# The past and present distribution of Stachys germanica L. in Britain

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#### ABSTRACT

Stachys germanica L. (Downy Woundwort) is confined to Oxon, v.c. 23, although it was probably native or well-established in N. Hants., v.c. 12; W. Kent, v.c. 16; Northants., v.c. 32, and S. Lincs., v.c. 53, in the 19th century. A field and literature survey of the Oxfordshire sites was undertaken in 1984 and 1985. The eleven known post-1950 sites are scrubby wood edges, hedges, uncultivated banks and verges, quarries and fallow fields on oolitic limestone soils. All the known populations are small and vary from 1–100+ plants. Flowering is erratic and long-term seed dormancy is followed by a few years of flowering and seed production, usually after wood cutting. The majority of sites are in old hedges in association with ancient routeways, although two populations occur in semi-natural habitats. S. germanica is probably a native species, well-adapted to traditional forms of forestry and agricultural practice on the Oxfordshire oolite, but is vulnerable to modern changes, including the removal or neglect of old hedgerows and copses.

#### INTRODUCTION

Stachys germanica L. is a robust and attractive labiate, readily distinguished from other native British members of the genus by the long, silky hairs which cover the stem, leaves and calices. The garden escape, S. byzantina C. Koch (=S. lanata Jacq.) (Lamb's ear), is often mistaken for the native plant but differs markedly in a number of characters, notably general habit, leaf shape and lanate-tomentose hair covering. The ecology, phenology and population dynamics of S. germanica are discussed by Dunn (1987).

S. germanica is a widespread species of dry calcareous pastures, roadsides and hedgebanks in central and southern Europe (Ball 1972). It is rare in northern Europe, especially in Britain where it reaches the northern limit of its range. Perring & Walters (1962) indicate records of S. germanica in eight 10-km squares for pre-1930 records, two post-1930 records and ten 'introductions' in England and Wales. Perring & Farrell (1977) report that "this attractive perennial species of calcareous pastures and roadside verges is now believed to be extinct except in five localities in Oxfordshire." In 1981, when S. germanica was added to Schedule 8 of the Wildlife and Countryside Act as a species in need of legislative protection, the known wild population was extremely small and in apparent danger (N.C.C. unpublished data). Subsequent searches suggest that the real position is slightly more favourable. In 1984 and 1985, S. germanica was found in flower in four of the eleven known post-1950 sites in Oxfordshire, but several of the other sites had become overgrown by dense scrub. The majority of sites are along the transition between scrubby, deciduous woodlands or hedgerows and uncultivated calcareous grassland. S. germanica can also grow in open limestone grassland where this is tall and sheltered, and it also colonized crop fields in the past. The plant is a poor competitor, requiring light and open conditions for germination and the first-year rosette phase of its life-cycle, and hence benefits from periodic woodland clearance by coppicing, scrub removal or hedge thinning. Its sudden appearances after a long absence suggest that the plant has a strategy of long-term seed dormancy, flowering and setting seed only in suitable conditions. The seeds are relatively large and heavy (one observer likened dehiscence to "coals falling from a scuttle"), and the main seed bank probably lies close to the parent population. Most of the extant populations are extremely local with a characteristic clumped form. Records suggest that it may persist at suitable sites for well over a century. As a plant of transitional, open habitats the phytosociological affinities of S. germanica are difficult to define. Most of the sites lie in the

close vicinity of tall, moderately species-rich grassland dominated by *Bromus erectus* and *Brachypodium pinnatum*, but at only two sites does the plant grow among closed grassy turf. More typically it grows on sheltered patches of bare soil, accompanied by other robust colonizers, notably *Clematis vitalba*, *Alliaria petiolata*, *Verbascum thapsus*, various thistles and umbellifers and regenerating scrub or hedgerow sprouts. In its hedgerow locations, *S. germanica* is sometimes accompanied by local species, notably *Astragalus glycyphyllos*, *Cirsium eriophorum* and *Nepeta cataria*, while *Salvia pratensis* occurs in similar situations nearby. These hedges are, without exception, rich in woody constituents including a high proportion of *Acer campestre* and *Corylus avellana*, indicative of ancient date and probable woodland origin (Pollard *et al.* 1974). The nature of the Oxford habitats of *S. germanica*, coupled with the known facts of its reproductive pattern, geographical distribution and very low frequency of naturalization, suggest strongly that, contrary to the opinion held by some 19th century authorities, *S. germanica* is a native species (Webb 1985). It was probably an original inhabitant of wood edges and glades, a circumboscal species (Rackham 1980) which became adapted to coppice and hedgerow management regimes on suitably dry, calcareous soils and colonized open ground in quarries and arable fields.

