (OXF). This specimen was part of an unnumbered exsiccatum, and isotypes have been lodged at LTR, S, BM, and perhaps elsewhere.

T. subbracteatum has been known in the British Isles since 1968 or earlier, but until recently has been confused with the unrelated species in section *Taraxacum*, *T. crispifolium* Lindb. f., which shares narrow dark, multilobate, crisped leaves and a short, valvate involucre. The latter species also occurs in the British Isles, but is much more scarce, and most earlier records refer to *T. subbracteatum*. *T. subbracteatum* is definitely known from the following 36 vice-counties: 2, 5, 9, 12, 14, 15, 20, 23, 24, 42, 44, 45, 46, 49, 50, 51, 55, 58, 59, 62, 67, 68, 70, 73, 75, 88, 89, 90, 94, 95, 96, 98, 101, 104, 106, 109. Although not recorded from Ireland, it seems principally to be an Atlantic species, and is locally abundant in such areas as Kintyre, west Argyll and Pembrokeshire. However, it is one of the few species in section *Celtica* that extend into south-eastern England (*T. nordstedtii*, *T. adamii* and *T. raunkiaerii* are others). *T. subbracteatum* is related to *T. britannicum* and *T. bracteatum*, although the latter species has been placed into section *Hamata* as an anomalous member, on account of its cytology. The leaf-shape is very similar to *T. britannicum*, which has however very distinctive erect, blackish pruinose, white-bordered bracts and scarcely rugose achenes. *T. bracteatum* is a grosser plant with broader leaves and fewer leaf-lobes. The valvate involucre of *T. subbracteatum* is distinctive, and it is an easy species to identify.

6. *Taraxacum edmondsonii* A. J. Richards, **sp. nov.** (Plate 2c)

Planta parva vel mediocris, haud robusta. Folia prostrata vel erecta, obscure viridia, supra praesertim prope nervo mediano sparse aranoseo-pilosa, saepe subparve discrete interdum sparse nigro-maculata vel emaculata, anguste lanceolata, ad 200 × 40 mm; lobi laterales 3–5, valde recurvati, angusti longo-acuminati, margine distalo plusminusve recto, integres vel acuminate parve 2–6 dentati; interlobia angusta, filiformiter dentata; lobus terminalis mediocris vel longus, sagittatus integer, acutus vel subobtusius; petiolus exalatus vel anguste alatus, folia 3-plo brevior, cum nervo mediano obscure purpureus. Scapus sub anthesi folia aequans, praesertim sub calathium aranoseo-pilosus, purpureo-suffusi. Squamae exteriores vel rariore recurvatae vel erectae-patentes, 8–12 × 1–3 mm, anguste sed distincte pallide-marginatae vel purpureo-marginatae, ad basim saepe dentatae, supra pallide viride, subtus obscure viride, mutabiliter purpureo-suffusae, epruinosa. Calathium obscure luteum, 35–45 mm in diametro, ligulis planis, stria atropurpurea notatis, atropurpureo-dentatis; styli sordidi, polliniferi vel epolliniferi. Corpus achenii 3·3–3·5 mm longus, stramineo-brunneus, apice spinulis lato-basibus instructus, alibi laevis, in pyramidem conicam 0·5 mm longam abiens; rostrum 10–12 mm longum; pappus albus.

Plant small to medium-sized, not robust. Leaves prostrate to erect, dark green, sparsely aranose-pilose above, especially on the midrib, often black-spotted, with fairly small, discrete spots, which may be sparse or absent, narrowly lanceolate, to 200 × 40 mm; lateral leaf-lobes 3–5, strongly recurved, narrow, long-acuminate; distal margin ± straight, entire or with 2–6 rather small acuminate or filiform teeth; interlobes narrow, filiform dentate; terminal lobe medium length to long, sagittate, entire, acute to subobtuse; petiole unwinged or narrowly winged, about 1/3 length of leaf; petiole and midrib deep purple. Scape about equalling leaves at flowering, aranose-pilose, especially under capitulum, usually suffused purple. Exterior bracts (recurved-) spreading (-erect), 8–12 × 1–3 mm, narrowly but distinctly pale to purple bordered, frequently dentate proximally, pale green above, dark green below, variably suffused purplish, not pruinose. Capitulum deep yellow, 35–45 mm in diameter; ligules flat, striped deep purple with purple ligule teeth; styles discoloured; pollen present or absent. Achene body 3·3–3·5 mm, straw-brown, with stout-based spinules at the apex, the rest smooth, with conical cone, 0·5 mm; rostrum 10–12 mm; pappus white.

HOLOTYPE: Eryrys, Denbighshire, v.c. 50, GR 33/19.57, damp limestone slope, *T. Edmondson*, 16/5/1982 (OXF). Isotypus: **herb. T. Edmondson**.

Edmondson first collected this distinctive small *Naevosa* species in 1976, and has since collected it from various sites in Cheshire and Denbighshire, but it is only certainly known outside this area at present from one site in Hertfordshire, and in Jylland, Denmark. The Cheshire and Denbigh material originally gave rise to a good deal of confusion, and had been equated with *T. maculosum* A. J. Richards, *T. euryphyllum* (Dahlst.) M. P. Christiansen, *T. naevosiforme* Dahlst. and *T. pseudolarssonii* A. J. Richards, all of which are frequent in this area. Matters were further confused by otherwise similar material from the same site varying with respect to production of pollen.

Material was sent to C.-I. Sahlin, who suggested it might be a new species related to *T. maculigerum* Lindb.f. Material sent from Denmark by H. Øllgaard in 1982 included copious material of a plant informally named by him '*lange-maculigerum*', which he noted chiefly differed from *T. maculigerum* by the extenuate, sagittate terminal lobe (*T. maculigerum* is only known from three sites in the British Isles, in Ulster, but is common in Denmark). Øllgaard's '*lange-maculigerum*' had originally been named by A.J.R. *T. acrifolium* Dahlst. (1972a, p. 49), but this localised endemic from Orkney and Shetland is quite different, although similar in leaf-shape. '*Lange-maculigerum*' is identical with our revised, Cheshire and Denbighshire, concept of *T. edmondsonii*. We are most grateful to T. Edmondson, whose meticulous and copious collections, and taxonomic persistence have led to clarification of several taxonomic problems in section *Naevosa*.

In the British flora, *T. edmondsonii* is most closely related to *T. subnaevosum* and *T. olgae*, and shares with these species a rather small size, and leaves with small, punctate spots. It has more erect bracts and a different leaf-shape from the former, while the latter has smaller achenes, and much larger, more erect bracts. Most other British species in section *Naevosa* have larger leaf-spots, and none have the distinctive leaf-shape of *T. edmondsonii*. As noted by both Øllgaard and Sahlin, *T. edmondsonii* is undoubtedly closely related to *T. maculigerum*, from which it differs chiefly by leaf-shape. Øllgaard is currently investigating the reliability of this character in cultivation experiments.

7. *Taraxacum berthae* C. C. Haworth, sp. nov. (Plate 3A)

Planta parva vel mediocris. Folia patentes, obscure viridia, supra pauce nigro-maculata, laeves, ad 140 mm longa; lobi laterales 2–4, subpatentes vel recurvati, triangulares, subconvexo vel recto vel sigmoideo, integre vel margine distalo sparse filiformo-dentati; interlobia integra vel filiformo-dentata vel interdum dente maiori munita; lobus terminalis vulgo magnus, ad tertiam partem folii longus, subsagittatus subobtusus mucronatus, integer vel ad basim subdivisus; petiolus exalatus vel anguste alatus, ad tertiam partem folii longus, cum nervo mediano purpureus. Scapus sub anthesi folia subaequans, pilosus vel glabrescens, purpureus. Squamae exteriores erectae vel ad involucrium adpressae, ovatae, 7–9 × 1.5–4 mm, supra pallide virides, subtus obscure virides, ad apicem purpureo-suffusae, vulgo emarginatae. Calathium c. 30 mm in diametro, ligulis stria obscure purpurea notatis; styli sordidi epolliniferi. Corpus achenii 3.6–3.9 mm longus, stramineo-brunneus, distaliter spinulis lato-basibus instructus, alibi laevis, in pyramidem conicam 0.5–0.6 mm longam abiens; rostrum 7 mm longum; pappus albus.

Plant small to medium-sized. Leaves spreading, dull dark green, with black spots scattered on the adaxial surface, smooth, up to 140 mm; lateral leaf lobes 2–4, subpatent to recurved, triangular, subconvex to straight or sigmoid and entire or with sparse filiform teeth on the distal margin; interlobes entire to filiform denticulate or occasionally with a larger tooth; terminal lobe usually large, up to 1/3 leaf length, subsagittate, subobtuse, mucronate, entire or subdivided at the base; petiole terete or narrowly winged, to 1/3 leaf length; petiole and midrib purple. Scape ± equalling the leaves at flowering, subglabrous or pilose, purple. External bracts erect to adpressed, ovate, 7–9 × 1.5–4 mm, pale green inside, dark green outside, suffused purple at the apex, mostly unbordered. Capitulum c. 30 mm in diameter; ligules with a dark purple stripe; styles discoloured, pollen absent. Achene body 3.6–3.9 mm, straw-brown, with a broad-based spinules above, the rest smooth; cone conical, 0.5–0.6 mm; rostrum 7 mm; pappus white.

HOLOTYPE: Whitehaven, Cumberland, v.c. 70, GR 25/984.178, as a garden weed at 5 Standings Rise, Whitehaven, C. C. Haworth, 10/5/1982 (OXF). Isotypi: **BM**, **herb.** **A. J. Richards**. This is the only known locality.

T. berthae clearly belongs to the group centred around the widespread *T. subnaevosum*. In leaf-shape and size it much resembles that species but it is a much darker plant and the bracts are entirely different, being pale, tenuous and recurved in *T. subnaevosum* but dark, robust and erect in *T. berthae*. *T. olgae* is another close relative but it lacks the large end lobe to the leaf. The external bracts of *T. olgae* are erect but have an extremely distinctive, wide, white border, which *T. berthae* lacks. The achenes of *T. berthae* are considerably larger and more robust than those of

both the other species mentioned. This species is known so far only from the front garden of the author! In spite of this it merits publication since it has been the subject of intense comparative scrutiny. The specific epithet recognizes the author's wife's forbearance with the hoe.

8. *Taraxacum serpenticola* A. J. Richards, **sp. nov.** (Plate 3b)

Planta parva vel mediocris, subrobusta. Folia prostrata vel adscendentes, obscure olivacea- vel brunneo-viridia, supra irregulariter obscuro-maculata, ovato-lanceolato-spathulata, ad 110 × 30 mm; folia aut elobata, apice obtusa breve mucronata, distaliter plusminusque integra, aut lobata 1–3 dentibus magnis deltoideis vel brevissimis lobis (ad quartem partem folii latis) instructa, deinde proximaliter irregulariter acuminato-dentata; petiolus ad basim exalatus, folia 4-plo brevior, cum nervo mediano obscure brunneo-purpureus, nervis lateralibus nonnullis etiam purpurei, supra prope nervum medium saepe brunneo-suffuso. Scapus sub anthesi folia brevior vel aequans, sub involucrio aranoso-piliusculus, subpurpureus. Squamae exteriores ad involucrium adpressae, 5–7 × 2–4 mm, vix marginatae, extus brunneo-virides, praesertim ad apicem purpureo-suffusae. Calathium luteum, 30–35 mm in diametro, ligulatis planis, stria obscure rosea subtus notatis, purpureo-dentatis; styli subinclusi sordidi epolliniferi. Corpus achenii 4·8–5·0 mm longus, stramineo-brunneus, in quarta parte distali breviter spinulosus, alibi subrugosus, in pyramidem brevissimum 0·4 mm longam conicam abiens; rostrum crassum, ad pyramidem coloratam etiam crassiore, 5–6 mm longum; pappus albus.

Plant small to medium-sized, rather robust. Leaves prostrate to ascending, dark olive or brownish green, with sparse irregular dark spots on the upper surface, ovate-lanceolate-spathulate, to 110 × 30 mm; leaves ± unlobed, obtuse with a short mucronate tip, ± entire distally, with 1–3 large, obtuse, deltoid teeth, or very short lobes (not dissected to more than 1/4 the width of the leaf) and irregular, acuminate, smaller teeth distally; petiole unwinged proximally, about 1/4 of the leaf; petiole and midrib dark brown-purple, with some lateral veins also purple, and sometimes with a brownish suffusion on the upper surface in the region of the midrib. Scape shorter than or equalling leaves at flowering, slightly aranose-pilose beneath the capitulum, purplish. Exterior bracts adpressed to the involucre, 5–7 × 2–4 mm, scarcely bordered, olive green outside, suffused purple especially towards the apex. Capitulum mid-yellow, 30–35 mm diameter; ligules flat, striped deep carmine with purple teeth; styles ± included, discoloured; pollen absent. Achene body 4·8–5·0 mm, straw-brown, with short spines for the apical 1/4, the rest faintly rugose, with very short, conical cone, 0·4 mm; rostrum thick, becoming even thicker approaching the coloured cone, 5–6 mm; pappus white.

HOLOTYPE: Muckle Heog, Unst, Shetland, v.c. 112, GR HP/61, grassy ledges etc. among serpentine outcrops, W. Scott 2763, 13/6/1982 (OXF). Isotypus: **herb. W. Scott**. Paratypus: W. Scott 2703, 3/7/1980 (OXF).

In section *Spectabilia* (*Euspectabilia* sensu M. P. Christiansen 1942) only three species occur on the mainland of Britain, *T. spectabile* Dahlst., *T. faeroense* (Dahlst.) Dahlst. and *T. eximium* Dahlst. It is therefore remarkable that a further three species occur on Shetland and Orkney. One of these, recently detected, is *T. ornatum* Hagl., which also occurs in Norway, Sweden and probably Iceland. This is the plant originally illegitimately published by Beeby (1909) from Lang Clodie Loch, North Roe, Shetland as *T. spectabile* subsp. *geirhildae*. We are most grateful to W. Scott for his painstaking research which has led to this conclusion. A second is *T. acrifolium* Dahlst., now thought to be restricted to Orkney and Shetland (c.f. Richards 1972a). The third, *T. serpenticola*, is so far only known from the Unst serpentine rocks, which have long been known to possess a remarkable flora with at least one other localised endemic, *Cerastium arcticum* Lange subsp. *edmondstonii* (H. C. Watson) A. & D. Löve, and curious ecotypic variants of several other species.

T. serpenticola is closely related to the other British species in the section. The achenes are longer than all except *T. eximium*, in which the spines are less well developed and the rest of the achene body lacks rugosity. The nearly entire leaves, even when well developed, and the dull, brownish hue of the leaves, which are thick and leathery, are distinctive, and the purplish exterior bracts are smaller than in *T. eximium*.

9. *Taraxacum sarniense* A. J. Richards, **sp. nov.** (Plate 3c)

Planta mediocris, gracilis. Folia erecta, viridia, emaculata, ad 150×15 mm, integra, semper elobata, anguste lanceolato-spathulata, edentata vel proximaliter dentibus 3–5 distantibus regularibus brevibus deltoideis; apex foliae acutus; petiolus longitudine lamina foliae aequens, ad basim exalatus, purpureus; nervus medianus viridis vel ad basim subpurpureus. Scapus sub anthesi folia aequans vel ea superans, sub involucreto aranoseo-pilosus, deinde glabrescens, ad apicem purpureo-suffusus. Squamae exteriores ad involucreum adpressae, $3-6 \times 1.5-3.5$ mm, ovato-acuminatae, apice subrotundatae, extus virides, nervo mediano obscuriori, plusminusve manifeste albo-marginatae margine area quarta parte squamae totae aequanti, praecipue in alabastro interdum omnino roseo-suffusae. Calathium luteum, 25–35 mm in diametro, ligulis planis, stria cinereo-violaceis subtile notatis, purpureo-dentatis; styli sordidi polliniferi. Corpus achenii 3.0 mm longus, stramineo-brunneus, apice breviter spinulosus, alibi sublaevis, in pyramidem cylindricam 0.9 mm longam abiens; rostrum 10 mm longum; pappus albus. $2n = 32$.

Plant medium-sized, slender. Leaves erect, mid-green, unmarked, to 150×15 mm, not lobed, narrowly lanceolate-spathulate, entire, or more usually with 3–5 distant, regularly spaced, deltoid, short teeth proximally; apex acute; petiole half length of leaf, unwinged proximally, purple; midrib green, or purplish proximally. Scape equalling or exceeding leaves at flowering, aranose-pilose beneath capitulum at first, glabrescent, usually suffused purple distally. Exterior bracts adpressed to the involucre, $3-6 \times 1.5-3.5$ mm, ovate-acuminate, with the apex itself somewhat rounded, medium-green outside, with a darker mid-vein and with a $\pm$ clearly demarcated white border about 1/4 of the area of the bract, all sometimes suffused pinkish, especially in bud. Capitulum mid-yellow, 25–35 mm in diameter; ligules flat, striped grey-violet, with purple ligule teeth; styles discoloured; pollen present. Achene body 3.0 mm, straw-brown, shortly spinulose at the apex, the rest $\pm$ smooth, with cylindrical cone, 0.9 mm; rostrum 10 mm; pappus white. $2n = 32$.

HOLOTYPE: Grande Mare, Guernsey, v.c. S, pasture, *D. McClintock*, 22/4/1971 (OXF). Isotypus: STP. Paratypes: Grande Mare, Guernsey, seed collected 23/4/1966, cultivated at Durham University, *A. J. Richards* (OXF); Jersey, Étang de St Ouen, 9/5/1926 (**herb. F. le Sueur**).

In 1966, during a brief visit to Guernsey, I noted a species of *Taraxacum* in section *Palustria* growing in fenny meadows with a number of choice associates. Collected seed was grown to flowering, and appeared to key down to *T. austrinum* Hagl. in van Soest (1965). A specimen was sent to van Soest who wrote "I have no better proposal", on the basis of which this species was reported from Guernsey in Richards (1972a, p. 43). Other records from Lancashire and Cambridgeshire subsequently proved to be *T. palustrisquameum*, and those from Co. Galway, *T. webbii* A. J. Richards. Re-examination of Haglund's type of material from Sørø, Sjaelland, Denmark, by H. Øllgaard showed that van Soest (1965) misinterpreted *T. austrinum*, which has fusiform and scarcely spinulose achenes with a long cone, and lacks pollen. It has not been identified with certainty away from Sjaelland (Zealand). It is not clear to what species van Soest's remaining records from the Netherlands, Germany and France refer. Undoubtedly, *T. sarniense* is closely related to *T. austrinum*, from which it is best distinguished by the presence of pollen, and the turbinate, spinulose achenes. Of the British and Irish species in the section, *T. palustre* (Lyons) Symons and *T. webbii* both have much longer achenes. *T. pollichii* van Soest is similar to *T. sarniense* in many respects, with very similar achenes and the possession of pollen, but always has shortly lobed leaves of a different shape. It seems to be restricted to the New Forest in the British Isles. *T. sarniense* is best diagnosed by its characteristic, narrowly lanceolate-spathulate leaves with regularly spaced teeth (similar to *T. austrinum*), the presence of pollen, discoloured styles, short, turbinate achenes with a long cylindrical cone (similar to *T. pollichii*), and aranose-pilose scapes when young.

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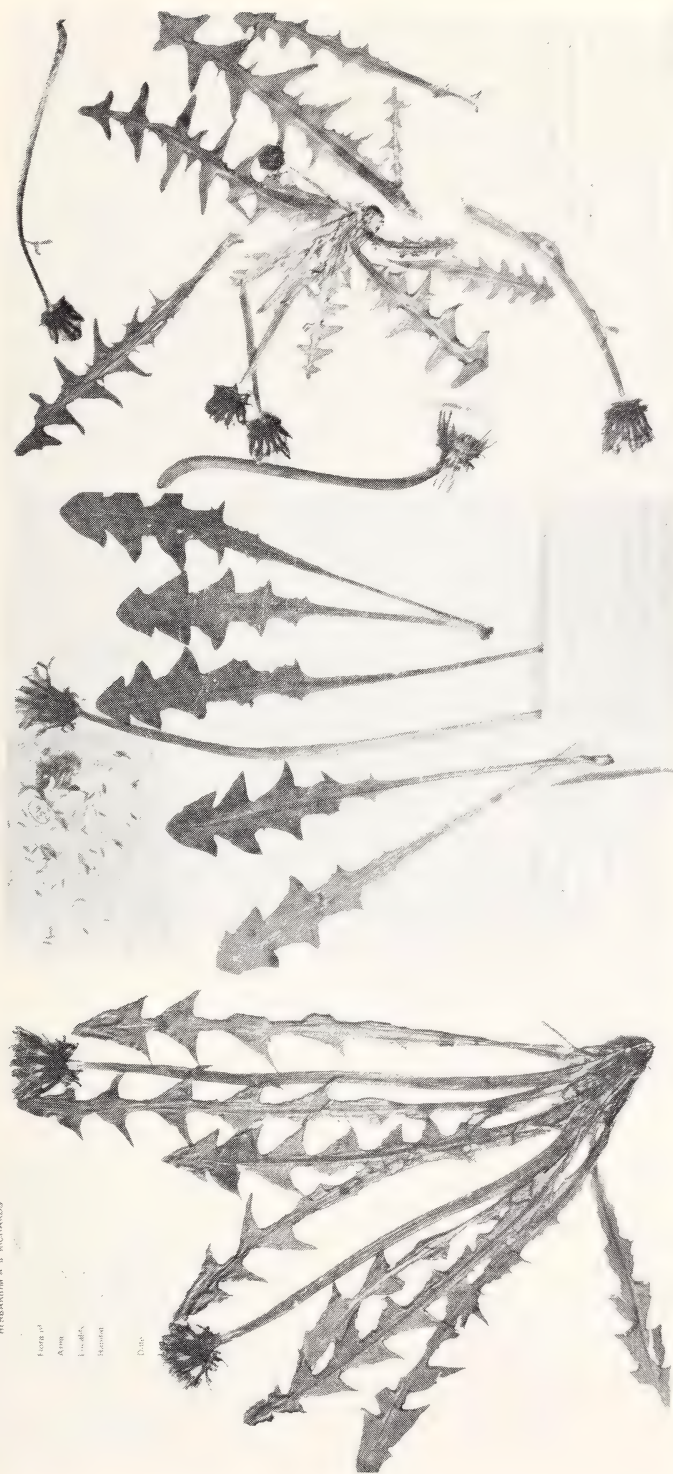
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H. RICHARDS

From the
A. M.
Locality
D. M.



A

B

C

PLATE I. A, *Taraxacum ardensense*; B, *T. cambricum*; C, *T. celicum*. All $\times 1/5$.



C

B

A

PLATE 2. A, *Taraxacum luteum*; B, *T. subbracteatum*; C, *T. edmondsonii*. All $\times 1/5$.



A



B



C

PLATE 3. A, *Taraxacum berthae*; B, *T. serpenticola*; C, *T. sarniense*. All $\times 1/5$.



PLATE 4. *Halimione portulacoides* growing on coastal rock at Howth Head, Co. Dublin, GR O/268.371, 25th June 1979. The plant was photographed in the vicinity of quadrat 2 (Table 1).

Halimione portulacoides (L.) Aellen on coastal rocks and cliffs

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ABSTRACT

Halimione portulacoides (L.) Aellen, usually a salt-marsh species in Britain and Ireland, also occurs on rocks and cliffs by the sea from the Isle of Wight and Cornwall to the Mull of Galloway, and on the southern and eastern coasts of Ireland. Records from this habitat are known from 27 10 km squares in 13 vice-counties. *Armeria maritima*, *Limonium binervosum* and *Spergularia rupicola* are characteristic associates of *Halimione* on coastal rocks.

INTRODUCTION

Halimione portulacoides (L.) Aellen† (*Atriplex portulacoides* L., *Halimus portulacoides* (L.) Dum., *Obione portulacoides* (L.) Moq.), Sea Purslane (Chenopodiaceae), is characteristically a plant of salt-marshes, where it grows at all levels from the lower to the upper marsh (Adam 1981). It frequently occurs in relatively well-drained sites, such as the raised margins of creeks (Tansley 1939). Standard reference works (e.g. Clapham *et al.* 1981) often imply that it is restricted to salt-marshes and similar low-lying habitats along the sea-shore. The *Biological Flora* account (Chapman 1950) describes *Halimione* as “a locally abundant salt-marsh plant of England and Ireland, commonly fringing creeks and pans and occurring on sea-walls . . . grows successfully on a wide variety of substrata: shingle, almost pure sand, sandy mud, peaty silt and more or less pure silt or clay”. Nowhere in his account does Chapman refer to the occurrence of *Halimione* on sea-cliffs. There are, however, one or two places where *Halimione* has been known on cliffs for many years and referred to repeatedly in local Floras, and a search of literature and herbarium records has shown that its occurrence in this habitat is more frequent than has perhaps been realised hitherto. This paper draws together the records of *Halimione* from sea-cliffs and describes briefly the habitat at some sites. The definition of cliffs adopted is “those terrestrial surfaces which are subjected to a maritime climate and based on rocks other than blown-sand, sea-washed mud and shingle” (Anon. 1972). We have not included records from sea-walls.

RECORDS OF *HALIMIONE* ON SEA-CLIFFS

The following records have been culled from a search of local Floras, a number of herbaria (BEL, BM, CGE, DBN, E, K, NMW, OXF, RNG, TCD), records held at the Biological Records Centre (B.R.C.), information provided by B.S.B.I. vice-county recorders and other botanists, and from our own field observations. Grid references are given for all localities, and are placed in square brackets unless they were provided by the original recorder. The records are mapped in Fig. 1.

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† Nomenclature follows Tutin *et al.* (1964–1980).

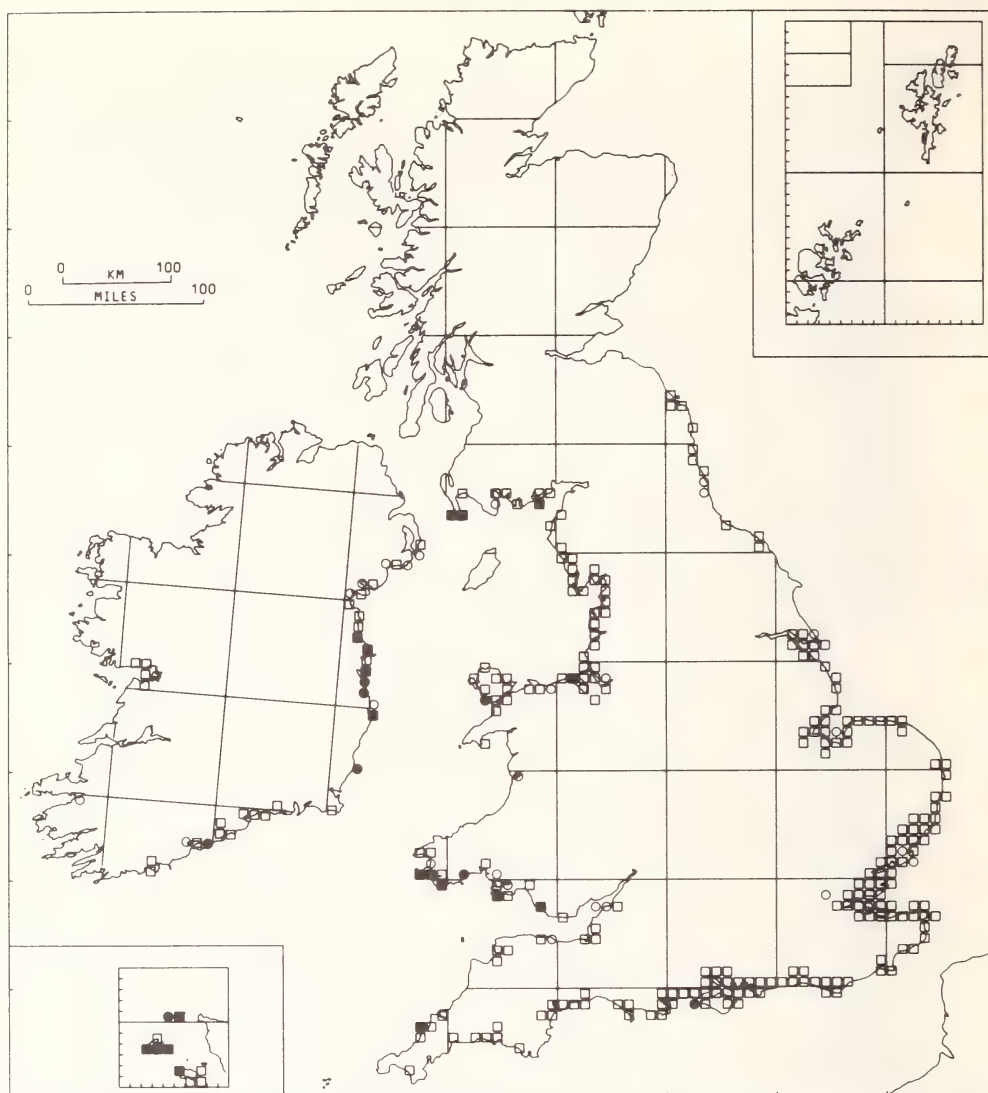


FIGURE 1. The distribution of *Halimione portulacoides*.

Solid symbols denote at least one record in a 10 km square from sea cliffs or coastal rocks; hollow symbols, other records. Squares denote records made after 1950; circles, earlier records. Based on records held by the Biological Records Centre, mainly collected by members of the B.S.B.I. with additions compiled during the present investigation.

CHANNEL ISLANDS

Guernsey

W. Christy's record from Moulin Huet Bay [GR WV/3.7] (Babington 1839) was probably from cliffs, but the first specific record from this habitat was made in 1894 from the base of cliffs at Les Thiellies [GR WV/26.74] by the Rev. R. H. Tourtel (Marquand 1901). According to Marquand "in 1898 and 1899 Mr Cecil Andrews discovered that this plant is generally distributed and locally abundant all along the south coast, from Petit Port [GR WV/33.75.] westwards, growing on the lower part of the cliffs where the soil is rubbly, and mostly in places difficult to reach without a good deal of climbing". Girard (1965) also gives the base of cliffs as the habitat of *Halimione* in Guernsey. As McClintock

TABLE 1. VEGETATION ASSOCIATED WITH *HALIMIONE* ON CLIFFS

Quadrat	4	1	5	3	2	7	6	8	10	11	9
Area of quadrat (m ²)	4	6	4	4	6						
Slope (degrees)	25	45	5	5	30						
Aspect	SE	W	SW	SW	NE						
Bare rock (%)	70	80	60	55	75						
<i>Halimione portulacoides</i>	5	5	6	5	5	X	X	X	X	X	X
<i>Armeria maritima</i>	3	1	+	2	2	X	X	X	X	X	X
<i>Spergularia rupicola</i>	1	1	2	1	2				X	X	X
<i>Limonium binervosum</i>	4	4	3	2	1		X		X		
<i>Puccinellia maritima</i>			4	4	3						
<i>Plantago maritima</i>			3	2	2	X					
<i>Cochlearia officinalis</i>				1	1	X					
<i>Aster tripolium</i>			3	+			X				
<i>Festuca rubra</i>		1			1	X		X	X	X	X
<i>Crithmum maritimum</i>							X	X	X	X	X
<i>Inula crithmoides</i>							X	X	X	X	
<i>Beta vulgaris</i> subsp. <i>maritima</i>							X	X	X		
<i>Plantago coronopus</i>								X	X	X	
<i>Daucus carota</i>									X	X	
<i>Cochlearia danica</i>										X	X

Additional species; quadrat 2: *Elymus farctus* (1); 3: *Suaeda maritima* (+); 5: *Parapholis strigosa* (+); 7: *Bellis perennis*; 8: *Dactylis glomerata*; 9: *Silene vulgaris* subsp. *maritima*; 10: *Sonchus oleraceus*; 11: *Asplenium marinum*; *Euphorbia portlandica*.

Cover-abundance is listed on the Domin scale for quadrats 1–5; the rest list presence only.

Location of quadrats: 1: Near Black Castle, Wicklow, GR T/32.93, 10.6.1979, J.R.A. & C.D.P.; 2: near Martello Tower, Sutton, Co. Dublin, GR O/268.371, 25.6.1979, J.R.A. & C.D.P.; 3: 500 m E. of quadrat 2, 19.8.1979, J.R.A.; 4: 1 km N. of southerly Martello Tower, Donabate Head, Co. Dublin, GR O/26.50, 28.8.1979, J.R.A.; 5: 40 m E. of quadrat 2, 5.8.1981, J.R.A.; 6: Gun Cliff, 0.5 km W. of Stackpole Head, Pembrokeshire, GR 11/989.944, 9.1974, Perry *et al.* (1975); 7: Dale Point, Pembrokeshire, GR 12/824.051, 14.2.1983, Ms J. Brodie; 8: Fourquie, Alderney, GR WA/56.05, 28.8.1957, Mrs F. le Sueur; 9–11: Brittany, France, Roux & Lahondère (1960), tab. III.

(1975) points out “these steep, warm, well-drained slopes are a very different habitat from the normal sloshy sea mud”. He states that *Halimione* occurs at intervals from Pleinmont [GR WV/23.75] to Jerbourg [GR WV/33.74.] and may reach to near the top of cliffs, 175 feet [53 m] above the sea, e.g. at Mont Hérault [GR WV/2.7].

Jersey

Attenborough (1926) reported that *Halimione* “was found in great abundance by Frère Arsène in the Val Rouget”. Arsène himself (in Turrill 1929) said that it grew in Jersey on “muddy or rocky sea-shores . . . it is found, as far as I know, in seven or eight different localities, especially at the base of cliffs. It is very abundant at Rouge Nez”. These two sites are close together, Le Val Rouget being a bay with precipitous sides on the west side of Rouge Nez, GR WV/58.55. *Halimione* still grows in quantity on the vertical cliffs at Rouge Nez (F. le Sueur pers. comm. 1983).

Alderney

On 28th August 1957, Mrs F. le Sueur (in litt. 1983) found *Halimione* on Fourquie, an isolated sea stack to the east of Telegraph Bay, Alderney [GR WA/56.05] (see Table 1). It was later found by O. Johns at a nearby site, the south end of Le Val de l'Emauve, in a sheltered gully on a 45° cliff facing south-south-east [GR WV/565.060]. Here it grows between 20 feet [6 m] and 70–75 feet [22 m] above the high tide mark (P. Ryan in litt. 1983). Johns (1981) said that “it appears to be increasing despite competition from *Carpobrotus*”. These are the only sites for *Halimione* on Alderney.

In 1927 a French algologist, Mons. A. Davy de Virville, visited the Casquets, west of Alderney [GR WA/4.0], and recorded *Halimione* from these rocks (Virville 1936; F. le Sueur in litt. 1983).

Sark

The species was first recorded from Sark on 1st September 1976, growing on a steep cliff in a sheltered gully at Venus Pool, Little Sark [GR WV/455.732.] (Ryan 1978, in litt. 1983).

WEST CORNWALL (v.c. 1)

Davey (1909) gives "rocky places by the sea" as one of the habitats of *Halimione* in Cornwall. The only locality he lists that appears to fit this description is Goose Rock off East Pentire [GR 10/77.61], where the species was found by Clement Reid in 1903. Margetts & David (1981) record *Halimione* from cliffs at Porth Joke, less than 1.5 km south-west of Goose Rock. The locality, at about GR 10/773.605, is a south-west facing slope on low cliffs along an inlet of the sea. The plant was first found there after 1950, and is still present (L. J. Margetts in litt. 1983).

ISLE OF WIGHT (v.c. 10)

Bromfield (1856) states that *Halimione* occurs on "chalk-cliffs at the west end of Scratchell's bay [GR 40/2.8], at a great elevation", and gives a vivid description of the habitat: "On the lofty and almost perpendicular cliffs of Scratchell's bay this, with samphire, thrift and other maritime plants, forms large patches of vegetation on the narrow ledges of the chalk-rock called by the cliffsmen 'greens', similar verdant spots composed of grass being designated 'meads', and both are resorted to in the season, for birds and their eggs, by that adventurous race, though only accessible from above by a rope at much personal risk, and attempted in a manner which makes the inexperienced shudder to witness".

GLAMORGAN (v.c. 41)

Halimione was collected from crevices in rocks, just above the high water mark, at Porthcawl [GR 21/8.7] by J. Lamond on 16th May 1958 (E). Q. O. N. Kay recorded it on low Carboniferous limestone rocks in the spray-zone at Port Eynon Point, GR 21/470.845, in 1976 (Q. O. N. Kay in litt. 1983).

