Short Notes

SENECIO SQUALIDUS L. × *S. VULGARIS* L. IN CAMBRIDGESHIRE

On 9th July, 1977, we found a single plant of the hybrid *Senecio squalidus* L. × *S. vulgaris* L. on sandy ground on the top of a disused railway embankment between Toft and Bourn, Cambs., v.c. 29, GR 52/338.558; specimens are in **herb. A. C. Leslie** and **CGE**. A description of the plant follows:

Plant 47cm; stock 1·5cm, short, thick; stems numerous, erect, much branched. Lower leaves all shrivelled or eaten by larvae of cinnabar moth (*Callimorpha jacobaeae*) at time of gathering; upper leaves narrowly lanceolate, shallowly lobed or toothed, auriculate. Capitula numerous, ± cylindrical or narrowly ovoid, *c* 9–12mm diameter; rays 7–9 (–13 in cultivation), 3–4mm long, eventually reflexed and coiled. Anthers with 14% stainable pollen grains. Elongated stigmatic papillae fewer and more variable in length than in *S. squalidus*. Achenes pale and shrivelled. Chromosome no. $2n = 30$ (counts from six cells).

This is the first record of this hybrid in Cambridgeshire and only the third cytologically confirmed British record. Stace (1977) reported two counts (one from Manchester, the other from Leicester), both from plants in long-established mixed populations of the parents. *Senecio cambrensis* Rosser is thought to have arisen from such a hybrid by chromosome doubling. The sterile triploid is the plant Druce called *S.* × *baxteri*, the correct citation for which is as follows:

Senecio squalidus × *S. vulgaris* = *S.* × *baxteri* Druce in *Rep. botl Exch. Club Brit. Isles*, **2**: 228 (1907) (Lectotype: Cardiff Docks, Glamorgan, v.c. 41, June 1905, H. J. Riddelsdell plant B (**OXF**)); *S.* × *baxteri* Druce in *Rep. botl Exch. Club Brit. Isles*, **1**: 374 (1893), nom. nud.

In his original publication of the hybrid name *S.* × *baxteri* in 1893, Druce gave no description, but in 1907, when discussing some Senecios collected by Riddelsdell at Cardiff Docks, he said: 'but I should be inclined to consider them hybrids of *vulgaris* × *squalidus* (= × *baxteri* Druce).' He went on to say how these plants differed from the parents, thus validating the hybrid name. Three different gatherings, labelled A, B and C, are involved and these specimens are to be found in his herbarium (**OXF**). They were also distributed through the Botanical Exchange Club and duplicates are to be found in other herbaria. Specimen B is chosen as the lectotype. It has larger heads than have most *S. vulgaris* plants and smaller ligules than in *S. squalidus*. The elongated stigmatic papillae are more abundant than in *S. vulgaris*. The achenes, as stated by Druce himself, are mostly undeveloped. This specimen seems to be good *S. squalidus* × *S. vulgaris*. Specimens A and C are hardly distinguishable from rayed forms of *S. vulgaris*, but at least some of the plants have undeveloped achenes. All three specimens had been labelled, in an unknown hand, '*S. nebrodensis*', which is a glandular hairy plant, quite unlike *S.* × *baxteri*.

The Cambridgeshire plant was conspicuous on account of its size and number of capitula, which became nodding after flowering as the apex of the pedicel withered. It was growing with both parents, though *S. squalidus* was in small quantity, together with *S. viscosus* L. and a number of plants of *S. squalidus* × *S. viscosus*. There was no *S. vulgaris* var. *hibernicus* Syme. The railway line has been disused since 1969 and it is probable that these three species colonized the area shortly after.

Cuttings from this plant (from which root-tip chromosome counts were made) were grown in the University Botanic Garden, Cambridge. Under these conditions the leaf form showed considerable plasticity. Those leaves produced soon after rooting were broadly lanceolate and only shallowly toothed, whereas the later leaves were deeply lobed. Comparisons with *S. vulgaris* var. *hibernicus* collected in the Botanic Garden revealed that the hybrid often has a broader area of disc florets and broader, sometimes more numerous, rays, which may overlap, unlike those in the majority of rayed groundsels. Moreover, var. *hibernicus* (like var. *vulgaris*) has few or no elongated stigmatic papillae. The hybrid differed from *S. squalidus* in its habit, capitulum size and shape, leaf dissection and stigmatic papillae.

