Short Notes

CARDAMINE IMPATIENS L.: A NATIVE SCOTTISH LOCALITY

During a visit in January 1986 to a remote deciduous woodland by the Slitrig Water to the south of Hawick in Roxburghs., v.c. 80, I saw a number of green rosettes which were unfamiliar to me. They appeared to belong to a crucifer but the leaflets were too divided for *Cardamine hirsuta* L. or *C. flexuosa* With. The illustrated Floras I possessed did not feature the basal rosettes of *C. impatiens* L. However Ellis & Jones (1969) provided the answer with excellent illustrations of the basal leaves of all three species and there was little doubt that the rosettes were those of *C. impatiens*. Their identity was confirmed when the wood was revisited in June with J. Grant Roger when *C. impatiens* was in flower.

This old woodland lies on the steep south-facing side of a valley at an altitude of 215–230 m and covers an area of about 3 ha. The soil is derived from the underlying and mainly basic Silurian rock which outcrops in places and which has been quarried on a small scale many years ago to form small areas of scree. *Cardamine impatiens* is found exclusively on and around these screes, there being several hundreds of plants. *Fraxinus* and *Ulmus* predominate with several of the latter suffering from Dutch Elm disease. *Quercus*, *Betula* and *Corylus* are less common with *Crataegus*, *Prunus spinosa*, *Salix caprea* and *Sorbus aucuparia* also occurring. *Lobaria pulmonaria*, a very local foliose lichen, occurs on *Fraxinus* and *Ulmus*. It is a species indicative of old forest continuity and demonstrates the ancient origins of this woodland. Cattle and sheep have free access and the effects of grazing and trampling are much in evidence with bare soil exposed and several of the *Cardamine* plants uprooted or heavily browsed. *Pteridium aquilinum* is common at the edges of the wood with *Dryopteris filix-mas* conspicuous where there is more shade. *Brachypodium sylvaticum* and *Mercurialis perennis* are locally dominant and there is an extensive and impressive colony of *Origanum vulgare*. Other woodland species present are *Agropyron caninum*, *Circaea lutetiana*, *Epilobium montanum*, *Geranium robertianum*, *Geum urbanum*, *Hypericum hirsutum*, *Moehringia trinerva*, *Myosotis sylvatica*, *Potentilla sterilis*, *Primula vulgaris*, *Ranunculus ficaria*, *Stellaria holostea*, *Stachys sylvatica*, *Teucrium scorodonia*, *Veronica chamaedrys*, *Vicia sepium* and *Viola riviniana*. *Hyacinthoides non-scripta* is absent. It is of interest that a further seven plants of *C. impatiens* were seen rooted in the mossy base of an old *Ulmus* tree in woodland 1·5 km to the north in the same valley. Other local rarities nearby included *Euonymus europaeus*, *Vicia sylvatica* and *Viola hirta* growing on a steep scar above the river. Tansley (1939) quoted E. Price Evans' description of an upland wood of *Fraxinus* on basic igneous rock in Merioneth, Wales, in which *C. impatiens* occurs. There are many similarities between this and the Roxburghshire woodland with two-thirds of the flowering plants common to both. Not surprisingly the western element of the flora is lacking from the latter.

The status of *C. impatiens* in Scotland is confusing. The uncertainty of some of the old records and its occurrence as a casual are responsible for this. The single post- 1930 record for Scotland is from Angus, v.c. 90 (Perring & Walters 1976), where according to Ingram & Noltie (1981) it is doubtfully native. The only pre-1930 record lies in Dumfriesshire, v.c. 72 (Perring & Walters 1976), and it is relevant that Druce (1932) stated that it is "absent from Scotland save Dumfries". He also comments that *C. flexuosa* is often mistaken for it. He presumably took his source as Scott-Elliot (1896) but it is doubtful whether the plants were correctly named and there are no specimens in **E**. I have been unsuccessful in refinding this species in two of the named localities in v.c. 72 and Mrs M. Martin (pers. comm.) has seen neither past nor present material. Hooker (1821) gave "rocks on the banks of the river above the falls of Clyde" on Hopkirk's authority and quoted Lightfoot for "foot of mountains and in shady places but rare". Hooker & Arnott (1855) gave "near the falls of Clyde and banks of Doune, Scotland". Babington (1881) put a query against Scotland and Watson (1883) put a query against Ayrs., v.c. 75, as the sole Scottish vice-county. Hooker (1884) omitted Scotland as did Bentham & Hooker (1924). Clapham (1962) gave Angus as the only Scottish vice county. There are, however, specimens in **E** from Mouse Water in Lanarks., v.c. 77, dated 1883 and from Lanark in 1901 collected by Craig-Christie. It is not known whether

