Cardamine bulbifera (L.) Crantz (Cruciferae) in the British Isles

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ABSTRACT

The taxonomy, reproduction, dispersal, habitats and distribution of *Cardamine bulbifera* (L.) Crantz (Cruciferae) in the British Isles are described, and all localities traced are listed. It is currently known from about 155 native and 27 introduced sites. It is a scarce plant in Britain; the main threats to its survival are woodland replanting and clearance.

INTRODUCTION

Coralroot (*Cardamine bulbifera* (L.) Crantz)* was first recorded in Britain by J. Goodyer, "at Mayfield in Sussex in a wood called Highreede", in 1634 (Wolley-Dod 1937), and it is now known to be a very local, native plant of ancient woodlands in South East and Central England. It is widely introduced elsewhere in England, Scotland and Ireland. On continental Europe, the plant is also local, occurring widely from central France eastwards (though rare near the Mediterranean coast) to the Black Sea, the Caucasus and northern Iran, and northwards to 64° in southern Scandinavia.

At least 13 species of *Cardamine* have been recorded in the British Isles. In addition to *C. bulbifera*, there are five other native species: *C. amara* L., *C. flexuosa* With., *C. hirsuta* L., *C. impatiens* L. and *C. pratensis* L. (Rich 1991). *Cardamine chelidonia* Lam., non L., *C. glanduligera* O. Schwarz, *C. heptaphylla* (Villars) O. E. Schulz, *C. kitaibelii* Becherer, *C. pentaphyllos* (L.) Crantz, *C. raphanifolia* Pourret and *C. trifolia* L. have been reported as introduced and are variously naturalized. *C. bulbifera* is easily distinguished by the large pinkish-purple flowers, scaly rhizomes and axillary bulbils. Some authors (e.g. Rose 1981) transfer *C. bulbifera* to the genus *Dentaria* L.

Cardamine bulbifera is considered to be a scarce plant in Britain (Stewart & Pearman 1991). The purpose of this paper is to document its ecology, occurrence and current status.

TAXONOMY AND VARIATION

Cardamine bulbifera shows little morphological variation. Schulz (1903) and Hegi (1958) noted a number of varieties and forms, of which only two have been noted in Britain, in addition to the typical *C. bulbifera* forma *bulbifera*. Forma *ptarmicifolia* (DC.) O. E. Schulz is distinguished by the broadly serrate teeth on the leaves; the leaflets also tend to be ovate and more asymmetrical (Fig. 1), and the plant is generally bigger and with browner bulbils. It is probably native in scattered localities through Europe to the Caucasus but appears commonest in the Alps, and has been introduced to

*Nomenclature follows Stace (1991), and Jones (1964) for *Cardamine*.

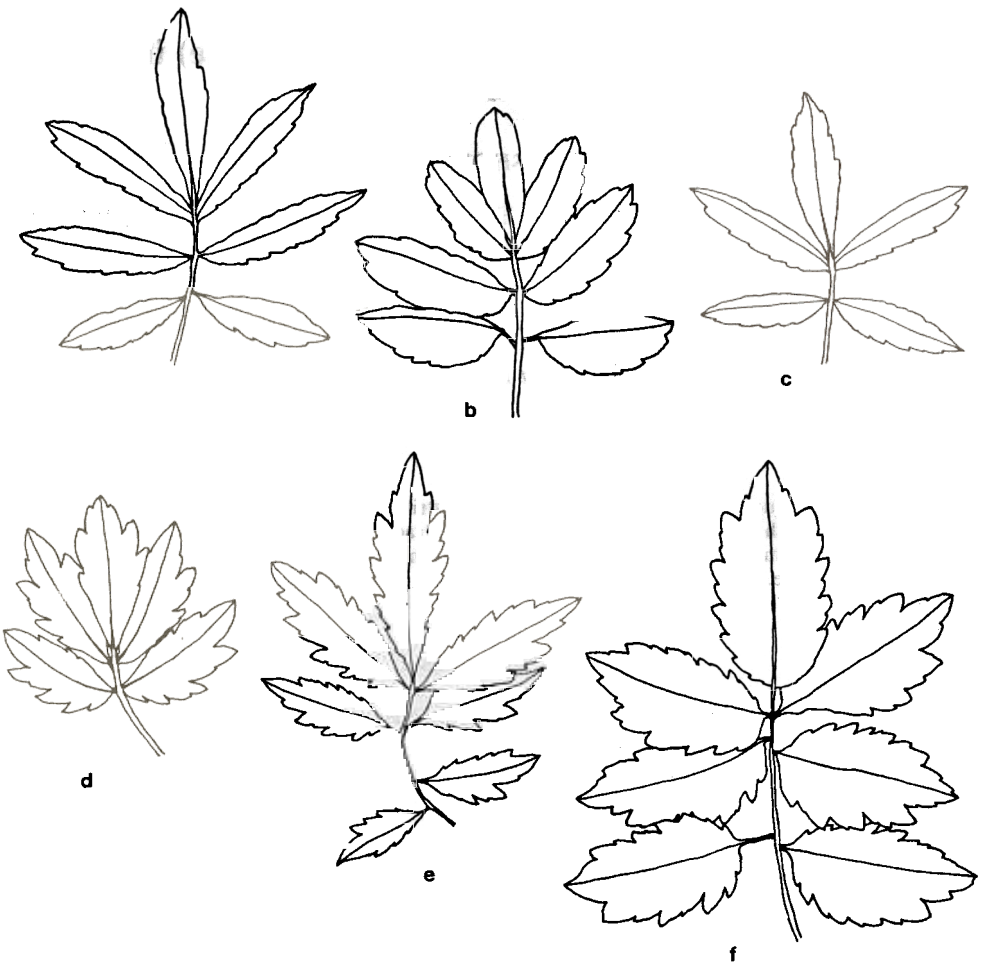

FIGURE 1. Basal leaf shapes of *Cardamine bulbifera*. a–c, forma *bulbifera* (native). a. Fennels Wood; b. Booker Common; c. Hawkhurst. d–f, forma *ptarmicifolia* (introduced). d. Silverdale; e. Trudoxhill; f. Warley Place. The scale bar is marked in cm intervals.

and naturalized in a number of localities in Britain. Forma *lactea* (Wirtgen) O. E. Schulz has white petals, and has only been cultivated in flower beds at Saville Gardens, Windsor Great Park (v.c. 17). Rich (1991) provides a description of native British material.

Examination of herbarium material of typical *C. bulbifera* show clinal variations in leaf shape across its natural distribution. The variation is most marked in basal leaves, but as these are rarely collected the variation is illustrated from middle stem leaves which are generally present on herbarium specimens (Fig. 2). Material similar in leaf shape to those of native British plants occurs in most of western Europe, specimens from Belgium being identical. Plants with broad leaves tend to occur mainly in the Alps. In Scandinavia, the leaflets tend to be longer and less toothed, and eastwards towards the Commonwealth of Independent States, the leaf shape is often narrower. In Bulgaria, Greece and Turkey, at the S.E. end of the range, the leaf margins often have pronounced teeth (but not as pronounced as in forma *ptarmicifolia*).

FIGURE 2. Clinal variation in representative middle stem leaf shapes of *Cardamine bulbifera* (distribution map redrawn from Hegi 1958). Outlying localities are shown as dots (●). The leaves are not drawn to exact scale.