PEMBROKESHIRE (v.c. 45)

Tenby

A specimen (OXF) was collected by W. H. Purchas from cliffs at Tenby in July 1868. J. Woods collected the species from South Cliff, Tenby [GR 22/13.00]; the specimen (CGE) is undated.

Stackpole

On 16th June 1971, a group of botanists, including S. B. Evans, visited the Carboniferous limestone cliffs of Stackpole and saw "a remarkable growth of two or three large clumps of *Halimione portulacoides* high up on a cliff" (S. B. Evans in litt. 1983). In September 1974, six patches of *Halimione* were counted in a blow hole above Gun Cliff, GR 11/989.944, 0.5 km west of Stackpole Head. The smaller patches of *Halimione* grew in rock clefts without pockets of soil (Perry *et al.* 1975; S. B. Evans in litt. 1983). *Halimione* is still present, and the site is now within Stackpole N. N. R.

Dale Point

S. B. Evans saw a patch of *Halimione* in maritime grassland on cliffs at the tip of Dale Point, GR 12/824.051, on 19th February 1982. As Mr Evans points out, this site was not mentioned by George (1961), so the plant may be a later arrival. On 14th February 1982, Ms J. Brodie kindly examined this colony, which is about 50 feet [15 m] up on a sheltered north-east-facing cliff. The associates she listed are given in Table 1, but as the cliff is inaccessible she could not examine the vegetation closely.

Skokholm

Colonies of *Halimione* were "persisting on the tops of small sea stacks in the north east" of Skokholm, 1947–1953 (Gillham 1953). The first record from the island was that of Lockley (1943), but he gave no further details. On 14th August 1973, it was seen by S. B. Evans "north of East Bay on a rock in the *Crithmum* zone", and on 11th August 1974, C. Lightfoot collected it from the cliff edge, The Stack, Skokholm Island (Lightfoot 51, RNG). The altitude given by Lightfoot, 51 m, is clearly an error: the only part of Skokholm which reaches an altitude of 50 m is at the opposite end of the island. *Halimione* is still present on Skokholm, growing not on the Stack itself but on two steep-sided small Old Red Sandstone rocks in Obione Bay, the northernmost inlet of East Bay [GR 12/744.053], where it has been growing since 1947. Both rocks are above the high water mark but receive spray when the wind is from the south-east. There are four patches of *Halimione*, rooted in shallow soil in

rock crevices and covering an area of about ten square metres. No other vascular plants are associated with it (E. Gynn in litt. 1983).

ANGLESEY (v.c. 52)

Halimione grows "on high rocks in Bodowen Park" [GR 23/3.6] (Davies 1813).

CHESHIRE (v.c. 58)

Sharrock (1967) recorded occasional plants of *Halimione* on sandstone cliff-tops at Hilbre Island in the Dee estuary [GR 33/1.8]. This record was made in 1960 or 1961 (J. T. R. Sharrock in litt. 1983). In 1978 Greenwood & Greenwood (1982) noted cliff-top communities dominated by *Halimione*, growing over sandy soil resulting from the erosion of Bunter Sandstone cliffs, at each end of Middle Eye, Hilbre. *Ammophila arenaria*, *Carex arenaria* and *Elymus farctus* grew in sandier cliff-top soils nearby.

KIRKCUDBRIGHTSHIRE (v.c. 73)

Halimione was recorded by A. McG. Stirling as uncommon on sea-cliffs, Balcary Point, Auchencairn, GR 25/8.4, in 1959 (B.R.C.) and by Mrs O. M. Stewart from a rocky ledge by the sea, Balcary Point, GR 25/828.494, on 5th August 1977 (B.R.C.).

WIGTOWNSHIRE (v.c. 74)

In describing the excursion he had led to the Mull of Galloway on 12th August 1843, Prof. J. H. Balfour (1844) commented: "we failed in getting *Halimus portulacoides*, which grows on inaccessible cliffs at the Mull". There are specimens from the Mull of Galloway dating from this period in several herbaria (including BM, CGE, E, K, OXF); those at E were collected in September 1836 and in 1842, but most sheets are undated and lack any description of the habitat. *Halimione* was refound at this locality in 1980 by H. A. Lang. A small patch 1–1½ feet [30–50 cm] across grew at GR 25/154.303 on shallow friable soil on a broken vertical cliff about 20 feet [6 m] high, and about 8 feet [2.5 m] down from the top. When Dr Lang descended the cliff by rope in 1981 he saw that half of the patch was withering, and formed the conclusion that it would not survive for long (H. A. Lang in litt. 1982).

Dr Lang also discovered *Halimione* about 6.5 km north-west of the Mull, at the foot of a south-east-facing cliff at Portdown Bay, GR 25/098.332, on 3rd August 1977 (B.R.C.). This was a large patch of several square metres, growing in coarse talus right up to the edge of the cliff, 20–30 m above the high water mark (H. A. Lang in litt. 1982).

KERRY (v.c. H1–2)

Scully (1916) described the habitat of *Halimione* as "muddy and rocky sea shores" in his *Flora of County Kerry*. Neither of the localities he listed were known to be on rocky shores, however, and the description must be a general one, perhaps applying to Ireland as a whole.

E. CORK (v.c. H5)

Halimione was recorded from rocks near Ballycotton [GR W/9.6], sparingly, by Isaac Carroll (Moore & More 1866; Allin 1883).

CO WEXFORD (v.c. H12)

"On an island rock outside a point a little north of Cahore Point [GR T/2.4] is a patch of *Obione portulacoides*" (Hart 1881).

CO. WICKLOW (v.c. H20)

"On a detached rock between the East Pier and the Castle, Wicklow, 1946!" (Brunker 1950). We saw nine plants of *Halimione* growing in thin pockets of soil about 8 m above sea level on a steep cliff very close to the ruins of the Black Castle, Wicklow, GR T/32.93, on 10th June, 1979 (see Table 1).

Brunker (1950) also records *Halimione* "sparingly on the rocks at Greystones 1940!" [GR O/2.1].

CO. DUBLIN (v.c. H21)

Halimione is commoner on cliffs in Co. Dublin than in any other region of the British Isles, and its occurrence in this habitat at Howth Head is particularly well documented. Consequently Irish botanists have always been more aware of the cliff habitat of *Halimione* than have their English

counterparts. The records below are listed, from south to north, in the 10 km squares in which they occur.

O/2.2.

"On ye Rocks towards Dunlary [Dun Laoghaire], July, 1734" (Colgan 1904). This is much the earliest record of *Halimione* on rocks that we have traced. Colgan himself recorded *Halimione* "sparingly on cliffs below Killiney Hill, 1902" (Colgan 1904).

O/2.3.

First recorded at Howth Head by John Templeton on 31st July 1799, "among the rocks of Howth facing Dublin Bay" (Colgan 1904). Mackay (1836) described the habitat there as "decayed granite rocks on steep banks by the sea-side". It was "at the Martello Tower below Sutton" (Kane 1833) and Colgan & Scully (1898) commented "still there on clay banks and on a sea stack, 1896; Miss S. Colgan". Hart (1887) recorded *Halimione* on "rocky banks by the sea at the Martello Tower below Sutton, and again about a hundred yards south of it; in two places on the rocks below The Cliffs, about a mile further south from the last station", and Colgan (1904) stated that it was frequent at Howth in 1904. Our own field observations (1979–1981) showed that *Halimione* is locally frequent on the south side of Howth Head from Sutton village, GR O/26.37., to Drumleck Point, GR O/282.362. Typically, as on the south side of the Martello Tower at Sutton, GR O/268.371, and for about 100 m along the coast to the south, it occurs on rock and on the gently sloping cliff top where the soil is eroded back. It is not present in the closed turf of *Festuca rubra* landward of this zone. Details of the vegetation at Howth are given in Table 1, and a typical site illustrated in Plate 4.

Most herbarium specimens from Howth Head are poorly annotated and we have seen none that add appreciably to the literature records quoted above.

O/2.5.

"Rocks on the south side of Portraine [Portrane]" (More 1872). Colgan (1904) stated that it was frequent there in 1903. *Halimione* was collected from sea-cliffs, Donabate, on 24th June 1976, by T. Crawford, who described it as abundant (DBN). On 28th August 1979, J. R. A. confirmed that it occurred as a common cliff plant from 1 km north of the southerly to the northerly of the two Martello towers, GR O/26.50. Most of the plants were on rather inaccessible cliffs.

Halimione was frequent on Shennick's Island, off Skerries [GR O/26.59] in 1902 (Colgan 1904). These plants were probably growing on rocks, but no details of the habitat were given.

O/1.6.

One plant of *Halimione*, growing on rocks with scattered *Armeria maritima*, was collected by J.R.A. on the headland north of Balbriggan, GR O/19.66., on 10th April 1980 (TCD).

DISTRIBUTION

The recorded sites for *Halimione* on cliffs (Fig. 1) show a distinctly westerly bias in Great Britain, all sites except that in the Isle of Wight being from the west coast. This is not the case in Ireland, where almost all records are on the east coast (*Halimione* is a rare plant in western Ireland). The distribution of *Halimione* on rock parallels the distribution of some plant taxa (e.g. *Asparagus officinalis* subsp. *prostratus*, *Scilla verna*) which are western in Great Britain but eastern in Ireland. The distribution pattern shown in Fig. 1 might have to be revised in the light of further records: *Halimione* may have been overlooked on steep cliffs because of the inaccessible nature of the site, or botanists may have failed to take note of its occurrence, thinking that the presence on cliffs of this frequent coastal plant was of little interest. The absence of records from the cliffs of Devon is particularly surprising.

We have not searched the continental literature systematically for records of *Halimione* on cliffs. It is recorded from this habitat on the western coast of France (Kuhnholz-Lordat 1926, Roux & Lahondère 1960). In the eastern Mediterranean it occurs on small rocky islets in the Aegean (Greuter 1979) and in the supralittoral zone on rocky shores in Israel (Lipkin & Safriel 1971).

Halimione is found in its more usual salt-marsh habitats within 5 km of some of the sites where it occurs on cliffs. Other sites, however, are relatively isolated: the Stackpole locality is at least 10 km from any other *Halimione* population (S. B. Evans in litt. 1982) and the Mull of Galloway sites are probably even more remote from their nearest neighbours. On some small islands, such as Alderney, Sark and Skokholm, *Halimione* is restricted to rocky habitats. L. J. Margetts (in litt. 1983) has

pointed out that Davey (1909) notes the presence of *Halimione* on Goose Rock, but not along the nearby channels of the salt-marsh below Newquay, The Gannel, GR 10/80.60, where it is now abundant. Mr Margetts suggests the interesting possibility that the plant may have spread from the Goose Rock to the salt-marsh, and says that the species is definitely increasing in Cornwall in salt-marshes.

We have no evidence of any consistent morphological differences between rupestral and salt-marsh populations of *Halimione*. Plants of *Halimione* show great variation even within salt-marsh populations, and much of this variation is presumably genotypic rather than phenotypic. Some collections from coastal rocks have rather narrow leaves, but they can be matched by some plants from salt-marshes. A large scale genecological experiment would be needed to test for genetic differences between populations from different habitats.

HABITAT AND VEGETATION

The site descriptions given above show that *Halimione* occurs both on rocks by the sea and on cliffs up to a height of over 50 m. Its occurrence in such habitats is not merely casual, and at four sites (Guernsey, Jersey, the Mull of Galloway and Howth Head) there are records showing that it has persisted for over 50 years. There is considerable variation in the geology of the sites, in soil depth and in the position on the cliff in which *Halimione* occurs. The underlying rocks include chalk (v.c. 10), Carboniferous limestone (e.g. Stackpole, v.c. 45), Lower Devonian slates (v.c. 1), Old Red sandstone (e.g. Dale Point, v.c. 45), Bunter sandstone (v.c. 58), quartz rock (Howth Head, v.c. H21) and gneiss (Guernsey). Some observers have noted a preference for the base of cliffs, but *Halimione* also occurs on the sides of steep cliffs, sometimes in sheltered inlets. Some plants are rooted in rock crevices, others in a layer of soil.

The plants occurring with *Halimione* in five quadrats from the east coast of Ireland are shown in Table 1. Also included are the species associated with *Halimione* on cliffs in Alderney, Pembrokeshire and Brittany. The vegetation at all sites is similar to the maritime crevice community described by Malloch (1971), in which *Armeria maritima*, *Crithmum maritimum*, *Festuca rubra*, *Plantago coronopus* and *Spergularia rupicola* are the most frequent species. Malloch refers this community to the association *Crithmo-Spergularietum rupicolae* Géhu 1964. However he did not record *Halimione* in his intensive study of the cliffs of the Lizard and Land's End peninsulas in Cornwall.

The presence of *Aster tripolium* with *Halimione* in Co. Dublin and Pembrokeshire is interesting, as Malloch (1971) recognised a subassociation of the *Crithmo-Spergularietum rupicolae* "characterised by the almost constant presence of *Armeria maritima*, *Crithmum maritimum*, *Spergularia rupicola* and *Aster tripolium*. *Festuca rubra* is frequently present, but other species occur rarely". He pointed out that *A. tripolium* was not recorded from cliffs in Brittany, and thought it likely that this community was restricted to the highly oceanic cliffs of south-western England, western Ireland and possibly western Wales. The quadrats from Ireland show some resemblance to this subassociation in the constant presence of *Spergularia rupicola* and the occurrence of *A. tripolium* in some quadrats, but differ in the absence of *Crithmum maritimum* and in the constant presence of *Limonium binervosum*, restricted to the typical subassociation in Malloch's quadrats.

On 18th December 1978, Q. C. B. Cronk and C.D.P. noted *Halimione* growing on cliffs around a very steep narrow inlet of the sea east of Pleinmont, Guernsey. Most of the colony was inaccessible, but towards the top of the cliff it was associated with *Armeria maritima*, *Dactylis glomerata*, *Daucus carota*, *Plantago coronopus*, *P. lanceolata*, *Raphanus raphanistrum* subsp. *maritimus*, *Sedum anglicum* and *Spergularia rupicola*. This list (probably incomplete) indicates a less exclusively maritime community than that described above, probably because the cliffs here rise to over 50 m above sea level and the soil is relatively deep.

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Ulmus × *hollandica* Miller var. *insularum* Richens, var. nov.

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ABSTRACT

The principal nothotaxon of *Ulmus* × *hollandica* in the Channel Islands is described and named *Ulmus* × *hollandica* Miller var. *insularum* Richens, var. nov. It is restricted to the Channel Islands and to the adjacent Cotentin peninsula of France.

THE CHANNEL ISLAND ELMS

Traditionally, woodworkers in northern France and Belgium have distinguished between two categories of elm: small-leaved trees designated 'orme mâle' or 'orme rouge' and large-leaved trees designated 'orme femelle' or 'orme blanc' (Duhamel du Monceau 1755; Huberty 1904). When, later, these elms were assigned to conventional botanical categories, the small-leaved elms were equated with *Ulmus campestris* L. or *U. suberosa* Moench, and the large-leaved elms with *U. montana* Stokes. Re-interpreted in the light of the taxa accepted today, the small-leaved elms are *U. minor* Miller and the large-leaved elms mainly *U. × hollandica* Miller (*U. glabra* Hudson × *U. minor*).

Small-leaved and large-leaved elms occur also in each of the larger Channel Islands. The large-leaved elm of Guernsey was known, as on the French mainland, as 'orme femelle' (Jee 1961, 1972). Presumably the small-leaved elm of Guernsey was 'orme mâle.'

The situation in Jersey is more complicated. According to Le Maistre (1958, 1966), the small-leaved elm of this island is known as 'orme rouge' as in France, but its other designation 'orme femelle', was what in France applied to the large-leaved elms. Conversely, the large-leaved elm of Jersey is 'orme blanche' (orme retaining the Latin gender in Jersey though not in Guernsey) or 'orme mâle'. It would appear that at some stage the significance of 'orme mâle' and 'orme femelle' has become reversed.

The small-leaved elms of the Channel Islands were treated by earlier botanists, notably Babington (1839), Piquet (1896), Marquand (1901) and Lester-Garland (1903) as *U. campestris* or *U. suberosa* as on the Continent. They are now allocated to *U. minor* or, in the case of Guernsey, to *U. minor* var. *sarniensis* (Loudon) Druce.

The proper botanical understanding of the large-leaved elms of the Channel Islands has been slower in coming. In the 19th century, the large-leaved hybrids now regarded as *U. × hollandica* were frequently treated as within the circumscription of *U. montana* (= *U. glabra*), the Wych Elm. This species does occur, but not frequently, in the larger Channel Islands, and is most unlikely to be the *U. montana* of the earlier botanists which was stated to be of frequent occurrence. That it is quite different from *U. glabra* was clearly recognized by Jee (1961, 1972). McClintock (1975) correctly assigned it to *U. × hollandica*. It had meanwhile been recognized as a biometrically distinct population of *U. × hollandica*, restricted to the Channel Islands and northern France, by Richens & Jeffers (1975), in whose paper it is referred to as "Hybrid III."

There are some elms in Jersey and Sark intermediate between the typical large-leaved and small-leaved elms. These are probably second-generation derivatives of the large-leaved elm or hybrids between it and the small-leaved elm.

The large-leaved elm of the Channel Islands occurs on all the larger islands (Alderney, Guernsey, Jersey, Sark) and is a major component of the landscape of each. It is distinctive in appearance, not widely variable, and of limited overall distribution (the Channel Islands and northern France). It has therefore been considered worthy of naming. Its description is as follows:

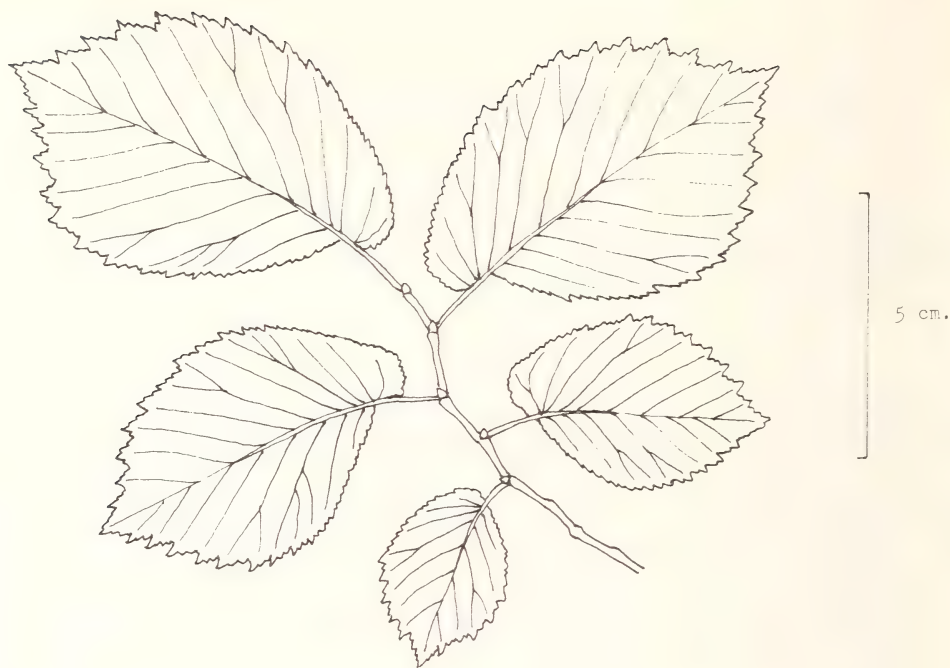


FIGURE 1. *Ulmus* $\times$ *hollandica* Miller var. *insularum* Richens.

***Ulmus* $\times$ *hollandica* Miller var. *insularum* Richens, var. nov. (Fig. 1)**

Coma diffusa; ramificatio irregularis. Folia subdistalia ramulorum brevium late ovata, supra laevia, valde asymmetrica, 65–85 mm longa, 45–60 mm lata; ratio latitudinis laminae longitudini laminae 0.65–0.75; dentes marginis in parte distali foliae acuti, 5.0–6.0 mm lati, 2.5–3.0 mm alti; denticulae ibidem acutae, 2–3 in uno dente; summa dentium denticularumque 114–148; caespites pilorum in axillis nervorum sub foliis densi et saepe confluentes; petioli glabri vel sparse pilosi, 8–12 mm longi; ratio longitudinis petioli longitudini laminae 0.11–0.16.

Canopy open; branching irregular. Subdistal leaves of the short shoots (Fig. 1) broadly ovate, smooth above, highly asymmetric, 65–85 mm long, 45–60 mm broad; ratio breadth of leaf/length of leaf 0.65–0.75, primary teeth of the leaf margin on the shoulder of the leaf, acute, 5.0–6.0 mm broad, 2.5–3.0 mm deep; secondary teeth in the same region acute, 2–3 per primary tooth; total of primary plus secondary teeth 114–148; hair tufts in the axils of the nerves beneath the leaf dense and often confluent; petioles glabrous or sparsely pilose, 8–12 mm long; ratio length of petiole/length of lamina 0.11–0.16. Flowers and fruit not investigated.

HOLOTYPE; Jersey, St Mary, Mrs F. Le Sueur, 1968–1970 (CGE). Isotypus: JSY.

The two nothotaxa of *U. x hollandica* of widest distribution in Great Britain are var. *hollandica*, the so-called Dutch elm, and var. *vegeta* (Loudon) Rehder, the Huntingdon Elm. Var. *insularum* differs from both nothotaxa in its relatively longer petiole, greater foliar asymmetry and more extensive axillary tufts on the lower surface of the lamina. In habit, var. *insularum* is closer to var. *hollandica* than to var. *vegeta*.

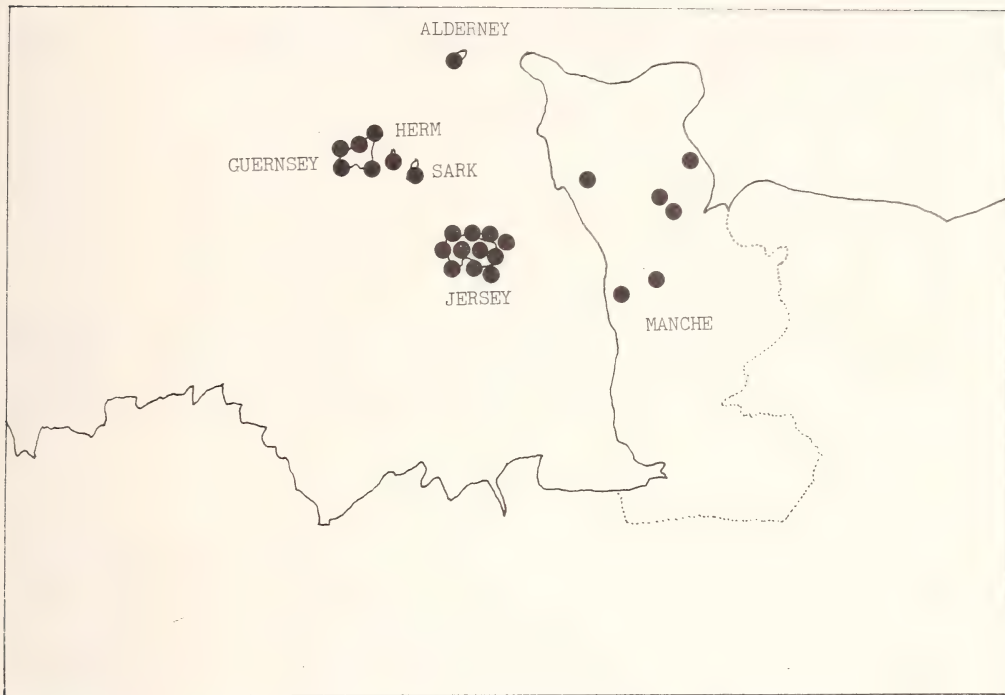


FIGURE 2. The distribution of *Ulmus x hollandica* var. *insularum*.

DISTRIBUTION

The elm occurs in Alderney, Guernsey (Câtel, St Martin, St Peter in the Wood, St Saviour, Vale), Herm, Jersey (Grouville, St Brelade, St Clement, St Helier, St John, St Martin, St Mary, St Ouen, St Peter, St Saviour, Trinity), Sark and France (Carquebut, Feugères, Fontenay-sur-Mer, Geffosses, St Côme-du-Mont, St Maurice-en-Cotentin).

As is clear from Fig. 2, var. *insularum* is restricted to the Channel Islands and the adjacent Cotentin peninsula. The putative parental taxa occur both in the islands and on the French mainland. It is most likely that var. *insularum* originated in Cotentin since *U. glabra* is probably wild there and *U. x hollandica* is represented on the peninsula by a whole range of nothotaxa of which var. *insularum* is but one. If it had been taken to the islands as clonal material and propagated vegetatively thereafter, the low variability of *U. x hollandica* in the islands compared with its considerable variability in Cotentin would have an explanation.

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Artemisia L. species in the British Isles

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ABSTRACT

All known native and casual species of *Artemisia* L. (Compositae) that have occurred in the British Isles are listed. Four of these species were omitted from *Flora Europaea* so brief descriptions of them are given here. The list includes brief details of distribution, status and habitat in the British Isles, some herbaria where representative specimens are lodged (when known) and literature references.

INTRODUCTION

The purpose of this paper is to list all the native and casual species of *Artemisia* that are believed to have occurred in the British Isles.

The genus *Artemisia* L. (Compositae) contains over 200 species (400 species according to some authors) of mostly perennial, aromatic herbs or sub-shrubs with usually pinnatisect leaves and numerous small, more or less spherical or oblong heads of flowers (capitula) arranged in racemes or panicles. Most species occur on the steppes and prairies of north temperate regions and some are also found in mountains, e.g. the Himalayas and the Rockies. There are also a few species in Central and South America. In Africa only three or four species are widespread, extending down to the Cape. No native species occur in Australia.

The species are extremely critical and are often separated on apparently trivial differences, for example in leaf shape and degree of hairiness, minor floral characters, or on the form of the inflorescence (whether racemose or paniculate). Many of the European, Asian and North American plants are very similar, yet have been described as distinct species, primarily because they are separated geographically, although it is difficult to separate them convincingly on morphological grounds (Britton & Brown 1913; Komarov 1961; Tutin *et al.* 1976; Cullen 1975).

In the British Isles, four species of *Artemisia* are native, of which two are very rare and two others are widely established weeds, or perhaps denizens, in waste places. About 16 other species (depending on one's taxonomy) have been recorded as casuals, although only two or three have succeeded in becoming more or less temporarily established in a very few places. The British climate is probably too damp in winter and too cool in summer to encourage the survival of the numerous steppe species. About 20 species have also been grown in gardens, and doubtless several of the records refer to outcasts from cultivation. Nearly all the species occurring in the British Isles are described in the excellent account in *Flora Europaea*, but for the four species not included brief descriptions have been provided in the notes given below.

NOTES ON ARTEMISIA SPECIES OCCURRING IN THE BRITISH ISLES

1. *A. vulgaris* L. (north temperate regions, very widely introduced). Native, common in waste places. Closely-related taxa, which include *A. ludoviciana* Nutt., *A. gnaphalodes* Nutt. and *A. longifolia* Nutt. (all from North America), are often recorded as dock aliens (BM, K, RNG, OXF, SLBI). These are here considered as subspecies of *A. vulgaris* following Hall & Clements (1923). They are distinguished by leaf shape and indumentum, but there is a complete range of intermediate variants. Illustrated in Britton & Brown (1913).

2. *A. verlitorum* Lam. (south-western China, naturalized in Europe, Australia and South America). A well established alien of waste places mostly in south-eastern England, especially near London (**BM, K, RNG, OXF**) (Brenan 1950).

An extraordinary specimen collected by J. E. Lousley in S. Lancs., v.c. 59, in late September 1961, which grew to a height of over 3 m, was probably this species and certainly not *A. princeps* Pamp. (Japan) as provisionally suggested (**BM, RNG**).

3. *A. absinthium* L. (Europe and Asia, naturalized in North and South America, West Indies and New Zealand). A frequent alien or denizen of waste places, wool-shoddy, tips and docks.

4. *A. stelleriana* Bess. (north-eastern Asia and north-western North America). A garden-escape naturalized in scattered localities, as near Dublin and in Cornwall (? extinct), Hampshire and Scotland (**BM, K, RNG, OXF**). Illustrated in Britton & Brown (1913).

5. *A. maritima* L. (Europe and Asia). Native, locally common on coastal salt marshes, but absent from northern Scotland and very local in Ireland. Closely-related species include: (i) *A. compacta* Fisch. ex DC. (Asia), which was found as a wool-alien by G. C. Stuart in 1868 (Hayward & Druce 1919) (**BM, E**); the specimen in **BM** is immature and may not be an *Artemisia* species; and (ii) *A. caerulescens* L. (Mediterranean), a rarely-cultivated species, which was recorded in error according to Druce (1919). The specimen in **BM** is without locality and is very scrappy.

6. *A. norvegica* Fr. (northern Europe). Native, very rare on two mountains in W. Ross, v.c. 105, discovered by Sir Christopher Cox in 1950 (Blakelock 1953).

7. *A. abrotanum* L. (Europe and Asia, naturalized in North America). A common garden plant, occasionally outcast on tips and waste ground (**BM, OXF, herb T.B.R.**).

8. *A. afra* Jacq. (tropical and southern Africa). A rare casual of wool-shoddy (**BM, K, RNG, E**). One of the gatherings in **BM** and **K** is atypical. Illustrated in Watt & Breyer-Brandwijk (1962). Omitted from *Flora Europaea*.

Brief description: herbaceous perennial with rootstock, woody below; leaves usually thinly downy above, densely white-hairy below, with recurved margins, feathery, deeply 2–3 times divided, narrowly ovate in outline (c. 8×4 cm), the ultimate segments 10×2 mm, linear-acute, well separated and opposite down the rachis and appearing pectinate; capitula campanulate, 3 mm, on peduncles 5 mm long; inflorescence dense, spreading, the racemes intertwined and intricate.

9. *A. pontica* L. (Europe and Asia, naturalized in North America). A rare garden-escape or relic (**BM, OXF, SLBI**), also found once in wool-shoddy in Yorks. in 1980 (**herb. T.B.R.**). This plant was atypical in having a very hairy receptacle.

10. *A. austriaca* Jacq. (Europe and Asia). Communicated by E. J. Clement without details.

11. *A. chamaemelifolia* Vill. (Europe). A very rare casual in Northern Ireland (Stewart & Corry 1938). Herbarium specimen unknown.

12. *A. macrantha* Ledeb. (Russia). A very rare dock alien (Wilson 1938, 1941). Herbarium specimen unknown (? at Hull). The related species *A. messerschmidtiana* Besser (Russia) was communicated without any details by E. J. Clement.

13. *A. sericea* Weber (eastern Europe and Asia). A very rare alien, listed by Druce (1928) without details. Herbarium specimen unknown.

14. *A. herba-alba* Asso (south-western Europe, Asia Minor and North Africa). An esparto-grass alien from Berwick, found by Miss M. McC. Webster in 1961 (**E**).

15. *A. annua* L. (Asia, naturalized in North America). A rare casual of wool-shoddy, tips and docks (**BM, K, RNG, OXF**).

16. *A. biennis* Willd. (Asia and North America, widely naturalized). A rare casual of wool-shoddy, grain and docks. Reported to be naturalized beside a reservoir in Somerset (**BM, K, RNG, OXF**). Here *A. biennis* is equated with *A. tournefortiana* Reichenb. (the Orient, Asia) following Kitamura (1982). However, according to Lawalree (1956) the two species can be separated on small differences in the involucre bracts, but in practice the characters are difficult to apply to herbarium material. Early material from Bristol at **OXF** was subsequently renamed *A. biennis* by Druce and others. Illustrated in Hayward & Druce (1919), Lawalree (1956) and Britton & Brown (1913). Omitted from *Flora Europaea*.

Brief description: annual or biennial herb with tap-root and single stem; lower leaves subglabrous, 2–3 pinnatisect, the final segments linear acute, entire or dentate; inflorescence leafy, narrow, ragged; capitula $\pm$ spherical, 2–3 mm, crowded in numerous erect appressed axillary clusters or short spikes with long subtending leaves.

17. *A. anethifolia* Weber (Asia). A very rare wool-alien, found once in Yorks. in 1980 (**herb. T.B.R., herb. E.J.C.**). The specimen was atypical. Illustrated in Komarov (1961). Omitted from *Flora Europaea*.

Brief description: annual or biennial herb with tap-root and single stem; leaves glabrous, deeply divided into long linear segments (1.5 cm), separated up the stem; inflorescence branches of long loose-flowered racemes; capitula spherical, 2–3 mm, with few (c. 4–6) florets, on peduncles 0.5–1.0 cm long.

18. *A. pectinata* Pall. (Asia). A very rare wool-alien, found once in Yorks. in 1980 (**herb. T.B.R., herb. E.J.C.**). Now placed in a separate genus, *Neopallasia* Poljak, by modern Russian botanists. Illustrated in Komarov (1961). Omitted from *Flora Europaea*.

Brief description: annual or biennial herb with tap-root and single stem; leaves subglabrous, 1-pinnate with filiform segments; stem arachnoid-pubescent, very leafy below and appearing feathery; inflorescence of capitula in spikes at the ends of the branches, each head subtended by a pectinate bract 1 cm long with teeth 1–5 mm; capitula oblong, 5 $\times$ 2–3 mm.

19. *A. dracunculus* L. (including *A. dracunculoides* Pursh). (Asia and North America, widely naturalised and cultivated). A rare alien of wool-shoddy and tips (**BM, RNG, OXF, SLBI**). The closely related *A. glauca* Pall. ex Willd. (Asia and North America), with narrower tomentose leaves and smaller capitula, has also been recorded. Illustrated in Britton & Brown (1913).

20. *A. tschernieviana* Besser (= *A. arenaria* DC.) (eastern Europe and Asia). A very rare alien of tips and grain (Anonymous 1923; Druce 1928). Herbarium specimen unknown.

21. *A. campestris* L. (north temperate regions). Native, very local on Breckland heaths of eastern England. A very rare casual elsewhere (Riddelsdell *et al.* 1948; Stewart & Corry 1938).

22. *A. scoparia* Waldst. & Kit. (Europe and Asia). A rare casual of wool-shoddy, tips and docks (**BM, K, RNG, OXF, SLBI**).

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Notes on *Milium vernale* Bieb. (Gramineae) in Guernsey

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ABSTRACT

The present distribution of the rare dune annual, *Milium vernale* Bieb. (Gramineae) in Guernsey is described. Four populations at two localities have been found. The distinctive prostrate habit of the Guernsey plants is noted and the chromosome number of $2n = 8$ confirmed.

INTRODUCTION

Milium vernale Bieb. is an annual grass species growing on sandy and light soils (Tutin 1950). Although it occurs widely through western, southern and central Europe, it is only found in very localized populations. It is a very variable species with different populations showing a wide range in plant size and branching of the panicle (Tutin 1980; Thomas unpub.). Three chromosome races have been reported, with $2n = 8$, 10, and 18 (Tutin 1950; Goldblatt 1981). Previous authors have described three annual European taxa in the genus *Milium*, *M. scabrum* Rich., *M. vernale* Bieb., *M. vernale* subsp. *montianum* (Parl.) Jahandiez & Maire (*M. montianum* Parl.) and one perennial European species, *M. effusum* L. Tutin (1980) however, recognizes only two species, *M. vernale* and *M. effusum*, and comments that, while *M. scabrum* and *M. vernale* subsp. *montianum* may merit subspecific rank, further investigation is needed.

M. vernale, previously reported as *M. scabrum*, is native to Guernsey and has not been recorded from any other site in the British Isles. It was first reported by Andrews in 1900 (Andrews 1900a,b) but was not rediscovered until 1949. Tutin (1950) records that it grew abundantly in small patches on L'Ancrese Common, at Grand Havre and Vazon Bay. Fifteen years later, McClintock (1965) commented that the species was only present in very small quantities at the western end of L'Ancrese.

As part of a larger study on the cytology of the genus *Milium*, the Guernsey populations were investigated in detail. This paper also describes the present distribution of *M. vernale* in Guernsey.

MATERIALS AND METHODS

Extensive searches for *M. vernale* were made along the north-western coast, from Bordeaux to Pleinmont in April 1982. Petit Bot Bay, where Andrews thought he had made his original collection, was also searched. The number of plants present in each population was counted and the plant species growing in the immediate area recorded. For the preparation of somatic chromosomes, root tips were pre-treated in a saturated solution of paradichlorobenzene for 18 hours at 4°C and then fixed in 3:1 absolute alcohol:glacial acetic acid for 24 hours. The roots were then treated with a 5% aqueous solution of pectinase for two hours at room temperature and hydrolysed in N HCL for nine minutes at 60°C before being stained in Feulgen for one hour and squashed in acetic orcein.