Stace (1977) suggested that var. *hibernicus* may have arisen by mutation, rather than having a complex origin involving hybridization and introgression of the ray gene from *S. squalidus*. He drew parallels with several other intraspecific rayed and rayless pairs within the Asteraceae (e.g. in *Aster*

tripolium). The morphological characters of *S. squalidus* × *S. vulgaris* differ greatly from those of var. *hibernicus*, in which nothing but the ray florets separate it from normal *S. vulgaris*. Indeed, as Stace pointed out, even the rays of var. *hibernicus* differ significantly from those of *S. squalidus*. The rarity and sterility of *S. squalidus* × *S. vulgaris* in Cambridgeshire would suggest that the derivation of var. *hibernicus* through the triploid hybrid is at most a very rare event. This does not preclude the possibility of hybridization involving unreduced gametes of *S. squalidus*, but if this were the case, one might expect the resultant plants to have some other *S. squalidus* characters. *S. squalidus* was certainly in cultivation at the University Botanic Garden before the end of the nineteenth century and rayed *S. vulgaris* was unknown there until 1901, when it was first recorded as *S. squalidus* × *S. vulgaris*; this sort of evidence cannot, however, really provide unequivocal support to either hypothesis. It seems sensible to concur with Stace's conclusion that an origin through mutation is at least as plausible an hypothesis as one via hybridization.

ACKNOWLEDGMENTS

We should like to thank the curator of the Druce-Fielding Herbarium, Oxford (**OXF**), for the loan of the relevant specimens and Mr P. D. Sell for supplying the notes on the nomenclature.

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R. I. S. BRETTELL & A. C. LESLIE

HEATHERS WITH PARTS IN FIVES OR SIXES

The discovery early in 1977 of more examples of *Erica tetralix* with five or six leaves in a whorl (cf. McClintock 1976) prompted a wider search for such plants in this and other species too, and thoughts on its value taxonomically or otherwise.

The five-leaved state was briefly ('feuilles quinées') described as var. *quinaria* by Guffroy (1927, p. 29). Senay (1928), unaware at the time of Guffroy's name, came across the plant independently (also in Brittany) and wrote a longer account, including a description of one plant with leaves in sixes. He recorded its presence in seven French départements, all in the north-west, and found a specimen that had been collected in 1858 by de Brébisson. Van Ooststroom & Reichgelt (1961) reported: 'Bladen in kranzen van 4 (of 6).'

Withering (1796) noted that *Erica tetralix* has 'leaves sometimes five in a whirl (sic).' Nothing more seems to have been noticed in Britain until P. Rawlinson found it in 1974 near Dolgelly, Merioneth, v.c. 48, and the next year it was sent from Co. Galway by Col. A. Morris. These were shown at the B.S.B.I. Exhibition Meeting in 1975 (McClintock 1976).

In 1977, one of us (P. R. B.) found it to be plentiful on Silchester Common and Bartley Heath, N. Hants., v.c. 12, and here too some of the whorls were in sixes. Further search by him showed that plants with leaves in fives or sixes are common on many other heaths in Hampshire, including the New Forest, and also in Surrey. This was followed by Col. Morris sending specimens of *E.* × *praegeri* with leaves in fives from Connemara. To his shame, the other author (D. McC.) found in his herbarium that he had collected *E. tetralix* in 1975 in the same locality with leaves in fives, and had not noticed it. Further search showed that this form of pleiomery occurs also in *E. mackaiana*, both in Connemara and Donegal (specimens in **herb. D. McClintock**, 1975), and in at least one named cultivar ('Whitehouse'). In extenuation, it may be pleaded that few people even look for this, nor is it easy to notice. Indeed, a search through **BM** showed specimens of *E. tetralix* with leaves in fives (apparently unnoticed) to be frequent, with one specimen dating back to 1855.

Further studies of these variants of *E. tetralix* have proved very interesting. The most obvious finding is that plants with leaves in fives are common, at least locally (up to one plant in three in some areas). On these plants, the number of shoots with leaves in fives or sixes is variable, but we have not found any plants where all the shoots are affected. Ecological observations show conclusively that

plants with leaves in fives are much more common on the borders of waterlogged areas than in the less wet parts. Also, the number of affected shoots on each plant is much higher in the wetter areas. Plants with leaves in sixes have only been found so far in the very wet areas, where there is much surface water, and they are not uncommon there. All such plants have at least some shoots with leaves in fives; one specimen was found with a shoot on which the numbers of leaves in each whorl alternated between five and six. Another common finding is for the leaves to lose their arrangement in whorls and to take on a spiral pattern. The number of sepals on all these plants also seems to vary between four and six, but this number does not necessarily correlate with the number of leaves on a shoot. On the other hand, there may be wholly pentamerous flowers (Hagerup 1928) and Miss M. J. P. Scannell has noticed that occasionally such plants also have leaves in fives.

Senay (1928) wrote: 'nos *Erica tetralix* ne présentent pas de stades intermediaires entre les verticilles tetramères et les verticilles quinées: la transition est completement brusque'. Our studies have shown the exact opposite. Indeed, it may be more appropriate to include all these states under plain *Erica tetralix* L., describing its leaves as whorls of 4 (–6) and flowers tetramerous (–pentamerous). The inconstancy of its appearance seems to reduce its taxonomic, if not its physiological, value. More study is needed, however, if a name is required for this variant under *E. mackaiana* and *E.* × *praegeri*, in neither of which it has previously been noted.