## NON-OXFORDSHIRE RECORDS

There are reliable records of Stachys germanica from at least ten vice-counties, and unauthenticated references in county floras to several others, some of which are probable or certain errors. Table 1 refers to those records which the author has traced. Some of the casual records not backed by an authenticated specimen are probably S. byzantina but S. germanica does occur, very occasionally, as an introduced casual, probably imported from Europe. In N. Hants., W. Kent, Northants. and S. Lincs. it evidently once occurred in similar situations to its Oxford localities and is probably an extinct native in those vice-counties. It may also have been native at one time in Beds., S. Hants. and E. Kent. All the recorded sites, with the exception of Luton, Beds., lie on chalk or oolite soils. In the case of the W. Kent record, the plant occurred at the edge of an ancient wood; in S. Lincs. it occurred in an area known to have been well-wooded in the early Middle Ages (Gibbons 1975). All the populations were small, except for those in an oolite quarry (or quarries) in Northants., and roadside hedges and verges around Colsterworth, S. Lincs., where it was respectively described as "plentiful" and "a common weed". The loss of the species was attributed to ploughing in the case of N. Hants. and W. Kent, and to the infilling of the quarry in Northants. Taken together, the records indicate that the plant was widespread but very rare by the time naturalists were first compiling county lists. Its wide distribution suggests that it may once have been considerably more common when semi-natural woodland and calcareous grassland were more extensive and the climate milder than at present.

# **OXFORDSHIRE SITES**

Stachys germanica was first recorded in Britain "in the field joyning Witney Parke", Oxfordshire, in 1632 (Druce 1886). The discoverer was Leonard Buckner, a London apothecary, and his record was published in Johnson's revision of Gerard's *Herbal* the following year. A specimen from Witney Park, dated c. 1730, survives in the Dillenius herbarium (**OXF**). Although no further localities are recorded for another century, Jacob Bobart, who was responsible for the entry of this species in the 1699 edition of Morison's *Plantarum Historia Universalis Oxoniensis*, states that the plant occurred on hills, rough stony ground and fallow land in Oxfordshire, presumably in more than one place ("*Locis variis montosis et saxosis asperis et arvis restilibus, agri Oxoniensis*"). In about 1735, John Blackstone found *S. germanica* growing plentifully "by the lane leading from Wychwood Forest to Charlbury" and in some of the coppices of the forest itself (Druce 1910). On 20th October 1767, Gilbert White, then visiting his friend John Mulso, Rector of Witney, describes an expedition to see "the base horehound, the *Stachys Fuchsii* of Ray, which, that Gent. says, grows near Witney park." White found "but one plant under the wall but further on near the turnpike that leads to Burford, in an hedge opposite to Minster Lovel, it grows most plentifully. It was still blowing & abounded with seed; a good parcel of which I brought away with me to sow in