RESULTS

FIELD OBSERVATIONS

Four populations were located, three on L'Ancrese Common and one at L'Hommet headland, near Vazon Bay (Fig. 1). Details of each site are given below. The plant species growing in association with *M. vernale* at each site are listed in Table 1.



FIGURE 1. Map of Guernsey showing coastal localities, (★).

Site 1. L'Ancrese Common: 69 plants were found growing amongst the rocky outcrops of the cliff edge at the western end of L'Ancrese Bay (Fig. 1). The plants were growing in a small patch approximately 3 m square. 54 plants were growing in short dune turf (Table 1) while the remaining 15 were found in longer grass dominated by tussocks of *Dactylis glomerata*.

Site 2. L'Ancrese Common: 175 plants were found scattered over a bank and hollow approximately 500 m west of Site 1. Sites 1 and 2 are clearly separated by tussocks of grass, particularly *D. glomerata*. The short dune turf covering the bank comprised 13 plant species including 57 individuals of *M. vernale* (Table 1). The hollow behind the bank contained 118 individuals of *M. vernale* growing amongst tussocks of *D. glomerata* with relatively few other species.

Site 3. L'Ancrese Common: site 3 was located approximately 45 m east of site 2. 104 plants were growing in short, species-rich, dune turf over a 35 m stretch (Table 1). Individual plants were grouped in twos or threes and occasionally larger numbers and were widely scattered over the area.

Site 4. L'Hommet headland: two groups of *M. vernale* plants were found growing on the small, grassy mounds close to the shore of the L'Hommet peninsula near Vazon Bay (Fig. 1). The plants were growing mainly in short dune turf containing the species listed in Table 1. However, some plants were growing amongst tussocks of *D. glomerata* in sheltered areas near the base of the mounds. 129 individuals of *M. vernale* were present on one mound while 201 were found on a mound 50 m to the west.

TABLE 1. PLANT SPECIES GROWING IN ASSOCIATION WITH *MILIUM VERNALE* AT SITES 1-4

Species	Site number			
	1	2	3	4
<i>Sedum anglicum</i>	X			X
<i>Daucus carota</i>	X	X	X	X
<i>Lotus corniculatus</i>	X	X	X	
<i>Myosotis ramosissima</i>	X	X	X	X
<i>Viola kitaibeliana</i>				X
<i>Romulea columnae</i>				X
<i>Erodium cicutarium</i>				X
<i>Cerastium holosteoides</i>	X	X	X	X
<i>Linum catharticum</i>				X
<i>Plantago coronopus</i>				X
<i>Plantago lanceolata</i>			X	
<i>Thymus praecox</i>		X	X	
<i>Sonchus oleraceus</i>	X	X	X	X
<i>Cochlearia</i> sp.				X
<i>Scilla autumnalis</i>		X		
<i>Ranunculus bulbosus</i>			X	X
<i>Bellis perennis</i>	X	X	X	X
<i>Ononis repens</i>				X
<i>Leontodon taraxacoides</i>				X
<i>Geranium</i> sp.	X		X	X
<i>Saxifraga tridactylites</i>				X
<i>Valerianella</i> sp.		X	X	X
<i>Arenaria</i> sp.				X
<i>Festuca rubra</i>	X	X	X	X
<i>Dactylis glomerata</i>	X	X	X	X
<i>Luzula campestris</i>			X	X
<i>Lagurus ovatus</i>		X		X
<i>Mibora minima</i>		X		X
<i>Moenchia erecta</i>				X

MORPHOLOGICAL OBSERVATIONS

The plants were seldom more than 3-4 cm high with between one and five flowering culms. The flowering heads were prostrate, a characteristic which appears to be peculiar to the Guernsey populations (D. McClintock pers. comm.; Thomas unpub.). Plants raised in cultivation retained the prostrate character but were much more robust, reaching a height of up to 9 cm.

CYTOLOGICAL OBSERVATIONS

Four plants from Site 3 were found to have $2n = 8$, confirming Tutin's earlier chromosome count (Tutin 1950).

DISCUSSION

M. vernale is clearly a very rare native species of Guernsey and would appear to be less frequent than records suggested in 1950 (Tutin 1950). Although this species is typically found in the short dune turf of northern Guernsey, plants are also able to survive in adjacent areas dominated by large tussocks of *D. glomerata*. While gene flow could conceivably occur between the three populations of *M. vernale* on L'Ancrese Common, the Guernsey plants are strongly isolated from other populations of

the species. There appear to be no recent records of *M. vernale* on the north-eastern coast of France and the nearest known population is at Port des Barques, near Rochefort, in the Charente-Maritime, several hundred kilometres further south.

The prostrate culms which characterize the Guernsey plants have not been observed in living populations or herbarium specimens from other areas of Europe. Plants growing in similar dune environments in north-eastern France and Holland do not show this character although such sites may be less exposed than the sites described in Guernsey. However, the significance of the prostrate character cannot be assessed until further investigations have been made.

ACKNOWLEDGMENTS

I am indebted to David McClintock for his help in locating populations of *M. vernale* and to Patience Ryan of the Société Guernésiaise for showing me the plants in the field and for providing assistance with plant identification. Financial support from the Research Committee, University of London Goldsmiths' College, is gratefully acknowledged.

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Short Notes

ELODEA ERNSTAE BACK TO E. CALLITRICHOIDES

Following the monograph of the eastern South American species of *Elodea* by St John (1963), Kent (1964) considered the plant previously referred to as *Elodea callitrichoides* (L. C. M. Richard) Caspary in Britain should be called *E. ernstae* H. St John. In Zürich we are preparing a world-wide revision of the genus *Elodea*. For South America we have not only examined most of the specimens seen by St John but have also seen considerable additional material. We are convinced that *E. ernstae* is not distinct from *E. callitrichoides*. The characters that St John used to differentiate the species (number of leaves at nodes, degree of inflation of the male spathe, relative lengths of the anthers and the thickness of the style) are not constant and have no diagnostic value. We have searched for additional differential characters without success. We therefore suggest that the plant referred to as *E. ernstae* since 1964 in Britain should be called *E. callitrichoides*.

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CAREX PUNCTATA GAUD. – THE DONEGAL RECORD

The discovery of *Carex punctata* on the Dunfanaghy estuary in West Donegal, v.c. H35, by E. A. G. Duffey on 24th July 1949, was reported in *Watsonia* by Tutin (1951). The report was greeted with satisfaction by a number of botanists including Praeger (1952) and Stelfox (1954), for it not only extended the range of the sedge but provided the missing link between the known Galway site and the Scottish sites on the Solway. The record was included in my survey of the plant's distribution (David 1981); and by an inexplicable error (mine not the printer's) it attracted, from a neighbouring entry, a note that specimens existed in CGE and E. I am indebted to D. Ledsham for an enquiry (in litt. 1983) that led me to discover that no such specimens existed, and to investigate more thoroughly the genuineness of the record.

A letter to Professor Tutin elicited the fact that voucher specimens were indeed preserved in LTR, but also that not long after the publication of the record he had himself come to doubt whether the determination was correct. He kindly arranged for the specimens to be loaned to me. There are three sheets. One is labelled *Carex distans* L. (correctly); the other two are labelled *Carex punctata*, but with pencilled notes in Professor Tutin's hand to the effect that, as the plants are largely sterile and the utricles are intermediate in shape and size between those of *C. punctata* and those of *C. distans*, there is a possibility that the specimens represent a hybrid between the two.

With A. O. Chater of the British Museum (Natural History) I have closely examined the specimens. The utricles have now largely dropped and been lost, so that it is no longer possible to be sure if the nuts have matured or not. The anthers, however, have dehisced normally, which does not usually happen in a *Carex* hybrid. The cross, *C. distans* × *punctata*, proposed by Professor Tutin, does not seem to have been otherwise recorded. If the Dunfanaghy plant is indeed a hybrid, we would suggest the parentage *C. distans* × *extensa* Good. (*C.* × *tornabonii* D*.

Chiov., which is known from Merioneth and West Cornwall). We see no sign in it of *C. punctata*, and are satisfied that it is in fact the form of *Carex distans* with smaller and smoother utricles which is frequent in the south and west of England. In that case the Donegal record must for the time being be expunged, though there seems to be no reason why *Carex punctata* should not occur in sheltered bays on that coast.

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LIMOSELLA AQUATICA L. IN FIFE: A DECLINING SPECIES MAKING A COME-BACK

A glance at any collection of local Floras will quickly confirm that *Limosella aquatica* L. has recently been suffering a widespread decline in the British Isles. Although it is an easily overlooked plant, in many counties it is now thought to be extinct.

For Scotland, Perring & Walters (1962) recorded *L. aquatica* in only three 10 km squares (all pre-1930). The first record for Fife, v.c. 85, was in 1973 when J. E. Lousley reported it from Loch Leven National Nature Reserve, Kinross. In following years *L. aquatica* was found to occur there in great abundance (Ballantyne 1977), while in the summer of 1976 it was discovered at two further sites in Fife: in a small dried-up pond at Pitlour, Strathmiglo; and on the north and west lochs at Morton Lochs National Nature Reserve, which at that time had just been drained prior to being partly dredged.

L. aquatica can rapidly colonise freshly exposed mud, and the low water levels which many of our lochs and reservoirs have experienced in recent summers have clearly aided its continued spread. In 1982/83 a survey of open waters in Fife produced four more sites, so that now the plant has been recorded at seven localities in v.c. 85, with all but one of these still extant in 1983. All the Fife localities are listed below.

GR 36/1.8, Cullaloe Reservoir, 1982, in quantity on exposed mud with scattered *Rorippa palustris* (L.) Besser, *Gnaphalium uliginosum* L., and *Littorella uniflora* (L.) Ascherson (N.F.S.); dominant in places, 1983 (G.H.B.).

GR 36/1.9, and 37/1.0, Loch Leven, 1973 (Lousley & Whitcombe 1974), particularly abundant on exposed mud at Levenmouth Pools (G.H.B.).

GR 37/2.0, Balgillie Reservoir, 1982, a few plants only (S.J.L., and N.F.S.); Ballo Reservoir, 1983, on newly exposed mud, sparingly with *Peplis portula* L., *Potamogeton gramineus* L., *Juncus bulbosus* L., and *L. uniflora* in sward of *Eleocharis acicularis* (L.) Roemer & Schultes (N.F.S., and S.J.L.).

GR 37/2.1, Pitlour, 1976, in dried-up pond (G.H.B.); searched for without success in 1983 (S.J.L.).

GR 37/3.0, Carriston Reservoir, 1982, in quantity with *E. acicularis* (N.F.S., and S.J.L.).

GR 37/4.2, Morton Lochs, 1976 (M. Benstead pers. comm.); still abundant, 1983, in sward with *Juncus bufonius* L., *J. bulbosus*, *G. uliginosum*, *R. palustris*, and *Chenopodium rubrum* L. (P. K. Kinnear and S.J.L.).

At several sites we found that in its vegetative state *L. aquatica* could easily be mistaken for small creeping variants of *Ranunculus flammula* L. However, in *L. aquatica* the lowest leaves are invariably subulate, and the upper leaves have petioles which narrow distinctly towards the blade; in *R. flammula* the petiole is usually of more or less even width. With a hand lens it can also be seen that in *L. aquatica* the petiole is circular in cross-section and has an obvious central

column, whereas in *R. flammula* it is slightly flattened or grooved on its upper surface and there is an even spread of tissue throughout the cross-section. Of course, when *L. aquatica* is in flower identification is fairly straightforward, and we would recommend that the plant is looked for in late August or September when it is most likely to be found in flower or fruit, and when water levels are at their lowest. It would be most interesting to know whether or not this 'declining' species is spreading in other vice-counties.

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DISCOID DAISIES

Composites lacking ray florets are no new phenomenon: *Aster tripolium* L. var. *discoideus* Reichenb. f. is particularly well-known. Nor are such variants unknown among the Common Daisy, *Bellis perennis* L. There is reference to them in Kräusel (1954): 'Köpfchen, die nur aus Rohrenbluten (Ochsenauge) . . . bestehen, sind bekannt'. In **BM** are the following examples:

- 1). No locality, no collector, no date; the specimen is obviously old, 18th century presumably. The specimen has from the same rootstock a proliferous stem ('hen and chickens') and a discoid one.
- 2). Jersey, St Ouen's Bay, *J. Boswell-Syme*, June 1853.
- 3). Ex herb. J. E. Cooper (1864-1952); no other information.
- 4). Dorset, Whatcombe, shrubbery, *Mrs N. Richardson*, 31 May 1895 (herb. Mansell-Pleydell, as f. *discoidea*).
- 5). Yorkshire, Bridlington, sea-bank to the south, one clump about a yard square, *J. F. Pickard*, 8 May 1903 (herb. F. A. Lees).

It may or may not be relevant, but numbers 1, 2 and 4 are each accompanied by a 'hen and chickens' specimen.

In 1981, Mrs C. M. R. Schwerdt, President of the Wild Flower Society, gave me a plant of this variant, which she had noticed in her lawn at Horsmonden, Kent. It has remained constant in cultivation and I have taken specimens. I have searched quite widely and have failed to find any published appellation for this variant, so it seems helpful to name it as follows:

***Bellis perennis* L. forma *discoidea* D. McClintock, f. nov.**
A typo absentibus radiis differt.

HOLOTYPE: cult. in horto Bracken Hill, Platt, Kent (ex prato, Horsmonden, Kent).
D. McClintock, 27th June 1982 (**BM**).

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TRIFOLIUM OCCIDENTALE D. E. COOMBE (ATLANTIC CLOVER) NEW TO NORTH DEVON

In May 1983 a colony of *Trifolium occidentale* was found in North Devon, v.c. 4, GR SS/212.180, by R. FitzGerald, C. Kitchen, M. A. R. Kitchen and J. N. B. Milton during the B.S.B.I. field meeting at Welcombe Mouth. The clover extends for 30 m along the top of west-facing cliffs on dry, sandy soils, where it is associated with *Festuca rubra*, *Armeria maritima*, *Anthyllis vulneraria*, *Plantago coronopus*, *Catapodium marinum* and *Trifolium scabrum*. This habitat is more xeric than that favoured by *Trifolium repens*, and as such agrees with the previously known sites for *T. occidentale* (Coombe 1961; Akeroyd 1983).

When it was first described, *T. occidentale* was known only from the Channel Islands, the Isles of Scilly and West Cornwall (Coombe 1961). Subsequently it was found near Newport, on the north coast of Cornwall (Coombe & Morisset 1967) and has been discovered in several sites in north-

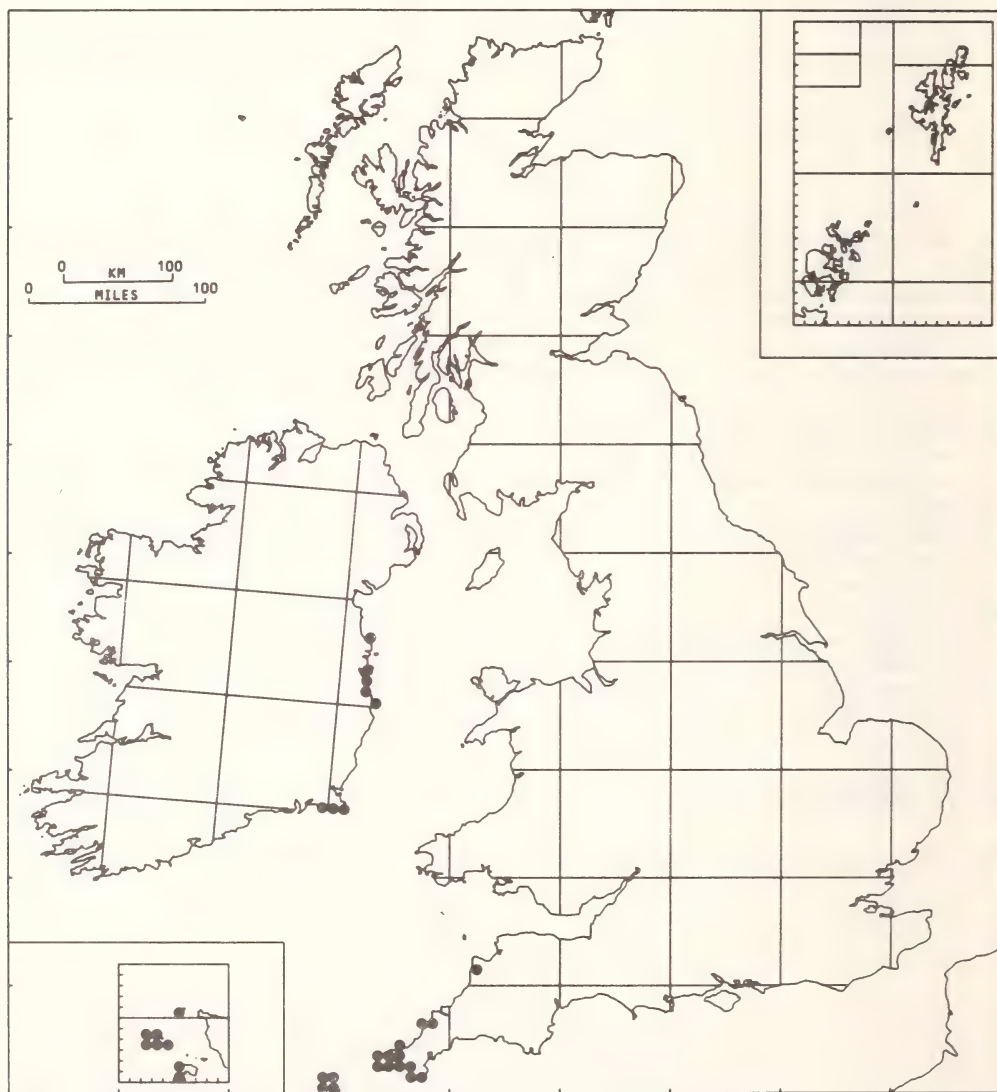


FIGURE 1. Known distribution of *Trifolium occidentale* in the British Isles.

western France, Spain and Portugal (Coombe & Morisset 1967; Géhu 1972). More recently, it was discovered in south-eastern Ireland (Preston 1980), where it is widespread and locally frequent (Akeroyd 1983).

The colony at Welcombe Mouth is therefore a new vice-county record, and represents an extension of the plant's range by 70 km. This record has been incorporated on to the map, which shows the known distribution of *T. occidentale* in the British Isles (Fig. 1). However, in view of its similarity to *T. repens*, it has probably been overlooked elsewhere in south-western England and southern Ireland, and therefore may be more widespread than the map suggests.

ACKNOWLEDGMENTS

I am grateful to C. D. Preston for producing the map, and to J. R. Akeroyd, D. E. Coombe and C. D. Preston for their helpful criticisms.

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ASEXUAL REPRODUCTION OF *BARBAREA VULGARIS* R.BR. IN THE BRITISH ISLES

MacDonald & Cavers (1974) described an asexual means of reproduction in *Barbarea vulgaris* R.Br. from Ontario, Canada. This involves the formation of rosettes of leaves (similar to those of the basal rosette) in the axils of the cauline leaves after normal seed production. These cauline rosettes, if allowed to come into contact with the ground, can form adventitious roots and establish themselves, producing fruit the following year if vernalized overwinter.

In March 1983, whilst mapping a small population of about 50 plants of typical *B. vulgaris* on Gaitbarrows N.N.R., W. Lancs., v.c. 60, a single plant was found bearing four cauline rosettes as described by MacDonald & Cavers. Each cauline rosette had rooted in the shallow protorendzina soil but was still attached to the large parent plant by the fibrous flowering stem, thus betraying its origin. In September three of these remained (one apparently having succumbed to the summer drought), each by then a separate individual.

The causes of the phenomenon are not known. The plant concerned had almost certainly been damaged by vehicles in 1982 and, although other plants in the vicinity had also suffered, no other cauline rosettes were found. It is possible that the rosettes are a manifestation of the capacity to recover after injury, probably due to the resulting physiological or hormonal imbalance.

The only other British example of reproduction in a similar manner in the Cruciferae is in the relatively closely related *Cardamine bulbifera* (L.) Crantz which normally reproduces by true axillary buds. Whether the cauline rosettes represent the potential for an evolutionary trend towards this mode of reproduction or are just one-off occurrences remains to be seen. Cauline rosettes have not been reported for any other members of the genus *Barbarea*.

This is believed to be the first report of the phenomenon in the British Isles, and the author would be pleased to hear of any other examples in this or other members of the Cruciferae.

ACKNOWLEDGMENTS

The author would like to thank the N.C.C. (N.W. Region) for permission to work at Gaitbarrows N.N.R.

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FURTHER DISCOVERIES OF THE FEN VIOLET (*VIOLA PERSICIFOLIA* SCHREBER)
AT WICKEN FEN, CAMBRIDGESHIRE

In 1980, a seedling of *Viola persicifolia* Schreber (*V. stagnina* Kit.) was grown from viable seed buried in the peat beneath old scrub at Wicken Fen (Rowell, Walters & Harvey 1982). The species had last been recorded at Wicken in 1916. Since this rediscovery, *V. persicifolia* has been found growing at two other locations on the Fen.

In May 1982, two small specimens of *V. persicifolia* were identified in an area subject to experimental cutting treatments. One plant was growing in the bare peat of a weathered mole-hill; the other was about 25 cm distant from the mound. The plants had not been observed in previous detailed recording of the vegetation of the area and it seems probable that they had recently established from seed brought to the surface during the excavation of a mole-run.

An extremely large population of *V. persicifolia*, consisting of many thousands of shoots, was found at an additional location in June 1982. This site was about 1500 m from the two plants located in May, and about 450 m from the area where the 1980 seed originated. The new site had been cleared of scrub in about 1966, and cut regularly (every 3–4 years) for sedge until the late 1970s. The area then became very overgrown with bushes, which were burned in April 1981 and uprooted during the following May–July. The surface peat was much disturbed by this activity. In mid-May 1982, the vegetation was cut close to the ground with a tractor-mounted rotary cutter and windrowed with a hay-rake. These activities caused considerable further disturbance of the surface.

The population was producing, when discovered, both chasmogamous and cleistogamous flowers; capsules and seedlings were frequent. A small quantity of *Viola canina* subsp. *montana*, which has also not been seen at Wicken Fen for many decades, was found growing in association with *V. persicifolia*, and putative hybrids of the two species were apparent in one place in 1983 (S. M. Walters pers. comm.). The violets appeared to be confined to the ridges between old peat diggings, which are evident over the whole of the area where the plants were established. *Viola* spp. had not been recorded during a visit to this site in 1971 (S. M. Walters pers. comm.). It seems likely, therefore, that the present population became established from buried seed in 1981 or 1982, following disturbance of the peat.

Disused peat trenches are present in all three of the areas at Wicken where *V. persicifolia* has recently been located. Historical information (Rowell 1983a) demonstrates that the extraction of peat from these sites ceased during the 18th and 19th centuries. It has been argued (Rowell 1983b) that, at both Wicken and Woodwalton Fens, *V. persicifolia* occurs in areas formerly dug for peat and, further, that the abundance of the species is determined by the magnitude of recent disturbance of the soil. It follows that cyclic disturbance of the soil may be a key factor in the conservation of the species at these Fenland reserves.

On the basis of the initial rediscovery of *V. persicifolia* at Wicken, Moore (1983) has discussed the possibility that conservationists may declare plant species to be extinct locally when invisible populations of viable seed may still be present. The more recent discoveries at Wicken suggest that the species may have occurred in the vegetative state in the period between 1916 and 1980. At the location of the large population, the clearance of scrub around 1966 would probably have created

conditions suitable for the germination of the species. If a transient population did establish then it remained unrecorded. Some of the apparent 'extinction' may, therefore, have been due to under-recording rather than an absence of vegetative plants.

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Plant Records

Records for publication must be submitted in the form shown below to the appropriate vice-county Recorder (see list of *County Recorders* (1982)), and *not* the Editors. The records must normally be of native or naturalized alien plants belonging to one or more of the following categories: 1st or 2nd v.c. record; 1st post-1930 v.c. record; only extant v.c. record, or 2nd such record; a record of an extension of range by more than 100 km. Such records will also be accepted for the major islands in v.c. 102–104 and 110. Only 1st records can be accepted for *Rubus*, *Hieracium* and hybrids. Records for subdivisions of vice-counties will not be treated separately; they must therefore be records for the vice-county as a whole. Records of *Taraxacum* are now being dealt with separately, by Dr A. J. Richards, and will be published at a later date.

Records are arranged in the order given in the *List of British vascular plants* by J. E. Dandy (1958) and his subsequent revision (*Watsonia*, 7: 157–178 (1969)). With the exception of collectors' initials, herbarium abbreviations are those used in *British herbaria* by D. H. Kent (1958).

The following signs are used:

* before the record: to indicate a new vice-county record.

† before the species number: to indicate that the plant is not a native species of the British Isles.

‡ before the record: to indicate a species which, though native in some parts of the British Isles, is not so in the locality recorded.

[] enclosing a previously published record: to indicate that the record should be deleted.

1/2. LYCOPODIELLA INUNDATA (L.) Holub 70, Cumberland: eastern Cumberland, GR 35/—. R. W. M. Corner, 1983, field record. Only extant record. *104, N. Ebudes: Loch Meodal, Sleat, Skye, GR 18/65.11. M. & E. Vickers, 1977, **herb. C. W. Murray**. 1st record for Skye.

†2/2. SELAGINELLA KRAUSSIANA (Kunze) A. Braun *82, E. Lothian: Biel Estate, Stenton, GR 36/62.75. Marshy ground. E. P. Beattie, 1957, **E**, det. C. N. Page.

3/2. ISOETES ECHINOSPORA Durieu 92, S. Aberdeen: Loch of Aboyne, GR 37/53.99. C. Newbold, M. Palmer & P. Marren, 1983, field record. 1st post-1930 record.

4/1. EQUISETUM HYEMALE L. 85, Fife: Newbigging of Craighall, Ceres, GR 37/41.10. N. F. Stewart, 1983, **herb. G. H. Ballantyne**. 1st record this century, confirms an 1884 record.

4/1 × 4. EQUISETUM HYEMALE L. × E. VARIEGATUM Schleich. ex Weber & Mohr *67, S. Northumb.: Chirdon Burn, GR 35/75.82. G. A. Swan, 1961, **herb. G. A. S.**, det. A. C. Jermy & C. N. Page. *70, Cumberland: side of River Lyne, Dodgsonstown, Roadhead, GR 35/50.75. G. Halliday, 1982, **LANC**, det. C. N. Page.

4/9 × 5. EQUISETUM ARVENSE L. × E. FLUVIATILE L. *83, Midlothian: N. Esk Reservoir, GR 36/57.15. H. McHaffie, 1983, **E**, det. C. N. Page.

7/1. HYMENOPHYLLUM TUNBRIGENSE (L.) Sm. *75, Ayr.: Biglees Glen, West Kilbride, GR 26/20.52. B. Simpson, 1982, field record.

15/4. ASPLENIUM MARINUM L. *82, E. Lothian: Bass Rock, GR 36/60.87. Mr McAffer, 1979, **E**.

15/5. ASPLENIUM TRICHOMANES L. subsp. TRICHOMANES *44, Carms.: Craig Cwm Clÿd, Mynydd Myddfai, GR 22/79.29. R. N. Stringer & I. K. Morgan, 1982, **NMW**.

16/1. ASPLENIUM CETERACH L. *75, Ayr.: Corbie Craigs Sill, near Dalmellington, GR 26/45.09. Old quarry. B. Simpson, 1973, field record. 1st definite record. †104, N. Ebudes: Suardal marble quarries, Skye, GR 18/62.20. Ballast of old tramway. M. Gregory, 1981, field record. 2nd record, 1st record for Isle of Skye.

21/2aff. DRYOPTERIS AFFINIS (Lowe) Fraser-Jenkins subsp. AFFINIS *44, Carms.: Stradey Woods, Llanelli, GR 22/49.01. I. K. Morgan, 1982, **NMW**, det. C. R. Fraser-Jenkins.

21/2bor. *DRYOPTERIS AFFINIS* (Lowe) Fraser-Jenkins subsp. *BORRERI* (Newman) Fraser-Jenkins *44, Carms.: Cwm Mawr, Llanelli, GR 22/48.02. I. K. Morgan, 1982, NMW, det. C. R. Fraser-Jenkins.

21/2sti. *DRYOPTERIS AFFINIS* (Lowe) Fraser-Jenkins subsp. *STILLUPENSIS* (Sabransky) Fraser-Jenkins *44, Carms.: Craig Cwm Clŷd, Mynydd Myddfai, GR 22/79.29. I. K. Morgan, 1982, NMW, det. C. R. Fraser-Jenkins.

21/6. *DRYOPTERIS CARTHUSIANA* (Vill.) H. P. Fuchs 107, E. Sutherland: Strath Steven, GR 29/8.0. B.S.B.I. Field Meeting, 1983, field record. 2nd record.

21/7 × 6. *DRYOPTERIS DILATATA* (Hoffm.) A. Gray × *D. CARTHUSIANA* (Vill) H. P. Fuchs *44, Carms.: Talley, GR 22/63.33. I. K. Morgan, 1982, NMW, conf. C. R. Fraser-Jenkins.

22/2 × 1. *POLYSTICHUM ACULEATUM* (L.) Roth × *P. SETIFERUM* (Forsk.) Woynar *44, Carms.: Cwm Clydach, Trimsaran, GR 22/44.07. I. K. Morgan, 1983, NMW, conf. P. M. Benoit. *104, N. Ebudes: Leac nan Craobh, Torrin, Skye, GR 18/57.20. M. Barron, 1976, herb. C. W. Murray, det. P. D. Sell & A. Sleep. 1st record for Isle of Skye.

24/2. *THELYPTERIS THELYPTEROIDES* (Michx) Holub subsp. *GLABRA* Holub *42, Brecks.: N. of Llanfihangel-nant-Bran, GR 22/9.3. Upland mire. R. G. Woods, 1983, NMW. 73, Kirkcudbrights.: Preston Merse, GR 25/94.55. O. M. Stewart, 1979, E. 2nd extant record.

25/1. *POLYPODIUM VULGARE* L. s.str. 25, E. Suffolk: Bentley, Dodnash Wood, GR 62/10.36. E. M. Hyde, 1983, herb. E. M. H., conf. R. H. Roberts. 2nd record. 26, S. Suffolk: Polstead, GR 52/99.40. E. M. Hyde, 1983, herb. E. M. H., conf. R. H. Roberts. 2nd record.

25/int. × 1. *POLYPODIUM INTERJECTUM* Shivas × *P. VULGARE* L. *25, E. Suffolk: Bentley, Dodnash Wood, GR 62/10.36. East Bergholt, GR 62/08.34. Both E. M. Hyde, 1983, herb. E. M. H., det. R. H. Roberts. 1st and 2nd records. 26, W. Suffolk: Polstead, GR 52/99.40. E. M. Hyde, 1983, herb. E. M. H., det. R. H. Roberts.

†27/1. *AZOLLA FILICULOIDES* Lam. *47, Monts.: Berriew, GR 33/1.0. Canal. C. J. Harris, 1981, field record. Wernllwyd, GR 33/20.02. Canal. M. Wainwright & E. D. Pugh, 1981, field record. 1st and 2nd records.

28/1. *BOTRYCHUM LUNARIA* (L.) Sw. 73, Kirkcudbrights.: New Galloway, GR 25/60.75. Golf course. V. McClure, 1972, field record. Only extant record.

29/1. *OPHIOGLOSSUM VULGATUM* L. 104, N. Ebudes: Drinan, Strathaird, Skye, GR 18/54.13. C. W. Murray, 1980, herb. C. W. M. 2nd record.

35/1. *TAXUS BACCATA* L. *48, Merioneth: Dduallt, GR 23/8.2. Ledge of acidic mountain cliff. P. M. Benoit & A. O. Chater, 1970, field record. 1st record in a natural habitat.

38/1. *HELLEBORUS FOETIDUS* L. †*81, Berwicks.: Gateheugh, S.S.S.I., GR 36/59.34. A. G. & D. G. Long, 1973, field record.

38/2. *HELLEBORUS VIRIDIS* L. 43, Rads.: Llanbadarn-y-garreg, GR 32/10.49. Woodland. R. & R. Key, 1983, field record. 2nd record.

46/10. *RANUNCULUS AURICOMUS* L. 45, Pembs.: Manorbier, GR 21/06.98. Woodland. M. Higgins, 1982, NMW. 2nd record. *46, Cards.: Llechryd, GR 22/21.43. Roadside bank. S. B. Evans, 1983, field record.

46/19. *RANUNCULUS FLUITANS* Lam. 59, S. Lancs.: Bradshaw Brook, Jumbles, Bolton, GR 34/73.13. A. J. Percy, 1982, field record. 2nd record, 1st record for over 100 years.

46/24bul. *RANUNCULUS FICARIA* L. subsp. *BULBIFER* Lawalrée *74, Wigtowns.: Portpatrick, GR 15/99.54. A. J. Silverside, 1981, field record.

57/1. *CERATOPHYLLUM DEMERSUM* L. 43, Rads.: Stanage Park, GR 32/33.71. Ornamental lake. R. G. Woods, 1983, field record. 2nd record.

58/5. *PAPAVER ARGEMONE* L. *107, E. Sutherland: Dornoch Links, GR 28/80.88. B.S.B.I. Field Meeting, 1983, field record.

62/1. *CHELIDONIUM MAJUS* L. †**94**, Banffs.: Gordon Castle, Fochabers, GR 38/35.59. Waste ground by farm buildings. M. McC. Webster, 1982, field record. 2nd record.

†65/2. *CORYDALIS BULBOSA* (L.) DC. ***57**, Derbys.: Risley, GR 43/46.35. Woodland. G. Smith, 1983, **DBY**.

66/3. *FUMARIA PURPUREA* Pugs. **68**, Cheviot: Embeton, GR 46/23.22. Disused Quarry. G. A. & M. Swan, 1983, **herb. G. A. S.** 1st post-1930 record.

66/7. *FUMARIA DENSIFLORA* DC. ***81**, Berwicks.: Burnmouth, GR 36/96.60. Railway cutting. N. Stewart, 1979, **herb. M. E. Braithwaite**. Haigsfield, GR 36/81.39. Arable field. M. E. Braithwaite, 1979, **herb. M. E. B.** 1st and 2nd records.

69/1. *RHYNCHOSINAPIS MONENSIS* (L.) Dandy **59**, S. Lancs.: Birkdale, Southport, GR 34/31.16. Old dunes. P. Smith, 1983, field record. 2nd record.

†72/1. *DIPLOTAXIS MURALIS* (L.) DC. ***93**, N. Aberdeen: Fraserburgh, GR 48/00.65. Rubbish dump. D. Welch, 1983, **ABD**.

72/2. *DIPLOTAXIS TENUIFOLIA* (L.) DC. ***47**, Monts.: Welshpool Railway Station, GR 33/22.07. I. C. Trueman & P. M. Benoit, 1982, field record.

74/2. *RAPHANUS MARITIMUS* Sm. ***46**, Cards.: Cardigan Island, GR 22/16.51. T. A. W. Davis, 1968, field record. 1st definite record.

†74/3. *RAPHANUS SATIVUS* L. ***45**, Pembs.: Strumble Head, GR 12/89.39. B. S. Leggett, 1982, **NMW**.

†79/1. *LEPIDIUM SATIVUM* L. ***45**, Pembs.: Pembroke Dock, GR 12/95.03. Waste ground. J. P. Curtis, 1982, **NMW**, conf. R. G. Ellis.

84/1. *THLASPI ARVENSE* L. **43**, Rads.: by River Ithon, near Penybont, GR 32/11.64. C. A. Chadwell, 1982, field record. 2nd record.

88/5 × 1. *COCHLEARIA DANICA* L. × *C. OFFICINALIS* L. ***82**, E. Lothian: N. of Gullane, GR 36/49.85. A. J. Silverside, 1982, **E.** 1st definite record.

†90/2. *BUNIAS ORIENTALIS* L. **80**, Roxburghs.: W. of Melrose Station, GR 36/54.33. Side of old railway track. R. W. M. Corner, 1983, **herb. R. W. M. C.**, det. D. R. McKean. 1st record since 1915.