REPRODUCTION AND DISPERSAL

Amongst the British flora, *C. bulbifera* is unusual in that it mainly propagates vegetatively by the axillary bulbils. The bulbils are probably reduced shoots with fleshy scale leaves (Hegi 1958), and are typically about 1 cm long, and black to dark purple. They are readily dislodged from the plant from June onwards. They fall to the ground and, after about four weeks, adventitious roots appear from the axils of the scale leaves, and then a few first leaves. In the second year, the plant produces the typical scaly rhizome with basal leaves, and in the third or fourth year, aerial shoots. Plants grown from bulbils have flowered in their third years in Britain (Ferroussat 1982). Occasionally, bulbils may start developing whilst on the plant; a plant brought to Maidstone Museum in late 1986 had some bulbils 10 cm long (E. G. Philp, pers. comm., 1989).

Many authors note that although flowering is common, *C. bulbifera* seldom produces ripe fruit or viable seed. Schulz (1903) had only seen fruiting specimens five times, and noted that they were all from near the coast, and that where it did fruit, bulbils were less numerous or not formed at all. This latter observation does not appear to apply to British material, fruiting plants regularly having bulbils. Hegi (1958) noted that fruit is only set under special conditions, usually in areas with high humidity and fresh limestone soils. These observations appear to be based on only a limited selection of material; examination of specimens at **K** and **BM** suggests that fruit set becomes more frequent at the south east end of the range, and in Turkey, some populations reproduce solely from fruit, lacking bulbils altogether. Reproduction by bulbils, does, however, seem to be the norm in Western Europe, and there may be a trade-off between fruit set and bulbil production – if the latter are stripped off the plant, fruit set is apparently more likely (Hegi 1958).

In the field in Britain, at least, it is generally not difficult to find a few fruits. Fruits are always borne on the larger plants (typically 22–25 cm tall, compared to the normal average of 19–21 cm).

whose stems and foliage remain green and fresh until the seeds are shed. Thus if a patch of flowering plants is revisited in June, there may be one or two fruits maturing on a small proportion of the plants, whereas on the remainder, the small green ovaries which showed some initial development will have dropped off and the plants will have started to die back. In July, when the fruits are ripe (though green) the seeds may be scattered a considerable distance when the siliquae dehisce explosively (as in some other species of *Cardamine*) (Showler 1988). These seeds can be germinated successfully, and plants grown from seed may flower in their third year (Ferroussat 1982). Fruit set appears to have been unaffected by the opening up of the tree canopy by the great storms of 1987 in Britain (C. I. Pogson, pers. comm., 1988).

None-the-less, the sexual reproductive performance of the plant is well below its potential. The plants flower for only a very short period of time in late spring, and Clapham (Clapham *et al.* 1987) reports that they are rarely visited by insects. B. (1866) notes that the flowers have a faint, sweet scent. Ferroussat (1982) noted that plants at Old Park Wood were pollinated by Orange-tip (*Anthocharis cardamines* L.) and Green-veined White (*Pieris napi* L.) butterflies, together with the Raspberry Beetle (*Byturus tomentosus* Degeer (*B. urbanus* Lindemann)) and flies. Occasional visits of beetles and flies have been seen during the current survey, though it is not known if these were pollinators. Often only a small proportion of the plants flower, many reproducing solely by bulbils. The flowers may require cross-pollination (many crucifers have well-developed self-incompatibility systems) to produce seed. Some stamens and ovaries may have retarded development (Hegi 1958), pollen grains may degenerate, and some ovules do not develop at all. There is no support for the observation of Deakin (1871) that the flowers "are often imperfect". The species is a high polyploid with 2n=96 (duodecaploid) (Clapham *et al.* 1987), and the reduced fertility may also involve abnormal chromosome behaviour. Hegi (1958) points out that such reductions in fertility are often associated with taxa of hybrid origin, but there is no evidence to suggest this in *C. bulbifera*.

Cardamine bulbifera spreads vegetatively by creeping rhizomes and often forms patches.

Bulbils (and seed) may be dispersed naturally in a number of ways. Hegi (1958) reports that bulbils are often carried by ants in continental Europe, but this has not been observed in Britain. Many localities in Kent and Sussex are on, or close to, river banks and ditches, suggesting that dispersal by water may occur; Rose (1966) suggested that this may govern its micro-distribution in the Weald. Bulbils may also be transported by wheels, hooves or muddy boots; the majority of localities in the Chilterns and close by (v.cc. 20, 21 and 24) are alongside footpaths, though this could also reflect other ecological factors. It is also possible that small mammals play some part in distribution, but this has not yet been noted.

Whatever the mechanism, dispersal is obviously a limiting factor of distribution. Plants are often locally abundant but absent from apparently suitable sites nearby. On a wider scale, the distribution is often irregular and disjunct, and there are many gaps between populations (e.g. Hegi 1958). The plant does not appear currently to be limited climatically in Britain; it survives well in many introduced localities outside its native range, often persisting for long periods of time and spreading, as at Glenbervie (v.c. 91), where, since 1934 or before, it has colonised many parts of the extensive grounds and now forms a very large population.

HABITATS

In South East England, *C. bulbifera* is associated with two distinct types of woodland; first, the wet, generally acidic woodlands of the High Weald in Kent and Sussex, and second, the Chiltern Beech woods which are drier with basic soils. These two types are referred to subsequently as the High Weald and Chiltern.

The High Weald woodlands occur on both sides of the Kent-East Sussex border. They are for the most part ancient woodlands, often now broken into quite small areas, called 'shaws' or 'rews' – thin strips of woodland left between fields (Whitebread *et al.* 1989a, b). They have survived clearance primarily due to the presence of the many small, steep-sided streams or gills, which make the land unsuitable for agriculture. The soil is generally acidic to neutral (the soil pH ranged from 5 to 7) and clayey, and the tree canopy is predominantly *Quercus robur* L., *Fraxinus excelsior* L. and *Carpinus*

betulus L. (Table 1). In the shrub layer, *Corylus avellana* L. is common, often with much *Crataegus laevigata* (Poiret) DC. The herb layer is usually very dense with many spring flowers such as *Hyacinthoides non-scripta* (L.) Chouard ex Rothm., *Mercurialis perennis* L., *Ranunculus ficaria* L., *Lamiastrum galeobdolon* (L.) Ehrend. & Polatschek and *Allium ursinum* L. *Carex pendula* Hudson is common in the damper places, and it is here especially that *C. bulbifera* is to be found, most frequently on the lower levels of the gills. It is often easiest to find the plant by walking up the stream beds, but even then the plants may not be easy to spot as in dappled sunlight small patches can be easily overlooked amongst *H. non-scripta* and other species of a similar height, and they are often very localised. For instance, by the Kent Ditch (a small stream marking the Kent-Sussex border for much of its length), *C. bulbifera* can occur on one bank but not the other 50 cm away. Many populations only have 15–20 flowering plants, usually, though not always, with juveniles, all occurring within a radius of 2–3 m. Plants are not always restricted to stream banks, and may be found nearby in damp, shaded areas of woodland. At a number of stations colonies are found on damp, sloping road verges, though these are often associated with ditches or water seepage.

Almost all the Kent and East Sussex sites are on Weald Clay or Wadhurst Clay and are of the High Weald habitat, as are the native sites in Surrey (two now destroyed) and those in the eastern part of West Sussex. However, at Harting (v.c. 13) (where the plants are probably introduced), High Rocks (v.c. 16) and Hawkenbury (v.c. 16), the plants are found on sandy soils. The single plant found near Brown's Wood (v.c. 14) is from a sandy road verge.