## TABLE 1. STACHYS GERMANICA: RECORDS IN VICE-COUNTIES OTHER THAN OXON

Vice-county	Location	Habitat	Source	Probable status	Year
1, W. Cornwall	Landaviddy	Field	Davey (1909)	Error (Margetts & David 1981)	1848
	Trewin	Field	Davey (1909)	Error (Margetts & David 1981)	undated
10, Wight.	Steephill, Isle of Wight	Chalk-pit	Rayner (1929)	Unknown	1909
12, N. Hants.	Itchen Abbas	Road verge and uncultivated field	W. Spicer, BM, Townsend (1883)	Native	1850, 1872
	?Itchen Abbas		Sowerby, BM		1859
15, E. Kent	Earthist	Bank	Hanbury & Marshall (1899)	Unknown	1829
16, W. Kent	Darenth Wood	Wood edge and uncultivated field	J. T. Boswell Syme, BM	Native	1857
	Sevenoaks	Railway station	Hanbury & Marshall (1899)	Casual or error	undated
30, Beds.	Clapham Hill	?Chalk grassland	Dony (1953)	Unknown	1801
	Near Luton	?	C. Abbot in Dony (1953	Casual or error	c. 1798
32. Northants.	Fineshade	Limestone quarry	W. Lewin, OXF	Native	1870
33, E. Gloucs.	Redbrook	?	Riddelsdell et al. (1948)	Casual	1874
	Oakridge	?	Riddelsdell et al. (1948)	Casual or error	undated
34 W Gloucs	Kingswood	Fowl-run	Sandwith (1932)	Casual	1917
en, ni cicator	Baptist Mills	?	Riddelsdell et al. (1948)	Casual	1930
	Poole Keynes	2	Riddelsdell et al (1948)	Casual or error	undated
50, Denbigh	Eyarth Woods	Woodland	Dallman (1911)	Probable error (for <i>Stachys</i>	1908
				alpina)	
53, S. Lincs.	Easton	?	R. Richardson in Gibbons (1975)	Native	1727
	Colsterworth	Road verges, hedges and fields	Turner & Dillwyn in Woodruffe-Peacock (1896)	Native	1794–96
			J. Davies in Gibbons (1975)		1805
	Stoke Rochford	2	Gibbons (1975) K	Native	1800
	Thurlby	Road verge	J. Dodsworth in Woodruffe-Peacock (1896)	Native	1840
54, N. Lincs.	Grimsby	Dock yard	A. Smith, LINC	Casual	1903
62, S.E. York	Whitby	?	C. Bailey, BM	Error (for Stachys byzantina)	1867

the dry banks round the village of Selborne" (White 1986). The introduction was evidently successful for, six years later, White observed that he never saw the bee, *Apis manicata* (*=Anthidium manicatum*) until *Stachys germanica* flowered, "on which it feeds all day: tho' doubtless it had other plants to feed on before I introduced that *Stachys*." Sibthorp (1794) listed it from cornfields and along waysides in the vicinity of Witney, Stonesfield and Woodstock in the west of the county. A contemporary botanist, Samuel Goodenough, found the plant in plenty in cornfields around Brize Norton in about 1800 (Druce 1927). The impression given by these early records is that *S. germanica* was more common in Oxfordshire than today and occurred in a variety of habitats, although it always seems to have been confined to the oolite and related formations.

Although records of *S. germanica* are frequently too imprecise to assign to known localities, I estimate that the plant has been found in about 30 sites over an area of approximately  $150 \text{ km}^2$  since its discovery, and at eleven since 1950. Fig. 1 illustrates the past and present distribution of the species in 2-km tetrads. The records of *S. germanica* lie within an area of distinctive landscape



FIGURE 1. Past and present distribution of *Stachys germanica* in Oxfordshire.  $\bullet$  post-1950;  $\bigcirc$  pre-1950;  $\oslash$  locality uncertain; X introduction; .... boundary of the Wychwood Forest at the time of the Domesday Book.

and social history, with a long continuity of managed deciduous woodland and calcareous grassland. This part of Oxfordshire is known to have been under fairly intensive cultivation in Roman times (Emery 1974), and from a very early period was scored by an intricate network of narrow lanes, "like veins on a leaf", many of which survive in their original, unmetalled condition as 'green lanes' – strips of old limestone grassland commonly bounded by hedges. Even those lanes which have since been widened and metalled often retain their original banks and verges. Elsewhere, old grassland survives mainly as small, steep banks flanking the 'bottom land' of streams and dry valleys. As a consequence of physical and historical factors, therefore, there has developed in this area an unusually high density of 'edge' habitats with the necessary combination of old woodland and grassland making an abundance of potential habitats for *S. germanica*. The frequency of old lanes and banks appears to be an important factor governing the distribution of this plant.

The physical and historical nature of the 20th century localities of *S. germanica* are outlined below, together with the recorded occurrences of the species. The precise locations of most of the sites must be kept confidential for conservation reasons.