†92/1. *LOBULARIA MARITIMA* (L.) Desv. **47**, Monts.: Dol-las near Forden, GR 33/20.00. Gravelly bank of River Severn. J. Roper & M. Wainwright, 1982, field record. 2nd record.

94/4. *DRABA MURALIS* L. ***17**, Surrey: Epsom, GR 51/23.58. J. Byatt & E. C. Wallace, 1983, field record. **43**, Rads.: Stanage Park, GR 32/32.71. R. G. Woods, 1983, **NMW**. 2nd record.

95/2spa. *EROPHILA VERNA* (L.) Chevall. Subsp. *SPATHULATA* (A. F. Lang) Walters ***84**, W. Lothian: near Queensferry, GR 36/10.79. Coastal turf. A. J. Silverside, 1981, **herb. A. J. S.**

97/2. *CARDAMINE AMARA* L. **29**, Cambs.: Isleham, GR 52/64.75. C. Turner, 1982, field record. 1st record since 1879.

102/3. *RORIPPA SYLVESTRIS* (L.) Bess. **96**, Easternness: Daviot, GR 28/72.39. M. Barron, 1983, field record. 2nd record.

†110/1. *CAMELINA SATIVA* (L.) Crantz ***45**, Pembs.: Pembroke Dock, GR 12/95.03. Waste ground. J. P. Curtis, 1982, **NMW**, conf. R. G. Ellis.

112/1. *RESEDA LUTEOLA* L. **72**, Dumfriess.: Corsehill Dump, GR 35/20.69. Old sandstone quarry. H. Darke & E. Pringle, 1983, **DFS**, det. J. D. S. Martin. 1st record this century.

113/5. *VIOLA REICHENBACHIANA* Jord. ex Bor. **45**, Pembs.: Manorbier, GR 21/06.98. M. Higgins, 1982, **NMW**. 2nd record.

113/8. *VIOLA PERSICIFOLIA* Schreber **29**, Cambs.: Wicken Fen, GR 52/54.70. and GR 52/56.70. T. A. Rowell, 1982, **CGE**, conf. S. M. Walters. 1st records since 1916.

115/1. *HYPERICUM ANDROSAEMUM* L. **95**, Moray: Darnaway, Forbes, GR 38/01.53. Shingle of River Findhorn. M. McC. Webster, 1980, field record. 2nd record.

115/6. *HYPERICUM MACULATUM* Crantz ***93**, N. Aberdeen: Delgatie, GR 38/76.50. Roadside. D. Welch, 1983, **ABD**.

122/1. *ELATINE HEXANDRA* (Lapierre) DC. **92**, S. Aberdeen: N.W. end of Loch Kinord, GR 37/43.99. D. Spence, 1964, field record. 1st post-1930 record.

†123/8. *SILENE ARMERIA* L. ***82**, E. Lothian: St Baldred's Cradle, Tynninghame, GR 36/63.81. Near high water mark below dune cliff. I. M. Strachan, 1982, **E**, conf. D. R. McKean.

†129/ocy. *SAPONARIA OCYMOIDES* L. ***41**, Glam.: Pencoed, GR 21/9.8. Spontaneous garden weed. H. J. Dawson, 1983, **NMW**, det. S. G. Harrison.

131/2. *CERASTIUM ARVENSE* L. **69**, Westmorland: Barrow-in-Furness, GR 34/21.68. Waste ground. G. Halliday, 1983, **LANC**. Only extant record. **81**, Berwicks.: Birgham, GR 36/ 79.38. M. E. Braithwaite, 1983, **herb. M. E. B.** 1st post-1930 record.

†131/3. *CERASTIUM TOMENTOSUM* L. ***95**, Moray: Lossiemouth, GR 38/23.69. Roadside verge by old quarry. M. McC. Webster, 1982, **E**.

131/12. *CERASTIUM SEMIDECANDRUM* L. **81**, Berwicks.: Hume Castle, Old Cambus, St Abbs, GR 36/70.40. M. E. Braithwaite, 1983, **herb. M. E. B.** 1st post-1930 record.

133/1. *STELLARIA NEMORUM* L. ***43**, Rads.: near Cabalva, GR 32/23.46. Woodland. R. G. Woods, 1983, field record.

133/3. *STELLARIA PALLIDA* (Dumort.) Piré ***81**, Berwicks.: Greenheugh Point, GR 36/80.70. Seashore. O. M. Stewart, 1979, **E**.

133/6. *STELLARIA PALUSTRIS* Retz. **85**, Fife: Woodhead Mire, by Black Loch, GR 37/26.15. S. J. Leach, 1982, field record. 2nd extant record.

135/1. *MOENCHIA ERECTA* (L.) Gaertn., Mey. & Scherb. **44**, Carms.: Mandinam, Llangadog, GR 22/73.28. R. G. Woods, 1983, field record. 1st record since 1908. **45**, Pems.: Manorbier, GR 21/05.97. Cliff grassland. J. P. Curtis, 1983, **NMW**. 2nd record.

136/1. *SAGINA APETALA* Ard. ***93**, N. Aberdeen: Fraserburgh, GR 48/00.65. D. Welch, 1983, **ABD**.

137/4. *MINUARTIA HYBRIDA* (Vill.) Schischk. **†*48**, Merioneth: near Llangower, GR 23/9.3. Railway bank. J. Fryer, 1983, **NMW**.

†141/6. *ARENARIA BALEARICA* L. ***43**, Rads.: Maesgwynne, Howey, GR 32/06.56. In stockyard. R. G. Woods, 1983, field record.

146/1. *HERNIARIA GLABRA* L. **6**, N. Somerset: Weston-super-Mare, GR 31/31.60. A. J. Byfield, M. A. R. & C. Kitchen, 1983, field record. Confirms 1791 and 1946 records.

148/1. *SCLERANTHUS ANNUUS* L. **82**, E. Lothian: Sheriff Hall, near North Berwick, GR 36/ 56.81. E. H. Jackson & A. J. Silverside, 1982, field record. 2nd record.

149/1b. *MONTIA FONTANA* L. subsp. *CHONDROSPERMA* (Fenzl) Walters ***47**, Monts.: above Garreg Bank, GR 33/28.11. Rocky outcrops in fields. F. H. Perring, 1980, field record. 1st definite record.

†149/2. *MONTIA PERFOLIATA* (Willd.) Howell ***94**, Banffs.: Gordon Castle, Fochabers, GR 38/ 35.59. Garden weed. M. McC. Webster, 1982, field record.

†153/3. *AMARANTHUS ALBUS* L. ***57**, Derbys.: Alvaston, Derby, GR 43/38.33. Garden weed. J. Ogden, 1983, field record.

159/1. *SALSOLA KALI* L. **67**, S. Northumb.: Druridge Bay, GR 45/27.99. G. A. Swan, 1983, field record. 1st record for over 100 years.

†*ABUTILON THEOPHRASTI* Medicus **41**, Glam.: Cardiff Docks, GR 31/19.75. Waste ground.

G. S. Walters, 1983, **NMW**. 2nd record. *43, Rads.: Llanfared, GR 32/06.50. Cultivated field.
F. M. Slater, 1983, **NMW**.

†**HIBISCUS TRIONUM** L. 41, Glam.: Cardiff Docks, GR 31/19.75. Waste ground. G. S. Walters, 1982, **NMW**. 2nd record, 1st post-1930 record.

168/2. **GERANIUM SYLVATICUM** L. *57, Derbys.: Nutwood, near Ravister Rocks, Brassington, GR 43/21.55. Carboniferous limestone woodland. G. Challenger, 1980, **DBY**, det. E. Milne-Redhead & G. A. Matthews. *101, Kintyre: near Loch nan Torran, Ormsary, GR 16/77.70. B. H. Thompson, 1982, field record.

†168/3 × 4. **GERANIUM ENDRESSII** Gay × **G. VERSICOLOR** L. *48, Merioneth: between Corris and Aberllefenni, GR 23/7.0. Roadside. I. K. Morgan, 1982, **NMW**, det. P. M. Benoit.

†168/6. **GERANIUM PHAEUM** L. 73, Kirkcudbrights.: by Loch Milton, GR 25/83.71. O. M. Stewart, 1983, field record. 2nd record.

168/12. **GERANIUM ROTUNDIFOLIUM** L. *82, E. Lothian: Rugged Knowes, Milsey Bay, North Berwick, GR 36/56.85. E. P. Beattie, 1977, E. W. of Carlekemp Plantation, North Berwick, GR 36/53.85. O. M. Stewart, 1983, field record. 1st and 2nd records.

†170/2. **OXALIS CORNICULATA** L. *99, Dunbarton: Victoria Street, Dumbarton, GR 26/40.74. E. R. Brock, 1983, field record, conf. A. McG. Stirling.

†170/4. **OXALIS EUROPAEA** Jord. *99, Dunbarton: Helensburgh, GR 26/30.82. A. Rutherford, 1982, field record, conf. A. McG. Stirling.

†172/1. **AILANTHUS ALTISSIMA** (Mill.) Swingle 25, E. Suffolk: Henham, GR 62/46.76. Naturalized extensively in woodland. P. G. Lawson, 1982, field record. Beccles, GR 62/41.89. P. G. Lawson, 1982, field record. 1st and 2nd records.

†183/pol. **LUPINUS POLYPHYLLUS** Lindley *107, E. Sutherland: Strathsteven, 3 miles E. of Golspie, GR 29/88.01. B.S.B.I. Field Meeting, 1983, field record.

†184/alp. **LABURNUM ALPINUM** (Miller) Berchtold & J. Presl *70, Cumberland: W. of Pooley Bridge Pier, Ullswater, GR 35.46.24. Roadside. R. W. M. Corner, 1983, **LANC**.

185/2. **GENISTA ANGLICA** L. *107, E. Sutherland: The Mound, GR 28/77.99. J. K. Butler, 1982, field record. Dornoch Links, GR 28/80.88. B.S.B.I. Field Meeting, 1983, field record. 1st and 2nd records.

†190/1 × 2. **MEDICAGO FALCATA** L. × **M. SATIVA** L. *82, E. Lothian: Preston Grange, Prestonpans, GR 36/37.74. O. M. Stewart, 1980, E.

190/5. **MEDICAGO POLYMORPHA** L. †*69, Westmorland: by River Mint, Mealbank, Kendal, GR 34/5.9. C. E. Wild, 1983, field record, det. G. Halliday.

191/3. **MELILOTUS ALBA** Medic. 43, Rads.: Bult Road, GR 32/02.53. Station yard. R. G. Woods, 1983, field record. 2nd record.

192/16. **TRIFOLIUM SUFFOCATUM** L. 6, N. Somerset: Weston-super-Mare, GR 31/31.60. Sea-front lawn. R. Fitzgerald, 1983, **BRIST**, conf. D. E. Coombe. Rediscovery of record of c. 1850.

192/24. **TRIFOLIUM MICRANTHUM** Viv. 83, Midlothian: Royal Botanic Garden Nursery, GR 36/24.75. Lawn. N. Bishop, 1970, E. 1st post-1930 record.

192/occ. **TRIFOLIUM OCCIDENTALE** D. E. Coombe *4, N. Devon: Welcombe Mouth, GR 21/21.18. Maritime cliff. J. N. B. Milton, 1983, **CGE**, conf. D. E. Coombe.

200/3. **ASTRAGALUS GLYCYPHYLLOS** L. 81, Berwicks.: at junction of Ale and Eye Waters, GR 36/94.62. M. E. Braithwaite, 1978, **herb. M. E. B.** 1st post-1930 record.

206/2. **VICIA TETRASPERMA** (L.) Schreb. *81, Berwicks.: Newton near Swinton, GR 36/85.48. Disused sandstone quarry. M. E. Braithwaite, 1982, **herb. M. E. B.** 1st definite record.

†207/5. **LATHYRUS TUBEROSUS** L. *50, Denbs.: Marford Quarry, GR 33/35.55. A. G. Spencer, 1982, **NMW**.

†207/8. *LATHYRUS LATIFOLIUS* L. *73, Kirkcudbrights.: near Southernness, GR 25/97.54. O. M. Stewart, field record. *107, E. Sutherland: Dornoch Links, GR 28/80.88. B.S.B.I. Field Meeting, 1983, field record.

†207/gra. *LATHYRUS GRANDIFLORUS* Sibth. & Sm. *83, Midlothian: Ratho, GR 36/13.70. O. M. Stewart, 1977, E. *99, Dunbarton: Clyde shore near Dalmuir, GR 26/47.71. Waste ground. A. McG. Stirling, 1979, field record.

†208/1. *PHYSOCARPUS OPULIFOLIUS* (L.) Maxim. *85, Fife: The Wilderness, Ladybank, GR 37/32.10. G. H. Ballantyne, 1975, field record.

†209/2 × 1. *SPIRAEA DOUGLASII* Hook × *S. SALICIFOLIA* L. *99, Dunbarton: near Erskine Bridge, Old Kilpatrick, GR 26/46.72. Canal bank. A. McG. Stirling, 1980, E, conf. A. J. Silverside.

†209/2. *SPIRAEA DOUGLASII* Hook. 73, Kirkcudbrights.: Knockbex, GR 25/58.49. O. M. Stewart, 1983, field record. 2nd record. *78, Peebles.: Neidpath/Haylodge Park, Peebles, GR 36/23.40. Bank of River Tweed. D. J. McCosh, 1980, herb. D. J. McC., det. A. J. Silverside. *99, Dunbarton: Craggan, Loch Long, GR 26/26.99. Roadside. A. McG. Stirling, 1980, E, conf. A. J. Silverside.

†209/alb. *SPIRAEA ALBA* Duroi *99, Dunbarton: Rosneath, GR 26/25.82. Roadside. A. McG. Stirling, 1979, field record, conf. A. J. Silverside.

†209/jap. *SPIRAEA JAPONICA* L. fil. *41, Glam.: Merthyr Mawr, GR 21/87.77. S. Waldron & G. Ellis, 1982, NMW.

211/6 × 9. *RUBUS CAESIUS* L. × *R. IDAEUS* L. *17, Surrey: Great Bookham Common, GR 51/13.56. A. C. Leslie, 1982, field record, conf. A. Newton.

†211/8. *RUBUS SPECTABILIS* Pursh *74, Wigtowns.: Stranraer, GR 25/04.62. D. Irvine, 1981, GLAM, det. A. J. Silverside. *93, N. Aberdeen: Rathen, GR 48/00.59. R. Bell, 1975, field record, det. M. McC. Webster. Turriff, GR 38/70.51. D. Welch, 1983, ABD. 1st and 2nd records.

211/11/9. *RUBUS AFFINIS* Weihe & Nees *42, Brecks.: Abercraf, GR 22/83.12. M. Porter, 1983, herb. M. P., det. A. Newton.

211/11/18. *RUBUS LATIFOLIUS* Bab. *78, Peebles.: Glack Farm, Kirkton Manor, GR 36/21.37. D. J. McCosh, 1983, herb. D. J. McC., det. A. Newton.

†211/11/54. *RUBUS LACINIATUS* Willd. *70, Cumberland: Scotby, Carlisle, GR 35/4.5. Railway siding. R. Graham, 1940, CLE, det. A. Newton.

211/11/80. *RUBUS PYRAMIDALIS* Kalt. *69, Westmorland: N. W. of Moss House, Chapels, Furness, GR 34/22.84. G. Halliday & A. Newton, 1983, LANC.

211/11/99. *RUBUS SEPTENTRIONALIS* W. C. R. Wats. *78, Peebles.: Leithen Water, above Huthope, GR 36/28.45. D. J. McCosh, 1983, herb. D. J. McC., det. A. Newton. *101, Kintyre: Knapdale Forestry Ground, near Barnluasgan, GR 16/7.9. A. G. Kenneth, 1980, herb. A. G. K., det. E. S. Edees.

211/11/126. *RUBUS ERRABUNDUS* W. C. R. Wats. *78, Peebles.: Easter Happrew, 1 mile N.N.W. of Stobo, GR 36/19.39. D. J. McCosh, 1983, herb. D. J. McC., det. A. Newton. *101, Kintyre: Kilmichael of Inverlussa, GR 16/77.86. A. G. Kenneth, 1980, herb. A. G. K., det. E. S. Edees.

211/11/146. *RUBUS SPRENGELII* Weihe *75, Ayr.: Loch Ryan shore, near mouth of Water of App, GR 25/05.72. A. McG. Stirling, 1982, E.

211/11/182. *RUBUS MUCRONULATUS* Bor. *70, Cumberland: Banks, N.E. of Brampton, GR 35/56.64. A. Newton, 1976, field record.

211/11/191. *RUBUS LEYANUS* Rogers *35, Mons.: Glanau Wood, Trellech, GR 32/49.07. A. Newton, 1983, field record.

211/11/252. *RUBUS EURYANTHEMUS* W. C. R. Wats. *42, Brecks.: Penrhos, GR 22/79.11. M. Porter, 1983, herb. M. P., det. A. Newton.

211/11/297. *RUBUS RADULOIDES* (Rogers) Sudre *73, Kirkcudbrights.: Richorn, Dalbeattie, GR 25/83.59. O. M. Stewart & A. Newton, 1982, field record.

211/11/315. *RUBUS FURVICOLOR* Focke *101, Kintyre: Cairnbarn, GR 16/8.9. A. G. Kenneth, 1980, **herb. A. G. K.**, det. E. S. Edees.

212/12. *POTENTILLA CRANTZII* (Crantz) G. Beck ex Fritsch 104, N. Ebudes: Ben Suardal, Skye, GR 18/63.20. C. W. Murray, A. A. P. Slack & A. McG. Stirling, 1981, **herb. C. W. M.**, conf. H. J. B. Birks. 1st record for Isle of Skye.

212/14 × 15. *POTENTILLA ANGLICA* Laichard. × *P. REPTANS* L. *93, N. Aberdeen: Leith Hall, Kennethmont, GR 38/54.29. Lawn. M. McC. Webster, 1982, **E.**

†214/1. *DUCHESNEA INDICA* (Andr.) Focke 41, Glam.: Cardiff, GR 31/19.78. Spontaneous garden weed. D. B. Sanday, 1983, **NMW**, det. R. G. Ellis. 2nd record.

220/3/1. *ALCHEMILLA GLAUCESENS* Wallr. †*81, Berwicks.: Oldcastles, Chirnside, GR 36/85.58. Disused railway cutting. M. E. Braithwaite, 1982, **herb. M. E. B.**, det. M. E. Bradshaw.

222/1. *SANGUISORBA OFFICINALIS* L. 81, Berwicks.: Bemerside Moss S.S.S.I., GR 36/60.33. Wet meadow. M. E. Braithwaite, 1978, field record. 1st post-1930 record.

223/1. *SANGUISORBA MINOR* Scop. subsp. *MINOR* †*48, Merioneth: Morfa Mawddach, GR 23/6.1. Ballast of old railway track. K. M. & P. M. Benoit, 1981, **NMW**. 1st definite record.

†223/2. *SANGUISORBA MINOR* Scop. subsp. *MURICATA* Briq. *67, S. Northumb.: Wylam, GR 45/12.64. Disused railway track. G. A. Swan, 1983, **herb. G. A. S.**

†225/5. *ROSA RUGOSA* Thunb. *99, Dunbarton: Ardmore Point, GR 26/31.78. Shore. A. McG. Stirling, 1971, field record.

225/8 × 15. *ROSA CANINA* L. × *R. MICRANTHA* Borrer ex Sm. *42, Brecks.: Talgarth, GR 32/16.32. M. Porter, 1979, **herb. M. P.**, det. R. Melville.

225/12. *ROSA SHERARDII* Davies *26, W. Suffolk: Gt Barton, GR 52/89.66. I. M. Vaughan, 1982, **IPS**.

†226/5. *PRUNUS CERASUS* L. *29, Cambs.: Cherry Hinton, GR 52/48.55. Chalk pit. S. M. Walters, 1982, **CGE**. 1st definite record.

†232/4. *SORBUS INTERMEDIA* (Ehrh.) Pers. 107, E. Sutherland: Dornoch Links, GR 28/80.88. B.S.B.I. Field Meeting, 1983, field record. 2nd record.

†237/hel. *CRASSULA HELMSII* (T. Kirk) Cockayne *34, W. Gloucs.: N.E. of Coleford, Dean, GR 32/58.12. S. H. Bishop, 1983, **herb. S. H. B.**

246/2. *RIBES SPICATUM* Robson *80, Roxburghs.: Kershope Burn, below Kershope Bridge, GR 35/48.82. F. J. Roberts, 1981, **herb. R. W. M. Corner**, det. D. R. McKean. 94, Banffs.: Marypark, GR 38/18.38. Bank of river. M. McC. Webster, 1982, field record. 2nd record.

†*OSMARONIA CERASIFORMIS* (Torr. & Gr.) Greene *35, Mons.: Tintern, GR 31/53.99. Site of derelict garden. M. & C. Kitchen, 1983, field record.

†254/6. *EPILOBIUM CILIATUM* Raf. *104, N. Ebudes: Druimfearn, GR 18/69.16. Waste ground. M. McC. Webster, 1978, **E.**

†256/cam. *OENOTHERA CAMBRICA* Rostański 12, N. Hants.: Aldershot, GR 41/87.51. A. Mundell, 1980, **herb. K. Rostański**, det. K. R. 2nd record.

†256/fal. *OENOTHERA FALLAX* Renner emend. Rostański *29, Cambs.: near Earith, GR 52/3.7. J. S. L. Gilmour, S. M. Walters & P. D. Sell, 1951, **CGE**, det. K. Rostański. Between Hauxton and Trumpington, GR 52/4.5. P. D. Sell, 1952, **CGE**. 1st and 2nd records.

†256/per. *OENOTHERA PERANGUSTA* Gates [*12, N. Hants.: *Watsonia*, 13:334 (1981), has been redetermined as *O. cambrica*.]

†256/sal. *OENOTHERA SALICIFOLIA* Desf. ex G. Don *51, Flints.: Mold, GR 33/2.6. Waste ground. G. Wynne, 1962, **herb. G. W.**, det. K. Rostański.

†260/1. *GUNNERA TINCTORIA* (Molina) Mirb. *57, Derbys.: Chisworth, GR 33/99.99. Woodland. J. Hawksford, 1982, field record.

261/1. *HIPPURIS VULGARIS* L. *45, Pembs.: West Williamston, GR 22/03.05. Pool in limestone quarry. S. B. Evans, 1983, field record. [*45, Pembs.: *Watsonia*, 11: 395 (1977) is now considered to be erroneous.] 104, N. Ebudes: Allt Port na Cullaidh, Elgol Skye, GR 18/53.14. M. Gregory, 1981, field record. 2nd record for Isle of Skye.

262/3. *CALLITRICHE OBTUSANGULA* Le Gall *47, Monts.: Nant Droppings, near Dylife, GR 22/85.94. Old reservoir. A. J. Morton, 1980, field record. Dol-las, near Forden, GR 33/20.00. Pools behind gravelly bank of River Severn. M. Wainwright, 1980, field record. 1st and 2nd records.

262/5. *CALLITRICHE HERMAPHRODITICA* L. 107, E. Sutherland: Loch Evelix, 4 miles E. of Dornoch, GR 28/73.87. B.S.B.I. Field Meeting, 1983, field record. 2nd record.

272/2. *ERYNGIUM CAMPESTRE* L. 6, N. Somerset: near Bath, GR 31/7.5. Rough grassland. R. Hurst, 1968, field record, relocated by R. G. B. Roe, 1983, 1st post-1930 record.

277/3. *TORILIS NODOSA* (L.) Gaertn. 81, Berwicks.: St Abbs Head N.N.R., GR 36/91.68. M. E. Braithwaite, 1983, **herb. M. E. B.** 1st post-1930 record. 82, E. Lothian: Sheriff Hall, near North Berwick, GR 36/56.81. E. H. Jackson & A. J. Silverside, 1982, field record. 1st post-1930 record.

287/1. *SISON AMOMUM* L. 47, Monts.: Forden, GR 32/2.9. Hedgebank of wet field. J. Roper, 1983, field record. 1st definite record for 50 years.

298/1. *CRITHMUM MARITIMUM* L. *101, Kintyre: Rudha a'Mharaich, GR 16/58.12. B. H. Thompson, 1982, field record.

†309/3. *PEUCEDANUM OSTRUTHIUM* (L.) Koch 80, Roxburghs.: Billhope, Hermitage, GR 35/44.97. Naturalized near old cottage. R. W. M. Corner, 1983, **herb. R. W. M. C.** 1st record since 1873.

319/11. *EUPHORBIA EXIGUA* L. 59, S. Lancs.: Southport, GR 34/33.17. Garden weed. V. Gordon, 1982, field record. 1st post-1930 record.

†319/16. *EUPHORBIA CYPARISSIAS* L. 84, W. Lothian: near Philipstoun, GR 36/05.76. O. M. Stewart, 1980, field record. 1st post-1930 record.

319/17. *EUPHORBIA AMYGDALOIDES* L. *43, Rads.: Stanner, GR 32/26.57. C. A. Chadwell, 1982, field record. Worsell Wood, GR 32/25.58. Forestry track. R. G. Woods, 1983, field record. 1st and 2nd records.

320/12. *POLYGONUM HYDROPIPER* L. 84, W. Lothian: Linlithgow Loch, GR 36/0.7. O. M. Stewart, 1980, field record. 1st post-1930 record.

320/13. *POLYGONUM MITE* Schrank *67, S. Northumb.: Ramshope Burn, near Catcleugh Reservoir, GR 36/73.03. G. A. Swan, 1959, **herb. G. A. S.**, det. J. R. Akeroyd. 1st definite record.

320/14. *POLYGONUM MINUS* Huds. *67, S. Northumb.: Broomlee Lough, GR 35/79.69. G. A. & M. Swan, 1968, **herb. G. A. S.**

†320/20. *REYNOUTRIA SACHALINENSIS* (Friedrich Schmidt Petrop.) Nakai 43, Rads.: Howey, GR 32/05.58. R. G. Woods, 1983, field record. 2nd record.

†320/21. *POLYGONUM POLYSTACHYUM* Wall. ex Meisn. 25, E. Suffolk: Benhall, GR 26/38.61. A. F. Leverett, 1982, field record. 2nd record.

†320/22. *POLYGONUM CAMPANULATUM* Hook. f. *74, Wigtowns.: Drummole, GR 25/13.37. Coastal scrub, well naturalized. A. J. Silverside, 1981, **GLAM.**

†320/aub. *FALLOPIA AUBERTII* (Louis Henry) J. Holub *74, Wigtowns.: Monreith, GR 25/36.40. Cliff-top scrub, well naturalized. A. J. Silverside, 1981, **GLAM.**

325/1/3. *RUMEX TENUIFOLIUS* (Wallr.) Löve *69, Westmorland: Flodding Hill, Holmscales,

New Hutton, GR 34/56.86. Rocky outcrops. G. Halliday, 1982, **LANC**, det. D. H. Kent. *75, Ayr: Bogside, Stevenson, GR 26/31.40. Sandy waste ground. A. McG. Stirling, 1979, **E**.

325/7 × 11. *RUMEX AQUATICUS* L. × *R. CRISPUS* L. *99, Dunbarton: near Ross Priory, Loch Lomond, GR 26/41.87. Near loch shore with putative parents. J. Mitchell, 1976, field record, conf. D. H. Kent. 1st record for the British Isles.

325/8. *RUMEX LONGIFOLIUS* DC. 83, E. Lothian: E. of Drem, GR 36/53.79. Roadside verge. A. J. Silverside & E. H. Jackson, 1982, field record. 2nd record, 1st post-1930 record.

325/8 × 12. *RUMEX LONGIFOLIUS* DC. × *R. OBTUSIFOLIUS* L. *73, Kirkcudbrights.: by the B7000, N. of Nethercleugh, GR 25/61.86. O. M. Stewart, 1983, **E**.

†325/9 × 12. *RUMEX CRISTATUS* DC. × *R. OBTUSIFOLIUS* L. *35, Mons.: Rumney, Cardiff, GR 31/20.79. River bank. G. S. Walters, 1983, field record. *41, Glam.: Rumney, Cardiff, GR 31/20.79. River bank. G. S. Walters, 1982, **NMW**, det. D. H. Kent.

325/11 × 12. *RUMEX CRISPUS* L. × *R. OBTUSIFOLIUS* L. *70, Cumberland: Whitehaven, GR 25/98.17. Allotment. C. C. Haworth, 1982, **herb. C. C. H.**, det. D. H. Kent. *82, E. Lothian: Sheriff Hall, GR 36/56.81. A. J. Silverside & E. H. Jackson, 1982, **E**.

325/12 × 14. *RUMEX OBTUSIFOLIUS* L. × *R. SANGUINEUS* L. *82, E. Lothian: Dunglass Estate, GR 36/76.72. A. J. Silverside, 1983, **E**.

330/2. *ULMUS PROCERA* Salisb. †*94, Banffs.: Gordon Castle, Fochabers, GR 38/35.59. M. McC. Webster, 1982, field record.

†331/1. *FICUS CARICA* L. *49, Caerns.: Edeyrn, GR 23/2.3. Cliffs. A. M. Pell, 1982, **NMW**.

†336/2. *ALNUS INCANA* (L.) Moench *57, Derbys.: Drakelow, GR 43/22.20. A. Willmot, 1981, field record.

†341/2. *QUERCUS ILEX* L. 47, Monts.: Glascoed Farm, GR 33/23.21. E. D. Pugh, 1980, field record. 2nd record.

†342/2. *POPULUS ALBA* L. × *P. TREMULA* L. (= *P. × CANESCENS* (Ait.) Sm.) *69, Westmorland: E. side of A6 near Brougham, Penrith, GR 35/52.27. R. W. M. Corner, 1983, **LANC**. *70, Cumberland: S.E. of Hunsonby, GR 35/59.36. E. side of B5305, N. of Catterlen, GR 35/48.34. Both R. W. M. Corner, 1983, **LANC**. 1st and 2nd records. 79, Selkirks.: N. side of River Tweed, opposite Peel Hospital, GR 36/43.35. R. W. M. Corner, 1978, **herb. R. W. M. C.**, det. D. R. McKean. 1st record since 1911. 80, Roxburghs.: Oakendean near Melrose, GR 36/56.33. J. G. Roger, 1982, **herb. R. W. M. C.** 1st localised record.

343/2 × 4. *SALIX ALBA* L. × *S. FRAGILIS* L. *82, E. Lothian: Samuelston, GR 36/4.7. O. M. Stewart, 1980, **E**, det. R. C. L. Howitt.

343/6. *SALIX PURPUREA* L. *45, Pembs.: near Caerfarchell, GR 12/79.26. M. & R. Gulliver, 1982, **NMW**.

343/6 × 9. *SALIX PURPUREA* L. × *S. VIMINALIS* L. *82, E. Lothian: GR 36/4.7. O. M. Stewart, 1980, **E**, det. R. C. L. Howitt.

†343/7. *SALIX DAPHNOIDES* Vill. *69, Westmorland: Lambrigg, Grayrigg, GR 34/59.96. M. Baecker & R. Dalton, 1981, **LANC**, det. R. D. Meikle. 70, Cumberland: S. side of Kirk Beck, E. of Bewcastle, GR 35/57.74. G. Halliday, 1981, **LANC**, det. R. D. Meikle. 2nd record.

343/13 × 12b. *SALIX AURITA* L. × *S. CINEREA* L. subsp. *OLEIFOLIA* Macreight *82, E. Lothian: Monynut Water, Laughing Law, GR 36/73.64. A. J. Silverside & E. H. Jackson, 1982, field record.

343/13 × 16. *SALIX AURITA* L. × *S. REPENS* L. *102, S. Ebudes: Glas Aird, Scalasaig, Isle of Colonsay, GR 17/40.94. A. McG. Stirling, 1983, **E**.

†344/2. *LEDUM PALUSTRE* L. subsp. *GROENLANDICUM* (Oeder) Hultén 59, S. Lancs.: Wheelton Moor, above Heapy, near Chorley, GR 34/63.19. J. M. Smith, 1983, field record, det. A. Gunn. 2nd record.

346/1. *LOISELEURIA PROCUMBENS* (L.) Desv. **104**, N. Ebudes: Coir'an Eich, Cuillin Hills, Skye, GR 18/43.22. D. Horsfield, 1981, field record. S. E. ridge of Sgurr nan Gilleann, Cuillin Hills, Skye, GR 18/48.25. G. D. Field, 1982, **herb. C. W. Murray**. 1st and 2nd records since unlocalised record of 1887.

†351/1. *GAULTHERIA SHALLON* Pursh ***35**, Mons.: Trelleck, GR 32/49.07. T. G. Evans, 1983, field record. ***99**, Dunbarton: Kilcreggan, GR 26/23.80. Rocky ground near shore. A. McG. Stirling, 1983, **E**.

†352/1. *PERNETTYA MUCRONATA* (L.f.) Gaudich. ex Spreng. ***5**, S. Somerset: Yenworthy, Oare, GR 21/80.48. Established on moorland. C. J. Giddens, 1982, field record.

358/3. *VACCINIUM ULIGINOSUM* L. **80**, Roxburghs.: between Newlands and Steele Road, Newcastleton, GR 35/51.93. R. W. M. Corner, 1983, **herb. R. W. M. C.** 2nd record.

358/4. *VACCINIUM OXYCOCCOS* L. **104**, N. Ebudes: Isle of Wiay, Loch Bracadale, Skye, GR 18/29.36. A. Currie, 1981, **herb. C. W. Murray**, det. D. R. McKean. 1st record for Isle of Skye since 1868.

†358/6. *VACCINIUM MACROCARPON* Ait. ***45**, Pembs.: Cwm Dewi, Dinas, GR 22/00.39. *Molinia* bog on edge of fen. S. B. Evans & R. A. Lindsay, 1981, **NMW**. Established for at least 20 years.

365/1. *LIMONIUM VULGARE* Mill. **35**, Mons.: Goldcliff, GR 31/3.8. Upper saltmarsh. P. Baker & C. Titcombe, 1983, field record. Only extant record.

372/4. *ANAGALLIS MINIMA* (L.) E. H. L. Krause ***43**, Rads.: Llandeilo Graban, GR 32/09.43. R. G. Woods, 1983, field record.

387/1. *NYMPHOIDES PELTATA* (S. G. Gmel.) Kuntze **†93**, N. Aberdeen: Delgatie Castle, GR 38/75.50. D. Welch, 1983, field record. 1st record since 1904, at same locality.

388/1. *POLEMONIUM CAERULEUM* L. **†92**, S. Aberdeen: near Monymusk, GR 37/69.14. Abundant over several acres of recently felled coniferous woodland. P. R. Marren, 1982, field record. 1st post-1930 record.

†392/3. *SYMPHYTUM ORIENTALE* L. ***81**, Berwicks.: Birgham, GR 36/79.38. Hedge bank. M. E. Braithwaite, 1983, **herb. M. E. B.**

392/6. *SYMPHYTUM TUBEROSUM* L. **†48**, Merioneth: Gwastadedd, near Llandderfel, GR 33/0.3. Road verge. H. Handley, 1983, **herb. H. H.**, conf. A. O. Chater. 2nd record, probably rediscovery of original 1887 record.

†394/1. *TRACHYSTEMON ORIENTALIS* (L.) G. Don ***35**, Mons.: Tintern, GR 31/53.99. Well established in small meadow. T. G. Evans, 1983, field record. ***41**, Glam.: Porthkerry Wood, Barry, GR 31/09.67. Waste ground. R. Tidswell, 1983, **NMW**.

†*AMSINCKIA INTERMEDIA* Fischer & C. A. Meyer ***81**, Berwicks.: opposite Horncliffe, GR 36/ 92.49. River bank. M. E. Braithwaite, 1983, **herb. M. E. B.**

400/10. *MYOSOTIS RAMOSISSIMA* Rochel **73**, Kirkcudbrights.: Balmae Haven, GR 25/67.44. O. M. Stewart, 1983, **E**. 1st record since 1887.

403/1. *ECHIU M VULGARE* L. **73**, Kirkcudbrights.: Gipsy Point, Dundrennen GR 25/68.43. O. M. Stewart, 1982, **E**. 1st definite record since 1843.

†406/2. *CALYSTEGIA PULCHRA* Brummitt & Heywood ***99**, Dunbarton: Ardoch, Cardross, GR 26/35.76. A. McG. Stirling, 1970, field record.

†408/1. *NICANDRA PHYSALODES* (L.) Gaertn. **59**, S. Lancs.: Southport, GR 34/32.17. Tip. V. Gordon, 1982, field record. 2nd record.

