Notes

TYPIFICATION OF SOME BARTON & RIDDELSDELL NAMES IN *RUBUS* L. (ROSACEAE)

In the two successive papers in which they described *Rubus bakerianus*, *R. furnarius*, *R. newbridgensis* and *R. pistoris* Barton & Riddelsdell (1935, 1936) indicated holotypes identified by numbers in Barton's herbarium. The gatherings to which those numbers referred were respectively:

Wimbledon Common, v.c. 17, 3 August 1934, *Barton & Riddelsdell 4376*
Sedbergh, v.c. 65, 1934, *Barton & Riddelsdell 4378*
Newbridge, v.c. 14, 2 August 1934, *Barton & Riddelsdell 4519*
Gormire, near Thirsk, v.c. 62, 1 August 1933, *Riddelsdell 4351*.

Unfortunately, the two were inadequately versed in the typification procedure prescribed in the new edition of the *International rules* (Briquet 1935) which had just then come into force. This explicitly stated that a holotype must consist of "a specimen" (Art. 18, Rec. IV). A specimen for the purposes of the microspecies of *Rubus fruticosus* agg. has long been accepted by specialists in this group as necessarily consisting of a flowering spray together with part of the primocane with at least one stem leaf attached to that. It is conventionally regarded as unsafe to venture a determination in the absence of either of those components. While Barton & Riddelsdell observed this convention impeccably, after Barton's herbarium (incorporating Riddelsdell's) passed to **BM** after his death it emerged that the designated holotypes in each of these four cases consisted not of a single specimen but of several. In the case of *R. bakerianus* as many as five sheets of specimens turned out to be sharing the particular number cited, three of those sheets bearing more than one flowering spray a piece. That in each case the specimens comprising the so-called holotype all came from the same bush is rendered likely by the fact that Barton labelled some of the sheets "co-type" (a term without official standing in the *International rules* either then or since); however, that word is not present on all, leaving open the possibility that more than the one bush may have been involved.

As more precise typification was clearly called for, at some unstated date one appropriate sheet was chosen in each case as the lectotype and labelled as such in an anonymous hand. Unfortunately, the fact that this had been done was not published, allowing Edees & Newton (1988), in their monograph of the group in the British Isles, to repeat from Barton & Riddelsdell's papers the details of what they supposed to be particular single specimens and similarly to cite these as holotypes.

The handwriting on the labels has now been identified as that of G. A. Matthews, a former member of the **BM** British Herbarium, and to him the lectotypifications are now here belatedly credited – except in the case of *R. pistoris*. Of that species the sheet in question bears three flowering spray pieces and five primocane pieces, making it necessary to restrict the lectotypification further to just one pair of those. The lower right-hand spray plus associated primocane piece (as indicated on the sheet) are accordingly here so designated.

ACKNOWLEDGMENTS

I am grateful to Dr C. E. Jarvis for advice on this matter and to A. R. Vickery for identifying the handwriting in question.

REFERENCES

BARTON, W. C. & RIDDELSDELL, H. J. (1935). *Rubus bakeri* F. A. Lees and its allies. *Journal of botany* **73**: 124–131.
BARTON, W. C. & RIDDELSDELL, H. J. (1936). A new *Rubus* from Sussex. *Journal of botany* **74**: 204–205.
BRIQUET, J., ed. (1935). *International rules of botanical nomenclature*, 3rd ed. Fischer, Jena.
EDEES, E. S. & NEWTON, A. (1988). *Brambles of the British Isles*. Ray Society, London.

D. E. ALLEN
Lesney Cottage, Middle Road, Winchester, Hampshire, SO22 5EJ

TRIFOLIUM OCCIDENTALE D. E. COOMBE (FABACEAE) IN ANGLESEY (V.C. 52)

The Western Clover, *Trifolium occidentale* D. E. Coombe, is an early-flowering and self-compatible coastal species, which is stoloniferous and superficially resembles *T. repens* L. Since it was first described by Coombe (1961), detailed information on the narrow maritime Atlantic range of *T. occidentale* has been reported at intervals, as discoveries of new localities have accumulated. In a recent summary review with accompanying map, Coombe (1994) outlined its specialised ecological distribution in exposed coastal-fringe grasslands in the Channel Isles, the Isles of Scilly and mainland W. Cornwall, with isolated records in N. Devon and on the Gower peninsula in Glamorgan; he was also able to report *T. occidentale* as frequent in south-west Ireland and north-west France, and rare on the west Iberian coast. It has since been recorded by R. S. Cropper at three localities in south-west Pembrokeshire (Evans 1997). A new record from Anglesey outlined in this note marks a further northward extension of its range on the west coast of Britain. The most northerly locality for *T. occidentale* in Europe is in Co. Dublin where it was reported by Preston (1980) and Akeroyd (1983).

In May 1995, Alan Lewis informed RHR (then vice-county recorder for v.c. 52) that he had recently found a few plants which resembled *T. occidentale* near Trearddur Bay, on Holy Island, in west Anglesey. A subsequent visit to the locality was delayed until April 1997, when we were able to examine plants and confirm them as undoubted *T. occidentale*. Very shortly afterwards, the site was visited by another party of botanists including C. D. Preston who also confirmed this determination.

The Anglesey population of *T. occidentale* is evidently quite small and highly restricted in extent. On 19 April 1997, about 20 separate patches were observed on a low bank above a small car-park at the landward end of a short rocky headland forming the south side of Porth Diana (SH/253.782). The soil of the bank has a high fraction of wind-blown sand; it is somewhat unstable and was probably disturbed during construction of the car-park. A single plant was also noted by a gateway on the opposite side of the minor road from the car-park. There is no evidence to indicate whether *T. occidentale* is a long-established native or if it has recently arrived in west Anglesey.

The population is close to the rocky shore-line and, as in other parts of its range, some of the associated species at Porth Diana are strongly maritime. Among the species growing in close proximity to *T. occidentale* are *Anthyllis vulneraria* L., *Bellis perennis* L., *Bromus hordeaceus* L., *Carex arenaria* L., *Catapodium marinum* (L.) C. E. Hubb., *Cerastium diffusum* Pers., *Cochlearia danica* L., *Erodium cicutarium* (L.) L'Hér., *Festuca rubra* agg., *Galium verum* L., *Hypochaeris radicata* L., *Lotus corniculatus* L., *Medicago lupulina* L., *Ononis repens* L., *Plantago coronopus* L., *P. lanceolata* L., *Poa pratensis* agg., *Ranunculus bulbosus* L., *Sanguisorba minor* L., *Scilla verna* Huds., *Senecio jacobaea* L. and *S. vulgaris* L.