#### HEDGEROW AND ROAD VERGE SITES

# STURDY'S CASTLE

The broad, road verges in the vicinity of Sturdy's Castle public house have been known as a *Stachys germanica* site for nearly two centuries. The plant grew on the level verges of the A423, close to a thicket derived from an old hedge, and usually flowered after the latter had been cut back. It was first recorded as "abundant" near Sturdy's Castle by William Baxter early in the 19th century (Druce 1927) and was rediscovered there by Druce (**OXF**) in 1903. A party who went to look for it in 1906 found the verge "unusually bare" following roadside works and no plants were in evidence (Druce 1907). The species was found again in 1931 (**OXF**), however, and again in 1962, following the cutting back of the encroaching thicket. In the latter year, 20 small plants were found on the disturbed ground by the hedge and, in the following year, 19 plants and three non-flowering rosettes appeared (**OXF**, **RNG**). A few more plants were found in successive years until about 1969. No plants were seen here in 1984 or 1985, by which time the hedge had once again become overgrown, but it may reappear once again when the hedge is cut back, although the verge flora is evidently less rich now than at the beginning of the century.

A second verge locality lies by the side of a lane about 2 km from the above. It was first found here by W. Wilson Saunders in 1840 (**OXF**) and was rediscovered in 1921 (**BM**). The plant reappeared in 1962 (**OXF**) close to the adjoining hedge, when 26 plants were counted on ground whose surface had been scraped about two years previously. A further four or five plants appeared the following year but were cut down before they could set seed. So far as is known, none have been seen since, although the habitat remains suitable.

## SITE A

Site A is a green lane, whose population of *Stachys germanica* is described in detail by Dunn (1987). The lane has a rich, tall, limestone grassland, verge flora and a very old boundary hedge, probably of woodland origin (see below). 62 plants were discovered here in 1984, on bare ground exposed after the hedge was severely cut back, probably for the first time in 35–40 years. The plant has reappeared annually, although in 1986 the stems were picked before it could set seed.

#### SITE B

An old lane near Worsham has been known as a locality for *S. germanica* for at least 50 years. A single plant appeared here in 1972 by the then overgrown boundary hedge. Another appeared in 1974, following a fire which had burned down that particular section of the hedge. In 1985, 25 plants bearing 43 vigorous flowering stems appeared out of a tangle of tall vegetation and regenerating hedgerow sprouts, on ground which had clearly been disturbed, perhaps again by fire, a few years previously. None were found in 1986, when the vegetation had perhaps become too dense to allow germination.

#### AKEMAN STREET

*S. germanica* has been found in at least three places along the route of this Roman road during the present century. One site was an old hedge bordering a shaded ditch near Stonesfield where more than one plant was observed in 1949 (**RNG**), and a single individual found in the ditch in 1955 (H. Bowen, pers. comm. 1985). Another single plant was found by a hedge 7 km further west in 1980. A third site along Akeman Street in the vicinity of Minster Lovell was recorded by Druce (1927).

#### CRAWLEY GREEN LANE

A single, stunted plant of *S. germanica* was found in 1979 in the centre of a green lane bordered on both sides by hedges. This lane is used as a farm track and the plant occurred on ground recently disturbed by cattle (J. M. Campbell in litt.), by whose agency it may have been introduced.

#### DORNFORD GREEN LANE

S. germanica was discovered along the course of this ancient track by W. D. Mavor in 1820 (Druce 1927). It was refound by Druce in the late 19th century and by W. B. Turrill and A. B. Jackson in 1909 (**OXF**, **BM**) and S. H. Bickham in 1912 (**BM**). The lack of recent records may be partly due to the overgrown boundary hedges, which are presently so dense as to threaten to block the lane in places.