In contrast to the High Weald habitat, the Chiltern woodlands where *C. bulbifera* is also found are typically with a canopy of *Fagus sylvatica* L., often with some *Prunus avium* (L.) L. and *Fraxinus excelsior*, an understorey of *Corylus avellana* and *Ilex aquifolium* L., and a sparse herb layer (Table 1). The woodlands are relatively dry and on slopes, though aspect appears unimportant. The soil is generally a very thin layer of clay with flints over chalk; the pH of the soil around the roots of the plant ranges from about pH 6·0 to 7·5, and often there is a considerable amount of leaf litter. Hughes (1988) and Robinson (1988) acknowledge that *C. bulbifera* is a plant of ancient woodland and almost without exception, these woodlands are classified as such (Table 2). The herb layer confirms this, typically consisting of sparse *Mercurialis perennis*, *Rubus* spp., *Hedera helix* L., *Galium odoratum* (L.) Scop., *Arum maculatum* L. and *Lamiastrum galeobdolon*. *Hyacinthoides non-scripta* is often absent reflecting its preference for the more acidic soils, and *Carex pendula*, a common associate in the High Weald, is totally absent.

Cardamine bulbifera can be found in such Chiltern woodlands in Buckinghamshire, Hertfordshire and Middlesex, generally in small patches or strips along the edges of footpaths or close to them. The sparse ground layer and gently sloping terrain makes the plants more conspicuous than in the High Weald woodlands. Again there are frequently only 20–30 flowering plants (though 100–150 is not uncommon), but the number of juveniles ranges from very few to several thousand. The plants will grow through a thin covering of *Mercurialis perennis*, *Rubus* spp., or *Hedera helix*, and sometimes *C. bulbifera* grows in open areas where leaf litter has blown clear, usually as a tight patch. There are only two Chiltern sites on road verges, but this may be because wooded verges are much less common in the Chilterns than the Weald. There is no association with water, and only two Chiltern sites are anywhere near water courses and one of these is man-made.

The plants in Staffordshire in the ancient Needwood Forest are found in a habitat which approximates to the Chiltern type, but are on flat land and on Keuper marl, not chalk.

Plants can often be found in replanted ancient woodland, provided that there has not been too much disturbance to the soil and ground layer. They are able to survive in deciduous woodlands, but are lost under dense conifer shade. Trimen (1862) noted that in Sussex "it appears to like copses recently cleared of underwood".

Elsewhere in Europe, *C. bulbifera* also occurs in a similar range of acidic and basic woodlands (e.g. Keller 1988), though most authors only note that it is characteristic of base-rich Beech woods. Hartmann (cited in Hegi 1958) suggests that in the more continental areas it prefers damper soils, and at lower altitudes, base-rich soils. In Southern Europe, it only occurs in the mountains, and often on north-facing slopes.

Table 2 classifies the known stations by woodland type as identified in the N.C.C. Inventories of Ancient Woodland (Hughes 1988; Robinson 1988; Whitebread *et al.* 1989a, b; Hutton 1990) for each vice-county. It should be borne in mind that areas of less than two hectares are excluded from these inventories so that some small sites are not classified.

TABLE 1. VASCULAR PLANT SPECIES RECORDED WITHIN 2 M OF *CARDAMINE BULBIFERA* IN THE HIGH WEALD AND CHILTERN HABITATS
Only species occurring in 15% or more of either site are included; a further 56 species were also noted at lower frequencies.

Species	Recorded in % of sites	
	HIGH WEALD* (n = 27)	CHILTERNS (n = 57)
Acer pseudoplatanus	15	12
Alnus glutinosa	19	[illegible]
Carpinus betulus	52	
Corylus avellana	48	25
Crataegus laevigata	22	0
Fagus sylvatica	11	74
Fraxinus excelsior	26	33
Ilex aquifolium	7	21
Prunus avium	0	16
Quercus spp.	26	[illegible]
Allium ursinum	19	2
Arum maculatum	4	30
Carex pendula	30	0
Circaea lutetiana	15	5
Galium aparine	41	19
Galium odoratum	7	33
Geranium robertianum	15	7
Hedera helix	70	37
Heracleum sphondylium	15	2
Hyacinthoides non-scripta	30	30
Lamiastrum galeobdolon	26	21
Melica uniflora	7	24
Mercurialis perennis	45	58
Ranunculus ficaria	19	11
Rubus spp.	74	69
Urtica dioica	19	16

excluding High Rocks.

DISTRIBUTION

In Britain, *Cardamine bulbifera* is currently known as a native species in Sussex (v.cc. 13 and 14), Kent (v.cc. 15 and 16), Surrey (v.c. 17), Hertfordshire (v.c. 20), Middlesex (v.c. 21), Buckinghamshire (v.c. 24) and probably Staffordshire (v.c. 39) (Fig. 3). It has not been recorded in its sole Berkshire (v.c. 22) locality since 1944.

In view of their isolation from the other sites in South East England, and the regularity with which the plant is introduced, the Staffordshire sites must be viewed with caution. The first record from Pendeford (Pitt 1796) was unusual in that it occurred in "hedge sides on this farm"; however, Pitt's list also included other species of old hedgerows (e.g. *Rhamnus cathartica* L., *Frangula alnus* Miller) and is packed with detailed, careful botanical observations and there is no obvious reason to reject the record. There are at least three localities around Needwood Forest, which have sometimes been suggested to be introduced (Edees 1972), and there is an undoubted introduction at Trentham. Edees (1972), whilst quoting it as "rare and of doubtful status" accepts Pendeford and Blithfield as native localities. D. P. Earl (pers. comm, 1987) notes that colonies he has seen recently "look native on the Keuper Marl" but also points out that none of these are far from houses and two are close to a road or track, suggesting that they may have originally been planted. The evidence from Chiltern populations, also associated with tracks, suggests that this need not necessarily be so, but 'looking native' is not always a good guide to status either (Webb 1985). As the early dates of recording lend

TABLE 2. ASSOCIATION OF NATIVE POPULATIONS OF *CARDAMINE BULBIFERA* WITH ANCIENT WOODLANDS AS CLASSIFIED IN THE N.C.C. INVENTORIES OF ANCIENT WOODLAND

Vice-county	No. sites	Ancient woodland		Other habitats*
		Semi-natural	Replanted	
	8	4		3
	33	19		10
	3	3		–
	19	12		1
	1	–		
	12	7		5
	2	2		–
	56	38		5
	2	–		–
Total	136	85 (62%)	27 (20%)	24 (18%)

* includes sites too small (less than 2 ha) to classify.

support to its native status, and as the plant also occurs in disjunct localities elsewhere in Europe, we currently accept the Needwood Forest plants as native.

Elsewhere in the British Isles, the plant has been introduced. It is often grown in gardens, perhaps as an unusual plant – it is certainly a pretty, early-flowering plant which can tolerate dense shade, though there are many other species with these attributes which flower for longer periods of time. Clear evidence is hard to come by, but *C. bulbifera* appears to have been cultivated in large gardens for many years (e.g. B. 1866). Once established, it can often increase rapidly and become almost a weed, as at Uffculme (v.c. 3), and at Knightshayes Court (v.c. 4) and Cliveden (v.c. 24) where it appears sporadically in flower beds. Escapes to adjacent verges or woodland, as at Bath (v.c. 6), Wellingore Hall Park (v.c. 53) and Silverdale (v.c. 60), are not uncommon, and it may persist for long periods of time. There are also many scattered records for introduced plants from the 1920s and 1930s, where it can no longer be found. Bulbils are easily collected, and the flourishing colony at Trentham (v.c. 39) may well have originated from the plants at Yoxall, and the casuals in v.c. 95 could have come from Glenbervie, not many kilometres away. Interestingly, the majority of West Country introductions are of forma *ptarmicifolia* suggesting a common origin. It would certainly be instructive to learn more of the history of the known introductions.