TABLE 1. COMPARISON OF SEED SET AND SEED SIZE IN *TRIFOLIUM OCCIDENTALE* AND *T. REPENS* FROM ANGLESEY, v.c. 52

a. Seed set

	No. of seeds per flower*				
	0	1	2	3	4
T. occidentale (29 June 1997)	33	31	30	6	–
T. repens (5 August 1997)	51	24	14	10	1

b. Seed size

	Seed length (mm)**	
	Mean (range)	n
T. occidentale	1·2 (1·0–1·6)	111
T. repens	1·1 (0·8–1·4)	88

*Counts of seed set for samples of 100 flowers in each species, obtained from ten inflorescences, each from a separate individual.

**Seed length data obtained from samples of ten inflorescences per species, each from a separate individual.

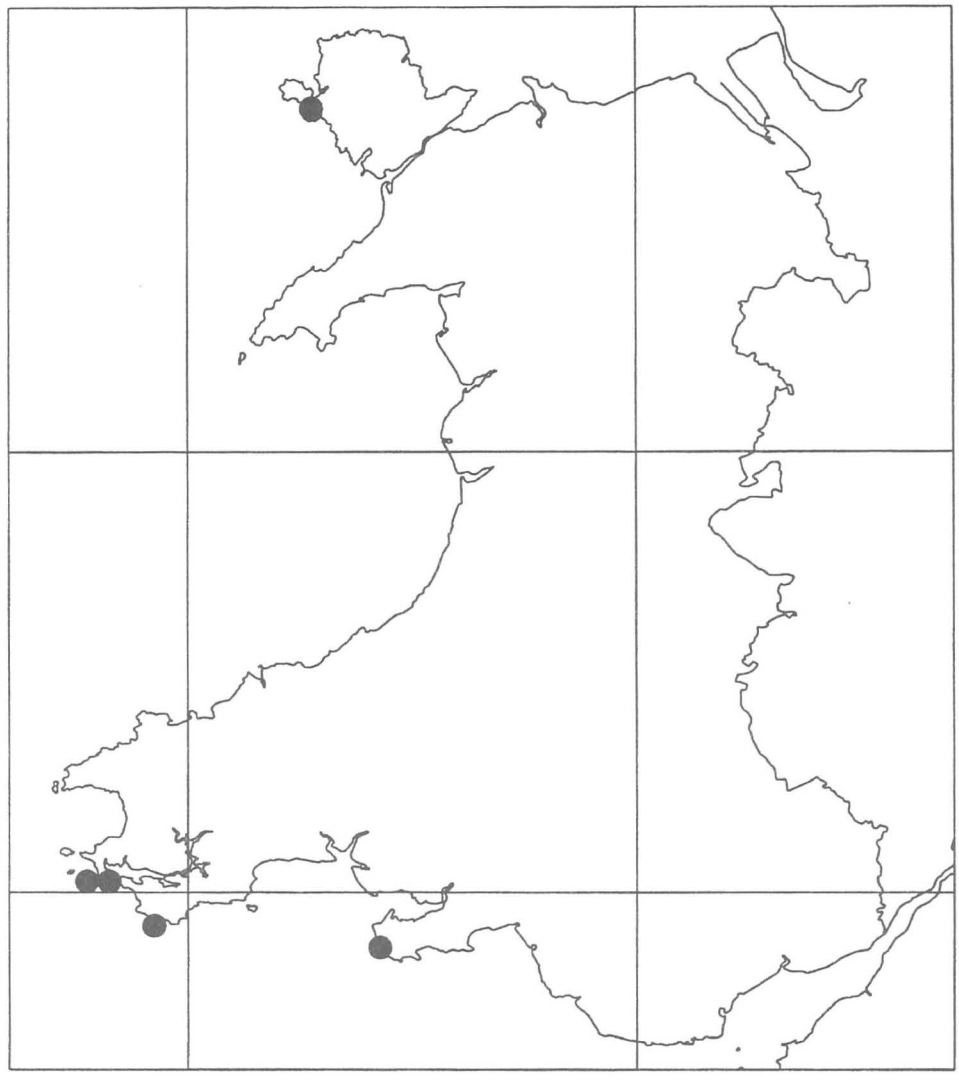

FIGURE 1. The distribution of Welsh records of *Trifolium occidentale*. ● Occurrence in 5 × 5 km squares of the national grid.

When it was observed on 19 April 1997, a few plants of *T. occidentale* had early inflorescences with flowers in bud. The locality was visited on several subsequent occasions during 1997 to make comparisons between *T. occidentale* and the much larger population of *T. repens* present in coastal turf on the headland. The main flowering period of *T. occidentale* lasted until mid-June, with a few stragglers appearing beyond this period. In contrast, *T. repens* started to come into flower in late May and early June, with its main flowering period persisting through to early August.

Material gathered from several plants of *T. occidentale* showed little variation. They agreed with descriptions given by Coombe (1961) and Coombe & Morisset (1967), having small (c. 10 × 10 mm), orbicular leaflets, of a darker green than in *T. repens* and without the leaf-markings common in that species; their upper leaflet surface is matt and minutely crystalline when viewed under low-power magnification, and the underside is strikingly glossy; the lateral veins are characteristically non-

translucent when a leaflet is viewed against strong diffuse light. In addition, the stipules are a deep vinous red, which was particularly apparent in the young creeping shoots.

This set of vegetative characteristics is diagnostic of *T. occidentale*. The presence of sparse, short, colourless hairs on the petioles and peduncles has often been cited as an additional distinctive character, but in our experience they also occur frequently in *T. repens*.

Floral characters in the Anglesey plants were also found to be equally uniform and in full agreement with those described by Coombe (1961). The flowers are creamy white with no tinge of pink, the standard is broadly elliptical and emarginate (a very shallow emargination also occasionally occurs in *T. repens*); the upper teeth of the calyx are parallel or convergent, broadly triangular or ovate-triangular and often minutely denticulate. As seed pods ripen, the flowers become a dark chocolate brown in *T. occidentale* with no trace of pink or red pigment which frequently suffuses the fruiting heads of *T. repens*.

Comparative estimates of seed set and seed size were made between *T. occidentale* and *T. repens*. Seed counts were recorded from samples of ten flowers taken from each of ten inflorescences per species from different plants; data were obtained in the main fruiting period in each species, and seeds damaged by insect attack or by pathogens were ignored. For both species seed length measurements were made on samples from ten inflorescences, each from a separate plant. The results are given in Table 1.

Seed germination was tested in two plants of *T. occidentale*, sown on 30 June 1997. Of 16 seeds sown from Plant A, 15 germinated between 13–24 July, while four seeds out of 13 sown from Plant B germinated between 5–10 August.

These findings suggest that seed size and productivity are similar in the two species, and also that at least a proportion of the *T. occidentale* seed is viable.

We have searched several other headlands and stretches of rocky coast in south-west Anglesey, extending from Holy Island to Llanddwyn Island, but have found no further colonies of *T. occidentale*. It also appears that it is very scarce on the Gower peninsula (Kay & Ab-Shukor 1988) and elsewhere in Wales; the only known records are shown in Fig 1.