## WOODLAND, GRASSLAND AND QUARRY SITES

## SITE C

One of the largest populations of *Stachys germanica* occurs by the edge of an ancient copse and in a neighbouring crop field in the vicinity of Minster Lovell. The edges of the copse are scalloped with small glades for game management purposes, from which scrub is periodically cut. A narrow strip of old grassland separates the wood from a small field, used in recent years to grow game crops of buckwheat and canary grass, and sometimes deliberately left fallow allowing colonization by biennial and perennial 'weeds'. The site was evidently known to Druce (1927). 25 plants of Stachys germanica were discovered flowering along the grassy field border by Palmer (1967). He found a further twelve plants in 1971 but none in the two subsequent years. The plant also appears at irregular intervals in glades along the edge of the copse, usually after scrub clearance. In one such glade, about 100 plants appeared on the bare ground in 1984 but only a single plant in 1985 (Palmer, pers. comm. 1985). S. germanica has also appeared almost annually in recent years on the strip of grassland and among the game crop. Estimates of its numbers have varied from one to three plants in 1980, 1984 and 1985, to 20-50 in 1982-83. The flowering of Stachys germanica at this site seems to depend on the periodic clearance of wood-edge glades, a form of management resembling coppice, and the continued maintenance of fields of game crops which are not ploughed every year. This is presently the only site in which S. germanica grows as a crop 'weed' as it did in the 18th century.

## SITE D

Site D lies about 1 km west of site C on a west-facing bank of tall limestone grassland dominated by *Bromus erectus* and partially invaded by hawthorn scrub. 23 plants of *S. germanica* were found in 1984 and a further nine in 1985, scattered along a section of the bank. The landowner has known of the plant for about 20 years and flowering seems to be unusually regular.

## STONESFIELD QUARRY

Druce (1910) reported that *S. germanica* had occurred in oolite quarries in the neighbourhood of Taynton, Burford, Minster Lovell and Charlbury, but omitted reference to the first two parishes in his later county flora (Druce 1927). The only quarry site known in recent years is a shallow, disused, slate quarry near Stonesfield, which was evidently also known to Druce. A few plants, mostly single specimens with a maximum of four in 1978, have appeared on the bare, stony ground of the quarry, but the site had become overgrown by 1985 when none were found. Seedlings of *S. germanica* from another site were planted here in 1964, and the more recent records are therefore of unknown provenance.

## OTHER OXFORDSHIRE SITES

Stachys germanica has been recorded from several other sites for which no habitat details or population data exist. The neighbourhood of Charlbury was once a well-known locality; most herbarium specimens seem to have been collected from the roadside banks and hedges running westwards from the village railway station along the northern fringe of Wychwood. The plant was first found hereabouts in c. 1735 (Druce 1910) but most sheets examined date from 1870-1935 (OXF, BM). Druce (1927) also refers to sites to the immediate north and south of the village. The neighbourhood of Witney was another favoured area; herbarium sheets labelled "near Witney" begin in 1766 (herb. Sir Joseph Banks, BM) and the last dated sheet is 1893 (OXF). A single plant was found by a hedge west of the town in 1972, but none appeared the following year (B.R.C.). Sibthorp (1794) discovered the plant along the main Oxford road between Woodstock and Enstone, although the site or sites may have been lost when the old road was straightened and improved in 1800. Finally a number of other records exist outside the main recorded range of S. germanica. Those backed with an authentic specimen are Kirtlington Park (Whiteheaves, 1858, **OXF**; Druce, 1901, **OXF**); Faringdon (undated, **OXF**) and Hanborough (Druce, 1888, **OXF**), while Druce (1927) also admitted Chipping Norton (1805), Sarsgrove (undated), Steeple Aston (undated), and Begbrook (undated). Seedlings from Sturdy's Castle were planted out at a railway

cutting through the oolite at Hensington and in a field near Wytham Wood, Oxford in the 1960s (C. J. Cadbury in litt.).

#### HISTORICAL FACTORS

The majority of sites of Stachys germanica in Oxfordshire are on the verges of green lanes and roads, usually associated with a hedge. A historical analysis of the recent sites suggests that it survives mainly in sites which show very long continuity of management and that the present-day routeways and hedges are of ancient origin. The larger old lanes were employed as drove roads for cattle and sheep until recently, and are characterized by tall hedges and very broad grass verges, often of uncultivated limestone grassland. At one time they would have carried a considerable traffic, both from local manors, whose commons often lay some distance away, and, in the case of the broadest lanes, as main routes. The green lane at Site A, for example, is known to have been used for conveying salt in the Middle Ages (Houghton 1929), and there is evidence that it was in use as early as the 8th century (J. Bond pers. comm.). The A423 at Sturdy's Castle was formerly a broad drove road which is mentioned in 11th century charters (Hooke 1981). The S. germanica site borders a deep, parallel earthwork and is close to the intersection of Akeman Street, a Roman road. Dornford Lane is another broad track, presently little used, which dates from no later than the 10th century and once linked the Norman Kings' hunting lodge at Woodstock with an outlying manor on the royal demesne (Hoskins 1955). All the other lanes containing S. germanica have been identified on 18th century county maps, which clearly show their boundary hedges, and there is every reason to assume they are of at least medieval origin.