The plant has also been recorded as introduced to some localities in Germany (Hegi 1958).

RECORDS

Records have been collated from national and county Floras, journals, correspondence with the B.S.B.I. vice-county Recorders and numerous other botanists, and from the following herbaria: **BEL**, **BM**, **DBN**, **K**, **OXF**, **LANC**, **RNG**, **TCD** and **YRK**. Full details, including population forms, are lodged at the Biological Records Centre, Monks Wood.

In the following list of localities, vice-counties or sites where the plant is introduced are marked with an asterisk (*). The records are given in order of vice-county, 10-km square, and tetrad (tetrad nomenclature follows Ellis 1986). Exact grid references are given where known for extinct or unvisited sites. The names for modern sites are largely those on the First or Second Series 1:25,000 or 1:50,000 Ordnance Survey maps. An estimate of the total number of plants is given for most sites (sometimes only as the number of flowering plants counted). All undated sites have been visited recently between 1987 and 1992 by A.J.S., often with help from co-workers, unless otherwise stated. Sites where we have seen material of forma *ptarmicifolia* are noted.

**V.c. 3, S. Devon*: Bere Ferrers (SX/4.6L), 1916, C. W. Bracken (Martin & Fraser 1939), presumed

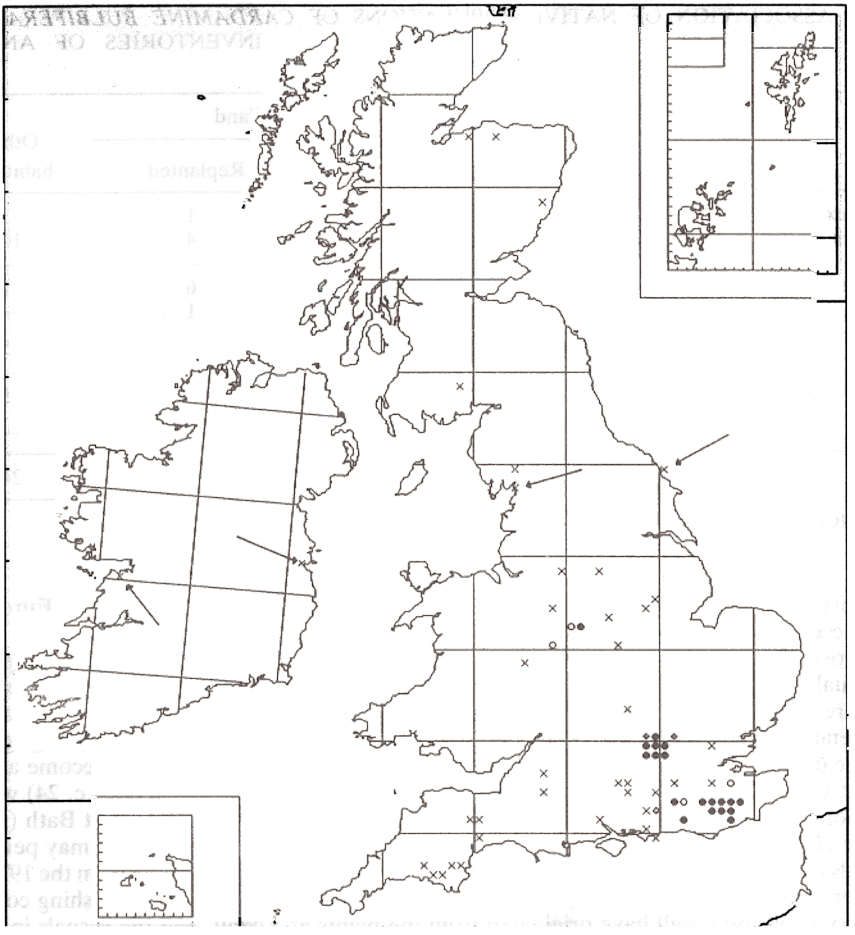

FIGURE 3. Current 10-km square distribution of *Cardamine bulbifera* in Britain and Ireland. ● native 1987 onwards, ○ native pre-1987, × introduction (all dates), ◇ record of uncertain status.

extinct. Plymstock (SX/5.5B), Plympton (SX/5.5N) and Harford (SX/6.5J), 1913, H. W. Smith (Martin & Fraser 1939), presumed extinct. Dartington Hall (SX/7.6W), woodland area of garden, C. Smith. Torbryan Plantation (SX/8.6I), "introduced by Mr Ogilvie and now spreading" (Martin & Fraser 1939), presumed extinct. Venn Ottery (SY/0.9R), over 800 plants, shaded lane verge, escaped from adjoining garden, W. Tucker (forma *ptarmicifolia*). Uffculme (ST/0.1R), garden of Yondercott House, thousands of plants over 0·25 hectare, in thin, damp woodland, Miss R. G. Laidlaw.

**V.c. 4, N. Devon*: Sherwill (SX/7.6), 1884, Wainwright (Martin & Fraser 1939). Knightshayes Court, National Trust (SS/9.1S), gardens by house, Miss R. G. Laidlaw (forma *ptarmicifolia*).

**V.c. 6, N. Somerset*: Millards Hill, Trudoxhill (ST/7.4L), in shrubbery and roadsides, escaped from Millards Hill House, P. Green & R. G. B. Roe (forma *ptarmicifolia*). Smallcombe Wood, Bath (ST/7.6S), scattered throughout but more frequent near ruins of adjacent garden, R. Randall & R. G. B. Roe (forma *ptarmicifolia*). Prior Park, Bath (ST/7.6), at one time abundant, destroyed by building work (Murray 1896). Batheaston (ST/7.6Z), about 500 plants, shaded track behind houses, probably dumped from garden, D. E. Green & R. G. B. Roe (forma *ptarmicifolia*).

**V.c. 11, S. Hants.*: Millbrook (SU/3.1W), J. F. Rayner (1915); presumed extinct.

**V.c. 12, N. Hants.*: Long since disappeared from East Ockley House (SU/5.5Q), D. H. Scott. Small copse near Preston Candover (SU/6.4), 1879, H. R. P. Fitzgerald, and Basingstoke (SU/6.5), 1916, G. W. Willis (Townsend 1904; Rayner 1929).