ACKNOWLEDGMENTS

We thank Alan Lewis for passing on his observations in 1995, Gwynn Ellis for providing information about Welsh records, and Chris Preston for his observations.

REFERENCES

AKEROYD, J. R. (1983). Further notes on *Trifolium occidentale* D. E. Coombe in Ireland. *Irish naturalists' journal* **21**: 32–34.

COOMBE, D. E. (1961). *Trifolium occidentale*, a new species related to *T. repens* L. *Watsonia* **5**: 68–87.

COOMBE, D. E. (1994). *Trifolium occidentale* Coombe, in STEWART, A., PEARMAN, D. A. & PRESTON, C. D. eds. *Scarce plants in Britain*, p. 414. Joint Nature Conservation Committee, Peterborough.

COOMBE, D. E. & MORISSET, P. (1967). Further observations on *Trifolium occidentale*. *Watsonia* **6**: 271–275.

EVANS, S. B. (1997). Welsh plant records – 1995. Pembroke v.c. 45. *Botanical Society of the British Isles, Welsh bulletin* **62**: 33–34.

KAY, Q. O. N. & AB-SHUKOR, N. A. (1988). *Trifolium occidentale* D. E. Coombe, new to Wales. *Watsonia* **17**: 168–170.

PRESTON, C. D. (1980). *Trifolium occidentale* D. E. Coombe, new to Ireland. *Irish naturalists' journal* **20**: 37–40.

T. H. BLACKSTOCK
Countryside Council for Wales, Penrhos Road, Bangor, Gwynedd, LL57 2LQ
R. H. ROBERTS
51 Belmont Road, Bangor, Gwynedd, LL57 2HY

LECTOTYPIFICATION OF *POTAMOGETON FLABELLATUS* BAB. (POTAMOGETONACEAE)

Since it was first described by Babington (1851), the name *Potamogeton flabellatus* has been applied to a variety of taxa. In Britain these have included broad-leaved plants which are now subsumed within

the variable *P. pectinatus* L. and superficially similar plants which are now known to be *P.* × *suecicus* K. Richt. (Dandy & Taylor 1946). Although the name is now usually reduced to synonymy, it survives as a convenient informal label for certain variants of *P. pectinatus* (Preston 1995). Lectotypification of the name is desirable both in itself and as part of the general need to typify names in the genus (Wiegleb 1988).

C. C. Babington was one of the first British botanists to take a critical interest in the genus *Potamogeton*. In his *Manual of British botany* (1843) he published a serviceable account of the genus as it was then known. He split the species into five groups, one of which corresponds with the current Subgenus *Coleogeton* Rchb. In this group he recognised *P. filiformis* (which had not previously been reported from the British Isles) and he divided the plants which we would now call *P. pectinatus* into two taxa, *P. pectinatus* and *P. zosteraceus* Fr. He described *P. zosteraceus* as having linear-acuminate, obscurely 3-veined leaves and fruits rounded on the back with a prominent keel, whereas *P. pectinatus* had narrower, linear-setaceous, 1-veined leaves and fruits with lateral ridges but no keel. He reported *P. zosteraceus* from only one site, the Serpentine in Hyde Park, London, where it had been collected by Dr J. A. Power. In the second edition of the *Manual* Babington (1847) retained *P. zosteraceus*, again on the basis of Power's plant from the Serpentine. Although there are minor changes in wording, his description of the plant is essentially the same as in the first edition. He had, however, begun to doubt whether the plant he described was the same as that described by Fries (1828). In an additional note at the end of this group of species he also drew attention to plants from Bath and Somerset which were "probably a new species but I am not sufficiently acquainted with it to describe it".

By the time that he prepared the third edition of the *Manual*, Babington (1851) had concluded that Fries' *P. zosteraceus* was not the plant that he had previously described under that name. He therefore introduced the name *P. flabellatus* for the British plant, with the synonym "*P. zosteraceus* Bab. (not Fr.)". He rewrote the description of the plant, characterising it as having broadly linear, abruptly apiculate or acuminate 5-nerved lower leaves which are normally decayed at the time of flowering, narrow, acute 3-nerved upper leaves borne on stems which are branched and spread like a fan, and keeled fruits. The flowering period is given as June–July, whereas previously *P. zosteraceus* had been described as flowering in July. This description is more detailed than that of the earlier descriptions of *P. zosteraceus* and it places more emphasis on vegetative characters. In particular, the description of the habit and broad lower leaves is new. *P. flabellatus* was said to occur in "ponds and ditches" in England, but Babington cited no specific localities. The plants from Bath and Sandwich mentioned as a possible new species in the second edition are not explicitly cited.

Although the concise entry for *P. flabellatus* in Babington's *Manual* provides no indication of the source of the material he described, Babington (1853) later provided a more detailed account of his species. In this he stated that he described *P. zosteraceus* in the first two editions of the *Manual* on the basis of a plant "which was very slightly known to me, it having been noticed in Hyde Park only". In 1849, however, he obtained "a series of most characteristic specimens" from Mr [Thomas] Kirk of Coventry, which convinced him that the plant was distinct from both *P. pectinatus* and from the true *P. zosteraceus*. "Accordingly, in the 'Manual' (ed. 3) the name of *zosteraceus* is changed into *flabellatus*, a term derived from the usually fan-shaped habit of the flowering plant." At the time he prepared the account of *P. flabellatus* for the *Manual* he thought that the plant from Bath was referable to *P. pectinatus*, but visits to Bath in 1853 had enabled him to re-examine the plant and convinced him that it was in fact *P. flabellatus*. Babington makes no mention in this paper of the plant from Sandwich.

It is clear from this historical resumé that the name *Potamogeton flabellatus* Bab. must be treated as a species described afresh in 1851, rather than simply as a replacement name for the plants from the Serpentine hitherto treated as *P. zosteraceus*. It is therefore appropriate to consider as syntypes all the material which Babington had available to him in 1851 and which he then considered referable to *P. flabellatus*. The following specimens from Babington's herbarium (now incorporated into **CGE**) were collected before 1851 and labelled as *P. flabellatus* by Babington and are available for selection as the lectotype. The names on the specimens are given in the order in which they were applied; names in inverted commas were given by the collector and the rest are in Babington's handwriting.

A. *Potamogeton pectinatus/zosteraceus/zosteraceus* Bab. not Fries/*flabellatus*. Serpentine, Hyde Park, London. J. A. Power, 9 July 1838.
B. "*Potamogeton zosteraceus* Bab."/*flabellatus*. Canal, Stoke Heath, Warwick. T. Kirk, June 1847.
C. "*Potamogeton zosteraceus* Bab."/*flabellatus*. Canal, Stoke Heath, Warwick. T. Kirk, 26 May 1849.