the former collection was from an old woodland site but this species has not been seen in v.c. 77 since then (P. Macpherson pers. comm.). Its occurrence in Scotland as a casual is further supported by specimens in **E** from Edinburgh in 1841 and from Methven in Perthshire in 1965. There is also a specimen from Roxburghshire (Ormiston near Kelso) collected in 1876 in **BM**. There is no Scottish material in **K** and I have been unable to examine other herbaria.

It is relevant that *C. impatiens* has recently been discovered in a base-rich wood in Ireland where its native status has now been put beyond doubt (Breen, Curtis & Scannell 1984). This Roxburghshire discovery has now made its native status in Scotland secure. I would hope that this woodland could be given sound protection and its conservation carefully assessed.

ACKNOWLEDGMENTS

I wish to thank the Keepers of the Herbaria of The Royal Botanic Garden, Edinburgh, The Royal Botanic Gardens, Kew, and the British Museum (Natural History) for permission to examine material.

REFERENCES

BABINGTON, C. C. (1881). *Manual of British botany*, p. 28. London.
BENTHAM, G. & HOOKER, J. D. (1924). *Handbook of the British flora*, 7th ed., pp. 33–34. Ashford, Kent.
BREEN, C., CURTIS, T. G. F. & SCANNELL, M. J. P. (1984). *Cardamine impatiens* L. in Co. Westmeath–an addition to the Irish flora. *Watsonia*, **15**: 164.
CLAPHAM, A. R. (1962). Cruciferae, in CLAPHAM, A. R., TUTIN, T. G. & WARBURG, E. F. *Flora of the British Isles*, 2nd ed., p. 162. Cambridge.
DRUCE, G. C. (1932). *The comital flora of the British Isles*, p. 22. Arbroath.
ELLIS, R. P. & JONES, B. M. G. (1969). The origin of *Cardamine flexuosa* with evidence from morphology and geographical distribution. *Watsonia*, **7**: 92–103.
HOOKER, W. J. (1821). *Flora Scotica*, pp. 198–199. London.
HOOKER, W. J. & ARNOTT, G. A. W. (1855). *The British flora*, p. 27. London.
HOOKER, J. D. (1884). *The students Flora of the British Isles*, p. 28. London.
INGRAM, R. & NOLTIE, H. J. (1981). *The flora of Angus*, p. 28. Dundee.
PERRING, F. H. & WALTERS, S. M., eds (1976). *Atlas of the British flora*, 2nd ed., p. 44. London.
SCOTT-ELLIOT, G. F. (1896). *The flora of Dumfriesshire*, p. 13. Dumfries.
TANSLEY, A. G. (1939). *The British Isles and their vegetation*, pp. 436–439. Cambridge.
WATSON, H. C. (1883). *Topographical botany*, p. 41. London.

R. W. M. CORNER
Hawthorn Hill, 36 Wordsworth St, Penrith, Cumbria, CA11 7QZ

PILULARIA GLOBULIFERA L. RECORDED AT HATFIELD CHASE, N. LINCOLNSHIRE

During extensive surveys of the drainage channels of the Hatfield Chase district, N. Lincs., v.c. 54, in the summer of 1986, a new site was discovered for *Pilularia globulifera* L. This short note describes the characteristics of the site in which this species was found.

Pilularia globulifera (Pillwort or Peppergrass), has a sporadic distribution in the British Isles but in recent times the plant has become rare in Europe and is regarded as an endangered species (Perring & Farrell 1977; Jermy *et al.* 1978). *P. globulifera* has been recorded from three sites in N. Lincs. (Gibbons 1975) and is now extinct at two of these sites, one loss at least being due to drainage (Gibbons & Weston 1985). The species has not been recorded from Notts., v.c. 56 (Howitt & Howitt 1963) although there is at least one record for W. Yorkshire (Lees 1888).