V.c. 13, W. Sussex: *Hotham Park, Bognor (SZ/9.9J), garden of former Bognor Museum, now demolished (H. W. Matcham teste M. Briggs). *Hunstan Copse (SU/8.0, R/Q), H. L. F. Guermonprez, ancient wood; searched for recently without success by N. J. H. Sturt, and probably last seen in the 1940s by F. Rose (pers. comm. to Mrs M. Briggs, 1987). *Harting Combe (SU/8.2C), one large clump, road side in Beech wood. A record for SU/8.2D (Hall 1980) is probably an error for this site. Half-way between Midhurst and Petworth (SU/9.2); this record, cited in Arnold (1907) and Wolley-Dod (1937), is based on a specimen said to be in **herb. Borrer**, which cannot be traced at **K**. Although the area is suitable, there are no other records and this site must be treated with caution. Warnham (TQ/1.3), "small copses in the parish", 25 April 1862, H. Trimen (Trimen 1862); exact site not traced, and presumed extinct. Langhurst Copse (TQ/1.3S), wooded verge south of, 2000+ plants. Tickfold Gill (TQ/1.3T), by stream in wood, 29 plants ("hundreds" were reported for this site in 1987, F. Rose *et al.* (pers. comm. to M. Briggs, 1987) so possibly overlooked). Nuns Wood (TQ/1.3, X and Y), a few plants in the woodland at the southern end, Mrs M. Briggs, 1961, and very sparse in western stream gulley in 1988. Great Benhams (TQ/1.3Y), north of, about 200 plants, shaded bank of Boldings Brook by bridge; this site is declining due to invasion by *Heracleum mantegazzianum* (A. Knapp, pers. comm., 1992). Horsegills Wood, Rusper (TQ/1.3Y), wet woodland, 600+ plants, Mrs M. Briggs, 10 May 1991. Terry's Cross (TQ/2.1H), 500 plants in hedge. (The record for TQ/2.2M (Briggs 1990) is an error.) Faygate (TQ/2.3), near, C. E. Salmon (Wolley-Dod 1937), probably extinct. There is a 40-column record card held at B.R.C. with details "Rusper, 11 June 1957, Collyers School Herbarium" which has the grid reference "TQ/20–.32–". As this grid reference refers to Roffey, Horsham, about 5 km south of Rusper, and *C. bulbifera* is known near Rusper in TQ/1.3, this record is dubious. Unfortunately, the Collyers School Herbarium cannot now be traced (Kent & Allen 1984) and it is impossible to check if the grid reference was correctly transcribed, or was added later to the B.R.C. card.

V.c. 14, E. Sussex: Withyham (TQ/4.3X), 140 plants in wood by Hewkins Bridge and also in churchyard, Miss E. J. Rich, 1992. Mayfield, Lawyers Wood (TQ/5.2T), Miss E. J. Rich, 6 July 1987; fruiting plants seen in 1992. Highreede Wood, Mayfield (TQ/5.2), J. Goodyer 1634; exact site not traced (Wolley-Dod 1937). Old Place Farm (TQ/5.2Y), one plant, E. side of road, Mrs P. Donovan, 1992, and roadside copse, Miss E. J. Rich, fruiting in 1992. Coggins Mill, by bridge (TQ/5.2Y), Miss E. J. Rich, 1992. Heronry Wood (TQ/5.2Z), 15 plants, wet muddy area close to entrance of wood near stream. P. C. Hall noted it as abundant in this wood when he was recording for the *Sussex plant atlas* (pers. comm., 1991) so possibly some colonies were overlooked. Furnace Wood (TQ/5.2Z), 6 m long patch on east verge of lane, Mrs P. Donovan, 1992. Banky Wood (TQ/5.2Z), four scattered groups in wet woodland, some on stream bank. TQ/5.3N, Hall (1980), further details not traced. Houndsell Place (TQ/5.3V), in 'wild garden' (wood), P. C. Hall, 26 April 1970. Mark Cross (TQ/5.3), in a hedge by the road side about a mile (1.5 km) from (Deakin 1871); presumed extinct. Great Wood (TQ/5.3X), P. C. Hall, 31 May 1969. Coggins Mill, (TQ/6.2D) stream bank 200 m east of, Miss E. J. Rich, 1992. Tidebrook (TQ/6.2E), large numbers of plants along 50–100 m length of road verge in woodland, and 20 flowering plants in damp, shady woodland to north. Mousehall (TQ/6.2E), 110 plants in lane east of Mill, and two in garden of Mousehall Cottage on old dam embankment, Mrs E. Gibb, 1992. Sharnden (TQ/6.2E), about 40 plants, wet woodland. Hawksden Park Wood, west of Hare Holt (TQ/6.2I), about 15 plants in hedgebank and ditch. Foxholes Wood (TQ/6.2G), J. Goodyer, 1634; not seen subsequently (Wolley-Dod 1937). TQ/6.2K, Hall (1980), exact site not recalled, possibly Cox's Mill (pers. comm., P. C. Hall, 1991). Burwash Weald (TQ/6.2L), three sites: steep bank near Mousehole Farm, 325 plants; Willingford bridge, 25 flowering plants on steep woodland stream bank and then clumps along the north bank of the R. Dudwell for about 1·5 km S.W. of bridge (F. R. Philps, pers. comm., 1987); Blackbrooks, about 100 scattered, flowering plants in wood. Coalpit Wood and Wet Wood (TQ/6.2M), about 500 plants in damp woodland. Wood N.W. of Stonegate Station (TQ/6.2, N & T), about 100 plants in damp Hornbeam wood. Rye Green Farm (TQ/6.2R), two sites: woodland west of farm with about 100 scattered, flowering plants; Bog Wood, 100 flowering plants on south bank, 60 on north bank. Bateman's (TQ/6.2R), 140 plants

flowering along 25 m of dense hedge, and 500 plants in copse to north. Fonthill Farm (TQ/6.2W), farm track, 60 plants. Copse between Boarders Farm and Dudwell House (TQ/6.2X), P. C. & J. F. Hall, 31 March 1968; site now destroyed. Shoyswell Wood (TQ/6.2, ?Y/Z), Mrs M. Warren, 1972 (there is some doubt about the exact location of this site as the original grid reference was given as TQ/688.261). Burgham (TQ/699.284Z), un-named wood N.W. of, Mrs M. Warren, 1972. Wardsbrook Farm (TQ/6.2Z), about 500 plants in wood by stream. Singehurst Farm (TQ/6.2Z), neglected, small, swampy wood S.E. of, probably only a few plants, Mrs L. B. Burt, 1984; not seen in 1989 but probably overlooked. Rivenhall (TQ/6.3B), large patch (5 m long) on road verge with a few plants in ditch behind, Mrs M. Vincent-Smith, 1992. Brown's Wood, road verge opposite Coker's Down (TQ/6.3D), one flowering plant. (The record for TQ/6.3E in Briggs (1990) refers to High Wood, v.c. 16.) Brown's Wood, near Sunninglye Farm (TQ/6.3J), with 180 plants on verge in hedge, 30 flowering plants on verge in edge of wood, and 215 plants in wood. Sluice Wood (TQ/6.3M), thinly scattered on stream bank in dense woodland, mostly on north side of stream, one large patch on south side of stream. Win Bridge (TQ/6.3M), 30+ flowering plants in small copse by administrative county (but not v.c.) boundary (presumably same site as Bayham Abbey (Arnold 1907, etc.)). Floshet Wood (TQ/6.3N), nine plants in wood by stream; this site is in the administrative county of Kent. Park Wood, near Sidley Green (TQ/7.1, F/K), H. J. Sargent (Wolley-Dod 1937); not seen recently. Goldspur Wood (TQ/7.1J), one very large clump. Hollington Wood (TQ/7.1V), *A. H. Simpson*, 1918 (**K**); now apparently built on, though recorded for this tetrad in Hall (1980). Beauport Park (TQ/7.1, ?W/X) (Wolley-Dod 1937); this site is now a caravan park and the plant is presumed extinct. Bluemans (TQ/7.1X), wet, shady woodland, with 50 flowering plants (many fruiting). Brookside Farm, wood (TQ/7.2C), 10+ plants on edge of recent woodland/verge. Fleet Wood (TQ/7.2D), about 40 flowering plants on edges of muddy bridleway in damp, shady conditions. Little Boarzell, Swiftsden House (TQ/7.2, E & J), about 120 flowering plants (and more vegetative) mainly in the wild garden but also on verge. Wood between Mountfield and Robertsbridge (TQ/7.2, F/G), 1944, Miss Hanson (Peatfield 1944). Etchingham, Gigmore Wood (TQ/7.2H), 20 plants in ancient woodland. Peagle Wood (TQ/7.2J), 85 plants in wood on Sussex side of Kent Ditch, and damp woodland close to road in adjacent tetrad (TQ/7.2P), about 3000 plants, many flowering. Copse in fork of A265 and minor road to Merriments Shaw (TQ/753.284J), P. C. Hall, 8 May 1970; wood cleared and plant extinct by 1988. TQ/7.2M, Hall (1980), further details not traced. Merriments Shaw (TQ/7.2P), several patches with over 400 flowering and many vegetative plants in ancient woodland on Sussex side of Kent Ditch. Crossroads Farm (TQ/7.2P), about 200 plants in wood by A229 on Sussex side of Kent Ditch, and about 75 plants in wood 300 m south west of cross-roads. Terrace Wood (TQ/7.2, S/T), about 200 plants on both sides of A229, plus one by stream. Bodiam Wood (TQ/7.2T), one large patch near wet hollow. Records from "about Hastings" presumably refer to sites at Hollington, Beauport Park and Bluemans (Peatfield 1943), and there are no localised sites in TQ/8.1.