413/3. *SOLANUM NIGRUM* L. **47**, Monts.: Llansantffraid, GR 33/21.19. F. H. Perring, 1980, field record. 2nd record. **†111**, Orkney: Alfred St, Stromness, GR 57/25.08. Garden weed. A. Thomson, 1982, field record. 1st post-1930 record.

416/7. *VERBASCUM NIGRUM* L. *43, Rads.: Nantmel, GR 32/02.66. Roadside verge. R. G. Woods, 1982, field record.

†420/2 × 3. *LINARIA PURPUREA* (L.) Mill. × *L. REPENS* (L.) Mill. *69, Westmorland: Glenridding, GR 35/38.16. M. Coulson, 1977, **LANC**, **herb. M. C.**, det. E. J. Clement.

420/3. *LINARIA REPENS* (L.) Mill. †94, Banffs.: Keith, GR 38/42.50. M. McC. Webster, 1982, field record. 2nd record.

422/2. *KICKXIA ELATINE* (L.) Dumort. 52, Anglesey: Clegir Mawr, Llanfairynghornwy, GR 23/30.90. Near Porth China, Aberffraw, GR 23/33.68. Both among arable crops. L. J. Rees, 1983, field records. 1st post-1930 records.

424/2. *SCROPHULARIA AURICULATA* L. *99, Dunbarton: near Shandon Church, GR 26/25.86. A. McG. Stirling & A. Rutherford, 1983, **E**.

†425/cup. × 1. *MIMULUS CUPREUS* Dombrain × *M. GUTTATUS* DC. *82, E. Lothian: Monynut Water, GR 36/73.64. A. J. Silverside & E. H. Jackson, 1983, **herb. A. J. S.**

†425/3. *MIMULUS MOSCHATUS* Dougl. ex Lindl. *106, E. Ross: Swordale, GR 28/06.98. E. H. Geldard, 1982, field record.

†430/14. *VERONICA PEREGRINA* L. *101, Kintyre: Northlea, Tarbert, Loch Fyne, GR 16/86.68. Garden weed. J. Dickson, 1982, field record.

432/2hib. *PEDICULARIS SYLVATICA* L. subsp. *HIBERNICA* D. A. Webb *102, S. Ebudes: near Uragaig, Isle of Colonsay, GR 17/39.97. A. G. Kenneth & A. McG. Stirling, 1983, **E**.

435/1/1. *EUPHRASIA MICRANTHA* Reichb. *78, Peebles.: Cramalt Head, GR 36/18.24. D. J. McCosh, 1980, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/1 × 1/13. *EUPHRASIA MICRANTHA* Reichb. × *E. NEMOROSA* (Pers.) Wallr. *78, Peebles.: Cramalt, GR 36/19.23. D. J. McCosh, 1980, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/17 × 1/1. *EUPHRASIA ARCTICA* Lange ex Rostrup × *E. MICRANTHA* Reichb. *78, Peebles.: Fruid Water, Tweedsmuir, GR 36/10.17. D. J. McCosh, 1982, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/15 × 1/2. *EUPHRASIA CONFUSA* Pugsl. × *E. SCOTTICA* Wettst. *78, Peebles.: Gaigy Middens, Fruid, GR 36/11.15. D. J. McCosh, 1982, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/17 × 1/2. *EUPHRASIA ARCTICA* Lange ex Rostrup × *E. SCOTTICA* Wettst. *78, Peebles.: Fruid Water, Tweedsmuir, GR 36/10.17. D. J. McCosh, 1982, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/13. *EUPHRASIA NEMOROSA* (Pers.) Wallr. *78, Peebles.: Talla Reservoir, Tweedsmuir, GR 36/10.22. D. J. McCosh, 1980, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/15 × 1/13. *EUPHRASIA CONFUSA* Pugsl. × *E. NEMOROSA* (Pers.) Wallr. *42, Brecks.: W. of Cefngorwydd, GR 22/89.43. M. Porter, 1978, **herb. M. P.**, det. A. J. Silverside. *82, E. Lothian: Laughing Law, GR 36/73.64. A. J. Silverside & E. H. Jackson, 1983, field record.

435/1/17 × 1/15. *EUPHRASIA ARCTICA* Lange ex Rostrup × *E. CONFUSA* Pugsl. *78, Peebles.: West Linton, GR 36/14.52. D. J. McCosh, 1974, **herb. D. J. McC.**, det. A. J. Silverside.

435/1/15 × 1/19. *EUPHRASIA CONFUSA* Pugsl. × *E. ROSTKOVIANA* Hayne *42, Brecks.: N.W. of Llanafon-fawr, GR 22/90.55. M. Porter, 1978, **herb. M. P.**, det. A. J. Silverside. 1st Welsh record.

435/1/17. *EUPHRASIA ARCTICA* Lange ex Rostrup *78, Peebles.: Cross Cryne, Biggar, GR 36/04.35. D. J. McCosh, 1980, **herb. D. J. McC.**, det. A. J. Silverside.

437/1. *PARENTUCELLIA VISCOSA* (L.) Caruel †69, Westmorland: Barrow-in-Furness Hospital at Hawcoat, GR 34/20.71. Newly-seeded area. G. Halliday, 1983, field record. 2nd record.

439/1. *LATHRAEA SQUAMARIA* L. 25, E. Suffolk: Priestley Wood, Barking, GR 62/08.53. J. Spencer & H. Barnett, 1983, field record. 2nd record.

440/3. *OROBANCHE RAPUM-GENISTAE* Thuill. **28**, W. Norfolk: Hockham, Hills and Holes, GR 52/90.95. On *Sarothamnus scoparius*. E. Campbell, 1983, field record, conf. C. P. Petch. 1st record since 1920.

440/4. *OROBANCHE ALBA* Steph. ex Willd. ***101**, Kintyre: Rudha Duin Bhain, near Largybaan, GR 16/59.14. Limestone cliff. E. Bignall, 1982, field record.

442/4. *UTRICULARIA MINOR* L. **81**, Berwicks.: Gordon Moss S.S.S.I., GR 36/63.42. G. Waldie, 1974, field record. 1st post-1930 record.

445/4 × 3. *MENTHA AQUATICA* L. × *M. ARVENSIS* L. **80**, Roxburghs.: Hare Moss, near Selkirk, GR 36/46.24. R. W. M. Corner, 1982, **herb. R. W. M. C.**, det. R. M. Harley. 1st localised record.

†472/afr. *PLANTAGO AFRA* L. ***41**, Glam.: Cardiff Docks, GR 31/1.7. Waste ground. J. Storrie, c. 1876, **NMW**, det. G. Ellis.

475/8. *CAMPANULA PATULA* L. ***47**, Monts.: near Hyssington, GR 32/3.9. Hedge bank. J. Warren, 1980, field record.

475/11. *CAMPANULA MEDIUM* L. ***49**, Caerns.: near Pwllheli, GR 23/3.3. A. P. Conolly, 1981, field record. Bangor, GR 23/5.7. Roadside bank. R. H. Roberts, 1982, field record. 1st and 2nd records.

476/1. *LEGOUSIA HYBRIDA* (L.) Delarb. **68**, Cheviot: S. of Craster, GR 46/25.19. G. A. Swan, 1983, **herb. G. A. S.** 2nd record, 1st record for over 100 years.

483/2. *ASPERULA CYNANCHICA* L. **61**, S. E. Yorks.: c. 1 mile E. of Settrington, GR 44/85.70. Chalk grassland. R. Jefferson, 1983, field record. 2nd extant record.

485/3a. *GALIUM MOLLUGO* L. **93**, N. Aberdeen: Leith Hall, Kennethmont, GR 38/54.29. Lawn. M. McC. Webster, 1982, **E.** 1st post-1930 record.

485/3b. *GALIUM ALBUM* Miller ***93**, N. Aberdeen: Inverurie, GR 38/77.22. D. Welch, 1983, **ABD**.

487/1. *SAMBUCUS EBULUS* L. **80**, Roxburghs.: Ashybank, W. of Denholm, GR 36/54.17. R. W. M. Corner, 1983, **herb. R. W. M. C.** 2nd extant record.

494/5. *VALERIANELLA DENTATA* (L.) Poll. **68**, Cheviot: S. of Craster, GR 46/25.19. Edge of cornfield. G. A. Swan, 1983, **herb. G. A. S.** Only extant record.

†496/1. *CENTRANTHUS RUBER* (L.) DC. ***107**, E. Sutherland: Meikleferry, 4 miles W. of Dornoch, GR 28/73.87. B.S.B.I. Field Meeting, 1983, field record.

498/1. *KNAUTIA ARVENSIS* (L.) Coult. **99**, Dunbarton: Dalmuir, GR 26/49.71. Roadside bank. A. McG. Stirling, 1983, **E.** 1st record this century.

499/1. *SCABIOSA COLUMBARIA* L. **81**, Berwicks.: Fouldon Dean, GR 36/92.54. M. E. Braithwaite, 1979, field record. 1st post-1930 record.

502/1. *BIDENS CERNUA* L. **81**, Berwicks.: Bemersyde Moss S.S.S.I., GR 36/61.33. Mire-pool edge. M. E. Braithwaite, 1978, **herb. M. E. B.** 1st post-1930 record.

†504/1. *AMBROSIA ARTEMISIIFOLIA* L. **44**, Carms.: Pont-y-fenni, GR 22/23.16. Roadside lay-by. R. D. Pryce, 1983, **NMW**, det. T. G. Evans. 2nd record, 1st record since 1911.

†506/13. *SENECIO FLUVIATILIS* Wallr. **80**, Roxburghs.: banks of River Tweed at Newstead, GR 36/56.34. J. G. Roger, 1979, field record. 2nd record. ***99**, Dunbarton: Cardross, GR 26/33.77. J. H. Penson, 1964, field record.

†506/ver. *SENECIO VERNALIS* Waldst. & Kit. ***85**, Fife: Dalgety Bay, GR 36/16.84. Waste ground. O. M. Stewart & J. Hewson, 1982, **herb. G. H. Ballantyne**. Kirkcaldy, GR 36/26.92. Re-seeded lawn. G. H. Ballantyne, 1983, field record. 1st and 2nd records.

†512/1. *INULA HELENIUM* L. ***99**, Dunbarton: between High Craigton and Carbeth, GR 26/52.78. Roadside. A. McG. Stirling, 1982, field record.

514/5. *FILAGO MINIMA* (Sm.) Pers. **79**, Selkirks.: Douglas Burn, near Craig Douglas, GR 36/29.24. On river gravel. R. W. M. Corner, 1983, **herb. R. W. M. C.** Only extant record.

515/2. *GNAPHALIUM NORVEGICUM* Gunn. **92**, S. Aberdeen: on S. side of Devil's Point, GR 43/97.95. A. G. Payne, 1979, field record. 2nd record.

†516/1. *ANAPHALIS MARGARITACEA* (L.) Benth. ***99**, Dunbarton: Bowling Harbour, GR 26/45.73. J. H. Penson, 1965, field record.

†518/4. *SOLIDAGO GRAMINIFOLIA* (L.) Salisb. ***69**, Westmorland: bank of River Brathay, by Old Brathay, Ambleside, GR 35/36.03. G. Halliday, 1983, **LANC.**

†519/7 × 6. *ASTER LAEVIS* L. × *A. NOVI-BELGII* L. ***99**, Dunbarton: Helensburgh, GR 26/31.82. Waste ground. A. Rutherford, 1983, field record, det. A. J. Silverside.

†519/8 × 6. *ASTER LANCEOLATUS* Willd. × *A. NOVI-BELGII* L. ***99**, Dunbarton: Bowling, GR 26/45.73. B.S.B.I. Field Meeting, 1982, field record, det. A. J. Silverside.

532/1. *MATRICARIA RECUTITA* L. **81**, Berwicks.: Haigsfield, GR 36/81.40. E. K. Swinton, 1950. M. E. Braithwaite, 1979, **herb. M. E. B.** 1st post-1930 record.

†534/1. *COTULA CORONOPIFOLIA* L. ***95**, Moray: Dyke, GR 28/98.57. Garden weed. M. McC. Webster, 1982, field record.

535/7. *ARTEMISIA MARITIMA* L. **81**, Berwicks.: Pettico Wick N. N. R., GR 36/90.69. C. Warman, 1981, **herb. M. E. Braithwaite**. 1st post-1930 record.

538/1. *ARCTIUM LAPPA* L. **73**, Kirkcudbrights.: Barlocco, GR 25/78.47. R. W. David & O. M. Stewart, 1983, field record. 1st post-1930 record.

542/1. *ONOPORDUM ACANTHIUM* L. †***42**, Brecks.: Crickhowell, GR 32/22.19. Edge of pasture. R. Waring, 1983, **NMW**, det. M. Porter †***47**, Monts.: Arddleen, GR 33/26.16. Disturbed ground. E. D. Pugh, 1981, field record. 1st localized record, 1st record for 150 years.

544/dil. *CENTAUREA DILUTA* Aiton ***45**, Pembs.: Strumble Head, GR 12/83.93. B. S. Leggett, 1982, **NMW**.

550/1pra. *LEONTODON AUTUMNALIS* L. subsp. *PRATENSIS* (Koch) Arcangeli ***68**, Cheviot: Hen Hole, Cheviot, GR 36/89.20. G. A. & M. Swan, 1983, **herb. G. A. S.**, det. C. Jeffrey.

†552/2 × 1. *TRAGOPOGON PORRIFOLIUS* L. × *T. PRATENSIS* L. ***29**, Cambs.: Litlington, GR 52/31.42. Meadow. R. H. Kyle, 1982, field record, conf. C. J. King. 1st definite record.

†552/2. *TRAGOPOGON PORRIFOLIUS* L. **26**, W. Suffolk: Boxford, GR 52/96.40. Roadside cutting. H. Mendel, 1983, field record, det. C. A. Green. 2nd extant record.

554/1. *LACTUCA SERRIOLA* L. ***50**, Denbs.: Llan-y-pwll, near Wrexham, GR 33/36.51. Sand quarry. J. B. Formstone, 1982, **NMW**.

†557/2. *CICERBITA BOURGAEI* (Boiss.) Beauverd ***80**, Roxburghs.: above Sprouston Burn. Newtown St Boswells, GR 36/57.32. Roadside verge. J. Blance, 1983, **herb. R. W. M. C.**, det. D. R. McKean.

†557/3. *CICERBITA MACROPHYLLA* (Willd.) Wallr. ***99**, Dunbarton: near Craigendoran Station. GR 26/30.81. Roadside verge. A. McG. Stirling, 1971, field record. ***101**, Kintyre: Crinan Canal, near Dunardry, GR 16/81.91. B. H. Thompson, 1982, field record.

558/1/32. *HIERACIUM DASYTHRIX* (E. F. Linton) Pugsl. ***104**, N. Ebudes: N. of Beinn Bhuidhe. N. of Kylerhea, GR 18/78.22. C. W. Murray, 1973, **ABD**, det. P. D. Sell.

558/1/52. *HIERACIUM CARNEDDORUM* Pugsl. ***43**, Rads.: Burfa Hill, GR 32/28.61. A. C. Powell, 1981, **NMW**, det. P. D. Sell.

558/1/63. *HIERACIUM JOVIMONTIS* (Zahn) Roffey ***104**, N. Ebudes: Balmeanach, Braes. Skye. GR 18/52.34. J. Palmer, 1979, **herb. J. P.**, det. C. West.

558/1/69. *HIERACIUM DICELLA* Sell & West ***94**, Banffs.: Inchrory, Tomintoul. GR 38/18.07. Limestone cliff. M. McC. Webster, 1982, **CGE**, det. P. D. Sell & C. West.

558/1/98. *HIERACIUM EXOTERICUM* Jord. ex Bor. s.str. *46, Cards.: Trawsgoed, GR 22/67.73. Open woodland. A. O. Chater, 1981, **NMW**, det. P. D. Sell.

558/1/112. *HIERACIUM PSEUDOSTENSTROEMII* Pugsl. 104, N. Ebudes: below Sgurr, Eigg, GR 17/46.84. C. W. Murray, 1973, **ABD**, det. P. D. Sell. 1st record for Isle of Eigg.

558/1/117. *HIERACIUM DIPTEROIDES* Dahlst. *104, N. Ebudes: Torrinn, Skye, GR 18/57.20. C. W. Murray, 1973, **ABD**, det. P. D. Sell.

558/1/138. *HIERACIUM CRAVONIENSE* (F. J. Hanb.) Roffey *81, Berwicks.: Longformacus, GR 36/68.57. M. E. Braithwaite, 1983, **herb. M. E. B.**

558/1/209. *HIERACIUM SUBCROCATUM* (E. F. Linton) Roffey *78, Peebles.: Black Burn, Winterhope, GR 36/17.20. D. J. McCosh, 1981, **herb. D. J. McC.** det. P. D. Sell.

558/1/cal. *HIERACIUM CALEDONICUM* F. J. Hanb. *75, Ayr.: Finnarts Bay, Glen App, GR 25/05.72. Old quarry. A. McG. Stirling, 1967, **herb. A. McG. S.**, det. P. D. Sell & C. West.

558/1/tri. *HIERACIUM TRIVIALE* Norrl. *78, Peebles.: Bowbeat Burn, Leithen, GR 36/28.46. D. J. McCosh, 1983, **herb. D. J. McC.**, det. P. D. Sell.

558/2/leur. *HIERACIUM PILOSELLA* L. subsp. *EURONOTUM* Naegeli & Peter *78, Peebles.: Blyth Bridge, GR 36/13.45. D. J. McCosh, 1981, **herb. D. J. McC.**, det. P. D. Sell.

558/2/1mel. *HIERACIUM PILOSELLA* L. subsp. *MELANOPS* Peter *78, Peebles.: Winterhope Burn, Megget Water, GR 36/19.20. A. J. Silverside, 1982, **herb. A. J. S.**

558/2/1mic. *HIERACIUM PILOSELLA* L. subsp. *MICRADENIUM* Naegeli & Peter *78, Peebles.: Underscar, Shieldgreen Kipps, N. of Peebles, GR 36/27.44. D. J. McCosh, 1981, **herb. D. J. McC.**, det. P. D. Sell.

558/2/1tri. *HIERACIUM PILOSELLA* L. subsp. *TRICHOSOMA* Peter *78, Peebles.: Kingledores, GR 36/11.27. D. J. McCosh, 1981, **herb. D. J. McC.**, det. P. D. Sell.

†558/2/7car. *HIERACIUM AURANTIACUM* L. subsp. *CARPATICOLA* Naegeli & Peter *93, N. Aberdeen: Inverurie, GR 38/77.22. Railway. D. Welch, 1983, **ABD**. *107, E. Sutherland: Evelix, GR 28/7.9. Roadside verge. B.S.B.I. Field Meeting, 1983, field record, det. M. J. Burnhill.

559/8. *CREPIS PALUDOSA* (L.) Moench 43, Rads.: Llanbadarn Ffynydd, GR 32/09.78. C. A. Chadwell, 1982, field record. 1st post-1930 record. *46, Cards.: Cwm Einon, GR 22/69.94. W. M. Condry, 1983, field record.

562/1. *LURONIUM NATANS* (L.) Raf. 52, Anglesey: Mynachdy, Llanfairynghornwy, GR 23/30.92. Llyn Dinam, GR 23/31.77. Both P. Day, 1983, field records. 1st post-1930 records.

†570/3. *ELODEA NUTTALLII* (Planch.) St John *33, E. Gloucs.: Cotswold Water Park, Lechlade, GR 42/21.01. S. C. Holland, 1983, field record, det. A. L. Grenfell. *34, W. Gloucs.: Cherington Lake, N. of Tetbury, GR 31/89.98. S. C. Holland, 1983, **herb. S. C. H.**, det. A. L. Grenfell.

577/2. *POTAMOGETON POLYGONIFOLIUS* Pourr. *82, E. Lothian: Aikengall Water, Sheeppath Glen, Lammermuir Hills, GR 36/68.70. Sir George Taylor, 1982, **BM, E.**

577/9. *POTAMOGETON PERFOLIATUS* L. 43, Rads.: River Ithon near Disserth, GR 32/04.59. C. A. Chadwell, 1982, field record. 2nd record.

577/15. *POTAMOGETON BERCHTOLDII* Fieb. 84, W. Lothian: Linlithgow Loch, GR 26/99.77. O. M. Stewart, 1980, field record. 1st post-1930 record.

577/19. *POTAMOGETON CRISPUS* L. 104, N. Ebudes: Loch Dubhar-sgoth, below Ben Edra, Skye, GR 18/45.63. H. J. B. Birks & C. W. Murray, 1983, **herb. C. W. M.** 1st localised record, 1st post-1930 record.

577/20 × 21. *POTAMOGETON FILIFORMIS* Pers. × *P. PECTINATUS* L. *83, Midlothian: Duddingston Loch, Edinburgh, GR 36/2.7. In Terras Herbarium, 1886, **E.** det. D. R. McKean.

598/1. *ORNITHOGALUM UMBELLATUM* L. †**42**, Brecks.: Llanhamlach, GR 32/08.26. River bank. D. R. Morgan, 1983, **NMW**, det. M. Porter. 1st localised record.

†600/2. *HYACINTHOIDES HISPANICA* (Miller) Rothm. ***69**, Westmorland: Honeybee wood, Brigsteer, Kendal, GR 34/48.89. Soil dump in wood. T. C. G. Rich & D. P. Earl, 1982, field record.

†601/1. *MUSCARI NEGLECTUM* Guss. ex Ten. ***44**, Carms.: Pembrey Forest, GR 22/40.02. Edge of ride. I. K. Morgan, 1983, field record.

605/7/amb. *JUNCUS AMBIGUUS* Guss. ***25**, E. Suffolk: Languard Common, Felixstowe, GR 62/28.32. A. Copping, 1983, **herb. E. M. Hyde**, conf. C. A. Stace. 1st definite record. **46**, Cards.: Ynys-las, GR 22/61.92. Brackish peat. A. O. Chater, 1983, **NMW**, det. C. A. Stace. ***67**, S. Northumb.: mouth of River Wansbeck, GR 45/30.85. S. of Cresswell, GR 45/30.91. Both G. A. Swan, 1983, **herb. G. A. S.**, det. C. A. Stace. 1st and 2nd records. ***68**, Cheviot: Inner Farne, GR 46/21.35. B. Sowerby, 1953, **BM**, det. T. A. Cope. Holy Island, GR 46/10.43. G. A. Swan, 1983, **herb. G. A. S.**, det. C. A. Stace. 1st and 2nd records. **70**, Cumberland: Drigg Dunes, GR 34/06.96. C. C. Haworth, 1983, field record. 2nd record. ***73**, Kirkcudbrights.: Preston Merse, GR 25/95.54. O. M. Stewart, 1983, **E**.

605/9 × 8. *JUNCUS INFLEXUS* L. × *J. EFFUSUS* L. ***61**, S. E. Yorks.: Rise Park, GR 54/14.41. F. E. Crackles, 1983, **herb. F. E. C**.

605/13. *JUNCUS BALTICUS* Willd. **85**, Fife: St Andrews Links, GR 37/50.17. Dune hollows. P. K. Kinnear, 1982, field record. 2nd extant record.

605/14. *JUNCUS MARITIMUS* Lam. ***81**, Berwicks.: Reed Point, GR 36/77.72. Salt marsh. B.S.B.I. Field Meeting, 1978, field record.

†606/4. *LUZULA LUZULOIDES* (Lam.) Dandy & Wilmott **69**, Westmorland: Appleby Castle grounds, GR 35/68.19. Sir Charles Willink, 1980, **LANC**. 2nd record.

†*YUCCA RECURVIFOLIA* Salisb. ***41**, Glam.: Crymlyn Burrows, Swansea, GR 21/7.9. Sand dunes. B. M. Sturdy, 1982, field record, det. M. E. Gillham.

607/5. *ALLIUM VINEALE* L. ***95**, Moray: Kearn Farm, near Hopeman, GR 38/1.6. Roadside verge. M. McC. Webster, 1982, **E**. **101**, Kintyre: W. of Borgadel Water, GR 16/60.07. B. H. Thompson, 1982, field record. Significant extension of range.

†607/9b. *ALLIUM ROSEUM* L. subsp. *BULBIFERUM* (DC.) E. F. Warb. ***44**, Carms.: Capel Hendre, GR 22/59.11. Churchyard. A. M. Pell, 1982, **NMW**, det. R. G. Ellis.

†*NECTAROSCORDUM SICULUM* (Ucria) Lindley ***41**, Glam.: Roath Park, Cardiff, GR 31/18.78. Naturalized on bank of stream. V. G. Ellis, 1983, **NMW**, det. R. G. Ellis. Porthkerry Park, GR 31/09.66. Naturalized on top of cliff. R. Tidswell, 1983, **NMW**, det. R. G. Ellis. 1st and 2nd records. ***42**, Brecks.: Gliffaes, Crickhowell, GR 32/17.19. B. M. Evans, 1983, **NMW**, det. R. G. Ellis.

611/1. *LEUCOJUM VERNUM* L. †***80**, Roxburghs.: Jed Water, below Ferniehirst Castle, GR 36/65.17. M. E. Braithwaite, 1978, field record.

†616/5. *IRIS GERMANICA* L. ***82**, E. Lothian: Ferny Ness, near Longniddry, GR 36/44.77. Sand dunes. A. J. Silverside, 1981, field record.

†617/1. *HERMODACTYLIS TUBEROSUS* (L.) Mill. ***45**, Pembs.: Manorbier, GR 21/06.97. D. Rees, 1981, **NMW**, conf. S. B. Evans.

†621/2. *GLADIOLUS COMMUNIS* L. subsp. *BYZANTINUS* (Miller) A. P. Hamilton ***41**, Glam.: Nash Point, GR 21/91.68. Sea cliff. B.S.B.I. Field Meeting, 1983, **NMW**. Established for at least 10 years.

†*CURTONUS PANICULATUS* (Klatt) N. E. Br. ***44**, Carms.: Machynys, Llanelli, GR 21/5.9. Rubbish dump. I. K. Morgan, 1983, **NMW**.

625/1. *EPIPACTIS PALUSTRIS* (L.) Crantz **35**, Mons.: Cwm Llanwenarth, Govilon, GR 32/25.12. Meadow. G.T.N.C./M.P.S. 'Grasslands' team, 1983, field record. 2nd record.

- 625/6. *EPIPACTIS PHYLLANTHES* G. E. Sm. *65, N.W. Yorks.: Richmond, GR 45/18.00. F. Horsman, 1983, field record.
- 628/2. *LISTERA CORDATA* (L.) R. Br. *46, Cards.: Pencreigiau'r Llan, GR 22/74.94. A. O. Chater, W. M. Condry & D. G. Jones, 1983, field record. 82, E. Lothian: above Aikengall Water, Sheeppath Glen, Lammermuir Hills, GR 36/68.70. A. Younger, 1982, field record. 2nd record, 1st post-1930 record. 85, Fife: St Michael's Wood, Leuchars, GR 37/44.23. Dune heath in pine plantation. S. J. Leach & P. Kinnear, 1982, field record. 2nd extant record.
- 629/1. *NEOTTIA NIDUS-AVIS* (L.) Rich. 92, S. Aberdeen: at the Shooting Greens, near Kincardine O'Neil, GR 37/62.95. Under birch scrub. M. Wilson, 1981, field record. 2nd record.
- 631/1. *HAMMARBYA PALUDOSA* (L.) Kuntze 73, Kirkcudbrights.: Cairnaber, GR 25/48.75. P. Starley & O. M. Stewart, 1983, field record. 2nd record.
- 635/1. *COELOGLOSSUM VIRIDE* (L.) Hartm. 73, Kirkcudbrights.: Ken Valley, GR 25/6.8. P. Starley, 1980, E. 1st record since 1897.
- 638/1. *PLATANThERA CHLORANTHA* (Custer) Reichb. 92, S. Aberdeen: N. bank of River Dee at Abergeldie, GR 44/28.95. P. Batty, 1983, field record. 1st post-1930 record.
- 643/3b. *DACTYLORHIZA INCARNATA* (L.) Soó subsp. *PULCHELLA* (Druce) Soó *99, Dunbarton: Craigton, Milngavie, GR 26/54.76. F. G. Rodway & A. McG. Stirling, 1982, field record.
- 643/3f. *DACTYLORHIZA INCARNATA* (L.) Soó subsp. *OCHROLEUCA* (Boll) Hunt & Summerh. *41, Glam.: Kenfig Burrows, GR 21/7.8. D. M. Turner-Ettlinger, 1982, field record.
- 649/2. *ARUM ITALICUM* Mill. †73, Kirkcudbrights.: New Abbey, GR 25/96.65. Sandy bank by Pow Burn. O. M. Stewart, 1983, E. 1st post-1930 record.
- †650/minus. *LEMNA MINUSCULA* Herter *25, E. Suffolk: Orford, GR 62/42.49. Drainage ditch behind sea wall. A. M. Boucher, 1983, field record, conf. A. C. Leslie.
- 651/1. *WOLFFIA ARRHIZA* (L.) Hork. ex Wimm. *35, Mons.: Goldcliff, GR 31/35.38. Abundant in reen. P. R. Glading, 1983, NMW. Only extant Welsh record.
- 652/2. *SPARGANIUM EMERSUM* Rehm. *107, E. Sutherland: Loch Evelix, 4 miles W. of Dornoch, GR 28/73.87. B.S.B.I. Field Meeting, 1983, field record.
- 652/4. *SPARGANIUM MINIMUM* Wallr. 81, Berwicks.: Gordon Moss S.S.S.I., GR 36/63.42. M. E. Braithwaite, 1982, herb. M. E. B. 1st post-1930 record. 85, Fife: Tentsmuir Forest, GR 37/49.26. S. J. Leach, 1983, field record. 2nd record, only extant record.
- 654/3. *ERIPHORUM LATIFOLIUM* Hoppe 104, N. Ebeudes: near Balmeanach, Raasay, GR 18/56.40. H. J. B. Birks, 1981, field record. 1st post-1930 record for Isle of Raasay.
- 655/5. *SCIRPUS HOLOSCHOENUS* L. 41, Glam.: Cardiff Docks, GR 31/19.75. Marshy ground. R. Tidswell, 1983, NMW. 2nd extant record.
- 655/8. *SCIRPUS LACUSTRIS* L. 84, W. Lothian: Linlithgow Loch, GR 36/00.77. O. M. Stewart, 1980, field record. 2nd record.
- 656/2. *ELEOCHARIS ACICULARIS* (L.) Roem. & Schult. 92, S. Aberdeen: Queen's Loch, Aboyne, GR 37/52.97. B. M. Gerrie, 1978, field record. 1st post-1930 record.
- 656/3. *ELEOCHARIS QUINQUEFLORA* (F. X. Hartmann) Schwarz 46, Cards.: Mwnt, GR 22/19.52. A. O. Chater, 1983, field record. 2nd record.
- 657/2. *BLYSMUS RUFUS* (Huds.) Link 81, Berwicks.: Reed Point, GR 36/77.72. Salt marsh. B.S.B.I. Field Meeting, 1979, field record. 1st post-1930 record.
- 663/7. *CAREX LEPIDOCARPA* Tausch *93, N. Aberdeen: Corsemaul, GR 38/39.40. D. Welch, 1983, ABD.
- 663/9pul. *CAREX SEROTINA* Mérat subsp. *PULCHELLA* (Lönnr.) Van Ooststr. *41, Glam.: Oxwich, GR 21/5.8. Edge of dunes. P. Jones, 1982, NMW, det. A. O. Chater & R. W. David.

663/15. *CAREX PSEUDOCYPERUS* L. **44**, Carms.: Laugharne Burrows, GR 22/28.07. J. Rees & I. K. Morgan, 1983, **NMW**, det. S. B. Evans. 2nd record, 1st record since c. 1840.

663/16 × 17. *CAREX ROSTRATA* Stokes × *C. VESICARIA* L. ***35**, Mons.: Llwyn-y-celyn, GR 31/47.94. T. G. Evans, 1983, **NMW**, det. A. O. Chater.

663/22. *CAREX PENDULA* L. **81**, Berwicks.: Dunglass Burn, GR 36/77.72. B.S.B.I. Field Meeting, 1979, field record. 1st post-1930 record.

663/27. *CAREX VAGINATA* Tausch **78**, Peebles.: Stirk Craig, Gameshope, GR 36/14.14. D. J. McCosh, 1983, **herb. D. J. McC.** 2nd record.

663/32. *CAREX HIRTA* L. **104**, N. Ebudes: Armadale, Skye, GR 18/63.03. A. Lee & J. W. Clark, 1982, **herb. C. W. Murray**, det. A. O. Chater & R. W. David. 1st record for Isle of Skye.

663/33. *CAREX LASIOCARPA* Ehrh. **81**, Berwicks.: Lurgie Loch S.S.S.I., GR 36/67.34. C. O. Badenoch, 1980, **herb. M. E. Braithwaite**. 1st post-1930 record. **85**, Fife: Dunbog Bog, GR 37/27.16. S. J. Leach, 1983, field record. 2nd extant record.

663/44. *CAREX NORVEGICA* Retz. **92**, S. Aberdeen: Glen Callater, GR 44/21.80. A. G. Payne, 1978, field record. 2nd record.

663/46. *CAREX ELATA* All. ***35**, Mons.: Whitson, Llanwern, GR 31/37.85. P. R. Glading, 1983, **NMW**, conf. A. O. Chater. **45**, Pembs.: Penally, GR 21/11.98. S. B. Evans, 1982, field record. 2nd record.

663/47. *CAREX ACUTA* L. ***45**, Pembs.: Haverfordwest, GR 12/95.16. J. Comont, 1982, field record. **52**, Anglesey: Llyn Pandy, Llangefni, GR 23/45.76. P. Day, 1983, field record. 1st post-1930 record, confirmation of an old record. **81**, Berwicks.: Dryburgh Suspension Bridge, GR 36/58.32. N. T. H. Holmes, 1973, **herb. R. W. M. Corner**. 1st post-1930 record.

663/56 × 54. *CAREX DIANDRA* Schrank × *C. PANICULATA* L. ***75**, Ayr.: Loch Lochton, 3 miles N.W. of Lendalfoot, GR 25/17.92. A. McG. Stirling, 1978, **BM, E**, det. R. W. David & A. O. Chater. 1st record for Scotland.

663/56. *CAREX DIANDRA* Schrank ***106**, E. Ross: Strathroary Valley, GR 28/68.77. A. S. MacIennan, 1983, field record.

†663/59. *CAREX VULPINOIDEA* Michx. ***75**, Ayr.: Dalry, GR 26/29.49. Site of old tip. B. Simpson, 1981, field record, det. A. O. Chater & A. C. Jermy.

663/68. *CAREX MURICATA* L. **79**, Selkirks.: Blakehope Hill, Caddonfoot, GR 36/44.34. R. W. M. Corner, 1983, **herb. R. W. M. C.** 1st record since 1917.

663/76. *CAREX RUPESTRIS* All. **104**, N. Ebudes: Ben Suardal, Skye, GR 18/63.20. C. W. Murray, A. A. P. Slack & A. McG. Stirling, 1981, **CGE, herb. C. W. M.**, det. R. W. David. 1st record for Isle of Skye.

670/2 × 3. *FESTUCA ARUNDINACEA* Schreb. × *F. GIGANTEA* (L.) Vill. ***74**, Wigtowns.: Glenluce, GR 25/18.58. A. J. Silverside, 1981, **GLAM**.

†670/5. *FESTUCA HETEROPHYLLA* Lam. **81**, Berwicks.: Mellerstain, GR 36/64.39. R. W. M. Corner, 1980, **herb. R. W. M. C.** 2nd record.

670/6pru. *FESTUCA RUBRA* L. subsp. *PRUINOSA* (Hackel) Piper ***73**, Kirkcudbrights.: Rockcliffe, GR 25/84.53. Seashore. R. Mackechnie, 1946, **E**. 1st definite record.

670/9. *FESTUCA TENUIFOLIA* Sibth. ***49**, Caerns.: near Moel-y-ci, Tergarth, GR 23/5.6. R. H. Roberts, 1982, field record. 1st definite record.

†670/dif. *FESTUCA DIFFUSA* Dumort. ***49**, Caerns.: Llaniestyn, GR 23/28.33. Derelict garden. A. P. Conolly, 1981, **herb. A. P. C.**, det. S. Cunningham.

670/gue. *FESTUCA GUESTFALICA* Boenn. ex Reichenb. ***29**, Cambs.: Cambridge, GR 52/4.5. J. S. Henslow, 1825, **CGE**, det. P. J. O. Trist. Hildersham Furze Hill, GR 52/55.48. G. Crompton & J. Heap, 1981, **CGE**, conf. P. J. O. Trist. 1st and 2nd records.