D. "*Potamogeton zosteraceus* Bab."/*flabellatus*. Canal, Stoke Heath, Warwick. T. Kirk, July 1849.
E. *Potamogeton zosteraceus/flabellatus*. Coventry. T. Kirk, 29 May 1850.
F. *Potamogeton zosteraceus* Bab.? River Lea below Ware, Herts. W. H. Coleman, 1848.

Specimen A is the plant described under the name *P. zosteraceus* in the first two editions of the *Manual*. Specimens B–E represent the series of specimens Babington received from Kirk which convinced him that the plant was a distinct but undescribed species. "Warwick" on Kirk's labels indicates the vice-county of Warwickshire; Stoke Heath is actually in Coventry and the canal which runs through it is the Coventry Canal. As specimen F was initially labelled "*Potamogeton zosteraceus* Bab.?", Babington must have received it before he coined the name *P. flabellatus*. In including it in the above list I have assumed that Babington decided that the specimen was *P. flabellatus* before he published this name, but I cannot prove it. Other than these six specimens, the only sheet in **CGE** collected before 1851 and labelled as *P. flabellatus* by Babington is a sheet from the "canal at Bath" collected by Babington himself in June 1830. This is the material which he referred to *P. pectinatus* at the time he described *P. flabellatus* (Babington 1853), and *P. pectinatus* is one of three names Babington wrote on the sheet and subsequently crossed out. It cannot, therefore, be regarded as a potential lectotype.

An ideal lectotype of *P. flabellatus* would show both the fruits and the lower leaves, the two characters which Babington (1851) emphasised when describing the species. Unfortunately none of the syntypes show both these features, presumably because the lower leaves have usually decayed by the time that the plants flower (as Babington noted). Specimens B and F are upper flowering stems with neither lower leaves nor fruits, and need not be considered further. The choice therefore lies between the single specimen from the Serpentine (A) and the Stoke Heath specimens (C–E). The plant from the Serpentine (A) is cited indirectly in the protologue via the reference to Babington's earlier description of *P. zosteraceus*. It was J. E. Dandy & G. Taylor's choice of lectotype: it is cited as such in their unpublished monograph "*The British species of* Potamogeton *L.*", and they labelled the specimen in **CGE** "Type specimen of Potamogeton flabellatus Bab., Man. Brit. Bot. ed. 3, 343 (1851)". This choice was never published, however, and does not constitute effective lectotypification (see *International code of botanical nomenclature* 1994, Article 7.10). Although the argument for selecting this specimen as lectotype is strong, I do not believe that it is conclusive. The protologue of *P. flabellatus* incorporates features which could not be derived from the Serpentine specimen, and it is clear that the Stoke Heath plants provided the main source for Babington's revised description. It is appropriate, therefore, to select specimen C, D or E as the lectotype. It is better to select a fruiting plant rather than a vegetative shoot and I have therefore selected specimen C; it is an upper fruiting stem and the specimen includes one fruit which Babington removed and sectioned. Specimen D, which consists of broad lower leaves, is mounted on the same sheet. Specimen E, which is labelled "Spring leaves" consists of very broad lower leaves. All the syntypes were determined as *P. pectinatus* L. by J. E. Dandy and G. Taylor in 1939, determinations with which I concur.

The nomenclature and typification of *P. flabellatus* can be summarised as:

Potamogeton flabellatus Bab., *Man. Brit. bot.* ed. 3, 343 (1851). Lectotype: Canal, Stoke Heath, Warwick. T. Kirk, 26 May 1849, **CGE** (designated here).

REFERENCES

BABINGTON, C. C. (1843). *Manual of British botany*. John van Voorst, London.

BABINGTON, C. C. (1847). *Manual of British botany*, 2nd ed. John van Voorst, London.

BABINGTON, C. C. (1851). *Manual of British botany*, 3rd ed. John van Voorst, London.

BABINGTON, C. C. (1853). On *Potamogeton flabellatus* Bab. *Phytologist* **4**: 1158–1160.

DANDY, J. E. & TAYLOR, G. (1946). An account of × *Potamogeton suecicus* Richt. in Yorkshire and the Tweed. *Transactions of the Botanical Society of Edinburgh* **34**: 348–360.

FRIES, E. (1828). *Novitiae Florae Suecicae*, 2nd ed. Berling, Lund.

PRESTON, C. D. (1995). *Pondweeds of Great Britain and Ireland*. Botanical Society of the British Isles, London.

WIEGLEB, G. (1988). Notes on pondweeds – outlines for a monographical treatment of the genus *Potamogeton* L. *Repertorium novarum Specierum Regni vegetabilis* **99**: 249–266.

C. D. PRESTON
I.T.E., Monks Wood, Abbots Ripton, Huntingdon, Cambs., PE17 2LS

AQUATIC PLANTS AT HIGH ALTITUDES IN THE BREADALBANE MOUNTAINS (V.C. 88), SCOTLAND

The standard work on the altitudinal range of British plants is Wilson (1956), which was based on papers originally published in 1930 and 1931 and is now somewhat dated. Some groups treated by Wilson have subsequently been the subject of taxonomic revision, and the altitudinal ranges of the taxa now recognised need to be established. There is also a need to localise many of the records cited. We believe that altitudinal limits should be based on precisely localised records, but in many cases Wilson (1956) relied on earlier authors who occasionally cited upper altitudinal ranges from areas as large and vague as the Scottish Highlands. Finally, there is a need to collate records made since Wilson's compilation was published.

In compiling data on the maximum altitude of aquatic plants in Britain and Ireland for publication (Preston & Croft 1997), it became clear that several species reached their upper limit in the Breadalbane mountain range. Many of these altitudinal limits are derived from White (1898). White usually stated the upper limits of species in Perthshire without citing the exact localities where these limits were reached, although for less common species these localities can often be deduced from the list of records. Our enquiries suggested that there were surprisingly few recent localised records of aquatic plants from these much-visited mountains: presumably botanists visiting the area have been preoccupied by the rich terrestrial montane flora and have seen no need to record aquatic plants which can be seen much more easily elsewhere. We therefore visited some lochs and lochans at high altitudes in the Breadalbane area in July 1995. The significant altitudinal records we made are detailed in this note. All the sites we visited in this area are in v.c. 88. We also refer to records made on a visit to Loch Vrotachan, v.c. 92, in 1996.

In the records which follow, altitudes cited by earlier authors have been converted from feet to metres, and all altitudes are rounded to the nearest 5 m. The term lowland is used here for altitudes below 300 m; Wilson (1956) used it similarly, for altitudes below 1000 feet (305 m). The card index of *Potamogeton* specimens compiled by J. E. Dandy and held in **BM** is referred to as the "Dandy index". Unless stated the records quoted here from the index refer to specimens which Dandy cited from **BM** but which are not now incorporated into the herbarium, probably because they were lost or damaged in the Second World War (cf. Preston 1988). Nomenclature follows Stace (1991) for vascular plants and Moore (1986) for charophytes.