Finally, there is a subform of *Calluna vulgaris* with 'flowers often with a pentamerous, sometimes hexamerous perianth', to which is added 'the packets of bracts are as a rule more or less twisted' (Beijerinck 1940, p. 133). This is the subf. *pentamera* of f. *multibracteata*, in which the number of bracts exceeds 12 and which is the normal state in late-flowering varieties. Both these taxa were described by J. Janssen in 1935.

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P. R. BROUGH & D. MCCLINTOCK

TRAGOPOGON × *MIRABILIS* ROUY IN WEST KENT, V.C. 16

On 31st May, 1976, we found a single plant of the hybrid *Tragopogon porrifolius* L. × *T. pratensis* L. (= *T.* × *mirabilis* Rouy) at a field border between Cuxton Great Wood and the M2 motorway near Rochester, W. Kent, v.c. 16. Dr F. H. Perring has confirmed that this is the first record for W. Kent. A flowering stem which was taken from the plant was confirmed by Dr C. A. Stace and is now in **MANCH**.

The plant was growing within a few metres of both parents and was about 1m high. Its capitula were purple with a yellow centre, and it resembled *T. pratensis* rather than *T. porrifolius* in its leaf-base and thickness of peduncle.

Fresh pollen grains were stained and measured; they varied between 24μm and 60μm, and 46% of them became stained in acetocarmine. The average size of stained grains was 48μm and that of unstained (presumably infertile) grains 36μm. Achenes produced appeared normal but none of those sown proved to be viable. When dissected they were found to be hollow, containing only shrivelled contents.

The site was revisited in 1977 but no hybrid plants were found.

B. & J. BURROW

PHALARIS ARUNDINACEA L. IN BARVAS

In my report of the 1975 field meeting at Stornoway, Outer Hebrides, v.c. 110 (Copping 1977), I mentioned that 'we passed two fields at Barvas containing *Phalaris arundinacea* apparently being grown as a crop.' A correspondent of Mr B. W. Ribbons of the Botany Department, University of Glasgow, expressed surprise and interest in this observation and as a result of enquiries Mr Ribbons received the following reply from the Area Agricultural Adviser for Lewis and Harris:

'Reed-grass (*Phalaris arundinacea*) is a common plant of marshy ground in the Islands. For example it occurs also in Tobson, Bernera and Strond, Harris, where it is encroaching into adjacent croft land due to a combination of impeded drainage and severe overgrazing in spring. It also occurs in the river valley at Horgabost in Harris.

The grass is a weed which is not cultivated, but has been allowed to spread. As I mentioned, most inbye areas [enclosures near a dwelling house] are overgrazed with sheep, especially in spring, which reduces the vigour of grass and its ability to compete with this weed. Lack of maintenance of drainage ditches encourages a higher water-table and waterlogging of land, resulting in a suitable environment for the plant.

I believe that in the past, when the 'black house' [humble dwelling built largely of turf] was occupied by the majority of the Islanders, this grass was used for thatching.'

So, evidently, I was mistaken, but I had never seen *Phalaris arundinacea* so dominant over such an extensive area before. Curiously enough, I discovered a similar situation in July, 1977, on a damp part of Mellis Common, E. Suffolk, v.c. 25, where the grass has grown rampantly to the virtual exclusion of other species. Had I seen this colony earlier I should probably not have been misled in Lewis.

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A. COPPING

THE DISTRIBUTION OF *CAREX ELONGATA* L. IN THE BRITISH ISLES

Carex elongata L. is scattered in central and northern Europe, where it reaches Arctic Norway, and extends into Siberia. Its existence in Britain is precarious, for the habitats that can provide its very specific requirements have been much reduced as a result both of natural causes and of human intervention.

This sedge demands abundant moisture and minimum competition, but cannot tolerate continuous swamp conditions or colonize newly exposed mud. A characteristic habitat is a carr of decaying alder or willow, where the plant is often epiphytic upon fallen boughs that raise it above flood level but allow its roots ready access to water. It also favours stagnant ditches in water-meadows, and canals where the ancient wooden camp-sheathing provides the kind of pedestal that it enjoys. Such situations are fast disappearing in England. The Mersey marshes, which supplied the earlier herbaria with so many robust specimens, have been wholly reclaimed for agriculture or for building. Those of Loddon, Wey and Medway have been domesticated, and there the sedge, if not entirely gone, is much reduced. Wayside and woodland pits have been filled in or taken over as rubbish tips. The rehabilitation of waterways for recreation has been at the expense of *Carex elongata*. The wash of powered 'long-boats' erodes the banks and necessitates their strengthening with metal sheathing that not only destroys the growing sedge but creates a rigid verge that denies it a footing for regeneration. Only in the north, and in Ireland, can the plant be said to flourish, and here its known position has been much strengthened by the very recent finding of three large colonies by Loch Lomond and its rediscovery, after 100 years, in more than one spot by Lough Neagh. Even so it is disconcerting to learn that the colony at Askham Bog, Mid-W. Yorks, v.c. 64, probably the largest and most floriferous in England, seldom sets viable seed.