In Europe *P. globulifera* is limited in its distribution primarily to countries bordering the Atlantic; it occurs north to the Hebrides, Moray and southern Fennoscandia; to the east it is very rare in northern and western parts of the Soviet Union, northern Poland and the Odra River Basin

in Poland, and isolated parts of southern Bohemia (Czechoslovakia). The species is found in the south to Portugal and mid-Italy but is absent from the Alps (Casper & Krausch 1980).

The drainage channel on Hatfield Chase in which the species occurred, the North Idle Drain, was 6 m wide at the water surface and approximately 12 m wide at the bank top. The soil type was a mixture of glaciofluvial drift, deep permeable sand and coarse loamy soils. The water had a maximum depth of 0·75 m, pH 6·3 and 3·8 mhos conductivity. The banks had a complete cover of herbs, grass and some *Rosa* and *Rubus* shrubs. The water surface was completely overgrown by aquatic plants with two dominant species: *Eleogiton fluitans* (L.) Link. and *P. globulifera*. Table 1 summarizes the species composition of three relevés taken from this drain which are representative of the *Pilularietum globuliferae* (Shimwell 1971).

TABLE 1. SPECIES COMPOSITION OF THREE RELEVÉS FROM NORTH IDLE DRAIN TAKEN ON 12TH AUGUST 1986

	Relevé Number[a]		
	1	2	3
Plot area (m^2)	5	2	4
Total cover (%)	100	100	100
Water depth (cm)	30	20	25
Number of species	10	8	9
Pilularia globulifera	3	3	4
Eleogiton fluitans	4	3	4
Agrostis stolonifera	2	1	1
Juncus bulbosus	2	1	2
Juncus articulatus	2	1	1
Equisetum fluviatile	+	1	+
Glyceria fluitans	1	·	1
Typha latifolia	+	+	·
Callitriche stagnalis	1	·	1
Alisma plantago-aquatica	·	+	+
Sparganium erectum	+	·	·

[a]Cover-abundance using Braun-Blanquet scale.

The North Idle Drain receives an annual herbicide treatment. In 1986 this was an application of 1–2 $mg.l^{-1}$ dichlobenil applied as a granule (Casoron GSR) whereas in 1985 terbutryne (0·05–0·10 $mg.l^{-1}$) was used. Both treatments were in the spring. The drain was hand scythed and hand dragged in the autumn.

The chromosome number of the plants collected was 2n=26 (Krahulcova pers. comm.). Herbarium specimens of this collection have been deposited in **UTLH** and the National Museum in Prague, **PR**.

REFERENCES

CASPER, S. J. & KRAUSCH, H.-D. (1980). Pteridophyta und Anthophyta. 1 Teil: Lycopodiaceae bis Orchidaceae, in ETTL, H. *et al.*, eds. *Süsswasserflora von Mitteleuropa*, **23**. Stuttgart.
GIBBONS, E. J. (1975). *The flora of Lincolnshire*. Lincoln.
GIBBONS, E. J. & WESTON, I. (1985). *Supplement to the flora of Lincolnshire*. Lincoln.
HOWITT, R. C. L. & B. M. (1963). *A Flora of Nottinghamshire*. Nottingham.
JERMY, A. C., ARNOLD, H. R., FARRELL, L. & PERRING, F. H. (1978). *Atlas of ferns of the British Isles*. London.
LEES, F. A. (1888). *The flora of West Yorkshire*. London.
PERRING, F. H. & FARRELL, L. (1977). *British Red Data Books, 1. Vascular plants*. Lincoln.
SHIMWELL, D. (1971). *Description and classification of vegetation*. London.

S. HUSAK & P. M. WADE
Department of Human Sciences, The University, Loughborough, LE11 3TU

GENTIANELLA CILIATA (L.) BORKH. IN BUCKINGHAMSHIRE

During the summer of 1982, P. Phillipson discovered a gentian in chalk grassland near Wendover, v.c. 24. This was provisionally identified by G. Atkins as *Gentianella ciliata* (L.) Borkh., and this identification was confirmed by R. Pankhurst at the British Museum (Natural History).