V.c. 15, E. Kent: Holman's Wood (TQ/777.287U), woodland with wet gills, F. Rose; not seen 1991, but probably still present. Kitchenham Farm (TQ/7.2Y), wood by Kent Ditch, E. G. Philp, sometime between 1971 and 1980. Detling, Maidstone (TQ/7.5), *A. D. Melvin*, 21 June 1867 (**BEL**); this is a surprising record. N.E. of Hawkhurst (TQ/763.313Q), last seen 1950s (E. G. Philp, pers. comm., 1991). Rolvenden, wood east of Halden Lane Farm (TQ/8.3L), 50+ flowering and many vegetative plants. Little Halden (TQ/8.3L), 17 flowering plants on steep north facing bank by stream near ancient woodland, plus one downstream; this is probably the same general locality as Little Oven Wood (Hanbury & Marshall 1899). Little Halden (TQ/861.326R), *F. Rose*, 1949 (**MNE**), site now destroyed .

V.c. 16, W. Kent: TQ/5.3P, Philp (1982), likely to be near High Rocks, but further details not known. High Rocks, Tunbridge Wells (TQ/5.3U), one large dense patch by railway with about 2400 plants, and two smaller patches to west with 250 plants; about 100 plants in scattered colonies on dry sandstone ridges and rocks at eastern end of rocks; more plants north of rocks by stream. Hungershall Park, Tunbridge Wells (TQ/5.3U), 300 flowering plants in dry woodland, presumably the same locality as Tunbridge Wells Common, K. E. Bull (Wallace 1954). Mount Sion (TQ/5.3Z), in a wood (Forster 1816); probably built on. *Platt (TQ/616.562), D. McClintock, c. 1960, patch in woodland and in a hedge nearby, probably escaped from garden. Palmers Farm, wood (TQ/6.3E), about 100 flowering and more vegetative plants in ancient

woodland. High Wood (TQ/6.3E), scattered plants in five areas, with 60 flowering plants on verge, 100 in cleared strip, and 100 in woodland, and 300 plants on dry sandy trackside in ancient woodland, and 130 in deep grass on cleared edge of wood. Mouseden (TQ/6.3E), on stream banks in fragments of ancient woodland, three groups with 17, 12 and 75 plants, extending into tetrad J. Pembury, wood east of Larkfield Hall (TQ/6.3J), twelve plants by stream. N.W. of Lamberhurst (TQ/661.377T), E. G. Philp, last seen about 1957, not refound, area spoiled by pheasant management. TQ/7.2J, Philp (1982), further details not traced. Kent Bridge Farm (TQ/7.2P), two sites: 1120 plants on bank of ditch in wood; 40+ plants on shaded road verge to north. Winch's Plantation (TQ/7.2P), 80 flowering plants in ancient woodland, well above stream level. Peagle Wood (TQ/7.2P), a few plants on Kent side of Kent Ditch. Merriments Shaw (TQ/7.2P), several plants on Kent side of Kent Ditch (see also v.c. 14). Goudhurst (TQ/708.374D), near A262 west of, F. Rose, last seen 1950s; site now destroyed. Little Pix Hall Farm (TQ/7.3F), wood north of, only two flowering plants seen, possibly more present. Furnace Wood (TQ/7.3H), south side, one dense patch with 30 flowering plants and a few stragglers in woodland by track. Wet Wood (TQ/7.3H), several plants near stream in replanted, wet ancient woodland; extinct at another site at TQ/733.358. N of Hawkhurst, (TQ/757.313K), last seen 1950s (E. G. Philp, pers. comm., 1991); possibly same as Highgate (Hanbury & Marshall 1899). Hedgingford Wood (TQ/7.3M), two sites; north side, two patches in woodland near stream, one with 600, the other to south with 650 flowering plants, and N.E. corner, 23 plants by stream in Hornbeam wood. Hartley, Forestry Commission wood (TQ/7.3M) west of, 42 plants on edge of ride just clear of conifers, an old site to east has been lost due to conifer planting. Another site at TQ/750.384M has disappeared under conifers.

V.c. 17, Surrey: *Hog's Back (TQ/0.5), demesne of 'Greyfriars', south-facing Beech wood, one patch, J. R. Akeroyd, May 1968. *Box Hill (TQ/1.5Q), by the River Mole, Miss B. M. C. Morgan, 1966, probably planted (Lousley 1976). About 250 plants seen in 1989, though few were flowering. Grove Copse (TQ/1.3T), many plants in 1949, only one visible in 1966, D. P. Young. Timber Gill (TQ/1.3T), about 100 plants in wooded ravine. Lower Gages Farm, ravine of Fylls Brook (TQ/184.378Y), numerous small plants seen on edge of stream, Surrey Flora Committee meeting, 1967; extinct by 1989 (and probably long before) due to activities of pigs. In deep ravine near Garrett Farm, Ockley (TQ/1.3; precise farm not traced), both on Sussex and Surrey banks, *E. Straker*, 15 May 1880 (**BM**); presumed different from above sites and now extinct. (The record for Waddington (Brewer 1863) is an error for *Lathraea squamaria* (Salmon 1931).)

**V.c. 18, S. Essex*: Warley Place (TQ/5.9V), still to be found in 1992 after 55 years in the derelict garden of A. E. Wilmott's home, where it was introduced (forma *ptarmicifolia*), D. C. Bloomfield (Jermyn 1974).