Nevertheless regeneration can and does occur, and a constant look-out should be kept in suitable

habitats for this very distinctive sedge. The inflorescence, with its rigidly angled zig-zag spikes, is like no other, and even in the vegetative state the bright yellow-green leaves that arch rather stiffly outwards from the strong, compact crowns can be recognized from many yards away.

A list of British stations follows, with grid references. All that can be traced have been surveyed since 1970, and the size of the population when last seen is indicated by the symbols A^1 = 1 to 9, A^2 = 10 to 20, B = 21 to 100, C = over 100. Where the plant has not been refound the date of its last sighting and the authority for this are given, with the location of authentic specimens seen in herbaria.

Dorset, v.c. 9: 41/0.0, Trickett's Cross, 1939, **BM, E, K, OXF**. Destroyed in the 1960s by building.

N. Hants., v.c. 12: 41/7.6, between Jouldern's and Thatcher's Fords, 1899, **OXF**.

W. Sussex, v.c. 13: 51/0.2, Billingshurst (A^1).

E. Sussex, v.c. 14: 51/3.2, Danehill (A^2); 51/5.3 (?), Tunbridge Wells, 1881, **BM, LIV** (Wolley-Dod 1937); 51/9.2, Rye, 1933 (Wolley-Dod 1937), pond filled, *c*1960.

E. Kent, v.c. 15: 51/9.3, Ashford, 3 places (A^1, A^1, A^2).

W. Kent, v.c. 16: 51/5.4, Penshurst, 1948, **E, K**; Tonbridge (F. Rose *in litt.* 1970); 51/6.4, Tonbridge (A^1); Yalding (A^2).

Surrey, v.c. 17: 41/8.5, Frimley, 1894, **BM, LIV**; North Camp, 1888, **BIRM, BM, CGE, E, LIV, MANCH**; 51/0.5, Ripley (A^1); Wisley, 1943 (Lousley 1976); 51/0.6, Horsell, 1943 (Lousley 1976); Ham Moor, 1892, **E**; Weybridge, 1904, **BIRM, BM, E, GL, K, LIV, MANCH**.

N. Essex, v.c. 19: 52/8.2, Markshall, 2 places, 1849, **BM, CGE, K, LIV**.

Berks., v.c. 22: 41/6.6, Padworth, 1959 (Bowen 1968), no specimen traced; 41/7.6, Jouldern's Ford, extinct (Bowen 1968); 41/7.7, Coleman's Moor, 1890, **BIRM, BM, LIV, MANCH, OXF**; 41/8.6, Sandhurst (A^2).

Bucks., v.c. 24: 41/9.8, Slough, 1940 (Davies 1951). A specimen from near Henley (41/7.8), 1976, is *C. paniculata* L.

E. Suffolk, v.c. 25: 62/4.7, Reydon Wood, 1917, **BM** (utricles only but determination correct); 62/5.8, Benacre, 1917, no specimen traced (F. W. Simpson *in litt.* 1977).

E. Norfolk, v.c. 27: unlocalized (Bennett *et al.* (1930) on basis of a specimen not traced). Specimen from Beccles, 1919, **RDG**, is *C. disticha* Huds. (H. J. M. Bowen *in litt.* 1977).

Cambs., v.c. 29: 53/4.2, 'washes on the Nene', 1883 (doubted by Perring *et al.* (1964)).

Worcs., v.c. 37: 32/8.7, Hartlebury, 1852 (Lees 1867). Lees' specimen in **WOS** is immature but in my judgement can only belong to *C. elongata*.

Warks., v.c. 38: 42/0.7, Earlswood (A^2); 42/1.7, Earlswood, 2 places (A^1, A^1); Dickens Heath (A^2), extinct in a second locality *c* 1965; 42/2.8, Hampton-in-Arden, 1876, **BM, E, MANCH, OXF**.

Staffs., v.c. 39: 33/7.2, Loynton (C); 33/7.5, Balterley (C).

Salop, v.c. 40: 33/4.3, Ellesmere, 1893, **BM, CGE, GL, K**; Colemere (A^1); 33/5.3, Brickwalls, 1968 (A^1), extinct 1977.

Denbigh, v.c. 50: 33/2.3, Chirk (A^1).