Carex lasiocarpa. With *C. rostrata* in swamp around lochan N. of Lochan Achlarich, E. of Beinn Heasgarnich, altitude 650 m, NN/432.381, 26 July 1995. Although *C. lasiocarpa* often fails to flower or flowers very sparingly, this was not the case at this site in the summer of 1995, where flowers were frequent. Wilson (1956) follows White (1898) in giving the upper limit of this species as 425 m in the Atholl region of Perthshire.

Carex limosa. Bog pools in flat-bottomed valley N.E. of Lochan Achlarich, E. of Beinn Heasgarnich, altitude 650 m, NN/436.385, 26 July 1995. Although this just exceeds White's (1898) and Wilson's (1956) upper limit, 640 m in Breadalbane, the species has been recorded by R. W. David at 830 m on Meall nan Tarmachan, NN/589.390, where it grew with *C. saxatilis* in a mire on a level shelf. This altitude, originally recorded as 2725 feet, is erroneously cited as 817 m by Jermy, Chater & David (1982); details of the original record are held at the Biological Records Centre.

Carex nigra. Edge of lochan fed by two melting snowpatches, 200 m S.E. of the summit of Beinn Heasgarnich, altitude 1005 m, NN/415.382, 26 July 1995. Also present at lochans at 995 m (NN/417.384) and 970 m (NN/418.385) elsewhere in this area. The upper limit for this species cited by Wilson (1956) is based on Macvicar's (1894) report of plants at 990 m within a radius of 10 miles [16 km] from Killin, v.c. 88.

Carex rostrata. Swamp on flat ground between Meall Garbh and Beinn nan Eachan, altitude 930 m, NN/572.386, 25 July 1995. This exceeds Wilson's (1956) upper limit for this species, 915 m, based on White's (1898) unlocalised record from the Breadalbane area. However, D. A. Ratcliffe recorded this species at 1040 m E. of the main plateau of Creag Meagaidh, NN/432.875, on 2 August 1957 (cf. McVean & Ratcliffe 1962, pp. 116–117).

Equisetum arvense. In *Sphagnum* at the edge of lochan fed by two melting snowpatches, 200 m S.E. of the summit of Beinn Heasgarnich, altitude 1005 m, NN/415.382, 26 July 1995, **CGE** (*Preston 95/55*). Also present by lochans at 995 m (NN/417.384) and 970 m (NN/418.385) elsewhere in this

area. The upper limit for this species given by Wilson (1956) is 945 m, based on Macvicar's (1894) record from a radius of 10 miles [16 km] from Killin. Macvicar reported his plant as var. *alpestre*, a variant with short prostrate stems and suberect branches. The plants we collected would be covered by Babington's (1881) description of this variant.

Equisetum palustre. By large lochan S.W. of the summit of Meall nan Tarmachan, altitude 945 m, NN/581.387, 25 July 1995. This exceeds the unlocalised upper record of this species, 915 m in the Breadalbane area (White 1898; Wilson 1956); the species is also reported by McVean & Ratcliffe (1962, p. 351) from 915 m at NN/635.409 on Ben Lawers.

Menyanthes trifoliata. Tiny plants at edge of lochan fed by two melting snowpatches, 200 m S.E. of the summit of Beinn Heasgarnich, altitude 1005 m, NN/415.382, 26 July 1995, **CGE** (*Preston 95/54*). Also present by a lochan 500 m N. of the summit, NN/418.385, at an altitude of 970 m. Swamp on flat ground between Meall Garbh and Beinn nan Eachan, altitude 930 m, NN/572.386, 25 July 1995. Wilson (1956), citing White (1898), gives 925 m in Breadalbane as the upper limit for this species.

Myriophyllum alterniflorum. In water 20–30 cm deep at edge of Lochan an Tairbh-uisge, Meall nan Tarmachan, altitude 780 m, NN/591.396, 25 July 1995, **CGE** (*Preston 95/52*). Frequent in water c. 1 m deep over sand, E. end of Loch Vrotachan, v.c. 92, altitude 750 m, NO/124.784, 27 July 1996, **CGE** (*Preston 96/96*). Lochan Coire Dhubhclair, altitude 735 m, NN/497.329, 27 July 1995. These records exceed the upper altitudinal limit given by Wilson (1956), 715 m in Breadalbane and in Wales.

Potamogeton alpinus. Water 16–50 cm deep over an otherwise bare schistose substrate, large lochan S.W. of the summit of Meall nan Tarmachan, altitude 945 m, NN/581.387, 25 July 1995, **CGE** (*Preston 95/53*). A large population of *P. alpinus* was present in this windswept lochan. The plants were small and reproducing vegetatively by stolons: small plants were growing at the tips of the stolons and rooting from stolons which were still attached to the parent plant. Some plants were also in bud. Similar dwarf plants with short stolons have been collected at high altitudes on Meall nan Tarmachan for many years, most recently by R. Mackechnie & E. C. Wallace on 8 July 1937 (**BM**). Meall nan Tarmachan is cited as the highest locality for this species by Dandy & Taylor (unpublished) on the basis of these collections. Wilson's (1956) upper limit of 3350 feet [1020 m] is based on Bennett (1907), who actually cited an unlocalised record from 3300 feet [1005 m] as the upper limit for this species in Britain. This higher value is best disregarded in the absence of further information. The altitudinal limits in Bennett (1907) are based on specimens he himself had seen, and he perhaps derived this figure from an imprecisely labelled sheet from "near the summit" of Meall nan Tarmachan (1043 m).

Potamogeton filiformis. Although this species has a northern distribution in Britain, it is primarily a lowland plant which ascends to 350 m in Drumore Loch, Angus, v.c. 90 (Stewart, Pearman & Preston 1994). The only exception is a specimen collected from "alt. near 2500 ft. [760 m]" at "lochan above Coire Dhubh Ghalair, Breadalbane" by D. A. Haggart on 1 August 1889 (**PTH**). The identification of this specimen was initially confirmed by Dandy & Taylor in 1939 and subsequently by C.D.P. in 1997. The site, Lochan Coire Dhubhclair, lies at an altitude of 735 m. We revisited it on 27 July 1995: it is a stony lochan with no emergents, although green algae cover the rocks. Small plants of *Juncus bulbosus* grew around the edge of the loch but we could find no *Potamogeton filiformis*. There is no reason to suppose that the specimen at **PTH** is mislabelled (M. Simmons, in litt., 1997), but it is possible that the species was only a transient colonist at this apparently unsuitable site which is 50 km from any other known population.