V.c. 20, Herts.: Baldwins Wood (TQ/0.9E), L. J. Stearn, pre-1967; not seen 1989–1991 but possibly overlooked. Bottom Wood (TQ/0.9G), one patch with 15 flowering stems. Chorleywood, Great Greenhills Wood, west of M25 (TQ/0.9H), 200 plants (see also tetrad M). Chorleywood, west of Dell Farm (TQ/0.9I), thousands of plants; also E.N.E. of Dell Farm, over 2000+ plants on south and west side of wood. *Chorleywood Common (TQ/0.9I), 640 plants in secondary woodland N.E. of pond; probably introduced. Bullscroft Spring (TQ/0.9I), patch about 4 m^2, G. Salisbury & J. Saunders, 1990. Sarrattmill Bridge, N.W. of (TQ/0.9J), 250 flowering plants in thin strip of woodland. Limeshill Wood (TQ/0.9J), "a scattering of plants amongst *Hyacinthoides* on a steep bank", G. Salisbury, 1991. Hanging Lane Wood (TQ/0.9J), over 2000 plants widespread in woodland. Springwell, Garrett Wood (= High Wood near Rickmansworth (Webb & Coleman 1849)) (TQ/0.9L), numerous plants remaining in Beech wood, though half of the wood (mainly the Middlesex part, where it was once abundant) has been lost to a quarry. Chorleywood, Great Greenhills Wood east of M25 (TQ/0.9M), 3000–4000 in west half, and many thousands in the east half, one of the largest, continuously covered areas seen. Beechengrove Wood (TQ/0.9N), "masses over quite a large area", G. Salisbury, 1991. Loudwater (TQ/0.9N), road verge bordering large house, 150 plants possibly relict from Loudwater Wood (Webb & Coleman 1849), and possibly the same as "larch plantation above Loudwater to the north, but adjoining the road from Croxley Green to Solesbridge" (Jackson 1887). Another Jackson (1887) record "in a wood a little further towards Solesbridge Wood" probably refers to Long Spring (TQ/052.970N) (T. J. James, pers. comm., 1991). Scrubbs Wood (TQ/0.9, N/P), L. J. Stearn, presence now doubtful, and probably the same locality as Blunt Wood, 20 April 1947, R. A. Graham, also not seen

recently. Sawpit Spring (TQ/059.982P), P. J. Ellinson, 1992; a small wood mostly destroyed during construction of the M25. Harrocks Wood (TQ/0.9T), 400 plants in scattered colonies. Assumed to be the same site as "wood at Red Heath", Mrs E. Shute (Webb & Coleman 1849). Whippendell Wood (TQ/0.9T), many, mostly small, scattered colonies (including Rousebarn Lane, P. J. Ellison), over 3000 plants. Lees Wood (TQ/0.9U), S. & P. Blackmore, 2 June 1978. A B.R.C. 40-column record card from "wood opposite Chandlers Cross, May 1922, P. W. Richards" (**NMW**), presumably referring to Harrocks Wood or Whippendell Wood, was allocated the grid reference TL/0.0 for the B.S.B.I. Maps Scheme (Perring & Walters 1962) rather than TQ/0.9; this appears to be an error and there are no other records for TL/0.0. There is also a record for "Brickett Wood, West Watford" (**OXF**). Bricket Wood (TL/1.0F) was in the 19th century an ancient wood (now the Building Research Station) and could conceivably have supported the species as it was species-rich, calcareous and damp, but there are no other records for this site (T. J. James, pers. comm., 1991).

V.c. 21, Middlesex: Harefield Church (TQ/0.8P), wood east of, many plants in ancient mixed woodland. Park Wood (TQ/0.9K), 100+ plants along west end of footpath in ancient wood. Jacks Lock (TQ/0.9K), copse N.E. of, last seen by R. M. Hamilton in 1972 who described it as "abundant"; wood now over-grown and not refound in 1989. Springwell, Garrett Wood (TQ/0.9L); see v.c. 20.

V.c. 22, Berks.: Last recorded in Park Wood, Bisham (SU/8.8M) (presumably same as Bisham Wood; Druce 1926), 29 April 1944, A. J. M. Bailey. A specimen in **RNG** labelled "Newbury, *C. Grant*, 1966", has a grid reference referring to the University Campus in Reading.

V.c. 23, Oxon: Recorded from Oakley Hill, near Chinnor (SU/7.9P) but probably in error (R. Fitter, pers. comm., 1990).

V.c. 24, Bucks.: Bloom Wood (SU/8.8U), about 3000 plants in ancient woodland. Horton Wood (SU/8.8U), thousands of plants in ancient Beech wood. Warren Wood (SU/871.899U), no other details available. *Cliveden, National Trust (SU/9.8C), in the gardens near the pond. Booker Common and Spring Coppice (SU/8.9F), a large population with about 800 plants flowering in ancient Beech wood. Yewtree Hill Plantation (SU/8.9I), 13 plants on edge of ancient woodland. The Coppice (SU/8.9I), 500+ plants in ancient Beech wood. Park Wood (SU/8.9J), Buckinghamshire tetrad record collected 1965–1985 (R. Maycock, pers. comm., 1988), but not refound 1991–1992. Common Wood (SU/8.9M), several thousand plants in ancient woodland, plus a few young plants on disturbed land 200 m W.S.W. Piggott's Wood (SU/8.9P), three populations with 300, 660 and 630 plants in main ancient wood, and one small colony with 20 plants on west side. Deangarden Wood, near Keep Hill (SU/8.9Q), about 500+ plants in ancient Ash-Beech woodland. The Rye (SU/8.9R), 30+ plants scattered in woodland (probably ancient). Millfield Wood (SU/8.9S), about 500 flowering plants in ancient Beech wood. Hanging Wood (SU/8.9S), 2000–3000 plants, ancient woodland. Green Wood (SU/8.9S), about 1700 plants in four small patches in ancient Beech woodland. Gomm's Wood (SU/8.9T), about 5000 plants in ancient Beech woodland. Hughenden Valley, ancient Beech woods north of Boss Lane Farm (SU/8.9T), several thousand plants. Longrove Plantations (SU/8.9T), about 500 plants in replanted woodland. Hughenden Valley, Citers Wood (SU/8.9U), Buckinghamshire tetrad record, 1978 (R. Maycock, pers. comm., 1988), not refound 1991–1992. Fennell's Wood (SU/8.9V), 400+ plants in ancient Beech wood. Deangarden Wood, near Abbey Barn Farm (SU/8.9V), about 360 flowering and more vegetative plants in ancient Ash-Beech woodland. Barrowcroft Wood (SU/8.9V), 20+ plants in ancient Ash-Beech woodland. Highfield Wood (SU/8.9W), several thousand flowering and numerous vegetative plants scattered through ancient Beech woodland. Gomm Valley (SU/8.9W), two small patches, old woodland bank in Nature Reserve, M. Young, May 1991. Kings Wood (SU/8.9W) about 800 plants in ancient Beech wood. Woolman's Wood (SU/9.8D), about 1000 plants, edge of clearing in replanted ancient woodland. Lower Pyebushes (SU/9.8U), scattered in replanted ancient Oak-Ash wood. Cut-throat Wood (SU/9.9A), scattered in ancient Beech wood, about 3000 plants. Hogback Wood (SU/9.9F), about 2400 plants in ancient woodland. Seagrave's Farm (SU/9.9G), wood N.W. of, 500 plants in ancient Beech woodland, and 120 plants to east in narrow strip of ancient woodland. Ash Grove (SU/9.9J), 3500 plants near railway in replanted ancient woodland. Keeper's Wood (SU/9.9J), about 1000 plants in new plantation of Beech and Oak. Great Beards Wood (SU/9.9L), scattered populations totalling about 6000 plants in replanted ancient woodland (some under conifers), and 100 plants in wood to