N. Lincs., v.c. 54: 43/8.9, Laughton, 1882, **BM**; 44/9.0, Manton, 1920 (Gibbons 1975), no specimen traced.

Cheshire, v.c. 59: 33/3.8, Bebington (de Tabley 1899); 33/5.4, Steer, 1972 (A^1), extinct 1976; 33/6.4, Wrenbury (A^2); 33/6.6, Over, 1827, **E, GL**; 33/7.7, Peover, 2 places, 1865, **BM**; de Tabley, 1867, **BM, OXF**; 33/7.8, Rostherne, 1868, **BIRM, BM, CGE, K, MANCH, OXF**; 33/7.9, near Irlam, 1885, **OXF**; 33/9.9, Staley Great Wood, 1851 (de Tabley 1899). Unconfirmed records from 33/2.8, West Wirral, 1958, 33/5.7 and 33/6.7, unlocalized, 1938, 33/7.5, Wybunbury, 1952, and 33/8.8, Lindow, 1955, are regarded as errors (A. Newton *in litt.* 1977).

S. Lancs., v.c. 59: 33/4.8, Hale (Savidge 1963); 33/6.8, Warrington, 3 places, 1841–1899, **BM, CGE, E, GL, K, OXF**; 33/6.9, Tyldesley, Town Lane Bridge, 1842, **BM**; 33/7.9, Irlam, 1880, **GL, MANCH**; 33/8.9, Eccles (Savidge 1963); Chorlton, 1854, **BM, CGE, E, GL, K, LIV, MANCH, OXF**; Stretford, 1866, **BM, LIV, MANCH, OXF**; Withington, 1842, **LIV, MANCH**.

E. Yorks., v.c. 61: 44/6.4, Langwith, 1874, **BM, E, LIV, MANCH**, extinct by 1902 (Sledge 1936).

S. W. Yorks., v.c. 63: 43/4.9, Aldwarke, **BM**, extinct 1874–1876 (Sledge 1936); 43/5.0, Doncaster, 1847, **OXF**; Fishlake, 1946, **K**, extinct by 1970.

Mid-W. Yorks., v.c. 64: 44/5.4, Askham Bog (C).

Westmorland, v.c. 69: 34/3.8, Roudsea Wood (B); 34/3.9, Esthwaite (B); 35/3.0, Pull Wyke (A^2); Ambleside (B).

Cumberland, v.c. 70: 25/9.0, Snellings Mire, extinct by 1882 (Hodgson 1898); 35/2.2, Ullock (Sledge 1944) was an error; Friar's Crag (A^1).
Dumfries, v.c. 72: 25/8.9 (?), Anchenessnane, 1893 (Scott-Elliot 1896), **BM** 'Dumfriesshire'.
Kirkcudbright, v.c. 73: 25/3.7, Wood of Cree (B); 25/6.7, Kenmure (A^2).
Stirling, v.c. 86: 26/4.8, Loch Lomond (C).
Dunbarton, v.c. 99: 26/3.8, Loch Lomond, 2 places (B, C).
Leitrim, v.c. H29: 23/1.1, Corduff Lake (B) (Faris 1974).
Cavan, v.c. H30: 23/2.1, Ballyconnell (B); Togher Lough (A^1) and Clonty Lough (A^2) (Faris 1974).
Fermanagh, v.c. H33: 23/3.2, Crom, 2 places (A^2, C); 23/4.3, Kilmacbrack (A^2).
Tyrone, v.c. H36: 23/8.6, Tamnamore (A^2), and 23/9.7, Killywoolaghan, 2 places (A^1, A^2) (Harron 1974).
Antrim, v.c. H39: 33/0.6, Selshan, 1856, **BM, CGE, E, GL, K, OXF**; 33/0.8, Farr's Bay, 2 places (B, B) (Harron 1974); 33/1.8, Antrim (A^2) (Harron 1974).
Londonderry, v.c. H40: 23/9.8, near Toome (A^1) (Harron 1974).
Faris's and Harron's colonies not seen by R. W. D.

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R. W. DAVID

VERBASCUM SPECIOSUM SCHRADER × *V. THAPSUS* L. NEW TO BRITAIN

In connection with his work on an 'Alien Flora' of Britain, Mr David McClintock was told about a population of *Verbascum speciosum* Schrader and *V. thapsus* L. growing with hybrids near Didlington, W. Norfolk, v.c. 28, by Miss V. M. Leather of Didlington, Norfolk. In July, 1976, together with A. Wilson, he collected a specimen which is now in **K**. This appears to be the first record of this hybrid occurring in Britain. For ease of comparison the details of this hybrid are given in the format of *Hybridization and the flora of the British Isles* (Ferguson 1975).

6×1. *V. speciosum* Schrader *V. thapsus* L.
a. *V.* × *duernsteinense* Teyber.
b. This hybrid is intermediate between its parents in most characters. The leaves are less decurrent than those of *V. thapsus* and those on the upper part of the stem are somewhat undulate as in *V. speciosum*. The inflorescence is weakly branched, being simple in the upper part. The anthers of the lower stamens are decurrent on the filaments, as in *V. thapsus*. Hybrids appear to be highly sterile; most of the pollen grains have no cell contents and capsules with ripe seeds are rarely formed.