The plants form a flourishing colony covering an area of approximately 10 × 15 m, in a closed community of short turf on a very thin humus over Lower Chalk. In 1982, a maximum of 50 flowering plants was counted, and in 1983 there was a maximum of 43 flowering plants. There is no evidence that the area has ever been cultivated and it is far from human habitation. The area has been lightly grazed by sheep for at least 15 years. Fortunately the landowners are co-operating with the local naturalists' trust, the N.C.C. and the B.S.B.I. in monitoring the population and conserving the site.

Among the associated species were *Festuca ovina*, *F. pratensis* and *Cirsium acaulon* as co-dominants, together with *Filipendula vulgaris*, *Helianthemum nummularium*, *Hippocrepis comosa*, *Koeleria macrantha* and *Polygala vulgaris*, which may prove to be characteristic or constant associates.

The history of this species in Buckinghamshire is a matter of considerable interest. Reference to Druce (1926) discloses the following entry: "*Gentiana ciliata* L. Calathian Violet. Error. On a hill not far from Wendover, Miss Williams in *Journ. Bot.* 295, 1785 (sic) but the specimen is *Campanula glomerata*. See *Journ. Bot.* 44, 1879. There must be some gross carelessness in such a record, as *ciliata* is not likely to occur in England".

The reference in the *Journal of Botany* (Anonymous 1875) (not 1785) cited by Druce reads as follows: "*Gentiana pneumonanthe* in Bucks. This gentian has been collected during the autumn by a lady (Miss M. Williams) on a hill not far from Wendover, Bucks. It is not given for that county in *Topographical Botany*".

Druce's second reference is to Britten (1879), whose note contains the following sentence: "It may be well to note that some error is to be suspected with regard to the Bucks locality for this plant given in 'Journ. Bot.', 1875. p. 295 as the specimen in the British Museum Herbarium, sent by Miss Williams from Wendover, represents *G. ciliata*". It seems that Britten examined Miss Williams' specimen more carefully than Druce because R. Pankhurst has located it in **BM** and it is indeed *Gentianella ciliata*. Miss Williams' name is on the label, and it bears the date September 1875.

The evidence seems to indicate that the present site is that discovered by Miss Williams, and the plants have all the appearance of being native. It is difficult to understand why this colony has since remained undetected for over 100 years, particularly since it is close to the junction of two well-used footpaths, in an area well known to botanists, but the late flowering season (late August to October) (Polunin 1969), and the comparative insignificance of the flowers, probably provide an explanation.

Since the re-discovery of the Wendover site I have traced a further British specimen at **K**. A note on the cover states that the plant is an alien, and the label reads "Coll. A. Patterson, 22 Sept. 1910. Meadow at Swallowfield, Limpsfield, Surrey. Named by W. B. Turrill".

Pritchard & Tutin (1972) give the distribution of the species as "Europe, except the extreme west and most of the islands", and then go on to list Belgium, Holland, Germany and France among the geographical territories in which it occurs. Britain is not included in the list but, having regard to the continental distribution, it is quite possible that the Buckinghamshire and Surrey records relate to a native population in southern England, and I suggest that suitable chalk downland sites should be searched in the autumn for further populations.

ACKNOWLEDGMENTS

I wish to thank R. Maycock for tracing the references in *Journal of Botany*, and for assistance with the list of associated species; R. Pankhurst, of the British Museum (Natural History), and G. Ll. Lucas, of the Royal Botanic Gardens, Kew, for examining their collections; and Joanna Martin, of the N.C.C., for help with population counts and research into the past history of the site.

REFERENCES

ANONYMOUS (1875). *Gentiana pneumonanthe* in Bucks. *J. Bot., Lond.*, **6**: 295.
BRITTEN, J. (1879). *Gentiana pneumonanthe* in Bucks. *J. Bot., Lond.*, **8**: 44.
DRUCE, G. C. (1926). *The flora of Buckinghamshire*, p. 299. Arbroath.
POLUNIN, O. (1969). *Flowers of Europe*, p. 318. London.
PRITCHARD, N. M. & TUTIN, T. G. (1972). *Gentianella*, in TUTIN, T. G. *et al.*, eds. *Flora Europaea*, **3**: 63–67. Cambridge.