north. Blue Close Wood (SU/9.9L), thousands of plants, on edge of pine plantation and likely to disappear. Owlsears Wood (SU/9.9L), 315 plants on edge of ancient wood and bank of old hedge. Bottom Wood and Starveacre Wood (SU/9.9L), 180 flowering plants in replanted ancient woodland. Stockings Farm (SU/9.9M), ancient woodland west of, three large populations with 3500, 300 and 210 plants. Wheatsheaf Wood (SU/9.9Q), 35 plants in recent Beech wood. Great Legs Wood (SU/9.9, Q & V), 2000–3000 plants in four main areas in ancient Beech wood. SU/9.9R, Buckinghamshire tetrad record collected 1965–1985, site details unavailable (R. Maycock, pers. comm., 1988). Ongar Hill Farm (SU/9.9S), wood west of, J. Pitt, 1977; not found in 1989, now overgrown. Parsonage Wood (SU/9.9T), 50+ plants in ancient Beech woodland. The Ash Beds (SU/9.9V), 370 plants by track in mixed, recent woodland. *Stowe, National Trust (SP/6.3Y), in the Japanese gardens, R. Maycock; several thousand plants of a variant approaching forma *ptarmicifolia* were seen in 1992. SP/8.0Q, Buckinghamshire tetrad record collected 1965–1985, site details unavailable (R. Maycock, pers. comm., 1988). Hyde Heath, Hyde House Wood (SP/9.0F), D. Ferguson, 1986. White's Wood (SP/9.0F), 200 plants, all vegetative, under dense Spruce canopy, and 250, also all vegetative, under Beech. White House Farm (SP/9.0K), Gracelets Wood north of, 3000 plants in old game covert. Monk's Wood (SP/9.0K), numerous plants in ancient wood and on bared strip. Elvidge Wood (SP/9.0K), ancient Beech wood west of, 500+ plants. Lower Bois, Hodds and Hilsbury Woods (SP/9.0Q); good numbers of plants spread along N. edge of ancient wood, and a few plants in N.W. corner of Lower Bois Cemetery. The Larches (SP/9.0X), only one plant seen in neglected, ancient, deciduous woodland. Newland Park (TQ/0.9B, possibly also in tetrad C), C. J. Smith, 1979, recent woodland. Carpenters Wood (TQ/0.9D), 120 plants in ancient woodland. Chenies (TQ/0.9E), 500 plants in wood adjoining ancient woodland. Chenies Bottom (TQ/0.9E), in two main groups with 52 and 60 plants plus a scattering of vegetative ones elsewhere. West Wood (TQ/0.9E), a very dense patch with 1350 plants in replanted ancient woodland. Turveylane Wood (TQ/0.9J); two small populations, one with about ten plants, the other with about 20 plants, replanted ancient woodland. Mount Wood (TQ/0.9J), three large groups plus scattered plants elsewhere in ancient woodland, about 650 plants. Denham Green, Ranston Covert (TL/0.8P), about 30 plants in ancient Beech Wood at foot of very steep slope.

V.c. 39, Staffs.: Pendeford, "hedge sides on this farm" (SJ/8.0), Pitt (1796). Blithefield, grove by the churchyard (SK/0.2), Mr Stanmers (Garner 1844); this site was thought to be a probable introduction by Perring & Walters (1962), though on what basis is not known; Pendeford is at the west end of Needwood Forest and if accepted as native at the eastern end, could well be native here too. Needwood Forest (SK/0.1 or 0.2), Garner (1844). Ridge (1922–1929) "failed to find the plant anywhere in Needwood Forest", and others have followed his caution in accepting the record. Yoxall (SK/1.2L), 40+ flowering plants on wooded road verge, replanted ancient woodland. Edees (1972) also gives "abundantly in a copse between Newchurch and Scotch Hill . . . and in the wood, formerly known as Coalpit Slade, on the east side of the road near Darleyoak Farm". *Ash Green, Trentham (SK/8.4, ?P/Q), wood of park, about 3000 plants.

**V.c. 40, Salop*: Broncroft Castle (SO/5.8), Miss M. B. Fuller, 1978–1992 (Sinker *et al.* 1985).

**V.c. 53, S. Lincs.*: Wellingore Hall Park (SK/9.5Y), 1962, Miss E. J. Gibbons. Small Hornbeam copse, with *Mercurialis perennis* and *Adoxa moschatellina*, probably escaped from the Hall gardens (Mrs I. Weston, pers. comm., 1988).

**V.c. 55, Leics.*: Glenfield, Leicester (SK/5.0I) "shady border in gardens of the Gynsills", 1971 (Primavesi & Evans 1988); this site is now partly under a hotel.

**V.c. 57, Derbys.*: Between Marple and Strines, near the River Goyt (SJ/9.8), T. Barker (Linton 1903). Long Eaton (SK/4.3J) (Clapham 1969). Sheffield (SK/3.8L), in woodland in Graves Park, first noted 12 April 1938, but no longer known (M. Shaw, pers. comm, 1992).

**V.c. 60, W. Lancs.*: Silverdale (SD/4.7S), several patches in woodland, escaped from adjoining Nursery. During a visit in 1988, Mr Kaye described *C. bulbifera* as more or less a weed, which he had dug out in masses.

**V.c. 62, N.E. Yorks.*: Scalby (TA/0.9A), "long established; the *Natural History of the Scarborough District* lists it as 'Rare. Scalby Churchyard, 1964 *et seq* . . .'. It was then in a much more restricted area than now. I assume it was originally planted on a grave . . . since it reached the wall of the churchyard it has not looked back" (T. F. Medd, pers. comm., 1988). This colony even

received a mention in *The Dalesman*, January 1900 "– it thrives throughout the village" (an overstatement).

**V.c. 69, Westmorland*: Bowness (SD/4.9), W. Clitheroe, 1940 (forma *ptarmicifolia*).

**V.c. 72, Dumfriess.*: Dardarroch, Dunscore (NX/8.8N), roadside verge, C. Rogers, 14 May 1981; Mrs M. E. R. Martin, 1988 (forma *ptarmicifolia*). The status of another record from Maxwelton House requires confirmation. Hooker (1870) listed *C. bulbifera* as "doubtfully native" in Ayr (v.c. 75), Lanarks (v.c. 77) and Perth (v.cc. 87–89) but no specimens or further details have been traced. Watson (1873) attributes the Ayr record to a specimen from a James Wilson.

**V.c. 91, Kincardines.*: Glenbervie House (NO/7.8Q), very widely distributed in the garden, known since at least 1934. The biggest introduced colony.

**V.c. 95, Moray*: Dyke (NH/9.5Z), one plant, garden of Rose Cottage, M. McC. Webster, 1972, introduced with plants from Blackhills (see next record). Blackhills House (NJ/2.5U), woodland policies, M. McC. Webster, 1963 (Webster 1978).

**V.c. H9, Co. Clare*: Ballyvaughan (M/2.0), outside P. O'Kelly's house in a field and adjacent hedge, 1987.

**V.c. H21, Co. Dublin*: Malahide Castle (O/1.3), in the demesne, 1980, J. G. D. Lamb (Lamb 1983). Rathfarnham (O/1.3), Marley Park, 1981, P. J. Jackson (Jackson 1983) (forma *ptarmicifolia*).

CURRENT STATUS

Cardamine bulbifera has thus been recorded in about 200 native sites; it is probably still present in about 155 sites, has been lost from about 30 sites, and about 17 are untraceable or unchecked. Most of the native sites have disappeared due to woodland clearance, but replanting, especially with conifers, is currently the main threat to the remaining populations. It has also been recorded from about 45 introduced sites of which it is still present in 27.

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