FIGURE 1. The distribution of *Sesleria caerulea* (×) and *S. albicans* (•).

c. Hybrids have been found only near Didlington, W. Norfolk, v.c. 28, where they grew in 1976 together with the two parents on open ground by a roadside, and in Austria.
d. None.
e. *V. thapsus* ($2n = 34, 36$).
f. FERGUSON, I. K. (1975). *Verbascum*, in STACE, C. A., ed. *Hybridization and the flora of the British Isles*, pp. 359–365. London.
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I. K. FERGUSON

ECOLOGY OF *SESLERIA ALBICANS* KIT. EX SCHULT.

Sesleria caerulea (L.) Ard. *sensu lato* includes at least two ecologically distinct and allopatric demes. Pouzar (1961) demonstrated that *S. caerulea* (L.) Ard. is the correct name for the taxon of 'Habitat in Europeae pascuis uliginosis' described by Linnaeus, and that *S. albicans* Kit. ex Schult. should be applied to the 'alkalophilic' taxon of rocky habitats, which includes all *Sesleria* in the British Isles. The distribution of these two species is shown in Fig. 1, which was compiled from all available sources. *S. caerulea* has, for this purpose, been regarded provisionally as including *S. heufleriana* Schur and *S. uliginosa* Opiz of Deyl's (1946) review of the genus, in which *S. albicans* was recognized as *S. calcaria* Opiz.

Characteristic phenodemes of *S. albicans* occur in particular habitats. The commonest growth-form of *S. albicans* is an *erect tussock form* with tillers arising at all angles to the vertical; this is characteristic of screes and other little-grazed areas. A *hanging form* occurs on vertical rocks, with the leafy tillers pendant on long (up to 30cm) rhizomes; the thin branching rhizomes are recognizable when bared by decay and disintegration, in both tussocks and hanging plants, of the sheathing proximal leaf-bases. A *sward form* occurs as mats or centrifugal rings of procumbent tillers, and is produced by heavy grazing by farm animals. Enclosure experiments show that this growth-form grows out to form tussocks which may soon dominate grassland released from grazing pressure. Such tussocks may persist for a quarter of a century or more. A *shade form*, with narrower, thinner, longer leaves, more open tussocks and few or no inflorescences, has been found in conifer plantations developing over *Sesleria* populations.

S. albicans is described by Schubert (1963) as a species with aspect preferences. However, it occurs on hillsides of all aspects in the British Isles, although not always on all sides of a single hill.

Morphological clines may occur in *S. albicans*: for example, a decrease in spikelet number per inflorescence from the south-east to the north-west of its world distribution.

A record by Rotheray (1900) of *S. albicans* in a millstone grit area has now been explained through examination of soil samples. Gritstone ledges high above the River Wharfe (GR 44/063.565) bore calcareous soil (pH 7·8, extractable calcium 80mg $100g^{-1}$), evidently deposited during spates, with tussocks of *S. albicans*, in 1977.

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D. J. HAMBLER & J. M. DIXON

A SEVEN YEAR STUDY OF A COLONY OF BEE ORCHIDS (*OPHRYS APIFERA* HUDSON)

During the years 1971–77 I conducted a study of two colonies of *Ophrys apifera* Hudson. Colony A was discovered in 1971 and Colony B in 1972. Both colonies are situated at Frampton Pools, W. Gloucs., v.c. 34, a set of now disused and flooded gravel workings about a mile from the River Severn. The

TABLE 1. NUMBER OF PLANTS AND NUMBER OF FLOWERS PER INFLORESCENCE EACH YEAR IN THE TWO COLONIES OF *OPHRYS APIFERA*

Year	Colony	No. of flowers per inflorescence							BR	DP	BP	Total plants
		1	2	3	4	5	6	7				
1971	A		5	10	3	4					3	25
1972	A		6	21	3			1	5			31
	B		3	6	3	1			1			13
1973	A		4	5	7				8	1	1	18
	B		4	1					8			5
1974	A		6	21	10	3			12		3	43
	B		8	10	1	3						22
1975	A		4	1	1				1			6
	B	1	5	5	3							14
1976	A		2	6							1	9
	B		11	5		2	1				1	20
1977	A		1	1	1	1						4
	B	3	13	10	2	2			79	3		33
Totals		4	68	105	35	16	1	1	114	4	9	243

BR – Basal rosette only
DP – Destroyed inflorescence
BP – Broken inflorescence

orchids occur on the edge of one of the pools, a sandy gravelly area dominated by sallow and birch scrub, around which vegetation clusters, thinning out to clearings and pathways. The water-table and humidity is high, and after rain the area is often flooded. In two important ways, therefore (the amount of water present and the density of competing vegetation), these two sites are unusual ones for *Ophrys apifera*.