P. R. KNIPE
Abbeyford, Rotten Row, Dorchester-on-Thames, Oxon, OX9 8LJ

COTYLEDON NUMBER IN *CONOPODIUM MAJUS* (GOUAN) LORET

In the autumn of 1984 I set up a field experiment designed to examine the relationship between seed size and establishment success in dense vegetation. The species used were a range of Umbelliferae, including *Conopodium majus* (Gouan) Loret. When *Conopodium* seedlings began to appear, in March and April 1985, it became immediately obvious that each had only one cotyledon. Seedlings of all the other Umbellifers I had sown had two cotyledons. I wondered whether this unusual feature of *Conopodium* had been observed previously. I consulted Müller (1978), which claims to have illustrations of the seedlings of all flowering plants found commonly in the Netherlands and adjacent regions (including south-eastern England). Unfortunately Müller's book does not include *Conopodium*, but it *does* have a picture of the seedling of the closely related *Bunium bulbocastanum*. *Bunium* has only one cotyledon, and I was therefore reassured that *Conopodium* probably has only one too.

I gave this matter no more thought for over a year, until I came across the entry for *Conopodium* in Tutin (1980). Tutin stated that *Bunium* has one cotyledon, but that *Conopodium* has two. This opinion is shared by *Flora Europaea* (Ball 1968), which also is quite categorical that *Conopodium* has two cotyledons.

I had by this time begun to consider the possibility that I had been mistaken. My seedlings had been growing in tall, dense turf, which had made it difficult to get a good look at them. I therefore decided to germinate some seed in the laboratory. Accordingly I collected some fresh *Conopodium* seed in 1986. My 1984 collection had come from Cotehele woods in Cornwall, this latest one from Saltram woods on the edge of Plymouth. The seeds germinated well after 6–8 weeks imbibed at 6°C, and all the seedlings had only one cotyledon. It therefore seems that *Conopodium majus* noted by Tutin (1962) as being very similar to *Bunium bulbocastanum*, is even more similar than previously thought. Certainly my *Conopodium* seedlings are identical to Müller's (1978) drawing of *Bunium*.

One question remains, however. Is the widespread belief that *Conopodium* has two cotyledons simply a mistake, perhaps deriving from wrongly identified seedlings? Or are there actually populations of *Conopodium* with two cotyledons? Tutin (1980) cited Cerceau-Larrival (1962) as the authority on Umbellifer seedlings. Unfortunately, neither *Conopodium majus* nor *Bunium bulbocastanum* is among the list of 97 Umbellifer seedlings for which she provides detailed descriptions. The origin of the widespread belief that *Conopodium* has two cotyledons is therefore not at all clear.

For the time being however, it seems that *Conopodium* can join the short list (along with *Bunium*, *Ranunculus ficaria* and some *Corydalis* spp.) of dicotyledons with only one cotyledon

REFERENCES

BALL, P. W. (1968). *Bunium* and *Conopodium* in TUTIN, T. G. *et al.*, eds. *Flora Europaea*, **2**: 329–33. Cambridge.
CERCEAU-LARRIVAL, M.-TH. (1962). Plantules et pollens d'Ombellifères. Leur intérêt systématique phylogénique. *Mém. Mus. natl Hist. nat., Paris, Sér. B*, **14**: 1–164.
MÜLLER, F. M. (1978). *Seedlings of the north-western European lowland*. The Hague.

TUTIN, T. G. (1962). Umbelliferae, in CLAPHAM, A. R. *et al. Flora of the British Isles*, 2nd ed., pp. 495–531. Cambridge.
TUTIN, T. G. (1980). *Umbellifers of the British Isles*. London.

K. THOMPSON
Department of Biological Sciences, The Polytechnic, Drake Circus, Plymouth, PL4 8AA

OCCURRENCE OF *ARMERIA MARITIMA* (MILL.) WILLD. ON AN INLAND ROADSIDE IN NORTH-EASTERN SCOTLAND

The spread of maritime species along the verges of heavily salted roads has been widely reported (Scott & Davison 1982; Scott 1985). For *Armeria maritima* (Mill.) Willd., the sea-pink, just two records are given, one for W. Kent, v.c. 16, the other for a roadside in Oxon, v.c. 23, and Scott (1985) considered that the latter plants could have a garden origin.