Potamogeton perfoliatus. With *P. praelongus* in water 20–30 cm deep at the shallow edge of Lochan an Tairbh-uisge, Meall nan Tarmachan, altitude 780 m, NN/591.396, 25 July 1995, **CGE** (*Preston 95/51*). Although *P. praelongus* has been collected at this site before (see below), *P. perfoliatus* appears to have been overlooked (or perhaps regarded by earlier botanists as too common to collect). This site exceeds the upper altitudinal limits given by Wilson (1956) and Dandy & Taylor (unpublished), both of which are based on E. S. Marshall's collection from 750 m at Loch Vrotachan, v.c. 92 (Marshall 1893; voucher in **CGE**), a site where the species was still present in 1996.

Potamogeton polygonifolius. Outflow of Lochan an Tairbh-uisge, altitude 780 m, NN/591.396, 25 July 1995. This exceeds the published upper limit of this species, 700 m in Breadalbane (White 1898; Wilson 1956). According to Dandy & Taylor (unpublished), the species occurs "up to about 3000

ft. [915 m] on Meall nan Tarmachan"; there are no specimens with precise altitudinal data in the Dandy index, although it details one collection by A. B. Hall from "pools near the summit of Meall nan Tarmachan" (July 1892). We failed to find this species at higher altitudes on Meall nan Tarmachan, although it might occur there.

Potamogeton praelongus. Flowering plants in water 50–60 cm deep, and a few scattered plants with *P. perfoliatus* in water as shallow as 20–30 cm, Lochan an Tairbh-uisge, Meall nan Tarmachan, altitude 780 m, NN/591.396, 25 July 1995, **CGE** (*Preston 95/49, 50*). This has hitherto been regarded as the highest locality for this species in Britain: it has been collected here since 1881, most recently by A. O. Chater in 1953 (**LANC**). However, a higher locality was discovered in 1995 by the Scottish Natural Heritage Loch Survey team, who collected *P. praelongus* at 800 m at Loch Coire Cheap, NN/480.754, in v.c. 97 (voucher specimen confirmed by C.D.P.). References to the occurrence of *P. praelongus* at higher altitudes on Meall nan Tarmachan are based on a specimen collected by H. N. Dixon & A. H. Vallance in 1893 (Dandy index) on which the altitude of this site is given, rather imprecisely, as 2500–3000 feet [760–915 m]. Both Bennett (1903) and Wilson (1956) chose the upper of these two values as the upper limit for the species.

Potamogeton × *zizii* (*P. gramineus* × *P. lucens*). Clear water 1 m deep, with *Littorella uniflora*, *Lobelia dortmanna*, the aquatic variant of *Juncus bulbosus* and *Myriophyllum alterniflorum*, Loch na Craige, altitude 395 m, NN/88.45, 29 July 1995, **CGE** (*Preston 95/64*). Wilson (1956) described this as a lowland plant, although there are earlier collections from this site, made by G. Taylor in 1932 and 1933 and by J. W. Clark in 1973. These collections were initially determined as *P. lucens* by W. H. Pearsall and J. E. Lousley respectively (Dandy index).

Sparganium angustifolium. A few plants in a lochan fed by two melting snowpatches, 200 m S.E. of the summit of Beinn Heasgarnich, altitude 1005 m, NN/415.382, and larger populations in a stony lochan 500 m N.E. of the summit, altitude 970 m, NN/418.385, **CGE** (*Preston 95/56*), 26 July 1995. Wilson (1956) includes both this species and *S. natans* in his entry for *S. angustifolium*, although suggesting (doubtless correctly) that the higher altitude records probably refer to *S. angustifolium*. None of his entries, however, is for an altitude as high as 1005 m. Druce (1932) cites a record made by P. Ewing at 990 m from Ben Lawers; this puzzling record may refer to the Lawers area as there does not appear to be any suitable habitat at this altitude on Ben Lawers itself.

Sparganium natans. Growing with *Potamogeton natans* in water 30–40 cm deep over peat (with submerged inflorescences), and as tiny plants in liquid mud (with emergent inflorescences), Lochan Achlarich, E. of Beinn Heasgarnich, altitude 650 m, NN/434.380, 26 July 1995, **CGE** (*Preston 95/57*). As explained under *S. angustifolium*, Wilson (1956) does not specify an altitudinal limit for this species. This record is higher than any others we have traced.

Triglochin palustris. By lochan 500 m N.E. of the summit of Beinn Heasgarnich, altitude 970 m, NN/418.385, 26 July 1995. Macvicar (1894) and White (1898) give the upper limit for this species as 855 m in Breadalbane, the value cited by Wilson (1956), although Druce (1932) cites an upper limit of 975 m on Lochnagar. The presence of this species at high altitudes in Britain is not unexpected, as it reaches high latitudes in the Arctic (Hultén & Fries 1986).

Utricularia intermedia sensu lato. Shallow water over peat, Lochan Achlarich, E. of Beinn Heasgarnich, altitude 650 m, NN/434.380, 26 July 1995, **CGE** (*Preston 95/59*). Also present at the same altitude in a small lochan N. of this site, NN/432.381. This exceeds the upper limit given by White (1898) and Wilson (1956), 550 m in the Breadalbane and 565 m in the Rannoch areas of Perthshire. However, Druce (1932) cites a record made by P. Ewing at 990 m on Ben Lawers, a record so much higher than the others that confirmation is desirable.

Nitella flexilis. In lochan fed by two melting snowpatches, 200 m S.E. of the summit of Beinn Heasgarnich, altitude 1005 m, NN/415.382, 26 July 1995, **CGE**. Forming low sward in water 20–30 cm deep over soft silt, in absence of vascular plants, smaller lochan S.W. of the summit of Meall nan Tarmachan, altitude 950 m, NN/581.386, 25 July 1995, **CGE**. Deep water in lochan on peat (but just below rock outcrops), N. end of Coire Heasgarnich, altitude 930 m, NN/420.389, 26 July 1995, **CGE**. Lochan Coire Dhubhclair, altitude 735 m, NN/497.329, 27 July 1995, **CGE**. N. F. Stewart now splits this species into the segregates *N. flexilis* and *N. opaca*. The specimens from 1005 m on Beinn Heasgarnich can only be identified as *N. flexilis* sensu lato but N.F.S. has identified the other three plants as *N. opaca*. Wilson's (1956) upper limit for the genus, *N. flexilis* at 545 m, is clearly much too low.

ACKNOWLEDGMENTS

We thank Mrs A. V. Pearman for joining us on our visits to all the Breadalbane sites, D. Marden (National Trust for Scotland) and Dr R. A. H. Smith (Scottish Natural Heritage) for permission to collect voucher specimens on Meall nan Tarmachan, M. Simmons for the loan of Haggart's *P. filiformis* specimen from **PTH**, Dr O. Lassière and Dr D. A. Ratcliffe for providing details of *Potamogeton praelongus* and *Carex rostrata* and N. F. Stewart for determining the charophyte specimens.