I have been particularly concerned with numbers of plants and numbers of flowers per inflorescence, for, as Summerhayes (1951, p. 309) said:

'One of the most striking features of the bee orchid is the uncertainty of its appearance in any given spot. Most people know at least some places where a few specimens may be found almost every year, but usually the number of plants fluctuates in an amazing manner. . . .'

This is borne out by the results given in Table 1. The number of flowering plants in Colony A varies from 4 to 43, and in Colony B from 5 to 33, and there is no consistent pattern of numbers.

Summerhayes (1951, p. 307) also stated:

'the flower-spike contains two to seven (rarely as many as eleven) rather widely spaced flowers.'

As can be seen from Table 1, all the specimens had between 1 and 7 flowers per inflorescence, with 2–5 being most frequent; 2 (29·5% of the 7 year total) and 3 (45·6% of the 7 year total) were by far the commonest numbers.

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D. A. HILL

OENOTHERAS IN BRITAIN

Dr K. Rostański of Katowice, Poland, an authority on the typical subgenus of *Oenothera*, visited Britain for the first time in September, 1977. During this visit he examined all specimens of this subgenus in **BM, BRIST, CGE, JSY, K, LINN, LIV, MNE, NMW, OXF, RDG** and **STP**, went to the dunes in S. Wales, and also saw Oenotheras growing at Cambridge and Oxford. He will be writing up his findings with a key and full details at a later date. Meanwhile, thanks to his diligence and skill, the following taxa, all of them biennial, have been identified by him for Britain:

O. biennis L. Quite generally distributed; perhaps less frequent than formerly and apparently not in Wales.

O. cambrica Rost. This new species (Rostański 1977) was shown to the B.S.B.I. at the 1975 Exhibition Meeting (McClintock 1976). It is rather like *O. erythrosepala*, but smaller and with always green sepals and with pink veins on at least the lower leaves. Plants thus named seem to be clearly the third most frequent species in Britain and the solution of some nagging identification problems. The most usual name it has gone under has been *O. parviflora.*

It has proved to be most plentiful along the coast of S. Wales, and I have been in touch with Dr Rostański about it there since 1969. It is also the plant recorded under changing names from the dunes across the estuary at Burnham and Berrow, N. Somerset and was collected at Portishead, N. Somerset, in 1941 and Sharpness, W. Gloucs., in 1956. Further afield, there are specimens from Jersey (nine dates from 1867 to 1973), W. Cornwall (Penzance), E. Cornwall (Rock, 1930), N. Devon (Braunton Burrows, 1917 and 1958), S. Hants. (Hayling Island, 1960; Southampton, 1958), W. Kent (Stone, 1974), Surrey (Peckham Fields, 1840), Oxon. (Oxford, 1972–77), Caerns. (Portmadoc, 1957), Denbigh (Llangollen), N. E. Yorks. (Redcar, 1958) and Edinburgh (Fushiebridge, 1962, 1964 and 1966).

O. erythrosepala Borb. (*O. lamarckiana* auctt., non Ser.). The largest flowered and probably our commonest species.

O. × *fallax* Renner em. Rost. (*O. biennis* × *O. erythrosepala*). Specimens attributable to the cross in which *O. erythrosepala* is the female parent (syns.O. × *fallax* sensu stricto, *O.* × *cantabrigiana* Davis, *O.* × *velutirubata* Renner) usually have the smaller flowers of *O. biennis*, but the red-striped sepals and at least some red-based hairs of *O. erythrosepala*, and have been seen from S. Lancs. (Aintree, 1942; Freshfield, 1956, 1961; Ince Moss, Wigan, 1969) and in the Oxford Botanic Garden, under various names, but the earliest record is from Guernsey in 1941/42, under *O.* × *velutirubata* (McClintock 1975). The reverse of this cross (syn. *O.* × *albivelutina* Renner), which is apparently more variable, was detected from N. Essex (Colchester, 1881), Oxon. (Banbury, 1972), Northants. (Northampton, 1875), Notts. (Nottingham, 1963), S. Lancs. (Birkdale, 1913), W. Lancs. (St Anne's, 1907), and Guernsey, 1941–42 (under *O.* × *albivelutina*) (McClintock 1975). In addition, this hybrid has been recorded from Jersey in 1881 and Somerset in 1833 (Davis 1926), and from Cheshire and S. Lancs. (Stace 1975).

O. muricata L. (*O. rubricaulis* Klebahn). In **LINN** Dr Rostanski found a specimen of Linnaeus' long disputed *O. muricata*, which proves its identity. This species was collected at Berrow, N. Somerset, in 1951 and at Lytham, W. Lancs., in 1965. It differs from the next species in its somewhat larger flowers, 10–25 mm, but with a hypanthium up to only 25 mm, and in its erect sepal-tips.