†671/2 × 1. *LOLIUM MULTIFLORUM* Lam. × *L. PERENNE* L. *82, E. Lothian: Sheriff Hall, GR 36/56.81. A. J. Silverside & E. H. Jackson, 1982, E.

673/2. *PUCCINELLIA DISTANS* (L.) Parl. 17, Surrey: A23 N. of Merstham, GR 51/28.55. G. D. Kitchener, 1983, field record. 2nd record.

674/2. *CATAPODIUM MARINUM* (L.) C. E. Hubbard *67, S. Northumb.: North Blyth, GR 45/32.81. Open ground, heavily contaminated with alumina. A. W. Davison, 1983, **herb. G. A. Swan**. 1st definite record. 81, Berwicks.: Breeches Rock, Burnmouth S.S.S.I., GR 36/95.62. Sea cliff. B.S.B.I. Field Meeting, 1979, field record. 2nd record.

676/11. *POA ANGUSTIFOLIA* L. *74, Wigtowns.: Lochinch, GR 25/1.6. R. Mackechnie, 1973, E.

†676/14. *POA PALUSTRIS* L. 48, Merioneth: Bala Lake, GR 23/9.3. P. M. Benoit, 1982, **NMW**. 2nd record.

†676/15. *POA CHAIXII* Vill. *43, Rads.: Llandrindod, GR 32/05.60. R. G. Woods, 1983, field record. 46, Cards.: Maestir Churchyard, GR 22/55.49. A. O. Chater, 1983, **NMW**. 2nd record.

681/1. *MELICA UNIFLORA* Retz. *94, Banffs.: Gordan Castle, Fochabers, GR 38/35.59. M. McC. Webster, 1982, field record.

†683/4. *BROMUS INERMIS* Leyss. 83, Midlothian: Musselburgh, GR 36/33.72. E. H. Jackson, 1976, E, det. A. J. Silverside. 1st post-1930 record. *99, Dunbarton: near Cardross Station, GR 26/34.77. A. McG. Stirling, 1982, E.

683/6. *BROMUS MADRITENSIS* L. 26, W. Suffolk: Lakenheath, GR 52/7.8. M. Southwell, 1953, **CGE**, conf. P. J. O. Trist. 2nd record.

683/15. *BROMUS COMMUTATUS* Schrad. 74, Wigtowns.: Lochinch, GR 25/1.6. R. Mackechnie, 1969, E. 2nd record, 1st record since 1883.

685/4. *ELYMUS PYCNANTHUS* (Godron) Melderis *73, Kirkcudbrights.: Auchencairn Bay, GR 25/8.5. H. Milne-Redhead, 1972, **DFS**. Carsethorn, GR 25/99.59. O. M. Stewart & A. Newton, 1982, field record. 1st and 2nd records.

†687/jub. *HORDEUM JUBATUM* L. 41, Glam.: N. Cardiff, GR 31/13.81. G. Hutchinson, 1982, **NMW**, det. R. G. Ellis. 1st record for 50 years. *72, Dumfriess.: Riggfoot, Lochmaben, GR 35/08.83. Pasture. M. E. R. Martin, 1983, field record. *81, Berwicks.: Soutra Hill, GR 36/47.56. Road verge. M. E. Braithwaite, 1983, **herb. M. E. B.**

689/1. *KOELERIA CRISTATA* (L.) Pers. 79, Selkirks.: Blakehope Hill, Caddonfoot, GR 36/44.34. R. W. M. Corner, 1983, **herb. R. W. M. C.** 1st localized record.

†692/1. *AVENA FATUA* L. *99, Dunbarton: Renton, GR 26/38.79. Barley field. A. McG. Stirling & A. Rutherford, 1983, E.

†697/3mul. *AIRA CARYOPHYLLEA* L. subsp. *MULTICULMIS* (Dumort.) Bonnier & Layens *82, E. Lothian: S. of Macmerry, GR 36/43.71. Disused railway line. O. M. Stewart, 1981, field record.

701/5 × 3. *AGROSTIS STOLONIFERA* L. × *A. TENUIS* Sibth. *82, E. Lothian: E. of Drem, GR 36/53.79. Roadside verge. A. J. Silverside & E. H. Jackson, 1982, E.

701/4. *AGROSTIS GIGANTEA* Roth 104, N. Ebudes: Prabost, Skeabost Bridge, Skye, GR 18/41.50. Garden. C. W. Murray, 1979, **herb. C. W. M.**, det. D. R. McKean. 2nd record for Isle of Skye.

702/1. *APERA SPICA-VENTI* (L.) Beauv. 70, Cumberland: Great Salkeld, GR 35/55.36. Laneside. G. Halliday, 1983, **BM, LANC**. 1st record this century.

711/1. *HIEROCHLOE ODORATA* (L.) Beauv. *74, Wigtown: Lochinch, GR 25/1.6. R. Mackechnie, 1973, E.

†713/2. *PHALARIS CANARIENSIS* L. 43, Rads.: Nantmel, GR 32/01.65. Tip. R. G. Woods, 1983, field record. 2nd record.

†*PANICUM MILEACEUM* L. **44**, Carms.: near Carmarthen, GR 22/41.20. G. Hutchinson, 1983, field record. 2nd record.

†719/2. *DIGITARIA SANGUINALIS* (L.) Scop. **35**, Mons.: Rumney, Cardiff, GR 31/21.78. A. R. Perry, 1982, **NMW**. 2nd record.

†720/1. *SETARIA VIRIDIS* (L.) Beauv. ***99**, Dunbarton: Balloch, GR 26/38.82. Waste ground. A. McG. Stirling, 1983, **E**.

Book Reviews

A history of naturalists in North East England. Edited by A. G. Lunn. Pp. 112, with 4 pages of portraits as black & white photographs. Department of Adult Education, University of Newcastle-upon-Tyne. 1983. Price £2.00 + postage 33p (ISBN 0-9508982-0-1).

To mark the 150th anniversary of the founding of what is now the Natural History Society of Northumbria, the Department of Adult Education of the University of Newcastle arranged a series of lectures on naturalists associated with the North East over this period, most of whom had close connections with the Society. This admirable idea has now had an even more admirable outcome: revised versions of the lectures made available to a larger audience in the form of this modestly but neatly produced, commendably inexpensive booklet.

It is appropriate that it should be the North East that has set the rest of the British Isles such an example. Always outstanding for its intense regional patriotism, this has long been the home as well of much more than its fair share of able naturalists. Though marine biology has been, relatively speaking, the richest beneficiary, the late W. A. Clark has had no problem in filling 14 pages with accounts of noteworthy botanists. These include N. J. Winch, John Storey, Baker and Tate, the little-known John L. Luckley and, coming down to recent years, R. B. Cooke and George Temperley. More botanists, as well as more details of some of those whom Clark mentions, can be found in the sections on other branches of natural history. George Johnston and Robert Embleton, for example, feature mainly or solely as marine biologists; Thomas Belt is tucked away among the geologists; J. W. Heslop-Harrison receives good coverage as an entomologist as well.

The only wonder is that many publications of this kind have not been produced already, especially by local museums. It is an abiding mystery, indeed, that so many curators are content to spend their years studying and looking after collections while taking little or no interest in those responsible for forming them in the first place. As a result, opportunity after opportunity is lost of blending natural history with local history and thereby bringing together two areas of study which otherwise tend to exist in quite separate compartments. Let us hope that Newcastle has now set a trend.

D. E. ALLEN

Flora of the London area. Rodney M. Burton. Pp. xxii+225, with drawings by Graham Easy. London Natural History Society, London. 1983. Price £16.50 (ISBN 0-901009-02-4).

This is a local Flora produced in the modern format to which we have become accustomed from such works as *Sussex Plant Atlas* by P. C. Hall (1980) and *Atlas of the Kent flora* by E. G. Philp (1982), that is to say the page size is approximately 30 cm × 20 cm, and there is an illustrated cover; in this case the picture is a photograph of the Tower of London taken from a low angle through summer herbage. There are entries for 2055 numbered species, and in addition there are passing references to many more of lesser importance that have not been allocated a number. The distributions of the species are recorded on a 2-km-square basis, and dot maps are given for the majority of them.

A prime consideration for any local Flora is for it to be clear about the extent of the region with which it is concerned. In this book the area covered is precisely delimited as a 68-cornered polygon, the sides of which are boundaries of 2 km squares of the National Grid. The question immediately arises, in what sense can this area of nearly 3,500 square km, easy to delimit on an ordnance survey map but more difficult to locate on the ground since it ignores all local landmarks, be regarded as "London"? Admittedly, previous authors from William Curtis onwards have been vague about the meaning they assigned to the word. Curtis's *Flora Londinensis* (1746–1799) and Robert Sweet's *Hortus suburbanus Londinensis* (1818) both include many plants that grow wild in and around London, but neither gives precise localities. Mariano Lagasca's *Hortus siccus Londinensis* (1826–1827) is more precise and is stated to be concerned with an area of 20 miles radius, but Alexander

Irvine's *The London Flora* (1838) includes all the home counties and extends to the English Channel. Daniel Cooper in *Flora Metropolitana* (1836) and Eyre de Crespigny in *A New London Flora* (1877) are content with a radius of 30 miles. Then E. B. Bishop, R. W. Robbins and H. Spooner in *Botanical records of the London area* (1929–1936) and D. H. Kent and J. E. Lousley in *A handlist of plants of the London area* (1951–1957) worked strictly within an area of radius 20 miles from St Paul's Cathedral in the City of London. The polygon used here *approximates* to this circle, which had been adopted by the London Natural History Society as its area of study in 1914, soon after its formation in the previous year by the amalgamation of the North London Natural History Society and the City of London Entomological and Natural History Society. It extends well beyond even the inflated limits of the administrative area of Greater London. The above details and references are given here because they are not to be found in the *Flora*, where only the Kent & Lousley *Handlist* is mentioned. This is in keeping with the modern trend in local Floras (for instance, the *Atlas of the Kent flora* mentioned above), which tend, partly perhaps because of the present-day high costs of printing, to omit that kind of information about previous writers that used to be included often under the heading *Botanologia*, and keep references to previous publications to a minimum. It is a pity though that no map is given similar to that in the *Handlist* showing place-names, so as to assist the reader in orientating localities at least approximately without having on every occasion to resort to ordnance maps. The *Handlist* was also meticulous in giving the vice-county for every record, but sadly there is no mention of them in the *Flora*. But the main disadvantage of the study area is that including records for such a heterogeneous region, and thus mixing up the urban areas of the Cities of London and Westminster and the London Boroughs with rural areas in the surrounding counties, blurs the picture of the plant life of a great city. The insights shown by the author in a recent essay entitled *Wildflowers in the Capital* (*Country Life*, 174: 1351–1355, 1983) are submerged in the *Flora* by his admittedly useful and interesting comments on plants in other types of environment. That he is conscious of this is shown in a paper on the function of a local Natural History Society in *The London Naturalist*, 62 (1983), in which he argues for computer-based storage of plant records for Greater London. In the *Flora*, however, he was committed to the study area of the London Natural History Society, since it is based on records collected by members of the Society during the period 1965–1976.

Another consideration of prime importance is the taxonomic system employed. The author has chosen to follow *Flora of the British Isles* by A. R. Clapham, T. G. Tutin & E. F. Warburg (2nd ed., 1962), when surely the revised pocket edition of this work (*Excursion Flora of the British Isles*, 3rd ed., 1981) or *Flora Europaea* (T. G. Tutin *et al.*, 1964–1980) would have been preferable. In any case many plants, mostly aliens, are recorded that are not mentioned in the *Flora of the British Isles*, and for them up-to-date names are used. A further criticism that has to be made is that the author has inappropriately made two new combinations in the genus *Amoria* (for segregates from *Trifolium*) in a note on the last page of the book, although they are not used in the text.

Many amateurs may find the author's decision to use the Clapham, Tutin & Warburg (1962) nomenclature acceptable because it is familiar to them, but whether they will like the way in which he has written the entire text as a continuous narrative is another matter. This unconventional approach has advantages, because it has made possible the inclusion of miscellaneous remarks about the identification and biology of the species listed based on wide experience and even wider reading without the restrictions imposed by a pre-determined more or less rigid format, and these are often very interesting. Useful hints on distinguishing related species are freely given, sometimes to the extent of setting out diagnostic features in tabular form (*Epilobium*) or as a dichotomous key (*Cotoneaster*). Many of the points made are further clarified by excellent drawings from the pen of Graham Easy, illustrating the leaves (e.g. *Chenopodium*), flowers (e.g. *Cerastium*), fruits (e.g. *Sisymbrium*) and whole plants (e.g. *Oxalis*) of in all 131 species. The reviewer rather likes this departure from formality, and suspects that there will be many other readers who will enjoy dipping into this book from time to time or even reading and re-reading it as if it were a novel, quite apart from looking up individual species to find particular information. Some of the formalities that have been discarded are not useless lumber, however. Authorities for names are not given in the text. Synonyms are not regularly given either, and families receive only casual occasional mention. The names of the latter do appear in running heads to the pages; but this is not very helpful, as confusions could occur. Thus, to quote but one example from many, *Dipsacus fullonum* might be thought to be a member of the Valerianaceae, as Dipsacaceae does not appear until one turns the page. Also,

families with few representatives only appear by the chances of the pagination; Azollaceae is given at the head of a page on which most of the species mentioned are conifers that are not assigned to families. The index does include families, authorities and some synonyms, but this is not a satisfactory substitute for their presence in the text.

This Flora has had a long gestation period: from 1965, when eleven years of recording began, and when that was completed another seven years until the publication of the book. Some of the reasons for delays are to be found in a lengthy account of the history and organisation of the London Natural History Society's plant mapping scheme given at the beginning. This is intended to be of assistance to future recorders and Flora writers but it is in fact advice on how to proceed in the 1960s, and the next *London Flora* is more likely to employ the data-bank techniques outlined in the author's paper on *The function of a local Natural History Society* mentioned above. Another reason for delay is the very great amount of dedicated voluntary effort that has gone into the work. The author's claim that, in spite of the publishing delay (for which he apologises) the end result is still a fair description of the present state of the flora, seems justified. Like other books of its kind it has its faults, but it stands up to comparison with them and it has its own particular virtues too. It is a worthy and worth-while account of the plant life to be found within a 20-mile radius of the City of London.

F. H. BRIGHTMAN

Collins guide to the ferns, mosses and lichens of Britain and Northern and Central Europe. Hans Martin Jahns. English edition translated and revised by E. Launert, A. Eddy and J. R. & R. J. Laundon. Pp. 272, with 655 colour photographs and 24 line drawings. Collins, London. 1983. Price £8.95 (ISBN 0-00-219254-3).

This compact book, well illustrated with excellent photographs, provides a good introduction to pteridophytes. The life cycle and variations in structure are outlined. Only two species native to Britain are not included, and hybrids (with one exception) have wisely been excluded.

Unfortunately, there are some proof errors, and the common name for *Phegopteris connectilis* (Beech Fern) is omitted. Some points are not clearly expressed, especially the distinction and relationship between 'true' ferns and allied plants (Clubmosses, Horsetails and Quillworts).

The sections on bryophytes and lichens are also very good, with the same high standard of illustrations.

J. M. CAMUS

Flowers of the wild—Ontario and the Great Lakes Region. Z. Zichmanis & J. Hodgins. 272 pp and 254 colour photos and line drawings. Oxford University Press, Toronto. 1983. Price £25.00 (ISBN 0-19-540390-8).

This is one of those very attractive books, with every evidence of the devoted concern of all those involved, which leave the reviewer asking the question "What is it for?" In these days, the term 'coffee table' has a strongly pejorative flavour, but, in many ways, this is a fair and informative description of this book, and is used here without any depreciatory intention. The main body of the book consists of two-page spreads, each devoted to a single species and including very good and well-reproduced colour photos with much less satisfactory line drawings. The latter give a reasonable impression of the general appearance of the plants but, all too often, reflect their origin from herbarium specimens rather than from life. Since most of the species depicted are common and widespread, it is far from clear why this should have been necessary. The drawings generally fail to supplement the photos in the ways that good botanical illustrations should, e.g. through enlarged details of flowers and fruit, although this function is implied in the Preface to be a feature of the book. The text by Mr Hodgins is very concise, but generally interesting and informative. Useful information is provided on the conditions needed for successful growth in cultivation, coupled with a strong conservation message that should deter thoughtless transplantation from the wild. References are given to papers where further information can be found, although some of these are

distinctly esoteric in the setting of the general level of the text. In some cases the world distribution is given under 'range', while in others the statement is confined to occurrence in North America. Thus British botanists will be surprised to find under *Cypripedium calceolus* only "Northern half of North America; throughout Ontario", while for *Potamogeton natans* mention is also made of Eurasia. Beginners, who will presumably be prominent among the users of the book, may be confused by the *Eriocaulon* inflorescences that appear in the photo of the latter, and the inclusion of an explanatory note at this point would have been a good idea. British botanists will enjoy seeing the photos of many European species that are widely naturalized in Canada, and, likewise, of species known to us as introductions growing in their native habitats. The pictures of the interesting and attractive species that have not crossed the Atlantic will encourage contemplation on the possibilities of a Canadian holiday.

In conclusion, we must return to the author's objectives in producing the book. These certainly cannot have included the publication of a practical manual for the identification of flowering plants from Ontario and the Great Lakes, since from the publisher's 'blurb' on the dust cover we learn that only 127 out of Ontario's total of nearly 2000 species are included. The best explanation comes from the preface by the Director of the Royal Ontario Museum where we find, "Believing that everyone ought to be something of an environmentalist, Zichmanis and Hodgins decided that a new book was needed to foster the appreciation that can help us make rational decisions about our natural environment". Rather an ambitious aim, but the book certainly reflects the author's own deep enjoyment and appreciation of both the aesthetic and scientific features of the plants depicted. If this comes across to readers as yet unmoved by the need to preserve the world's natural heritage, their efforts will not have been wasted. However, with the purchase price of £25, one fears that only a minute proportion of those who could benefit from this message will be reached.

J. F. M. CANNON

Flora of Connemara and the Burren. D. A. Webb & Mary J. P. Scannell. Pp. xlv+322, including 4 pages of colour plates and 25 black & white illustrations. Royal Dublin Society and Cambridge University Press, Cambridge, etc. 1983. Price £35.00 (ISBN 0-521-23395-X).

This long-awaited Flora covers what are arguably two of the most botanically popular and contrasting parts of Ireland. To the north of Galway Bay lie the rain-soaked quartzitic mountains of Connemara with its featureless glaciated coastal fringe and with the idyllic loughs of Mask and Corrib separating it from the central Irish plain to the east. South of the Bay rises the Burren, step upon step of bleak, dry limestone pavements, the best examples in north-western Europe. To the south-east the Burren hills fall away to a lowland limestone plain studded with lakes and turloughs; to the south-west the geology changes abruptly to shales and sandstones, terminating in the fine 160 m high sea-cliffs of the Cliffs of Moher.

The vascular flora of this area is very rich, comprising 82% of the native Irish species. Its interest lies in the many species which in Ireland are restricted to this area or have their headquarters there. These include such geographically disparate bed-fellows as *Hydrilla verticillata*, *Daboecia cantabrica*, *Dryas octopetala*, *Adiantum capillus-veneris* and *Hypericum canadense*. Also in this category are *Asplenium septentrionale* and *Arenaria norvegica*, both discovered relatively recently and new to Ireland; unfortunately the latter has never been re-found. Ecological contrasts and paradoxes abound: *Eleocharis multicaulis* and *Lythrum portula* on the limestone, *Teucrium scorodonia* on shattered limestone pavement (as in north-western England), *Juncus subnodulosus* on blanket bog, *Phragmites australis* on wall-tops, and even *Glyceria declinata* on a football pitch.

This is not a comital Flora although it does happen to cover all of West Galway (v.c. H16). Otherwise it includes a substantial part of Clare (v.c. H9) and very small parts of South-east and North-east Galway (v.cs H15 & 17). The authors have divided the area into eight districts of which two transgress vice-comital boundaries, and there are no doubt instances where it is not possible to allocate species for these two districts to individual vice-counties. The first published record from the area is cited for each species irrespective of vice-county.

Professor Webb commenced recording in 1962 and was assisted over the years by many botanists, particularly visitors from Britain. The actual starting date for records in the Flora is 1959; species

unrecorded since then are relegated to small type. To gain an objective picture of the frequency of the commoner species, species lists were compiled within a radius of 400 m at four or five selected sites in each 10 km square.

The Flora has the usual brief introductory essay on the area, its geology, soil and climate, the character of the flora, the habitats, the post-glacial vegetational history (by Professor W. A. Watts) and the history of botanical investigations. The arrangement of the systematic part will be familiar to Irish readers through *An Irish Flora* (Webb 1977) but since this is essentially a Bentham & Hooker sequence it may well puzzle the younger generation of British botanists. The Flora concludes with further brief essays on various cryptogamic groups of which those on mosses and liverworts (Dr M. E. Perry) and lichens (Dr A. R. Mitchell) will be particularly useful.

Although the authors make numerous helpful taxonomic comments I should like to have seen more. The lack of help with microspecies is a failing of almost all local Floras. To present a list of 10 or 20 *Hieracia* or *Rubi* leaves the interested reader with the unpalatable alternatives of either trying to extract the necessary information from the relevant monographs or abandoning the attempt. Surprisingly, no infraspecific taxa are mentioned under *Agrostis canina* nor are hybrids or intermediates in *Betula* and *Quercus*; hybrids between *Geum urbanum* and *G. rivale* are relegated to the latter—are back-crosses to the latter commoner in Ireland? Curiously there is no mention of *Hedera hibernica* although another recent western Flora, of Cornwall (Margetts & David 1981), gives this as the only ivy. Some 'old' names are retained, intentionally (*Epilobium nerterioides*) and no doubt unintentionally (*Rubus selmeri* for *R. nemoralis*). There are interesting comments on the status of *Salix repens* subsp. *argentea*; but in discussing the problems posed by *Potamogeton pusillus* and *P. berchtoldii* there is no mention of the usually conspicuous nodal glands in the latter, nor, in the comment under *Isoetes setacea*, is the useful note by Stokoe (1978) mentioned.

The authors have taken the opportunity of correcting various errors in the *Atlas* (Perring & Walters 1962) and *Atlas of ferns* (Jermy *et al.* 1978) but appear to have overlooked the single records in the *Critical Atlas* (Perring & Sell 1968) for *Arenaria leptoclados* and *Stellaria neglecta*. *Callitriche hermaphroditica* was actually collected by Charles Bailey at Cong (v.c. H16/17) in 1885, nearly 70 years before the record cited in the Flora.

The policy towards aliens is a restrictive one, only those which appear to be effectively naturalized being admitted. The more intermittent casuals are therefore excluded, and localities are given only for the usually planted hedgerow trees and shrubs where, as in the case of *Spiraea salicifolia*, they are spreading into adjacent habitats.

The format of the Flora is very pleasing—clear and with extremely few typographical errors. The plates, however, are disappointing. Those in black & white are half-tone and consequently rather dull and lifeless, and the same is true of several of the colour plates, especially that of The Twelve Pins. I dislike the striking but garish and stylised dust-jacket but even more the exorbitant price. Here we have an excellent, attractive, informative and well-written Flora, precisely intended for visitors to these two delightful parts of Ireland and yet denied to most by the high-price and surely short-sighted policy of the Cambridge University Press. By comparison the recently published *Simpson's Flora of Suffolk* (Simpson 1982) offers nearly twice the number of pages and 20 times as many pages of colour illustrations at half the price.

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G. HALLIDAY

The Flora of Iceland. Askell Löve. Pp. 403 with numerous line drawings and 9 watercolours. Almenna Bókafélagid, Reykjavik. 1983. Price not stated.

A copy of this book was given to me shortly before setting out on a botanical holiday in Iceland, so I was extremely pleased to turn to it instead of the 1970 edition in Icelandic I had struggled with up to then. But my delight soon turned to dismay when I noticed the changed nomenclature. Where was *Veronica chamaedrys*?—under *Veronicella*. *Veronica serpyllifolium* appears as *Veronicastrum serpyllifolium* and *Veronica fruticans* as *Petrodora fruticans*; worse still, *Veronica persica* and *V. agrestis* have been placed in *Pocilla*.

These are no isolated examples as it seems the author has split any genus that could be split. Thus there is *Acetosella vulgaris* for *Rumex acetosella* (with the new combination *A. multifida* published here!), *Acetosa pratensis* for *Rumex acetosa*, *Bistorta vivipara* for *Polygonum viviparum*, *Alsine media* for *Stellaria media* (in Alsinaceae, not Caryophyllaceae), *Spergella* is split from *Sagina*, *Oberna behen* subsp. *maritima* for *Silene vulgaris* subsp. *maritima* and so on.

Nomenclatural changes are inevitable, as every taxonomist regrets; but to ignore current publications such as *Flora Europaea* and to follow one's own ideas, presumably to boost the status of the small Icelandic flora, is confusing for the students for whom it is intended. Here the author has not only changed genera but recognised as many subspecies or varieties as possible. Of course the keys and descriptions are useful, but it is a pity there are no extra-Iceland distributions. There is also an illustration of every species, although enlargements of the diagnostic features would have been helpful. All in all, therefore, if you can wait for the forthcoming publication of the revised edition of Stefánsson's *Flora*, I think it will be a better buy.

F. N. HEPPER

Plant collecting and herbarium development: a manual. J. S. Womersley. Pp. 137. Food and Agriculture Organisation of the United Nations, Rome. 1981. (FAO Plant Production and Protection Paper 33). Price not stated (ISBN 92-5-101144-3).

This excellent manual, written by a former Director of the Botanic Garden and Herbarium (Department of Forestry, Division of Botany), Lae, Papua New Guinea, is designed for those setting up or administering a herbarium in developing countries but contains much of interest to all in the U.K. who visit such countries as part of university or other expeditions.

The first chapter, on field collecting, outlines the basic techniques and emphasised the kinds of information that should be written on the label. We are reminded that the minimum number of specimens of any gathering is two—one of them being left behind in the host country. Chapter II describes the preservation of specimens from drying or by chemical means. A number of chapters that follow are on: the function and organization of a herbarium; processing herbarium collections (distribution, fumigation, mounting, etc); herbarium curation (storage, filing systems, scientific work in herbaria), and ancillary services (photography, artists, library and culture). Appendices give instructions (written by specialist taxonomists with experience in field collecting) on particular groups (*Pandanus*, bananas, palms, bamboos, aroids and aquatic plants).

It is difficult to fault this book. It is written by one whose experience, though wide, is mainly based on working in the tropics, and wet tropics at that. It is also written for other tropical herbaria or government research institutes. It will, and does, therefore lack hints on Mediterranean collecting or tips on arctic tundra. However, it should be on the shelves of all universities and read by those whose research involves collecting and herbaria.

A. C. JERMY

Man's impact on vegetation. Geobotany 5. Edited by W. Holzner, M. J. A. Werger & I. Ikusima. Pp. xii+370, with frontispiece of Makoto Numata (in whose honour the volume is edited) and

numerous text figures and black & white plates. Dr. W. Junk Publishers, The Hague, Boston & London. 1983. Price Dfl 225.00 (ISBN 90-6193-685-3).

As the fifth in a series of compilation volumes, dealing with the broad aspect of geobotany, *Man's impact on vegetation* contains a stimulating collection of papers and essays, concentrating on the relevance of the human factor in ecological studies. The 27 papers are broadly divided into two sections; part one covers the more general aspects of man's impact on vegetation, while the majority of the work in part two, is devoted to his effect on the various vegetational zones. Examples are taken from a wide range of countries, but have a slight bias towards Europe and Japan. The similarities in man's treatment and the subsequent effect on vegetation, between these two countries, may surprise the reader who has previously concentrated on the British and European ecological literature. In the final chapter (pp. 341-357), Holzner compares the anthropogenic effect in Japan and Central Europe of denudation of primeval forest, afforestation by (often non-native) conifers, and coppiced forests, and the relationship between hunting and the increase in grassland and heathland (cf. Hara in Japan). He concludes that human impact generally keeps vegetation in the early stages of succession.

Not only do the papers summarize the history of dramatic vegetational change on a global scale, they also discuss the future effect of man on species diversity, as, for example, the one by Peet *et al.* (pp. 41-54). Sadly, the most seriously affected vegetation zone - the "humid tropical forest" - is discussed in detail in only one out of the 27 papers (Boerboom & Wiersum, pp. 83-106). It seems that although man has inhabited the forests since prehistoric times without affecting them greatly, the present rate of his impact, in terms of forest conversion, is estimated at between 120,000 and 245,000 km² per year.

Although it is not possible to do justice to all the excellent papers contained in this volume, I commend it to all who are interested in ecology, at whatever level.

S. G. KNEES

Elm. R. H. Richens. Pp. xii+347, with black & white frontispiece and 152 text-figures. Cambridge University Press, Cambridge. 1983. Price £35.00 (ISBN 0-521-24916-3).

The first impression of this book created by the noble English Elms on the dust jacket is favourable, so that one turns eagerly to see what is presented inside. A short introduction introduces the reader to some of the principal kinds of elm found in England, with figures of their habits. Then follows a chapter on botany, in which the author explains his biometrical research on elms. Seven measurements of the sub-apical leaves of the short shoots were used: the length, the length/breadth ratio, a ratio to define the degree of asymmetry of the leaf, the length and breadth of the principal teeth, the leaf stalk/leaf length ratio and the total number of major and minor teeth around the leaf margin. None of these criteria is critical for the determination of species. No measurements were made of the critical curvatures of the basal lobes of the leaf or of the curvature of the shoulder and leaf apex. The use of the computer appears to give an air of scientific finality to the analysis, but when no critical data are fed in, no critical conclusions can come out. The result is that the author can recognise only two species, one genuine (*Ulmus glabra* Huds.) and the Field Elm (*U. minor* sensu Richens), which is a conglomeration. In discussing botanical classification, after the two elms of Theophrastus (both regarded by Richens as Field Elm) and the two of Columella (perhaps distinct), little progress was made until Johnson's edition of Gerard's Herball (1633), and then again little until the reviewer began his study of elms in 1935. References to the elms referred to the Field Elm are given in an appendix. So Richens emerges as a super-lumper, turning full circle back to Columella. His computer segregates consist of species surrounded by a variable halo of hybrid forms, which obscure the true limits of the species and make a mockery of taxonomy.

A discussion of the pre-history of the elms leads to the assumption that the Wych Elm is the only one that reached England by natural migration in post-glacial times. The deduction follows that all the 'Field Elms' have been introduced by man; and this leads on to a study of the vernacular names of elms and an attempt to link them with the meagre evidence on the human settlement of Britain. This approach lies behind the detailed, county by county, discussion of elm distribution which occupies a

quarter of the book. One is left with a mental picture of Bronze Age warriors carrying little rooted elm suckers into an elm-infested Britain in an operation equivalent to 'carrying coals to Newcastle'. The misconceived biometrical technique has led to the collection of much historical information that was not readily available; and there are chapters on the utilization of elm products and on the elm in literature and art.

R. MELVILLE

A Checklist of the Flora of Cambridgeshire. G. Crompton & H. L. K. Whitehouse in collaboration with G. M. S. Easy & A. C. Leslie. Pp. 95, with 16 maps and 7 line drawings. Cambridge University, Cambridge. 1983. Price £5.50.

To be asked to review the successor to a Flora one helped to produce 20 years ago is an uncomfortable reminder of advancing years; this *Checklist* is also a reminder of the rate of change of our flora and the rate of accumulation of knowledge these days.

Several thousand new 10 km square records have been added to those included in the 1964 *Flora of Cambridgeshire*, whilst the list of species has been considerably enlarged, particularly with aliens, which are the forte of Graham Easy. In addition, using an objective assessment and Mrs Crompton's wide knowledge of eastern England, any species rare in Country or County has been indicated, providing both a stimulus for search (amongst critical taxa) and a warning of the number of species which are now threatened, including a group of cornfield weeds (such as *Fumaria densiflora*, *F. vaillantii* and *Galium tricornutum*) which were still quite widespread when 10 km mapping was at its height in the 1950s.

The *Checklist*, as did the 1964 Flora, embraces the bryophytes, and the obviously ageless Harold Whitehouse is again the editor responsible. He reports some remarkable 'natural' changes – notably the colonization of Wicken Fen by calcifuge species. The first records were made in 1963 just in time to be added to the *Flora* in proof, but since then Alan Leslie and others have added over 40 species, some more than 100 miles from their nearest locality.

But this *Checklist* is more than just an update of the *Flora*: it includes a completely new feature – a definitive description (with maps) of the vice-county boundaries of this much-altered county – invaluable not only to v.c. 29 addicts but to mappers and recorders in the eight adjacent vice-counties. It also includes a few distinct illustrations by Graham Easy, apparently chosen to fill spaces but with useful diagnoses covering particularly *Muscari*, *Solanum* and *Symphytum* (when can we have an Easy Guide to Unusual Wildflowers?).

The only criticism I have of this compact and handy list is the decision to present species in alphabetical order using the nomenclature of *Flora Europaea* and the *Excursion Flora*, 3rd ed. The *Checklist* is in effect a super-supplement to the 1964 Flora, and as such it would be easier for the reader to study the two together had the order in the *Checklist* been identical with that of its predecessor – and how will it relate to the new *Flora*, for which the authors too modestly describe it as a working document for use by recorders? This *Checklist* should certainly not be as ephemeral as that description implies and deserves to stand in line with the six *Floras* of the County which have preceded it since 1660, together providing probably the most complete account of changes in plant distribution in any area of the world.

F. H. PERRING

Outline of plant classification. Sandra Holmes Pp. viii+181, with 7 diagrams. Longman, London, New York. 1983. Price £8.50 (ISBN 0-582-44648-1).

At a time when ideas about the classification of the major groups of plants seem to be undergoing almost continuous change, it may seem unwise, if not pointless, to publish a conspectus of that classification. On the other hand, precisely because of these changes it is difficult to obtain an overall view of the subject that would enable one to decide (for example) which classification(s) to use in classwork. Sandra Holmes has provided a most useful conspectus of the plant kingdom (including

the bacteria, blue-green algae and fungi), using the correct suffixes (-*phyta*=division or kingdom, -*opsida*=class, etc.) systematically throughout. For each plant group she has had to choose one scheme of classification from several possible ones, but she always shows at least some alternative views. For each taxon (class, order, etc.) she gives a concise summary of its characters and cites one or more of its members.

Whilst I would recommend this book to anyone who requires a clear 'standard' classification with alternatives, I must mention some caveats. The author admits that the system adopted is not necessarily the most natural one (which has still to be discovered), but claims that the groups are familiar and easy to handle. This seems to be so in the lower plants; but when she comes to the Angiosperms (Spermatophyta), she has adopted a system "based on Cronquist and Takhtajan", comparing it with those of Bentham & Hooker and Engler & Prantl. There is no mention (even indirectly) of the currently competing systems of Thorne and Dahlgren: the Dilleniales (for example) stand next to the Paeoniales as if the natural proximity of these obviously very disparate orders had been established once and for all. As regards the Dilleniales themselves, Miss Holmes has not adopted the latest version of Cronquist's classification: she includes the Crossosomataceae in that order, whereas Cronquist now follows Thorne in placing the family in the Rosales (with reservations). The potential reader should also be warned that this book cannot be used as a key because the short descriptions (particularly those of flowering plant orders) are not diagnostic.

Despite these reservations, however, this is a book that should be present on the shelves of many botanists, both professional and amateur.

N. K. B. ROBSON

Palaeobotany and the evolution of plants. Wilson N. Stewart. Pp. 405, with 320 text figures and 9 charts. Cambridge University Press, Cambridge. 1983. Price £17.50 (ISBN 0-521-23315-1).

Although the main topics of this book are not strictly relevant to the interests of the B.S.B.I., it is well worth drawing to the attention of members who are interested in plant evolution in general and angiosperm evolution in particular. The author gives a full review of the fossil evidence for plant evolution and the theories related to it. In particular, there is a very good penultimate chapter on 'The origin and early evolution of angiosperms', bringing the subject right up to date with a discussion of the evidence from the Glossopteridales.

N. K. B. ROBSON

Provisional atlas and catalogue of British Museum (Natural History) specimens of the Characeae. Compiled by J. A. Moore & D. M. Greene. Pp. 121, with 48 distribution maps. Biological Records Centre, Monks Wood Experimental Station, Huntingdon. 1983. Price £6.35 (ISBN 0904282732).