Corroborative evidence of ancient date is provided by the hedges in which *S. germanica* has occurred. Table 2 presents data collected from six hedges in which the species has occurred at least once since 1950. There is a strong possibility, both on biological and historical grounds, that some or all of these hedges were formed from woodland constituents. Three lie within the reconstructed Domesday boundary of the Royal Forest of Wychwood (Schumer 1984) and all lie within what was then a well-wooded area. The hedgerow constituents reveal these hedges to be of medieval or even

## TABLE 2. PHYSICAL AND BOTANICAL CHARACTERISTICS OF HEDGEROWS CONTAINING STACHYS GERMANICA

The hedges marked with an asterisk occur within the Domesday Book boundary of Wychwood royal forest, as defined by Schumer (1984).

Hedges	Length examined (metres)	Associated earthworks	Number of hedgerow species	Dominant hedgerow species	Notable features
Sturdy's Castle	200	Sunken lane with steep banks	9	Mixed but Prunus spinosa, Acer	by the small quarter postesset.
				campestre, Crataegus prominent	
Site B	150	Faint bank and ditch	14	Acer campestre, Prunus spinosa	
Site A*	200	Faint ditch	17	Acer campestre, Corylus avellana	Sorbus torminalis in hedgerow. Parish boundary
Stonesfield*	100	Prominent bank and ditch	11	Acer campestre, Corylus avellana, Sambucus nigra	Ancient stools of Acer campestre and Ilex aquifolium. Parish boundary
Akeman Street*	50	Cut into natural bank	7	Mixed (no Acer)	ooundary
Crawley Green Lane	100	Cut into natural bank	6	Acer campestre, Corylus avellana, Prunus spinosa	
Dornford Lane	1	Not examined	not counted	Acer campestre	

earlier date. The abundance of Acer campestre, both as a hedgerow constituent and as a standard tree, and of Corylus avellana, suggests woodland origin, as does the presence of Sorbus torminalis in one hedge, whose suckers accompany one of the largest clumps of S. germanica. The Wychwood area has a well-documented history of land reclamation from woodland or assarting, especially in the 13th century, by which neighbouring fields retained strips of original woodland both as an enclosure and as a source of firewood (Schumer 1984; Stede undated). The evident association of S. germanica with these ancient landscape features is strong evidence that the plant is a true native despite the apparently man-made origin of most of its sites.

#### SURVIVAL FACTORS

The historical distribution of *Stachys germanica* has no parallel in the British flora although it is approached by another large labiate, *Salvia pratensis*, which is very locally abundant in tall calcareous grassland on tracksides, verges and banks on the same part of the Oxfordshire oolite. *Cynoglossum germanicum*, which once shared the coppices of Wychwood with *S. germanica*, also shares its predilection for ancient trackways: the largest Oxfordshire colony of *C. germanicum* lies on the wooded bank of a pre-Saxon lane known as the Ruggeway (Emery 1974). Finally, the closely related *Stachys alpina* is also found mainly by hedges and in open woodland on oolitic soils in Gloucestershire and on limestone in Denbigh. The best known colony is by an ancient hedge with twelve constituent woody species within a 100 m length, and closely resembles some of the Oxfordshire sites of *S. germanica*.

Why does *Stachys germanica* survive on the Oxfordshire oolite but, so far as we know, nowhere else in Britain? Possibly the plant was always rare and was eliminated elsewhere in the country by a series of chance events. However a possible explanation of its survival can be deduced from the circumstantial evidence of the land-use record of western Oxfordshire. Two particular local circumstances probably favoured the survival of *Stachys germanica*:

i) The presence of a large, ancient forest on predominantly calcareous soils, which was long managed as coppice-with-standards woodland (Stede undated; Petchey 1977).

ii) The survival of semi-natural habitats, notably ancient and medieval tracks and hedges, in a landscape which has changed relatively little since the Middle Ages (Emery 1974).