REFERENCES

BABINGTON, C. C. (1881). *Manual of British botany*, 8th ed. John van Voorst, London.
BENNETT, A. (1903). *Potamogeton praelongus* Wulf. in Britain. *Journal of botany* **41**: 165–166.
BENNETT, A. (1907). Notes on *Potamogeton*. *Journal of botany* **45**: 373–377.
DANDY, J. E. & TAYLOR, G. (unpublished). *The British species of* Potamogeton *L.* Manuscript in Natural History Museum library (catalogued as DF 440/65, 66), London.
DRUCE, G. C. (1932). *The comital Flora of the British Isles*. T. Buncle & Co., Arbroath.
HULTÉN, E. & FRIES, M. (1986). *Atlas of north European vascular plants north of the Tropic of Cancer*. 3 vols. Koeltz Scientific Books, Königstein.
JERMY, A. C., CHATER, A. O. & DAVID, R. W. (1982). *Sedges of the British Isles*. B.S.B.I. Handbook no. 1, 2nd ed. Botanical Society of the British Isles, London.
MACVICAR, S. M. (1894). Altitudes reached by certain plants in Mid-Perth. *Annals of Scottish natural history* **1894**: 164–166.
MARSHALL, E. S. (1893). Some plants observed in E. Scotland, July and August, 1892. *Journal of botany* **31**: 228–236.
MCVEAN, D. N. & RATCLIFFE, D. A. (1962). *Plant communities of the Scottish Highlands*. Monographs of the Nature Conservancy no. 1. Her Majesty's Stationery Office, London.
MOORE, J. A. (1986). *Charophytes of Great Britain and Ireland*. B.S.B.I. Handbook no. 5. Botanical Society of the British Isles, London.
PRESTON, C. D. (1988). The *Potamogeton* L. taxa described by Alfred Fryer. *Watsonia* **17**: 23–35.
PRESTON, C. D. & CROFT, J. M. (1997). *Aquatic plants in Britain and Ireland*. Harley Books, Colchester.
STACE, C. A. (1991). *New Flora of the British Isles*. Cambridge University Press, Cambridge.
STEWART, A., PEARMAN, D. A. & PRESTON, C. D. comps & eds (1994). *Scarce plants in Britain*. Joint Nature Conservation Committee, Peterborough.
WHITE, F. B. W. (1898). *The Flora of Perthshire*. Perthshire Society of Natural Science, Edinburgh.
WILSON, A. (1956). *The altitudinal range of British plants*, 2nd ed. T. Buncle & Co., Arbroath.

C. D. PRESTON
I.T.E., Monks Wood, Abbots Ripton, Huntingdon, Cambs., PE17 2LS
D. A. PEARMAN
The Old Rectory, Frome St Quintin, Dorchester, DT2 0HF

COLONISATION BY *COCHLEARIA OFFICINALIS* L. (BRASSICACEAE) AND OTHER HALOPHYTES ON THE ABERDEEN-MONTROSE MAIN ROAD IN NORTH-EAST SCOTLAND

Clumps of *Cochlearia officinalis* L. (Common Scurvygrass) have been visible on the verges of the A92 road south of Stonehaven since the 1980s, and possibly earlier. Because halophytes have been increasing elsewhere in Britain along trunk roads in the last 20 years (Scott & Davison 1982; Scott 1985; Leach 1994), a similar spread could be occurring in N.E. Scotland. We therefore made a car-borne survey of the coastal main road in Kincardineshire (v.c. 91) in late April and early May 1997, driving slowly along its whole length in the vice-county looking for flowers of halophyte species. On finding plants we assessed their distribution pattern across the road verges.

For the survey we searched between the North Esk bridge just north of Montrose and the Dee bridges in Aberdeen, with extra traverses on key sections. We also checked the branches of the coast road leading into Stonehaven (designated A92 until the mid 1980s when Stonehaven was by-passed) and the A956, which gives a second entry to Aberdeen further east than the main road (Fig. 1). From Aberdeen to the south end of the Stonehaven by-pass, the road is now a dual carriageway and numbered A90;

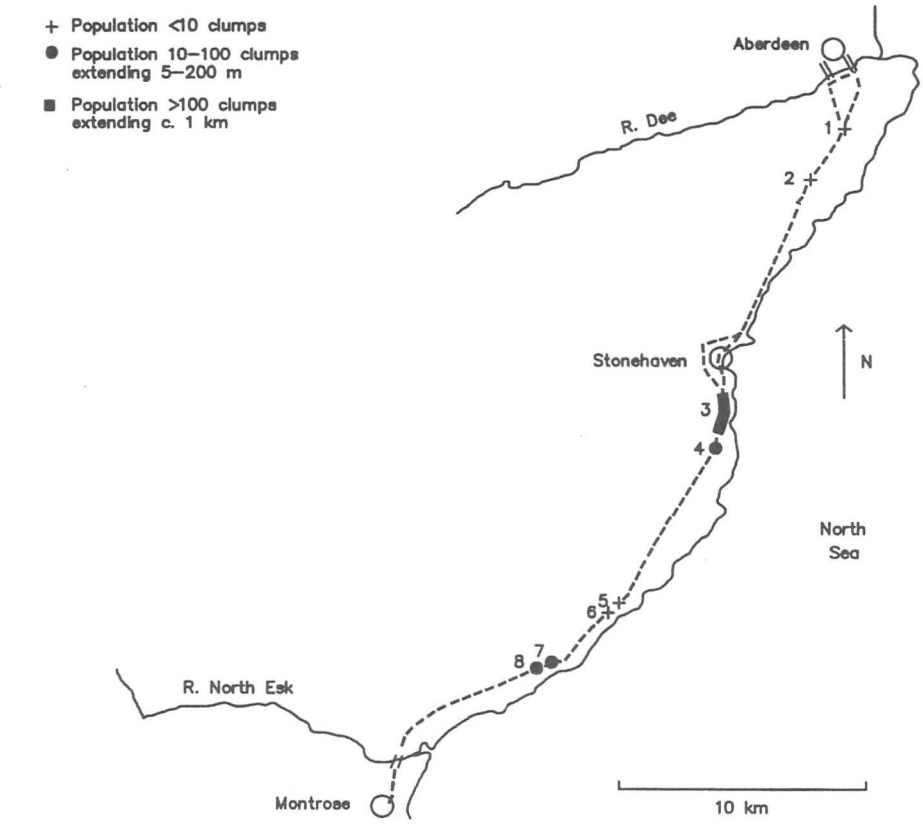

FIGURE 1. Distribution of *Cochlearia officinalis* on the Aberdeen – Montrose main road in spring 1997.

from the Stonehaven by-pass to Montrose the road is a single carriageway apart from a short section near Gourdon (location 5, Fig. 1).