In a year which saw the beginnings of a campaign to improve the conservation of 'The Water's Edge' it is most fitting that we should be given an up-to-date and authoritative statement of the distribution of the British charophytes. The charophytes, that taxon of algae adopted many years ago by field botanists, comprises a fascinating range of species found in a range of aquatic habitats, many of which are threatened by drainage and other interferences by man.

After a brief introduction to the history of charophyte collections and an explanation as to the compilation of the data, the maps and catalogue are presented. 4,307 records have been amassed of which 2,711 are based on British Museum specimens; they are represented on the maps in their respective 10 km squares and allocated to 30-year periods beginning with a pre-1899 period. The catalogue of British Museum (Natural History) specimens provides a computer print-out of a range of data including date of collection, locality and, where known, habitat. Both atlas and catalogue are easy to use.

This publication will be a valuable aid to anyone who takes it upon himself to explore some of the many gaps which the maps reveal exist in our knowledge of this oft-neglected plant group.

P. M. WADE

The conservation and development programme for the UK. A response to the World Conservation Strategy. An overview—Resourceful Britain. B. Johnson. Pp. 104. Kogan Page Ltd., London. 1983. Price £7.95 (ISBN 0-85038-768-X).

The conservation and development programme for the UK. A response to the World Conservation Strategy. Pp. 496. Price £14.95 (ISBN 0-85038-746-9).

In 1980 the International Union for Conservation of Nature and Natural Resources (I.U.C.N.) invited six sponsors to organize a U.K. response to the World Conservation Strategy (I.U.C.N., 1980). The second of these two volumes is that response, probably the most extensive programme ever undertaken in the U.K. on environmental and conservation issues. The first volume is an attempt by Brian Johnson to produce an overview of the response.

The sponsors, World Wildlife Fund UK, the Nature Conservancy Council, the Countryside Commission, the Countryside Commission for Scotland, the Council for Environmental Conservation and the Royal Society of Arts commissioned seven reports on the industrial, urban, rural, marine and coastal, international, ethical and educational aspects of the response. An author advised by a review group of professionals and practising experts produced a report, each report appearing as a 'part' in the main volume. Before final publication 8,000 copies of the reports were circulated for consultation and debate. The breadth of experience which has gone into the preparation of the response is impressive. Part 3, 'Putting trust in the countryside', written by Professor T. O'Riordan, covers the sustainable utilization of rural resources, discussing why this is not occurring at the present time and making recommendations to ensure that future rural development is ecologically sustainable. The report contains a lot of interesting and pertinent information which is carefully used to provide an understanding of the conflicts and imbalances existing in our countryside, leading to the synthesis of solutions for the future. Other reports are not as impressively thorough: part 7, 'Education for commitment', for example, was not tackled in similar depth, and the recommendations, although on the face of it apparently sound, are not based on such a substantial foundation.

The differing approaches and styles of writing help to make the book more readable, but in most parts it is heavy going: part 2, 'The livable city' took over four hours to read and comprehend. The absence of any overall editing makes for much repetition. More infuriating still, the book is very difficult to use. There is no index, no lists of tables, figures or references.

The overview in contrast is a much more readable and stimulating text, but it is presented rather as Brian Johnson's overview than as an integrated summary. As such a vital aspect of the programme—it is in this book that the overall recommendations are made—it lacks the weight of its companion volume.

My main disappointment with these books is that all the hard work and time could so easily be wasted. The overview provides a good starting point for discussion on the integration and restructuring which the whole programme will need, a fact recognized in the individual reports: how will this be achieved? The programme has also to be put into action, an emphasis of the World Conservation Strategy. Although the seven 'parts' make in excess of 160 recommendations, no grand action plan is included and the programme fails to kindle the fire which will be vital to its success.

These two volumes provide an extensive and in most parts authoritative and interesting conservation and development programme for the U.K. As books to use, they will, I fear not become signposts to further programmes and to action, but rather milestones on the bookshelves of university and polytechnic libraries.

REFERENCE

INTERNATIONAL UNION FOR CONSERVATION OF NATURE AND NATURAL RESOURCES (1980). *World Conservation Strategy*. I.U.C.N., Switzerland.

P. M. WADE

Double flowers, a scientific study. Joan Reynolds & John Tampion. Pp. 183, with line-drawings and photographs. Polytechnic of Central London Press, Pembroke Press, 1983. £9.75 (ISBN 0-86206-004-4).

"There are many areas of study where elucidation of the abnormal aids the understanding of the normal" (say the authors of this book on p. 23). This is the basis of much experimental biology, in which the abnormality is induced. Sometimes the abnormal occurs spontaneously, as with doubleness in flowers, and its study can be equally valuable.

This book reveals the morphological and developmental details of double flowers in the genera *Aquilegia*, *Petunia* and, less fully, *Narcissus*, and of double capitula in *Calendula*. These are studies carried out by the first author for a Ph.D. thesis.

Introductory chapters deal with history, double flowers in the wild (English names of British plants known to have produced 'doubles'), commercial growing, genetical aspects and physiology, as well as a classification of double flowers which looks useful (though I cannot see the difference between classes Id and IIId). An appendix lists all known species and hybrid groups in which double flowers are known, giving the type of doubleness according to the authors' classification.

The authors acknowledge that this book is only "a signpost to others", but I feel that in the space available they could have presented the problems more clearly and discussed them more rigorously. Interesting topics loom up and melt away; no synthesis of the subject is achieved. There is much repetition, and the book occasionally lurches away from its elementary vocabulary to a highly specialized one. Misprints and mis-spellings are frequent. The book will be useful in its signpost function and for the 'map of the territory' embodied in the references, but I found it a disappointment on the whole.

The publishers have not allowed full-stops for abbreviations except initial letters of generic names and, sporadically, authorities for names of plants (look at the effect in the references!). I regret that an academic publisher can be so enslaved by fashion.

P. F. YEO

Obituaries

MAYBUD SHERWOOD CAMPBELL (1903–1982)

With the death on 11th August 1982 of one of our Honorary Members, Miss Maybud Sherwood Campbell, at her home at Roquebrune, Cap Martin, France, British botany has lost one of its most devoted and colourful figures.

Maybud was born on 9th March 1903 at Streatham, the daughter of Dr J. W. Campbell, who during the season was doctor to the British community in Menton. She spent considerable periods there in her young days in the family villa, Casa Rossa, where she became familiar with the cultivated plants of the Riviera as well as the wild flowers of the Mediterranean coast and the Alpes Maritimes behind. Whilst her father was still alive, she spent much time in Perthshire, and was devoted to her only brother, J. W. (Jamie) Campbell, who developed an interest in birds and became a well known and much respected Scottish ornithologist. He died in 1971, and his three sons were her only close relatives.

Maybud was educated at Belstead House, Aldeburgh, and kept in touch with some of her school friends all her life. She developed into a versatile, energetic and somewhat complex person, but botany was her dominating interest. Her active interest in wildflowers started early, and she joined the Wild Flower Society in the 1920s, at the instigation of her old governess. She submitted some very good diaries in the next ten years, even reaching Valhalla! Miss Gertrude Bacon (later Mrs Foggitt) said of Maybud's 1927 Diary: "It is a dream Diary" . . . "my Secretary is clucking like a hen with a very promising new chick".

Maybud had, like many other W.F.S. members, been recruited into the Botanical Society and Exchange Club of the British Isles (the B.E.C., as the B.S.B.I. was then called) by its indefatigable Secretary, G. Claridge Druce in 1923. When, in 1932, W. H. Pearsall became Secretary, he favoured the appointment of Local Secretaries, and Maybud was one of the first, appointed for Essex. She later became L.S. for four Scottish vice-counties.

She owed her introduction to scientific field and herbarium botany to Gertrude Foggitt, whom she had got to know through the W.F.S. Maybud wanted to know something of herbarium techniques, how to use a microtome and how to prepare microscope slides. It was in 1933, through Gertrude Foggitt, that (to use her own words) "I penetrated behind the locked doors" at the B.M. (N.H.) and received the Keeper's permission to start work on *Salicornia* under A. J. Wilmott in the British Herbarium. She became a semi-permanent voluntary worker on the staff.

Meanwhile another botanical interest had developed, with Wilmott's collaboration and Maybud's Scottish heritage, namely an annual botanizing expedition to the Outer Hebrides, with a view to obtaining enough material and information to write a Flora. Other interested B.S.B.I. members used to join in, and the last pilgrimage to the Hebrides was as recent as 1981! The rich proceeds of these many expeditions are in the B.M. Herbarium, a fitting memorial to her love of Scottish botany, as is her *Flora of Uig* (Campbell 1945).

After 15 years' membership of the Society, Maybud resigned in 1938, following a difference of opinion with the Editor (P. M. Hall) over acceptance of a controversial paper on Dactylorhizids which she saw as a deliberate affront to her colleague Wilmott. Following P. M. Hall's tragic death in 1941, Maybud was persuaded to rejoin the Society in 1943.

One of Maybud's many attributes was a fine mezzo-soprano voice. She had studied under de Verdi among others, and in the 1930s sang at occasional concerts in the Wigmore Hall. She specialized in Czech *lieder*, and decided to make use of this talent after the outbreak of War in 1939 by joining E.N.S.A., where she was much in demand in places where the Free Czech Forces were stationed.

It was not until after the War that Maybud became involved in the administration of the B.E.C. She was added to the Committee (which had largely remained unchanged during the war years) in March 1945, and became a member of the Excursions and Field Work Sub-committee (and the

following year its Hon. Secretary) and of the newly formed Development Sub-committee, to advise on the future of the Society.

In July 1947 the Committee agreed to nominate Maybud for the post of Hon. General Secretary following the resignation of John Chapple. As she was unable to take up the new duties until October, Wilmott filled the gap until she was elected at a S.G.M., at which meeting she was also elected Hon. Excursions Secretary. Henceforth her London flat in Addison Crescent effectively became the B.E.C.'s headquarters; most sub-committee meetings and one general committee meeting took place there. In February 1948 she generously invited members in the London area to meet the President and Officers, and in all she entertained 27 to a social evening in her flat.

Maybud, assisted by Wilmott, led the successful field meeting based on Pitlochry in June 1946, when the land likely to be affected by the Tummel Garry Hydro-Electric Scheme was surveyed. The only known British site for *Schoenus ferrugineus* (Brown Bog Rush) was on the wet peaty margins of Loch Tummel in Perthshire; and the level to which it was proposed to raise the water would have drowned the *Schoenus*. Maybud, following the B.S.B.I.'s Pitlochry field meeting in 1946, had made contact with the North of Scotland Hydro-Electric Board and arranged for a suitable new site to which to move as much as possible of the Brown Bog Rush. She had got together a number of her botanical friends, and these volunteers duly carried out the transplant to the area near the new shore of Loch Tummel in 1950. I gather the species failed to survive in the new site, but the Loch Tummel plant has done well in cultivation and a stock is available for possible future plantings. Meanwhile *Schoenus ferrugineus* has been discovered in two additional sites in Scotland (see Brookes 1981).

In 1947 she again showed her organizing ability in the Glen Affric field meeting, which must be one of the most successful the B.S.B.I. has ever held. A thorough botanical survey was made of the Glen, due to be flooded by another Hydro-Electric scheme, and it attracted 'C.T. & W.' in persons, as well as such eminent botanists as Noel Sandwith, Canon Charles Raven, E. C. Wallace, Duncan Poore (later Director of the Nature Conservancy) and, last but not least, N. D. Simpson. Many data were collected, yet the results of the botanical survey have never seen the light of day apart from a list of some of the finds in the *Year Book of the B.S.B.I.* 1949!

During her period in office the exchange activities of the Society remained static; and at the S.G.M. in October 1947 the B.E.C. became the B.S.B.I., the Committee became the Council and the Sub-committees lost their 'Sub.' The first *Year Book of the B.S.B.I.* came out in 1949, with Maybud Campbell as joint editor with W. R. Price.

That same year she handed over the Field Secretaryship to John Dony, and in 1950 she relinquished the post of Hon. General Secretary to Ted Lousley. She sat on the newly formed Conservation Committee from 1951–54 and remained on the Development and Rules Committee until its demise in 1970, though latterly seldom attending meetings as by then she no longer lived in Britain.

At the A.G.M. in March 1950 Maybud was not only elected Vice-President of the Society, but made an Honorary Member in appreciation of the valuable work she had done whilst in office.

When the preparation of *Flora Europaea* was begun, Maybud took a keen interest in the project and, in its earliest stages, provided funds for secretarial work. She attended several of its international meetings and wrote the account of *Myrtus* for it (in Vol. 2, published 1968).

She was a Fellow of the Linnean Society of London from 1935 until her death, and of the Royal Horticultural Society.

Maybud's mother had acquired Layer Marney Hall (now known as Layer Marney Tower), a fine house about 6 miles south-west of Colchester. Maybud spent much of her early life there when not in Menton, and botanized the surrounding country before modern agriculture had 'improved' the meadows or put them under the plough. When Stan Jermyn's *Flora of Essex* appeared in 1974, Maybud was disappointed that so few of her records had been included. However, she was responsible for adding one undescribed new alien species to the Essex and British and European flora! A strange *Erophila* was found by Wilmott on the gravel paths in and outside Layer Marney Tower garden. This turned out to be the offspring of an *Erophila* which Maybud had collected as seed in Rhodes in 1934 and had grown in the greenhouse, from which it had escaped to the garden path by 1938 and to the paths outside by the church by 1947. It was duly described as *Erophila conferta* Wilmott (1949). It was plentiful there in 1954 (B.T. Ward) and still surviving in 1970 (Jermyn 1974).

When her mother died, Maybud took up residence in her delightful villa at Menton. Here at last her gardening instincts could develop, and before long the garden was full of interesting shrubs and herbaceous plants. She had inherited her father's collection of *Citrus* species and cultivars, and one year she staged a fine exhibit of their fruits at the R.H.S. Chelsea Show.

Maybud was always so vivid and interesting and active, in spite of an accident in her Layer Marney days which left her with considerable physical disability. In her young days, however, she enjoyed English and Scottish dancing, tap-dancing and ice-skating; and she played a good game of lawn tennis. With Maybud, partnered either by Arthur Exell or by Wilmott, the B.M. (N.H.) team fielded a formidable first couple in the annual mixed doubles match against Kew!

In the 1960s she began to find the hot Mediterranean summers rather trying, so she acquired a second home in the Swiss Alps at Chernex, which she called Casa Rossa, migrating there during the early summer before her annual peregrination to Britain to visit relations and friends and to botanize in the Outer Hebrides. She would return to Chernex before the oncoming winter enticed her back to Menton.

Maybud got a lot of pleasure out of showing botanists the local flora of that corner of France, and knew all the best places for plants in the Alpes Maritimes. She used to invite small parties of students particularly interested in taxonomic botany, studying under Tom Tutin at Leicester or Max Walters at Cambridge, to come out and stay at Casa Rossa or nearby, providing them with subsidized accommodation and transport to visit some of her favourite botanical haunts. Several professional biologists of today had their interests in floristic botany stimulated by their study visits to Menton under such particular pleasant conditions.

As inflation started to bite, Maybud reluctantly decided to part with Casa Rossa, and sold the villa and the garden to the Jardin des Plantes, Paris, to develop as an outstation. She retained a small 'pavilion' in the grounds and was there till 1980. Meanwhile, she had left Chernex, as the Swiss Government was excluding foreign residents. She moved to a flat in Le Rouret near Grasse and 18 months later had to move again, this time to Roquebrune, Cap Martin, where she died.

As she got older, her disability became worse. At Stoke Mandeville in the 1960s she underwent a serious operation from which she made a complete recovery. However, in the 1970s her other long-standing troubles handicapped her greatly, and she was not able to do much driving. She made full use of the motor-rail services of both British and French Railways and got various friends to drive her around in her own car, packed with luggage. Prominent among them was John Wilmott, son of her great friend A. J. Wilmott, who took her up to the Hebrides and, so it seems, anywhere else she wanted to go.

One cannot write about Maybud without mentioning her cats. When we first went to Casa Rossa in the 1950s, she had about a dozen, all with individual characters which she knew and understood. One or two were privileged to live in the house, but most of them had special wire enclosures. Some of them were named after citrus fruits! They moved with her to the Pavilion and to Le Rouret. She did not take them to Chernex, but had a cat-keeper during her summer absences from Menton. Latterly she did not replace those that died of old age, and the numbers decreased considerably; but she still had to find a cat-sitter during her summer 'holidays' in Britain. The cats were an essential part of Maybud's life.

Maybud had incredible pluck and determination, not allowing her ill health or physical condition to divert her from her objective. Right to the end she would plan most complicated itineraries for her British visits and carry them out, undaunted by the fact that she had not got a car and could no longer drive, and that walking any distance was impossible. Sadly she had a somewhat dominating nature, and would make fierce, usually unjustifiable, attacks on those who opposed her. She also lost some friends owing to stupid misunderstandings developing into blazing rows. Happily time, the great healer, took its course, and years later some of these friendships were renewed. Maybud had a great sense of humour and of the ridiculous, and would dissolve into fits of giggles as she recounted amusing incidents on botanical outings or elsewhere.

We were expecting her for her annual visit in 1982 when we heard the sad news of her departure. Mercifully the end came suddenly, as she would have hated it to be otherwise. My wife and I have very happy memories of times spent with Maybud both here and abroad.

I am grateful to the B.S.B.I. members and other friends of Maybud who have helped me gather details of her full and interesting life, especially Frances Balfour-Brown and David Allen.

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E. MILNE-REDHEAD

JOHANNES LEENDERT VAN SOEST
(1898–1983)

Professor van Soest, who died on the 30th of October 1983, visited the British Isles rarely, and was known to few British and Irish botanists. Yet, he was one of the greatest amateur Dutch botanists, and one who left a lasting legacy through his work with *Taraxacum*. Although earlier workers such as Hugo Dahlstedt, Harald Lindberg, Gustav Haglund and Gunnar Marklund had set the pattern for the complex taxonomy of *Taraxacum*, their work in northern Europe was limited in scope, and variable in quality. In contrast, van Soest's work was global in scale, and was coupled with a good working knowledge of nomenclature, typology, genetics and biogeography. From the years 1960 to 1980 he produced about 50 scientific papers, which form the foundation of our present understanding of this very large and widespread genus. During these years he described nearly 400 new species, and twelve new sections of the genus. Each new taxon was meticulously collected with duplicates, well-annotated, and beautifully described, with excellent illustrations. He extended our knowledge of the genus, not only into the Alps and southern Europe, but to Turkey, central Asia, the Himalayas, China and South America, and he visited many of these places himself on extended collecting trips. The volume and comprehensiveness of his work on *Taraxacum* was more than sufficient for one lifetime. Yet, it is remarkable that almost all this work was achieved after his retirement at the age of 65, following the tragic death of his wife at a relatively young age.

Johannes van Soest was born in the Hague, in which city he also spent his retirement. A brilliant pupil, he published his first mathematical paper at the tender age of 17. Having qualified as an electrical engineer in 1925, he was director of the Netherlands Physics Laboratory TNO at Waalsdorp from 1927–1957. From 1949 to 1964 he taught mathematics and information theory at the Technical High School at Delft. He was involved in pioneer research on high frequency electronics, including radar, which proved to be a highly sensitive topic during the German Occupation from 1940 to 1945. His diplomacy during that difficult time was recognised by a spate of honours after the war: honorary membership of the Nederlands Radiogenootschap (1947), of the Electronical Society (1948), and Officer in the Order of Oranje-Nassau (1948). He was finally awarded no less than ten honorary memberships and degrees, the most recent being Honorary Membership of the B.S.B.I. (1970) in recognition of his work on British *Taraxacum*.

Van Soest became interested in botany while still at school, and was a keen and active field botanist all his life. In his early years he published work on the distribution and phytogeography of the Dutch flora, and he continued to be interested in these problems for over 50 years. Latterly, the Dutch *Taraxacum* species were carefully mapped on 10 kilometre squares, as well as being monographed. He was also involved in the taxonomy of *Hieracium*, and of crustose lichens.

Johannes van Soest was not only a brilliant physicist and mathematician and an outstanding botanist, but a man of many interests, for instance in the visual arts, interests which he derived from his artist father and shared with his wife, who was an excellent painter. He was also an outstanding linguist, publishing papers on *Taraxacum* in Dutch, Flemish, French, German and English. He was a fluent English speaker, although he claimed that this was his fifth language! He was also a dedicated and stimulating teacher, and, determined that the study of *Taraxacum* in Holland should not die with him, he trained several young botanists, who are active today. I was very fortunate to stay with him on two occasions in the late 1960s, and I owe very much to his insight, patience, wisdom and humour. A kind and gentle man, but an accurate critic, I liked him very much, and I shall miss him.

A. J. RICHARDS

Reports

CONFERENCE REPORT

WOODLANDS OF THE WORLD

The second symposium to be organized jointly by the B.S.B.I. and the fauna and flora Preservation Society took place in the rooms of the Zoological Society of London on Saturday, 1st October 1983. The theme of 'Woodlands of the World', expounded by conservation stalwarts and their supporters, attracted good attendances from members of both societies. Fresh speakers, notably Brian Morris, Sabina and Martin Gardner, Sue Jerrard and Elizabeth Hamilton, held the attention of the audience with narratives of forest traders, the exploitation of mahogany, the Chipko movement and the British Woodland Trust. David Bellamy and Hugh Synge enthused and inspired as only they can, and the film *Korup* illustrated the richness of tropical forest, an urgent case for international conservation. Our chairmen, John Cannon and David Bellamy, kept the proceedings perfectly to time, and this successful event was rounded off by an excellent buffet.

The symposium proved the ability of indoor meetings to attract B.S.B.I. members who do not normally attend field meetings and the Annual General Meeting or Exhibition Meeting, and demonstrated the value of collaboration with other societies. Our sincere thanks go to Vivien Burton of the f.f.P.S. for detailed organization, and we look forward to future joint symposia.

J. MARTIN

EXHIBITION MEETING, 1983

The annual Exhibition Meeting was held in the Department of Botany, British Museum (Natural History), London, on Saturday, 26th November 1983, from 12.00 to 17.30 hours. The following exhibits were shown.

OROBANCHE CRENATA FORSKÅL—NATIVE IN THE BRITISH ISLES?

In July 1975 a well-established colony of *Orobancha crenata* Forskål was discovered on the edge of Cranham Marsh, Upminster, S. Essex (v.c. 18), parasitizing an extensive area of *Vicia tetrasperma*. In August of the same year several plants appeared in a garden 2 km to the north, suggesting that seed had dispersed from the Cranham Marsh colony in a previous year. The recent discovery by F. J. Rumsey of a specimen, lodged in the Kew Herbarium (K), that was collected in 1950 from a garden even nearer to the Cranham Marsh colony, suggests that it has been dispersing seed and establishing satellites in the area for at least 34 years.

On the continent the distribution of *O. crenata* is markedly circum-Mediterranean. It has, however, become firmly established in several botanic gardens in Sweden (J. Kraft, *Svensk bot. Tidskr.*, 73: 27–37, 1979). Why then is its native distribution so closely tied to the Mediterranean? Possibly conditions in northern Europe, where it flowers much later (July to August) are seldom favourable enough for it to put down an adequate seed bank to tide it over less favourable years. The Cranham site is a sheltered sun-trap, and the 200 spikes in 1982 bear witness to the strength of the colony. How and when it first arrived at Cranham is unknown. At first sight introduction as a legume crop contaminant might seem likely, but who would obtain Broad Bean, Pea, Clover, Lucerne or Tare seed from the Mediterranean? A more likely scenario is that of introduction by a migrant bird

alighting to feed among the *Vicia tetrasperma* colony in a particularly favourable season so that a strong population and substantial seed bank became established.

K. J. ADAMS

'A CELTIC FRINGE'—VARIATION IN *RUMEX ACETOSA* L. IN IRELAND

Rumex acetosa L. is a widespread species in Britain and Ireland. It occurs from sea-level to 1350 m, usually on slightly acid soils, and exhibits considerable morphological variation. Two coastal variants are present in western parts of these islands: (a) plants from cliff communities—short (to 50 cm), stout plants with thick, rounded, dark-green leaves and a dense inflorescence; and (b) plants from communities on blown sand and machair—short (to 30 cm), slender plants with small leaves and a dense, subsimple inflorescence; the stems, petioles and veins of the lower lamina are variably papillose-puberulent. Variant (b), described by K. H. Rechinger as *R. hibernicus* (*Watsonia*, 5: 65, 1961), was studied in the field, in cultivation and in the herbarium, and the exhibit illustrated the data obtained. '*R. hibernicus*' undoubtedly merits taxonomic recognition, but not at species level. Its known distribution is centred in western Ireland, extending to Co. Wexford and the Hebrides, and some collections from Co. Wicklow, southern Wales and Scilly appear to be this variant.

J. R. AKEROYD

WALTER TULLIDEPH: A SLOANE COLLECTOR PORTRAYED

By a remarkable coincidence a one-time B.S.B.I. member, Mrs A. H. Gurney, of Walsingham Abbey, Norfolk, is a direct descendant of Walter Tullideph, one of the 23 members of the first formally constituted botanical society in Britain of which we have any record: that founded by John Martyn in London in the early 1720s. There is a portrait in the possession of her family of the member in question, of whom no likeness has hitherto been known to botanists. Through the kindness of Mrs Gurney and her cousin, Sir David Ogilvy, a photograph of this portrait was exhibited.

Walter Tullideph (otherwise Tulliedelph) went to school in Edinburgh and studied medicine at the University there. After acquiring a doctorate in France, he settled in London and at the time of his membership of Martyn's botanical society was acting as amanuensis to Dr James Douglas, the celebrated anatomist, to whom he was apparently related. About 1726 he went out to the West Indies at the invitation of a cousin who owned a sugar plantation in Antigua, where he practised for some years as a surgeon and physician, interested himself in the flora and corresponded with Sir Hans Sloane, to whom he sent many specimens along with notes on the medicinal properties of the local plants. Later, he married a wealthy widow and became a leading member of Antigua's 'plantocracy'. In 1758 he returned to Britain and bought an estate at Dundee; but it is not known whether he continued his botanical work. He died, at a great age, in or after 1794.

There are 49 of his specimens in the Sloane Herbarium. A sample sheet of these was also exhibited.

D. E. ALLEN

A PUTATIVE *REYNOUTRIA* × *FALLOPIA* HYBRID FROM WALES

Plants grown from seed collected from octoploid ($2n=88$) *Reynoutria japonica* Houtt. from three localities in Wales and one in Leicester showed a morphology and chromosome number intermediate between the parent *Reynoutria* and Russian Vine. It is suggested that these plants are hybrids between *R. japonica* and *Fallopia aubertii* (L. Henry) J. Holub or *F. baldschuanica* (Regel) J. Holub (both $2n=20$). The putative hybrids, one of which, from Pwllheli, Caerns., v.c. 49, was exhibited, show somewhat trailing aerial shoots with a hard, woody base unlike the erect, cane-like, non-persistent shoots of *Reynoutria*. They are more like the twining perennial shoots of Russian

Vine and also lack the rhizome characteristic of *Reynoutria*. Karyotypes of Russian Vine ($2n=20$) and of one of the putative hybrids ($2n=54$) were displayed; similarities could be observed between the largest chromosomes of the putative hybrid and the Russian Vine karyotype. The implications that such a hybrid would raise regarding the taxonomic relationship between *Reynoutria* and *Fallopia* were indicated. The appropriate artificial pollination has produced seed which is now being grown.

J. P. BAILEY & A. P. CONOLLY

THE IDENTIFICATION OF DACTYLORCHID HYBRIDS

The frequency of dactylorchid hybrids can only be accurately assessed if they can be confidently identified. This involves (a) distinguishing a hybrid from associated dactylorchid species, and (b) determining its parentage. Both require detailed knowledge of the characters that best separate dactylorchid species, and their probable values in hybrids. The exhibit summarized measurements from 640 plants representing all four British and Irish species, and illustrated with photographs a wide range of hybrid morphologies.

Hybrids between spotted and marsh orchids can usually be differentiated morphologically, but their parentage remains speculative unless potential parents are present or cytological data are available. Without cytological data, the recognition of hybrids between spotted orchids (*Dactylorhiza fuchsii* and *D. maculata*) and between marsh orchids (*D. incarnata* and *D. majalis*) is also difficult, and the identification of products of introgression is not feasible. There may be many erroneous records of dactylorchid hybrids in the literature.

R. M. BATEMAN & I. DENHOLM

SENECIO DORIA L. IN BRITAIN

A colony of this species was discovered on a roadside bank near Colonsay House, Colonsay, v.c. 102, on 4th August 1983. Although described in *Flora of the British Isles* (2nd ed. 1962), this species has been confused with *S. fluviatilis* Wallr. Specimens of each of these species were displayed, together with a map of the distribution of *S. doria* in Britain and photographs of the colony on Colonsay.

J. BEVAN

SORBUS SUBCUNEATA WILMOTT IN V.C. 35?

An unknown *Sorbus* species was discovered during the B.S.B.I. field meeting at Monmouth on 18th September 1982. Leaves collected indicated that the tree could be *Sorbus subcuneata*, but unfortunately no fruit was present. A return visit to the tree was made on 27th September 1983 when fresh fruit was found. The fruit was green, turning yellow and then brown upon ripening, and was very similar to fresh fruit of *S. × vagensis* Wilmott, examined on the opposite bank of the Wye. Specimens of *S. subcuneata* determined by A. J. Wilmott, from the British Museum (BM), were shown alongside two specimens from the single tree in Monmouthshire.

J. BEVAN

THE BOTANY LIBRARY, BRITISH MUSEUM (NATURAL HISTORY)

Daniel Solander (1733–1782): an exhibition of manuscripts, drawings and plant specimens illustrated aspects of his life and work. Solander, a pupil of Linnaeus, was a friend of Joseph Banks and accompanied him as his scientific assistant on Captain Cook's first expedition around the world in 1768–71.

Arthur Harry Church (1865–1937): Lecturer and Reader in Botany at Oxford and a Fellow of the Royal Society. The Museum holds much original material relating to his book *Types of floral mechanism* which was published by the Clarendon Press in 1908. This was originally prepared for class purposes to illustrate the different types of flowers. On display were his black and white photographs of the actual flowers used as models, and his original ms. text, pen and ink and water-colour drawings.

Recent botanical books: a selection of recent British botanical books and journal articles received at the Museum and publications by B.S.B.I. members were on display.

BRITISH MUSEUM (NATURAL HISTORY)

CARDAMINE IMPATIENS L. IN CO. WESTMEATH—AN ADDITION TO THE IRISH FLORA

Cardamine impatiens L. was found on a gravelly *eiscir* ridge at Toorlisnamore, 2 miles N.W. of Kilbeggan, Co. Westmeath, v.c. H23 (N340.388) on 21st May 1983. The significance of the discovery is that, while previous Irish records for the species carry the suspicion of being casual introductions, there is sufficient reason to suggest that its occurrence in base-rich woodland in v.c. H23 merits its inclusion in the native flora of Ireland. In this connection reference was made to the occurrence in similar isolated stations on the Carboniferous Limestone in Ireland of *Helianthemum nummularium* and *Gymnocarpium robertianum*, both of which occur more widely in Britain. The exhibit included a herbarium specimen, together with maps illustrating the species' distribution in Britain and its new Irish station.

C. BREEN, T. G. F. CURTIS & M. J. P. SCANNELL

A FLORA OF THE LIZARD DISTRICT—A REQUEST FOR RECORDS

Since the beginning of the 19th century, the Lizard District (v.c. 1) has been justly regarded as a 'Mecca' for field botanists. The mild climate and long growing season, the unusual and complex geology, as well as the high degree of exposure, have contributed towards the formation of a very rich flora, including a large number of rare species, of which five are known nowhere else in Britain. Despite the great interest in the area's flora and vegetation, botanical discoveries are still being made. During the past five years many taxa have been added to the flora, including *Carex pseudocyperus*, *Cirsium dissectum* and *Dactylorhiza incarnata* subsp. *pulchella* new to west Cornwall; *Deschampsia setacea* new to the south-west peninsula outside Dorset; and *Taraxacum hibernicum* in its first non-Irish locality.

Members were asked to contribute records towards a proposed *Flora of the Lizard District*, in which will be included historical and recent records of vascular plants, as well as ecological information. An address, to which records should be sent, is given in *B.S.B.I. News* 35.

A. J. BYFIELD

RIVER CORRIDOR VEGETATION OF THE UPPER WYE VALLEY—RIVERSIDE EVALUATION PROJECT

During the summer of 1982, vascular plant and bryophyte species were recorded along sample lengths of river and river-bank in the Upper Wye valley, as part of a cooperative study by U.W.I.S.T., Welsh Water Authority, R.S.P.B., Otter Haven Project and N.C.C. with principal funding administered by Powys C.C. from the Manpower Services Commission. This project was undertaken to give interested bodies a simple but objective account of the conservation value of all reaches of a particular water-course within the context of its catchment. The following riverside plants under threat in Wales were recorded: *Allium schoenoprasum*, *Carex acuta*, *C. pendula*, *Chrysosplenium alternifolium*, *Potamogeton crispus*, *P. perfoliatus* and *Scirpus sylvaticus*. Examination of aquatics revealed *Ranunculus peltatus* in the smaller acidic tributaries,

with *R. penicillatus* var. *calcareous* in slightly basic waters. Notable finds in Radnorshire (v.c. 43) included a first record of *Euphorbia amygdaloides*, and *Thalictrum minus* var. *major*, the latter not seen for 50 years.

C. A. CHADWELL

ILLUSTRATIONS FOR B.S.B.I. HANDBOOKS

Original drawings were exhibited of illustrations in two of the B.S.B.I. handbooks, *Umbellifers of the British Isles* and *Docks and Knotweeds of the British Isles*.

A. DAVIES (A. FARRER)

SOME RECENT ADDITIONS TO THE WELSH FLORA

In the last few years many species have been added to the Welsh flora. Most are casuals of waste ground and rubbish tips, but a few are native species or introductions that appear to have established themselves. The two most exciting discoveries were an extensive population of *Wolffia arrhiza* (L.) Hork. ex Wimm. in a drainage ditch near Newport in Monmouthshire (v.c. 35), and the hybrid dock *Rumex* $\times$ *lousleyi* D. H. Kent in three localities and two vice-counties, Monmouthshire (v.c. 35) and Glamorgan (v.c. 41), near Cardiff.

Vaccinium macrocarpum Ait. (a native of North America) was found in a *Molinia* bog on the edge of a fen near Fishguard, Pembrokeshire (v.c. 45) where it has been established for at least 20 years; *Gladiolus communis* L. subsp. *byzantinus* (Miller) A. P. Hamilton (a native of north-western Africa) was found among brambles on a cliff near Nash Point, Glamorgan (v.c. 41), during a B.S.B.I. field meeting, where it has been established for at least 10 years; and *Nectaroscordum siculum* (Ucria) Lindley (a native of southern Europe) was discovered almost simultaneously in three widely separated sites in Glamorgan (v.c. 41) and Breconshire (v.c. 42). *Gaultheria shallon* Pursh (a native of western North America) was found established in a laneside near Trellech, Monmouthshire (v.c. 35) and *Hermodactylis tuberosus* (L.) Miller (a native of the Mediterranean region) on a bank near a car park in Manorbier, Pembrokeshire (v.c. 45).

G. ELLIS

ORCHID WARDENING SCHEME

Over the last few years, populations of several rare species of orchids have been vandalized including *Himantoglossum hircinum*, *Ophrys sphegodes*, *Orchis militaris* and *O. simia*. With the objective of preventing further damage to these protected species, a number of their sites were wardened permanently from May to August 1983 by Nature Conservation Trusts in Berks., Bucks. and Oxon, Cambs. and Kent, under a scheme jointly funded by the Nature Conservancy Council and the Royal Society for Nature Conservation, through a grant from the Esmée Fairbairn Trust.

Three paid wardens and a number of volunteers kept watch. As a result no orchids were dug up or damaged at the wardened sites; about 1000 people, including many botanists, visited the sites and were told of the conservation problems, and the best individual flowering specimen that was readily accessible at each site was selected for close inspection or photography, so that the other plants remained undamaged. In addition, wardens made original observations on the flowering period, insect visitors and pollination rate of these orchids.

L. FARRELL & F. H. PERRING

THE GEARAGH—AN UNUSUAL HABITAT IN CO. CORK

The Gearagh is situated near Macroom, Co. Cork, in the valley of the River Lee. Hundreds of streams joining the river form a maze of braided channels between wooded alluvial islands. A relic of extremely ancient wet woodland, it was largely clear-felled and drowned in a reservoir in the 1950s. Lately it has been discovered that some of the original forest still exists.