O. parviflora L. This has very small petals, up to 10 mm, but a long hypanthium, exceeding 25 mm, and spreading sepal-tips. Specimens have been seen only from Glamorgan (Port Talbot, 1905; Aberdare, before 1917).

O.perangusta Gates. This is like *O. muricata*, but has narrower, less toothed leaves, hairs with thick, red bases and fruits specially hairy on the angles. There are seven records: Cheshire (Hoole Bank, 1968), Glamorgan (Nantgarw, 1935; Abercym, 1961), N. Devon (Saunton, 1972), Surrey (Hurst Park, 1963), W. Kent (Stone, 1974), E. Suffolk (Ipswich, 1975–77).

O. renneri Scholz. Distinctive in its rosette of imbricating spathulate leaves, and stems which are grey with soft hairs. Known for certain only since the early 1960s from Borthwick Bank, Edinburgh.

O. salicifolia Desf. ex Don (*O. depressa* Greene, *O. hungarica* Borb., incl. *O. multiflora* Gates). A tall mostly unbranched plant with small red bases to the hairs and flowers often cleistogamous or falling in bud, with petals usually under 20 mm and fruits greyish with appressed hairs. There are two records—Baildon, Mid-W. Yorks., 1962 (under *O. multiflora*) and Bristol, before 1918. Compare also Gates (1914, p. 387).

O. victorini Gates & Catches. A distinctive species with almost entire leaves with a pink midrib recorded only from Cofton, S. Devon, in 1915 and later.

The only other species of *Oenothera* found wild in Britain is *O. stricta* Ledeb. ex Link, which belongs to subgenus *Raimannia*.

Despite previous determinations, no specimens seen were attributable to *O. ammophila, O. chicaginensis, O. grandiflora, O. nuda* or *O. suaveolens*, which should disappear from our lists in the absence of verification.

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D. MCCLINTOCK

VARIATION IN TERMINAL LEAFLET SHAPE OF *ONONIS REPENS* L. IN THE BRITISH ISLES

Wild colonies of *Ononis repens* L. growing in various localities in the British Isles were sampled between the months of June and August from 1954 to 1956; in almost all localities, the exhaustive sampling method was employed except where some of the plants were inaccessible or the population was too

TABLE 1. MEAN TERMINAL LEAFLET INDICES OF *O. REPENS* IN THE BRITISH ISLES

Localities sampled	Sample size	Mean leaflet index	Standard error ±
1. Sands of Luce, Wigtown, v.c. 74	33	1·64	0·03
2. Oxwich Burrows, Glam., v.c. 41	33	1·66	0·05
3. Hartlepool Dunes, Durham, v.c. 66	137	1·67	0·02
4. Boxhill, Surrey, v.c. 17	100	1·70	0·03
5. Whitburn Coast, Durham, v.c. 66	149	1·73	0·02
6. Edinburgh, v.c. 83	34	1·78	0·04
7. Holy Island Dunes, Cheviot, v.c. 68	50	1·80	0·03
8. Lay-town, W. Meath, v.c. H23	34	1·81	0·03
9. Courtown Harbour, Wexford, v.c. H12	32	1·86	0·05
10. Slapton Sands, S. Devon, v.c. 3	66	1·87	0·04
11. Beachy Head, E. Sussex, v.c. 14	144	1·88	0·03
12. Corbridge, S. Northumb., v.c. 67	76	1·92	0·04
13. Tunstall, E. Suffolk, v.c. 25	111	1·93	0·03
14. Newmarket, W. Suffolk, v.c. 26	50	1·94	0·04
15. Berwick, Cheviot, v.c. 68	43	1·94	0·04
16. Oxwich mainroad, Glam., v.c. 41	34	1·95	0·04
17. Stroud Road (East), E. Gloucs., v.c. 33	33	1·95	0·03
18. Drigg Dunes, Cumberland, v.c. 70	51	1·95	0·04
19. Rodborough Common, W. Gloucs., v.c. 34	50	1·96	0·04
20. Quarrington, S. Lincs., v.c. 53	128	1·98	0·03
21. Albury, Surrey, v.c. 17	50	2·20	0·05
22. Stroud Road (West), E. Gloucs., v.c. 33	65	2·02	0·03
23. Newark/Sleaford Road, S. Lincs., v.c. 53	54	2·08	0·04
24. Clonakilty Bay, W. Cork, v.c. H3	38	2·35	0·04

large. With each plant sampled, the length and the greatest breadth of the terminal leaflet were measured; a leaflet index was then computed as the ratio of the former to the latter.

Table 1 shows the extent of inter-population variation in the leaf indices of the localities sampled. The data suggest that in the British Isles *Ononis repens* colonies show a continuous variation in their terminal leaflet indices. However, when some of these colonies are compared, they show significant differences in their terminal leaflet length, width, and index (i.e. leaflet shape). It also appears that most coastal colonies have lower leaf indices, and therefore broader terminal leaflets, than the inland colonies.

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