Clumps of *Cochlearia officinalis* were recorded in eight locations, and *Armeria maritima* (Miller) Willd. (Thrift) in three locations (Table 1). Although we would have missed any non-flowering plants of *A. maritima* and *C. officinalis*, and perhaps also some small flowering clumps if obscured by tall grasses, we are confident that major colonisation has occurred on only two sections of road near Dunnottar (locations 3 and 4, Table 1) and Johnshaven (locations 7 and 8). At three other locations only single clumps of *C. officinalis* were seen. The *A. maritima* colonies were all small, although the size of the clumps indicates that they have been established for several years. *Plantago maritima* L. (Sea Plantain) and *Spergularia marina* (L.) Griseb. (Lesser Sea-spurrey) were also found, each at one location (locations 5 and 3 respectively), when we were examining the verges on foot. They probably grow in more places along the A90/A92, but would not have been noticed as they flower later than *A. maritima* and *C. officinalis*. No plants of *Cochlearia danica* L. (Danish Scurvygrass) were seen in this survey, but in a check on the inland stretch of the A90 in Kincardineshire (v.c. 91) on 20 May 1997, four small clumps were found near Laurencekirk (NO/701.699–726.720). This road is a dual carriageway running W.S.W. from the Stonehaven by-pass (NO/861.843) to the vice-county boundary at North Water Bridge (NO/651.661); it was searched less thoroughly than the coastal main road and at greater speed, and no other halophytes were observed.

The distribution of *C. officinalis* within the colonies on the coast road was somewhat patchy, and at Lauriston the clumps appeared to be confined to one side of the road (Table 1). Across the verges there was a clear pattern of greater frequency of clumps at the road edge. However, this was much less marked than for *C. danica* on the M6 and M74 in northern England and southern Scotland (personal

TABLE 1. DETAILS OF OCCURENCES OF *ARMERIA MARITIMA* (Am) AND *COCHLEARIA OFFICINALIS* (Co) ON THE ABERDEEN-MONTROSE MAIN ROAD IN SPRING 1997. ALL LOCALITIES ARE IN KINCARDINESHIRE (V.C. 91)

Locality	Grid reference (all NO)	Species	Population size (no. clumps)	Spread (m)	Position
1. Loirston	931.001	Co	1	< 1	East verge
2. Bourtreebush	910.955	Co	1	< 1	Central reservation
3. Dunnottar	872.837–873.810	Co	c. 2000	2700	Both verges
4. Catterline	866.798–867.799	Co	c. 20	100	Both verges
5. Gourdon	824.711	Am	1	< 1	East verge
		Co	10	3	East verge
6. Benholm	810.691	Co	1	< 1	S.E. verge
7. Johnshaven	795.672	Am	1	< 1	S.E. verge
	792.671	Am	1	< 1	S.E. verge
	788.670–789.670	Co	c. 100	100	Both verges
	787.699	Am	c. 10	50	Both verges
8. Lauriston	784.698	Am	1	< 1	S.E. verge
	780.668–782.669	Co	c. 50	200	N.W. verge

observations); some clumps of *C. officinalis* occur at a distance from the carriageway. Plants were also observed on both sides of boundary fences and next to boundary stone dykes.

Grass verges exist along 63 km of the 70 km of the coast road, nearly all outside built-up areas. The length of verged road lying within 1 km of the sea totals 17 km, and over approximately 18% of this length *C. officinalis* is now established (Fig. 1). On the 39 km of verged road lying 1–2 km from the sea there are presently just two clumps of *C. officinalis* (locations 1 and 2, Table 1). Despite the closeness of the road to the coast, direct links to maritime semi-natural plant communities are few; mostly there is a strip of arable farmland between the road and the shore, with housing at settlements such as Inverbervie (NO/83.72).

Nearness to the sea, and the consequential deposition of salt by wind, seem to be the primary factors controlling halophyte colonisation on the Aberdeen-Montrose road. But once plants have got established they appear to be being spread by gusts of wind from passing traffic (Scott 1990), hence the patchy longitudinal distribution of *C. officinalis* along the verges. The two isolated clumps of *C. officinalis* at locations 1 and 2 (Table 1), nearly 2 km inland and 12 km from other roadside locations, have probably been dispersed by vehicles. Salting to prevent ice and snow accumulation is moderately intensive on the coast road, and may be creating bare ground and niches for colonisation immediately next to the carriageway (as suggested by Scott & Davison 1982), hence the greater frequency of *C. officinalis* in the 50-cm band closest to the road where about half the area is bare soil. In some sections of the A90 near Aberdeen, tracks with bare earth have been created by people walking along the verge, but no colonisations were observed there.

C. officinalis has spread along inland roadsides much less rapidly than *C. danica* (Scott & Davison 1982; Leach & Rich 1989; Leach 1994), although sizeable populations of the former are now established in S.W. England. Colonisation of roadsides in an area of S.W. Wales (Chater 1975) was judged by Scott & Davison (1982) to be a spread from adjacent long-established colonies in semi-natural vegetation rather than a consequence of road salting, but the distribution map given by Leach & Rich (1989) shows a clear relationship to trunk roads in Devon and Somerset. *Armeria maritima* has few inland records along roads (Scott 1985), and one reported occurrence in N.E. Scotland is associated with serpentine soils, there being adjacent populations on serpentine outcrops (Welch & Welch 1988).

We therefore conclude that the present populations of *C. officinalis* and *Armeria maritima* along the Aberdeen-Montrose coast road are largely colonisations of suitable non-ploughed habitat within the

coastal zone affected by natural salt deposition. But with a considerable population of *C. officinalis* now established and many seeds being dispersed, more rapid advance along trunk roads could occur in N.E. Scotland in the next few years, as has happened in S.W. England. However, as *Cochlearia danica* is now well established on the A74/M74 in southern Scotland as far north as Hamilton, and has begun to colonise inland trunk roads in northern Scotland, at Laurencekirk and probably elsewhere, there could well soon be a fascinating meeting here of the two species.

REFERENCES

CHATER, A. O. (1975). *Cochlearia officinalis* L. Common Scurvy Grass. *Nature Wales* **14**: 271.
LEACH, S. J. & RICH, T. (1989). Scurvy-grasses take to the road. *B.S.B.I. news* **52**: 15–16.
LEACH, S. J. (1994). *Cochlearia danica* on inland roadsides – an update. *B.S.B.I. news* **65**: 12–13.
SCOTT, N. E. (1985). The updated distribution of maritime species on British roadsides. *Watsonia* **15**: 381–386.
SCOTT, N. (1990). *Cochlearia danica* on inland roadsides – source of seed? *B.S.B.I. news* **56**: 11.
SCOTT, N. E. & DAVISON, A. W. (1982). De-icing salt and the invasion of road verges by maritime plants. *Watsonia* **14**: 41–52.
WELCH, D. & WELCH, S. (1988). Occurrence of *Armeria maritima* (Mill.) Willd. on an inland roadside in north-eastern Scotland. *Watsonia* **17**: 96–97.

D. WELCH AND M. J. WELCH
East Fernbank, Woodside Road, Banchory, Kincardineshire, AB31 5XL