Photographs, taken in August 1983 were exhibited. They showed aspects of a meeting of the Irish Biogeographical Society there. Exploration of the relict woodland was accomplished by wading in the channels, under close canopy of *Quercus robur*. The hot summer, lowering the water in the reservoir, had revealed the channels and stumps of the former forest. Plants colonizing the exposed mud included quantities of *Limosella aquatica* and *Elatine hexandra*, while shore-line species included abundant *Polygonum minus*.

R. FITZGERALD

STEREOPHOTOGRAPHS OF SOME OF BRITAIN'S ALIEN FLORA

Stereophotographs were exhibited of the following: (a) widely established and still-increasing plants, such as *Senecio squalidus*; (b) garden escapes which are thinly distributed and no longer increasing, such as *Doronicum plantagineum*; (c) casuals from shoddy fields and waste ground, such as *Ammi majus*; and (d) the anomalous American species, *Lysimachia terrestris*, which occurs nowhere else in Europe and only in one small area of Britain, in occasional years, when conditions are favourable.

J. H. FREMLIN

B.S.B.I. PUBLICATIONS

Material relating to the history of *B.S.B.I. News*, including early issues, was displayed, together with bound copies of this publication and *Watsonia*.

A. L. GRENFELL

TAN BARK ALIENS

The production of high grade leathers at the Manor Tannery of Messrs Croggon and Son Ltd, Grampound, Cornwall, utilizes tannins extracted from Forest of Dean oak bark in admixture with cupules of Valonia Oak, *Quercus macrolepis*, imported from Turkey. These cupules, with long scales and dense pubescence, provide an ideal vehicle for the introduction of propagules of Turkish plants and over 30 species have been recorded so far from Cornwall. (Notably, some 75% of these are members of the Leguminosae). The tanning process leaves the propagules undamaged; spent tan bark is increasingly being used in place of peat as a horticultural mulch. Alien taxa have so far been recorded from the tannery waste-heaps, from the County Experimental Garden at Probus, from large private gardens and from parks and public amenities falling within a 10–15 mile radius of Grampound. The occurrence of these plants is dealt with in more detail in 'Adventive News 26' (*B.S.B.I. News* 35). Herbarium sheets of some of these aliens were exhibited: *Chrozophora tinctoria*, new to Britain; *Amaranthus deflexus*, *Citrullus lanatus*, *Cucumis melo* and *Ornithopus compressus*, all new to Cornwall and to v.c. 2.

I am indebted to Mrs B. E. M. Garratt and Messrs A. J. Byfield, E. J. Clement and K. L. Spurgin for their help in this work, and to the Croggon brothers for permission to roam their works.

A. L. GRENFELL

THE URBAN SPACES SCHEME

The Urban Spaces Scheme, based at the Polytechnic of North London, is a Manpower Services Commission-funded project promoting the use of local open areas for ecological teaching in schools in North London. Concentrating in the Boroughs of Camden, Islington, Hackney and Haringay, the scheme is employing three full-time and 22 part-time workers (who are all graduates in biological sciences), to design and produce teaching materials and field information for teachers.

The display concentrated on sections of the work relating to opportunist species abundant in urban areas, inhabiting cracks and crevices in walls and pavements. Succession, on derelict sites and waste areas with a minimum of soil, is found in various stages of development: even the smallest site may usefully illustrate the dynamics of colonization. Grasses, apt to be overlooked due to their general occurrence, exhibit a surprising range of species.

A herbarium and an invertebrate collection are being compiled at the Polytechnic, and site descriptions and species lists are being recorded on a specially developed computer system.

M. HALE

SAGINA BOYDII DOES SET SEED!

Both *Flora of the British Isles* (2nd ed., 1962) and *Flora Europaea* (vol. 1, 1964) state that *Sagina boydii* Buchanan-White does not produce ripe seed. Specimens of the mature plant were exhibited, together with seedlings that are being raised from seed collected from those plants. A sample of the seed was on view, and transparencies showing various stages of seedling development were exhibited.

S. J. & V. G. HEYWARD

UNIVERSITY OF READING, BOTANY DEPARTMENT EXPEDITIONS, 1982-83

An annotated map showing 20 regions visited for fieldwork by staff, research students and undergraduates were exhibited, together with photographs. These visits ranged worldwide, but tended to concentrate on the Mediterranean region, especially the Iberian Peninsula, Italy and Sicily, and Greece and the Balkan Peninsula. Material was collected for herbarium studies, experimental and phytochemical projects in progress and for exchange with other institutions.

S. L. JURY

CHECK-LIST FOR NORTHANTS. AND THE SOKE OF PETERBOROUGH (v.c. 32)

A recently published list of all the known vascular plants of the vice-county was exhibited. As well as the systematic and vernacular names, it gives the 'Dandy' reference number and a subjective assessment of the present rarity of each species. The published list, in alphabetical order of systematic names, was generated on a micro-computer. This allowed the ready re-arrangement of the data into lists in 'Dandy' sequence and also in rarity status groupings. Copies of these were also exhibited.

S. L. M. KARLEY

HELP!

Sixteen 'awkward' specimens were displayed, and members were asked to assist in identifying them. Firm identifications were offered for most, and helpful suggestions made for some of the others. Two specimens only remained un-named. A very large *Orobanch* plant was also displayed, growing in a

large planter, with two possible hosts, a *Fuchsia* and a scented *Pelargonium*. Originally thought to be an unusual variant of *O. minor*, it was generally agreed to be *O. crenata*.

This exhibit will appear again next year and members will once more be invited to help with 'awkward' specimens.

S. L. M. KARLEY

WHAT POLLINATES *RUSCUS ACULEATUS*?

A full account of this exhibit by Q. O. N. Kay will appear in the next issue of *Watsonia*.

PETAL STRUCTURE, COLOUR AND TEXTURE IN SOME BRITISH PLANTS

The complex and optically interesting structures of petals are surprisingly little-known, and the ways in which they function are still not fully understood. In the exhibit, examples of the major types of petal structure that are known to occur in British plants were shown, including the recently-discovered multiple-papillate and reversed multiple-papillate types. Colour photographs at magnifications of $\times 250$ and $\times 1000$ showed texture, internal structure and pigment distribution in the petals of three species with papillate epidermises (*Lamium purpureum*, *Omphalodes verna* and *Viola tricolor*), two species with multiple-papillate epidermal cells (*Anagallis arvensis* and *Silene dioica*), one with a reversed-papillate epidermis (*Verbascum phlomoides*), one with a multiple reversed-papillate epidermis (*Meconopsis cambrica*), and one with a lenticular epidermis (*Borago officinalis*). The two blue-flowered members of the Boraginaceae have the visible pigments confined to the mesophyll, with U.V.-absorbing pigments occurring in the apparently unpigmented epidermis, but all the other species have an unpigmented reflective mesophyll and pigmentation confined to the epidermis. SEM microphotographs showed additional surface details in *Saxifraga rosacea* and *Dactylorhiza maculata* (papillate) and *Helianthemum nummularium* (multiple-papillate).

Q. O. N. KAY

BRITISH ORCHIDS (A PHOTOGRAPHIC RECORD), 1982/83

A photographic record in seven volumes was exhibited, comprising a selection of 380 prints from Ektachrome-64 slides, taken by the exhibitor over a period of two years. The prints relate to 40 species, together with varieties and a number of hybrids. Each species is illustrated showing plants in location, together with shots showing the plant, the inflorescence and a close-up of individual flowers. Information concerning geographical location (generalized references only) and dates were also given. In the interests of conservation, records of the rarer species were not taken in location.

A. I. KEMP

SOME NEW *TYPHA* RECORDS

Herbarium specimens of *Typha angustifolia* $\times$ *T. latifolia* (*T. \times glauca*) were exhibited from a recently detected site in Middlesex and from two sites in Surrey. The most useful characters to separate this hybrid from its parents were presented in a table and specimens of the parents were also exhibited.

A. C. LESLIE

POA BULBOSA BY THE THAMES IN LONDON

Living material of *Poa bulbosa* and an apparently perennial variant of *Poa annua* were exhibited, both from the towpath on the Surrey bank of the Thames at Hurst Park. The differences between the two taxa were emphasized, as earlier records of *P. bulbosa* from the towpath at Hampton Court have sometimes been dismissed as *P. annua*.

A. C. LESLIE

ADVENTIVE WATER PLANTS IN JERSEY

Living material of the following species, collected in Jersey in November 1983, was exhibited: *Azolla filiculoides* Lam.* (tropical America), *Crassula helmsii* (T. Kirk) Cockayne (Australia and New Zealand), *Myriophyllum alterniflorum* DC.* (Europe, only one previous Jersey locality), *M. aquaticum* (Velloso) Verdc. (tropical and subtropical America), *Elodea nuttallii* (Planchon) St John* (North America), *Lagarosiphon major* (Ridley) Moss* (South Africa), *Lemna minuscula* Herter (North & South America), together with a pressed specimen of *Potamogeton pusillus* L. (Europe, new to Jersey in 1982). Those species marked with an asterisk (*) were present in such quantity in individual pools as to be causing problems; the others, except the *Potamogeton*, were first noted only in 1983 and are, as yet, in small amounts.

P. pusillus, although new to the island in 1982, was growing so thickly in St Ouen's Pond in 1982 and part of 1983 that it was difficult to row a boat across. At the end of July 1983 it began to die, perhaps because of the great summer heat of that year, and by 6th August 1983 none was apparently left.

The identification of *Lemna minuscula* was confirmed by Drs H. D. Heine and A. C. Leslie.

F. LE SUEUR

DABOECIA WITH ERECT FLOWERS

Four different plants of *Daboecia cantabrica* with erect flowers, three white and one purple, were found within 1–2 m of each other in Holland in 1983, and by coincidence another, with purple flowers, in Connemara, western Ireland, a week later. No previous record of this aberration is known. Full details will be published in the *Year Book of the Heather Society* for 1984.

D. MCCLINTOCK

DISCOID DAISIES

Two sheets of *Bellis perennis* lacking ray florets were shown, together with a photograph. For a full account of this exhibit see 'Short Note', p. 119.

D. MCCLINTOCK

PLANTS OF W. KENT

34 pressed plants collected in 1983 were exhibited of which 23 are thought to be new to v.c. 16. These included *Sagittaria latifolia*, *Ligustrum stronglyphyllum*, *Coronilla emerus*, *Aethusa cynapium* subsp. *agrestis*, *Campanula persicifolia* subsp. *subpyrenaica*, *Cytisus* × *dallimorei* and *Clarkia pulchella*, together with a number of species of *Cotoneaster* and *Hebe*. Other new W. Kent species collected in 1983 have been held over to next year's exhibition.

J. R. PALMER

FLORA OF THE OUTER OUTER HEBRIDES PROJECT

The British Museum (Natural History) is preparing a *Flora of the Outer Hebrides*. Vascular plants only will be included. The museum has over 10,000 specimens from v.c. 110, many collected by A. J. Wilmott and M. S. Campbell and others in the 1930s and 1940s. A card index has been started and includes mainly herbarium records so far. Further records of any kind will be much welcomed by the museum or by Andrew Currie, the vice-county recorder. Photographs and specimens of Outer Hebridean plants were shown, and a leaflet describing progress to date was distributed.

R. J. PANKHURST & P. M. CHORLEY

CROCKENHILL TREE SURVEY

The Survey has now been completed and the final report, *Crockenhill—Trees and Shrubs of a Kentish Village*, financed by the Charitable Fund of the Wild Flower Society, was displayed.

One interesting side-line that emerged from the survey has been the insight gained into the history of the area through a study of its trees. A map of the woodland cover of the 18th century showed that the tree lines and hedgerows that are now most species-rich were once woodland boundaries. Another display illustrated tree features and tree management typically associated with mediaeval deer parks, in this case of Lullingstone Park, which lies along the edge of the survey area. The exhibit was intended to encourage others who might wish to undertake a similar survey in their own area, by showing how a survey can be carried out and how a report on a small area can be relevant to other areas.

S. PITTMAN

SOME EAST SUSSEX FLOWERS

Seven paintings by Eileen Hill were exhibited: with the exception of *Phyteuma spicatum*, all were of flowers of the Heathfield area.

E. J. RICH

ADVENTIVE OROBANCHE SPECIES IN THE BRITISH ISLES

Herbarium specimens and line drawings of four species of *Orobanchae*, adventive in the British Isles, were exhibited. *O. flava* and *O. lucorum* are reported to be naturalized in the Oxford University Botanic Garden: their introduction is presumed to have been unintentional. *O. aegyptiaca* is known only from a single occurrence in a Sussex nursery, in 1952. *O. crenata* has a longer history as a casual in Britain and, indeed, now has a permanent station in S. Essex (v.c. 18), where its status is controversial (see report of exhibit by K. J. Adams, pp. 161–162).

F. J. RUMSEY

THE GUERNSEY BAILIWICK, 1983

The Bailiwick of Guernsey consists of Guernsey itself, Alderney, Sark & Brechou and Herm & Jethou, each with its set of uninhabited islets. Three plants new to the whole archipelago, found in 1983, were exhibited: *Lathyrus nissolia* in Guernsey, *Arenaria balearica* in Sark and *Panicum capillare* in Alderney. Plants new to the lesser archipelagoes, which were exhibited, were: *Linaria*

purpurea (Alderney); *Brassica rapa*, *Polygonum amplexicaule* and *Echinochloa* cf. *crus-galli* (Sark); *Cardamine flexuosa*, *Chenopodium rubrum*, *Veronica filiformis*, *Matricaria recutita*, *Picris echinoides*, *Crepis vesicaria*, *Juncus gerardi* and *Holcus mollis* (Herm).

There have also been useful refinds of plants not seen since the last century, some of which were also exhibited. Herm, with its dozen or so vegetated islets, has been specially worked recently by Mrs Jennie Page for a revision of the list published in 1962. Mrs Page is taking over from me as Secretary of the botanical section of La Société Guernésiaise.

P. I. RYAN*

GETTING TO GRIPS WITH THE UMBELLIFERAE (3)

This report coincides with the author's tenth season of work on the Umbelliferae. The exhibit comprised pressed specimens, live plants, notes, 35 mm slides and the usual display-case of fruit-forms. The pressed specimens were mainly chosen as a series of species in the larger European genera represented in Britain, i.e. *Conopodium*, *Pimpinella*, *Seseli*, *Bupleurum* and *Peucedanum*. The slides were chiefly of less well-known species encountered since the previous exhibit in 1981. The live plants and notes illustrated some of the successes and difficulties encountered when growing a large number of southern and alpine species in Britain. The new season's work in this connection was presented by way of a box containing month-old seedlings of eight species, from tiny *Bupleurum semicompositum* L. to three-inch *Orlaya grandiflora* (L.) Hoffm. It was hoped that a further submission of this study to members' scrutiny would maintain, and perhaps increase, the varied contributions which have been of so much help.

M. SOUTHAM

FROG ORCHIDS IN KIRKCUDBRIGHTSHIRE

During the summer of 1980 a large colony of *Coeloglossum viride* was discovered on rough grassland in an unimproved hill pasture in Kirkcudbrightshire. It was the first discovery there of this species since 1897. All previously recorded sites had been near the coast. The numbers of plants in the newly-discovered site have fluctuated between 40 and over 400 in the past three years. Other orchid species are also well represented at the site. These include both *Platanthera bifolia* and *P. chlorantha*, in addition to *Gymnadenia conopsea* and *Dactylorhiza fuchsii*. Other plants characteristic of upland pastures also occur, including a large colony of *Gentianella campestris* in which some plants have white flowers.

P. D. STANLEY

A SCOTTISH MISCELLANY

New records for Kirkcudbrights. v.c. 73, included the first record since 1897 of *Coeloglossum viride* and first records of *Festuca heterophylla* and *Arum italicum*. New records for Scotland collected by Nicholas Stewart were *Elodea nuttallii*, from the canal near Falkirk (v.c. 86), and *Juncus subulatus* near Grangemouth (v.c. 86). *Calamagrostis purpurea*, refound at Braemar (v.c. 92), was first collected there in 1941 by R. McKechnie and E. Wallace as *C. canescens*, but all the measurements fall within the range of *C. purpurea*.

Other material exhibited showed *Crocasmia pottsii* (one of the parents of *C. × crocosmiflora*)

* Mrs Ryan has run over 100 outdoor meetings, month after month, with attendances of seldom fewer than 30 and once exceeding 60 (55 were out one month this year), a most remarkable sustained achievement. She has inspired, among many others, Jennie Page in Guernsey, Owen Johns and the late Victor Mendham in Alderney and Marcia Marsden in Sark - D. McClintock.

naturalized in three places in Kirkcudbrightshire; a key drawing to show the features to look for when examining *Hieracia*; and flower paintings, including one of *Taraxacum palustre*, which is found in three places in v.c. 73 (its only Scottish stations), and *T. olgae*.

O. M. STEWART

RECENT RARITIES

19 drawings, 18 from plants collected in W. Kent in 1983 and one (*Conyza bonariensis*) from Middlesex, were exhibited. Twelve of the drawings were of naturalized *Cotoneaster* species, nearly all in fruit, with drawings of the flowers to be added in 1984. One of the twelve could only be named provisionally, as *C. buxifolius*, though it appears to be frequently naturalized. It is hoped to draw as many cotoneasters as possible; there are at least 9 further ones in W. Kent and perhaps six more in other vice-counties, though some can only be named on a tentative basis.

H. S. THOMPSON

A MISCELLANY OF FLOWER PATTERNS

The 80 colour transparencies taken by the exhibitor showed the different patterns that occur in the general flora. By using various photographic techniques and a large selection of plants which covered species as diverse as *Primula veris*, *Verbascum nigrum*, *Papaver rhoeas*, *Pinguicula grandiflora*, *Paronychia argentea* and *Lilium pyrenaicum*, the general pattern and form of the inflorescence were depicted. Together with the many varied colours of the petals and bracts of the plants, this made for a general overall miscellany of floral pattern.

J. TUBBS

TWO NATURAL HYBRIDS IN *RANUNCULUS* SUBGENUS *BATRACHIUM* (DC.) A. GRAY

Herbarium specimens and photographs of two unusual batrachian Ranunculi were exhibited. (a) A plant from Holmesley bog, S. Hampshire (v.c. 11) resembles the hybrid *R. omiophyllus* Ten. $\times$ *peltatus* Schrank (*R.* $\times$ *hiltonii* H. & J. Groves), which was discovered by Mr T. Hilton at Copthorne Common, Sussex (v.c. 13/14) in 1896. The Copthorne hybrid was highly fertile and it has been suggested that it was an amphidiploid (Cook (1966), *Mitt. Bot. Staatssamml. München*, 6: 201). It is interesting, then, that the Holmesley hybrid is sterile and triploid. (b) Plants found at Slapton Ley, S. Devon (v.c. 3) resemble *R. baudotii* Godr. in several features but have atypical petals with pyriform nectar pits. These plants are thought to be *R. baudotii* $\times$ *peltatus*.

S. D. WEBSTER

BEE ORCHID SURVEY

In order to gain an understanding of fluctuations in Bee Orchid (*Ophrys apifera*) populations in Britain, detailed studies were started on populations at Monks Wood, Cambridgeshire and at Thurleigh, Bedfordshire, in 1979. At the same time, B.S.B.I. members were encouraged to make observations on populations elsewhere, using the same methods. The exhibit presented a summary of this study. Contrary to what most orchid books say, Bee Orchid populations are relatively long-lived, individuals more than 5 years old being not uncommon. Individuals are rarely monocarpic and may flower in the field for at least 5 years in succession, although, on average, they flower for only two or three years out of five. The winter-green rosette of leaves, which usually appears in early October, persists throughout the winter and is rarely damaged by cold or frost—rosettes may, however, be grazed by slugs, snails and rabbits. The size of the winter rosette is a good guide as to

whether the individual plant will flower the following year. In general, plants with large leaves and the greatest number of leaves flower. Drought in the spring may blacken and kill all above-ground parts, but the plant survives as a tuber and produces new leaves in autumn. It is this behaviour that may have led to the mistaken view that Bee Orchids are short-lived and only flower once.

T. C. E. WELLS & L. FARRELL

The following also exhibited:

- R. J. BANKS. Cretan spring flowers.
- J. CAMUS. A Victorian fern album.
- A. N. GIBBY. Botanical postage stamps.
- A. HALL. Effect of primrose picking.
- F. ROSE. Illustrations for a new Field Key to grasses, sedges and ferns.
- R. ROWE. Posters, cards and paintings of fungi, autumn fruits and leaves, by Moira Williams.
- C. SAUNDERS. St Christopher's School, Burnham-on-Sea: Operation Orchid.
- P. TAYLOR. A myriad of plants in their habitats.

In the lecture hall, the following members gave short talks illustrated by colour-slides:

- J. AGNAROFF. Natural history of Java.
- C. A. CHADWELL. Riverside plants of central Wales.
- F. E. CRACKLES. Some rarities of S.E. Yorks.
- J. L. MASON. B.S.B.I. Annual General Meeting, 1983—Bristol.
- F. H. PERRING. Endemics of the Alpes Maritimes.
- T. C. E. WELLS. *Rhizanthella gardneri* (Rogers' Underground Orchid)—the world's most elusive orchid.

BOTANICAL SOCIETY OF THE BRITISH ISLES, COMMITTEE FOR SCOTLAND, AND BOTANICAL SOCIETY OF EDINBURGH, EXHIBITION MEETING, 1983

An Exhibition Meeting was held on Saturday, 5th November 1983, at the Royal Botanic Gardens, Edinburgh, by courtesy of the Regius Keeper, at 12.00 hours. The following exhibits were shown:

- G. H. BALLANTYNE. A bramble miscellany. Plants from North Queensferry, all with a predominantly western distribution: how did they reach Fife? Also specimens from Angus, confirming finds of 50 years ago, and new county records from the Lothians.
- P. & D. BATTY. *Gentiana nivalis* at Ben Lawers, v.c. 88. Survey of annual and biennial variants and their survival in competition with both humans and sheep.
- J. BEVAN. *Senecio doria* L. in v.c. 102.
- J. K. BUTLER. East Sutherland Plants, v.c. 107. *Hypericum androsaemum*—in wooded gorges on east coast of Sutherland; *Neottia nidus-avis*—three new records extending range northwards; *Saxifraga granulata*—three records extending British range; *Genista anglica*—two new records extending range.
- J. W. CLARKE. Some Coll (v.c. 102) dandelions.
- R. W. M. CORNER. Plant records from Roxburgh and Selkirk (v.c. 80 and 79).
- J. H. DICKSON. A list of plants for a 16th century garden in Glasgow: Mark Jamieson's Physic Plants.
- G. HALLIDAY. (a) Recent records from Cumbria; (b) Some plants of the Montenegro coast, Jugoslavia.
- C. C. HAWORTH. Some Scottish dandelions, to encourage new collectors to send in more records.
- M. LITTLE. Wool aliens in a Galashiels garden (v.c. 79).
- D. LONG. Aquatic plants from south-western Ireland.
- E. McMAHON. Three watercolours: Daisy, Gentian and Grass of Parnassus.
- M. E. R. MARTIN. Dumfries (v.c. 72) plants, 1983.
- A. RUTHERFORD. An inspiration to plant artists.
- A. A. P. SLACK. Intimation of expected publication of Inverness Survey in 1984.
- O. M. STEWART. (a) New records, v.c. 73—*Coeloglossum viride* (1st record since 1897); *Osmunda*

regalis (2nd native record); *Anagallis minima* (3rd record); (b) Flower paintings; (c) *Calamagrostis purpurea* refound at Braemar, 1983; comparison with *C. canescens* and *C. epigejos*; (d) Plants found while recording for Flora of the Lothians, including *Bromus erectus*, *Listera ovata*, *Helictotrichon pubescens*; (e) Illustrated letter from Martin Nichols, on methods of recording.

A. MCG. STIRLING. (a) Distribution of *Rubus* in Dunbarton (v.c. 99); (b) (with A. G. KENNETH) A new bramble from Argyll and the Isles.

E. C. WALLACE. Plants from the R. MacKechnie herbarium, mostly *Carex* specimens.

M. MCC. WEBSTER. (a) Scottish records, 1983; (b) Tomintoul Field Meeting, July 1983 (v.c. 94), including *Betula nana*, a new county record.

J. WOODS. Wedgwood botanical series: drawings made for decorating crockery, with some of the finished articles.

P. WOODS. *Epipactis helleborine* (Broad-leaved Helleborine) in the Edinburgh area. Plants have reappeared in suburban gardens, in an area where the species was collected many years ago.

B.S.E. AND B.S.B.I. FLORA OF THE LOTHIAN PROJECT 1982-1992. New records for Midlothian (v.c. 83); Methods of recording and checking old records.

R. B. G. EDINBURGH. Some Scottish plant collectors. Notebooks and herbarium specimens of, among others, David Douglas and George Forrest.

FIELD MEETINGS, 1982 (FURTHER REPORTS)

IRELAND

CO. WESTMEATH

At all the field meetings in 1982 priority was given to recording for the proposed Flora of County Westmeath, which is being undertaken by the Irish Regional Committee. Recording is being based on records for 5 km squares, derived from the standard 10 km grid, as shown on the $\frac{1}{2}$ " O.S. maps of Ireland.

KINNEGAD, CO. WESTMEATH. 15TH MAY

The day was spent to the west of Kinnegad, exploring roadsides, waste ground and cut-over raised bog, and to the south of Killucan, exploring the disused canal and railway station. *Galium odoratum*, *Ranunculus ficaria* subsp. *bulbifer* and *Moehringia trinervia* were noted in hedgerows, while in the vicinity of the railway were seen *Cochlearia danica* (new record) and *Arabidopsis thaliana* (second record).

DELVIN, CO. WESTMEATH. 13TH JUNE

First visited was Clonagh Lake, which is at the foot of a small esker ridge to the north-east of Delvin. The lake was fringed with a rich flora, including *Ranunculus lingua* and *Berula erecta*, species which are very characteristic of the Irish midlands. On a drier ridge a strangely acidophilous flora was found, including *Carex binervis*, *C. pulicaris*, *Molinia coerulea* and *Galium saxatile*. The peaty area to the west of the lake yielded *Hydrocharis morsus-ranae* and a new station for *Pyrola rotundifolia*; the latter is a very rare plant in Ireland but has its main localities in Co. Westmeath. Other species of note were *Agrostis vinealis* (new record) in grassland at Crowinstown Lake and *Carex limosa* at the northern end of Lisclogher Bog. Also at the latter locality were seen *Andromeda polifolia* and *Drosera anglica*, species characteristic of midland raised bogs.

TYRELLSPASS, CO. WESTMEATH. 17TH JULY

The day started with recording on farm land, raised bog and gravel ridges at Torr, to the south-west of Tyrellspass. Here were seen *Antennaria dioica* and *Carlina vulgaris*. Next visited was the spectacular esker ridge near Kiltober and Rahugh. By a sand pit was a rich flora, including *Gentianella amarella*, *Origanum vulgare*, *Galeopsis angustifolia*, *Trifolium medium* and *Ophrys apifera*, while in woodland were *Sorbus hibernica* and *Cornus sanguinea*. *Ceterach officinarum* was found growing in a somewhat unusual habitat of coarse limestone gravel. Other species of interest

recorded were *Plantago media* (new record) in two stations by a disused canal south of Kilbeggan, *Carex spicata* and $\times$ *Festulolium loliaceum* at the side of a road to Cornaher, and *Carex vesicaria* and *Ranunculus trichophyllus* at Swallow Lake.

MULLINGAR, CO. WESTMEATH. 14TH-17TH AUGUST

This proved to be a very rewarding meeting. It was attended by 17 members, including several from England and four students from Kew. Particular emphasis was placed on exploring the more outlying parts of the vice-county.

On the first day the fen at Lough Sewdy was visited, together with raised bogs in the Inny Valley on the border with Co. Longford and a disused canal at Kelly's Bridge. Lough Sewdy yielded 15 Carices, including *Carex dioica*, *C. lasiocarpa*, *C. elata* and *C. diandra*, together with *Epipactis palustris*, *Dactylorhiza traunsteineri* and *Coeloglossum viride*. Despite some lowering of the lake level, *Pyrola rotundifolia* was still thriving at a station reported in 1958. *Rumex hydrolapathum*, *Apium* $\times$ *moorei* and $\times$ *Festulolium holmbergii* (new record) were found by the Royal Canal at Kelly's Bridge, and *Dryopteris carthusiana* and *Utricularia minor* at Conlanstown Bog.

On the second day the northern verges of the county were explored. A brief stop at Slevin's Lake yielded *Carex spicata*. On reaching the shores of Lough Sheelin the party divided, one group to work the ground by the lake, Lough Kinale and the impressive limestone bluff of the Rock of Curry, while the rest were to explore the area to the east, on the borders with Co. Meath. The first group compiled an impressive list of aquatic, fen, peat-bog and calcicole species. The limestone flora of the Rock of Curry, which included *Origanum vulgare*, *Cornus sanguinea* and *Rosa pimpinellifolia*, was likened by the English participants to the chalk downs of England. Among the more notable finds of the second group were *Carex curta* by Lough Sheelin, *Agrostis gigantea* at Tullystown, *Glyceria declinata* (new record) near Hilltown, and *Scirpus fluitans* and *Acinos arvensis* (both new records) by Lough Naneagh.

The third day was spent by Lough Ree, the varied habitats in this area produce the botanically richest area of the county. One party worked from Doonis Lough and Bethlehem promontory to Creggan Lough and the shore of Lough Ree at Inchmore. Near Bethlehem House they saw *Teucrium scordium*, *Lysimachia nummularia* (new record), *Carex hostiana* $\times$ *C. lepidocarpa* (new record), *Glyceria maxima* and *Hydrocharis morsus-ranae*. *Carex riparia* (new record) was found by the Tonagh River, it is a species which is rare in Ireland away from the east coast. A second party recorded by Lough Ree at Portlick and later in the vicinity of Waterstown House. Seen by Lough Ree were *Epipactis palustris*, *Carex serotina*, *Galium boreale* and *Achillea ptarmica*. A notable find by Waterstown was *Dryopteris* $\times$ *tavelii*, in only its second confirmed Irish station.

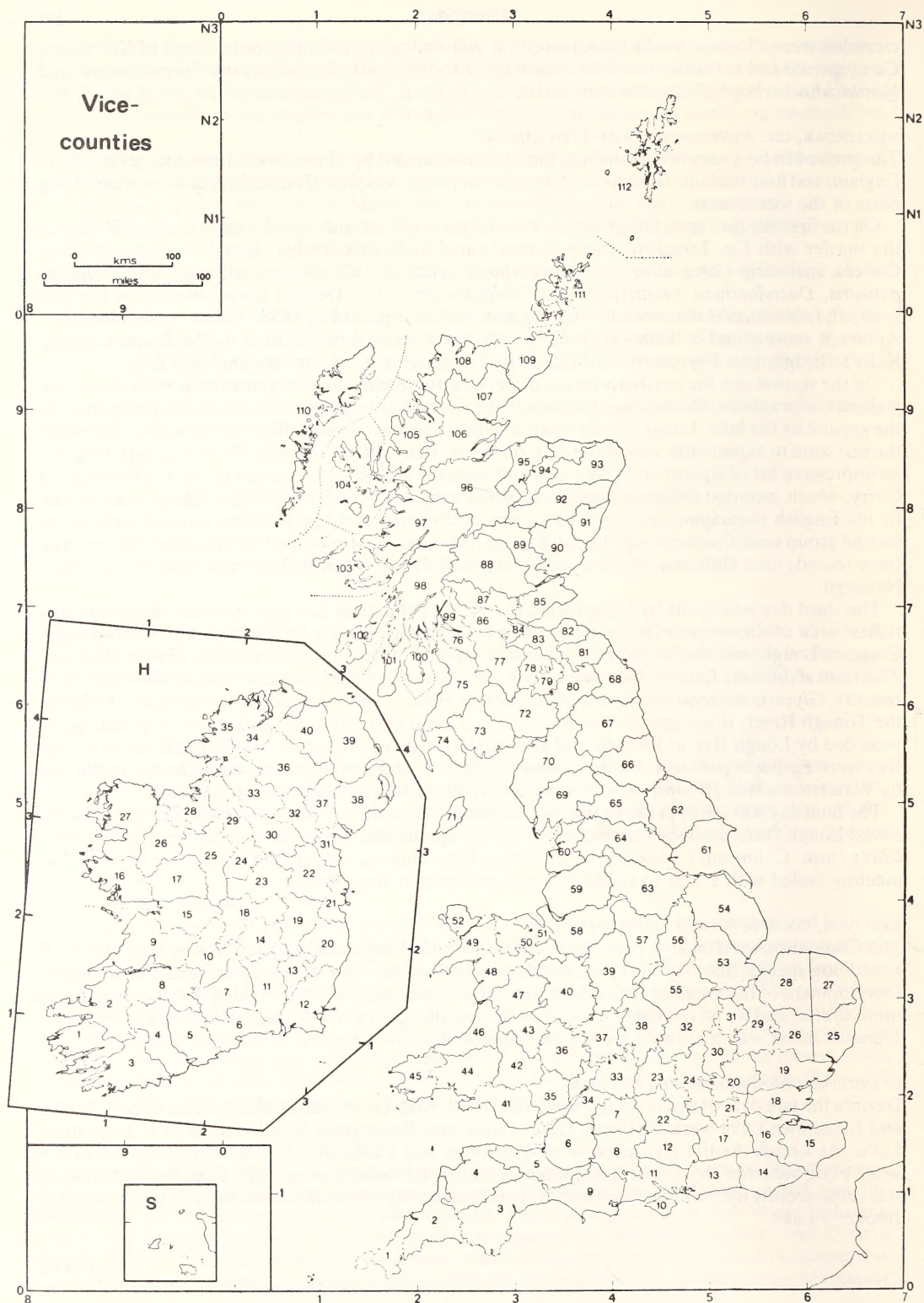
The final day was spent in the vicinity of Rathowen. *Agrostis vinealis* was found. The marshy area round Lough Gare produced an impressive list of aquatic and fen species, including *Cicuta virosa*, *Carex curta*, *C. limosa*, *C. lasiocarpa*, *C. dioica*, *Vaccinium oxycoccos* and *Empetrum nigrum*. The meeting ended with a visit to raised bog and riverside at Inny Bridge.

BALLIVOR, CO. WESTMEATH. 11TH SEPTEMBER

The Craddanstown/Bracklyn parts of the extensive raised bog were explored. Apart from the usual raised bog species, the day's list included *Senecio sylvaticus*, *Empetrum nigrum* and *Carex limosa*. Development of the area has certainly destroyed previous stations for *Saxifraga hirculus* and *Pyrola rotundifolia*, and we were unable to confirm the recent sightings of *Vaccinium vitis-idaea*; however, *Frangula alnus* was confirmed among the woodland by the entrance to the peat works.

DELVIN, CO. WESTMEATH. 9TH OCTOBER

Despite the late date of this meeting, some useful records were made. Booker's Lake, Lough Analla and Johnstown Lake were explored. *Cicuta virosa* and *Ranunculus lingua* were seen at Johnstown Lake. At Lough Analla *Hydrocharis morsus-ranae* and *Thalictrum flavum* were seen, and on a nearby bog occurred *Dryopteris carthusiana*. An unusual looking *Carex*, with rather inflated utricles, was subsequently identified as *C. rostrata* var. *utriculata*. *Myrrhis odorata* was seen by the roadside at Booker's Lake.



INSTRUCTIONS TO CONTRIBUTORS

Papers and Short Notes concerning the systematics and distribution of British and European vascular plants as well as topics of a more general character are invited.

Manuscripts must be submitted in duplicate, typewritten on one side of the paper only, with wide margins and double-spaced throughout. They should follow recent issues of *Watsonia* in all matters of format, including abstracts, headings, tables, keys, figures, references and appendices. Note particularly use of capitals and italics. *Only underline where italics are required.*

Tables, appendices and captions to figures should be typed on separate sheets and attached at the end of the manuscript. Names of periodicals in the references should be abbreviated as in the *World list of scientific periodicals*, and herbaria as in Kent's *British herbaria*. Line drawings should be in Indian ink, preferably on good quality white card, but blue-lined graph paper or tracing paper is acceptable. They should be drawn at least twice the final size and they will normally occupy the full width of the page. Lettering should be done in Lettraset or by high-quality stencilling, though graph axes and other more extensive labelling are best done in pencil and left to the printer. Photographs can be accepted only in exceptional cases.

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