In recent summers there has been a colourful display of sea-pinks along the B9002 Lumsden – Cabrach road in Aberdeenshire. *Armeria* grows sparsely on adjacent moorland near outcrops of serpentine, whilst the nearest coast is 40 km away. The occurrence of *Armeria* on serpentine in north-eastern Scotland has long been known (Dickie 1860), and several of the c. 15 10-km square records in the Eastern Highlands (Perring & Walters 1962) are for this rock type.

On 7th June 1986, the verges of the B9002 were carefully checked for sea-pinks. 30 clumps were found on the southern verge on a 100 m section at GR 38/459.247, and a further 50 clumps scattered between GR 38/440.252 and 38/451.251, nearly all on the southern verge. These clumps were well established, many bearing 20–30 inflorescences; younger, smaller, non-flowering clumps would have been missed. Also present was *Cochlearia officinalis*.

The altitude of these sections of road ranges from 330 to 360 m, thus much salting might be expected. But the road bears little traffic, and, with heavy snowfall often experienced, is closed for periods of at least a week in most winters. Therefore it was of interest to find out whether the verges were salt-rich or influenced by serpentine.

Soil in the zone 1–2 m from the carriageway was sampled by augur close to *Armeria* clumps and to a depth of 10 cm. About 50 cores were bulked together for each of the two sections of the Cabrach road. A similar composite sample was obtained from the A92 Banchory – Aberdeen road known to be heavily salted (from Crathes, GR 37/736.963). Another control sample was collected from a serpentine outcrop 200 m from the Cabrach road, at GR 38/442.248 on Peddie's Hill.

The soils were dried and sieved, then exchangeable nutrients were extracted with molar ammonium acetate solution at pH 7. Concentrations of calcium, magnesium and sodium were determined using an atomic absorption spectrophotometer at Robert Gordon's Institute of Technology, Aberdeen. It was found that the roadsides along the B9002 had a much lower sodium content than at Crathes (Table 1), but similar calcium and magnesium concentrations to the Peddie's Hill serpentine soil. Comparable values for soils over serpentine on the Hill of Towanreef, of which Peddie's Hill is part, are given by Proctor & Woodell (1971).

Thus it seems that the influence of serpentine rather than winter salting explains the presence of *Armeria* along the B9002. We can only speculate why the sea-pinks occur there more densely and flower more freely than on the adjacent moorland; perhaps they are favoured by the lack of sheep grazing along the fenced verge, or by mowing.

TABLE 1. SOIL CHARACTERISTICS

Locality	Concentration (mg g^{-1} dry soil)			pH
	sodium	calcium	magnesium	
Peddie's Hill serpentine outcrop	83	1860	2210	6·0
Cabrach roadside (East)	77	532	1970	6·4
Cabrach roadside (West)	70	676	1760	6·8
Crathes roadside	270	511	51	5·3

It will be interesting to see if the present colonies of *Armeria* spread further along the Cabrach roads and extend into non-serpentine soils. Populations growing on soils rich in heavy metals have been considered a separate subspecies (Pinto da Silva 1972), and the Cabrach plants have the small capitula characteristic of subsp. *halleri* (Wallr.) Rothm.

ACKNOWLEDGMENTS

The soil analysis was carried out as a S.Y.S. project at Banchory Academy by the junior author. We thank Mr G. Mitchell, principal teacher of chemistry, for guidance and Dr A. R. Morisson for allowing the use of the spectrophotometer at R.G.I.T.

REFERENCES

DICKIE, G. (1860). *Botanist's guide to the counties of Aberdeen, Banff and Kincardine*. Aberdeen.

PERRING, F. H. & WALTERS, S. M., eds (1962). *Atlas of the British flora*. London.

PINTO DA SILVA, A. R. (1972). *Armeria* Willd., in TUTIN, T. G. *et al.*, eds. *Flora Europaea*, **3**: 32–33. Cambridge.

PROCTOR, J. & WOODELL, S. R. J. (1971). The plant ecology of serpentine. I. Serpentine vegetation of England and Scotland. *J. Ecol.*, **59**: 375–395.

SCOTT, N. E. (1985). The updated distribution of maritime species on British roadsides. *Watsonia*, **15**: 381–386.

SCOTT, N. E. & DAVISON, A. W. (1982). De-icing salt and the invasion of road verges by maritime plants. *Watsonia*, **14**: 41–52.

D. WELCH & S. WELCH
East Fernbank, Woodside Road, Banchory, Kincardineshire