Stachys germanica appears to be a plant of woodland edges and clearings, which is well-adapted to a coppicing regime, when suitable conditions of light and open ground become available periodically. Although very few Oxfordshire woods are coppiced today, scrub clearance, a regular form of game management in some copses on the oolite, and the periodic cutting back of broad hedges provide similar ecological conditions. The former, local, two-field crop rotation, in which half the land was left fallow in any one year, also allowed biennials such as *S. germanica* to spread into crop fields from the boundary hedge or copse. A further niche for *S. germanica* was provided by the small quarries of Cotswold stone and slate which nearly every parish in the area once possessed.

In S. Lincs., and perhaps also in Northants., N. Hants. and W. Kent, habitat reduction and changes to traditional farming practices may have eliminated *S. germanica*. Happily, the area in which it occurs in Oxfordshire is one of large estates, in which game interests ensure that some deciduous woods, hedgerows, grassy banks and even fallow fields are conserved and that the use of environmentally harmful farming practices such as stubble-burning and the spraying of headlands is limited. The result is a landscape which, although far less suitable for *S. germanica* than its medieval predecessor, is still one in which sufficient old woodland/grassland edge habitats occurs for the plant to survive at the edge of its range. This does not in itself explain why the species has survived *only* in Oxfordshire, but this circumstance itself suggests that conditions here are more favourable to the plant than in other vice-counties.

## CONSERVATION

There is no evidence to suppose that *Stachys germanica* has greatly declined during the present century. It has been found in at least eleven sites since 1950. Druce, who had a closer acquaintance

with the Oxford flora than most living botanists, evidently succeeded in finding it in only nine sites over 40 years (Druce 1886, 1927). On the other hand, the population of flowering plants at some sites is very small in any given year, often single plants only, although the store of dormant seed buried in the soil may be much higher. Most discoveries of S. germanica have been made by chance and its true status is probably underestimated, although it is undoubtedly rare and local. Several recent trends may be contributing towards a long-term decline however. S. germanica is a southern European species at the edge of its range here and there is some evidence that long winters and cool summers weaken British populations and restrict seed production (Dunn 1987). The plant also requires the regular cutting of coppice, scrub and hedges in order to flower and set seed. In Wychwood, where regular coppicing had all but ceased by the late 18th century, it seems to have disappeared, along with other light-demanding old woodland species such as Cynoglossum germanicum, Gagea lutea and Convallaria majalis (Druce 1910). Many hedges in S. germanica localities are presently neglected and their grassland verges overgrown, a consequence of increased maintenance costs and the decline of dairying in favour of cereal crops. In 1975, local authorities began to cut back on roadside mowing and scrub cutting operations to save money. As a result, former roadside sites such as Sturdy's Castle are now thickly overgrown. The hedges of those green lanes which were used as drove roads must once have been kept in check by the browsing of cattle, while the hooves of domestic animals and the wheels of carts may have helped to transport the large, heavy seeds of S. germanica to other suitable sites. Many lanes are used less intensively today and the plant's ability to colonize new sites is correspondingly reduced. Suitable sites for S. germanica are also being lost by habitat removal; there are fewer banks of unspoiled limestone grassland than formerly and many have suffered eutrophication, especially by slurry spreading, or have become overgrown with scrub. Finally, recent events have shown that this attractive plant must be considered a target for unscrupulous collectors and gardeners. Conservation efforts have been inhibited by lack of knowledge, although intensive observation over three years at one site has indicated a form of management under which the species thrives (Dunn 1987). One site with a relatively large population of S. germanica is being notified as a Site of Special Scientific Interest (S.S.S.I.) with the co-operation of the landowners, and a very small population occurs on an existing S.S.S.I. With Government grants and voluntary management agreements available to landowners, it is likely that at least some S. germanica sites will continue to receive appropriate management and that the conservation outlook for the species is reasonably satisfactory.

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