

## What is *Anthyllis vulneraria* L. subsp. *corbierei* (Salmon & Travis) Cullen (Fabaceae)?

T. C. G. RICH

Dept. Biodiversity and Systematic Biology, National Museum & Gallery, Cardiff CF10 3NP

### ABSTRACT

*Anthyllis vulneraria* L. subsp. *corbierei* (Salmon & Travis) Cullen, originally distinguished by having spreading hairs on the stems and petioles, is reputed to be a British endemic confined to a few localities in Anglesey, Caithness, Cornwall and the Channel Islands. Examination of herbarium material indicates that plants with spreading hairs occur widely around the British coast and occasionally inland, encompassing a range of forms. Similar material with spreading hairs also occurs on the coast of northern France. Field work at previously reported sites (including the type locality) showed that most populations were polymorphic with respect to hair, corolla and calyx characters. Different hair types occurred in random combinations with different corolla and calyx characters. The occurrence of spreading or appressed hairs is probably simply polymorphic variation. I do not recognise subsp. *corbierei* either as an endemic or as a subspecies.

KEYWORDS: Britain, France, Red Data Book, polymorphism, infraspecific variation.

### INTRODUCTION

*Anthyllis vulneraria* L. is taxonomically very complex and consists of numerous inter-grading variants which are to some extent ecologically and geographically separated (Cullen 1976). Cullen (1968, 1976, 1986) provided accounts of the infraspecific variation, in which three native and two introduced subspecies were recognised in the British Isles. One of these, subsp. *corbierei* (Salmon & Travis) Cullen, is reputed to be a rare plant endemic to Britain, and was included in the third edition of the vascular plant Red Data Book (Wigginton 1999). However, Wigginton acknowledged that the RDB account was based on little recent information, and he suggested further investigation was required. This prompted R. A. Jones and T.C.G.R. to review the information available about subsp. *corbierei* and to carry out field work to assess its current status.

The taxon was first described by Salmon & Travis (1917) as *A. maritima* Schweigg. var. *corbierei* (coastal forms of *Anthyllis* were at the time ascribed by some botanists to *A. maritima* Schweigg., now often referred to *A. vulneraria* subsp. *vulneraria* var. *langei* Jalas; Cullen 1986). It was distinguished as having an abundance of spreading hairs on the stems and petioles ('*Caules folia petiolique valde patento-villosae*') in contrast to typical *A. vulneraria* which has appressed hairs. After studying herbarium material (including type specimens), cultivation experiments and field work at South Stack, Cullen (1967) raised the variety to subspecific rank for *Flora Europaea* (Cullen 1968). In his résumé of the *A. vulneraria* complex, Cullen reported subsp. *corbierei* from only four localities, in Anglesey (stated as forming large, distinct, homogenous populations), Cornwall and Sark, and suggested it could occur elsewhere (Cullen 1976).

Cullen (1986) provided a description, clearly based on his holotype in LIV: 'Upright perennial. Stems hirsute over their whole length. Leaves somewhat fleshy, concentrated in the lower part of the stem. Calyx usually not red-tipped. Corolla clear yellow'. This description has formed the basis of descriptions in subsequent floras (e.g. Stace 1997; Akeroyd 1998) except for the poor description in Clapham *et al.* (1987) which was derived indirectly from Cullen's *Flora Europaea* account.

The taxonomic complexity of *A. vulneraria* forced me to a wider investigation of subsp. *corbierei* from the literature, herbarium specimens, field work and limited cultivation experiments to try to clarify which populations were that taxon and therefore which might require conservation. The work has led to a different conclusion from Cullen about the most appropriate rank for the taxon and its distribution, and consequently its priority for conservation. The work applies only to *A. vulneraria* from the British Isles and northern France, and does not apply to other European taxa with spreading hairs (see Cullen 1968, 1976).

## ANTHYLLIS VULNERARIA FORMS WITH SPREADING HAIRS IN THE BRITISH ISLES

As the taxon was originally distinguished on the basis of spreading hairs on the stems and petioles, a review of such herbarium material was carried out. All material of *A. vulneraria* from the British Isles was examined at **BM**, **BRISTM**, **CGE** (mostly seen by J. Cullen or J. R. Akeroyd), **DBN**, **K** (mostly seen by J. Cullen, also Marsden-Jones & Turrill's 1933a material), **LIV** (which now includes Cullen's research collection transferred from **LIVU**), **NMW**, **OXF**, **RNG** (mostly seen by J. R. Akeroyd), **TCD** (mostly seen by J. R. Akeroyd) and material named as subsp. *corbierei* was borrowed from **E** and **LTR**.

The herbarium specimens with spreading hairs showed a large range of variation, especially with regard to corolla and calyx coloration. Notes on the specimens with most of the stem with spreading hairs seen, and their differences from Cullen's description of subsp. *corbierei* are given in Appendix 1 with other records. The records are mapped in Figure 1 with selected silhouettes; these show a large range of variation in general growth form, distribution of leaves on the stem and in leaf shape.

The herbarium material showed significant variation in the density, coverage and coloration of spreading hairs. Plants with spreading hairs right the way up the stem were uncommon, and many specimens had appressed hairs on the top and/or lateral peduncles (including Cullen's holotype). Inland plants tended to be less densely hairy than coastal plants. In plants with spreading hairs, the occurrence of red-tipped calyces was more frequent than green-tipped calyces; these character states are simple polymorphic variation which is widespread in many populations in Britain, with red-tipped calyces being dominant in most (but not all) populations. Variation in corolla colour was also frequent, especially in Cornish material.

Spreading hairs occurred in material which had been determined by various botanists as subsp. *vulneraria* or subsp. *lapponica* (Hyl.) Jalas, which are more or less recognisable subspecies, or as intermediates with subsp. *corbierei*. Plants with red corollas and spreading hairs were often ascribed to subsp. *vulneraria* var. *coccinea* L. but many could equally have been treated as subsp. *corbierei*.

## ANTHYLLIS VULNERARIA FORMS WITH SPREADING HAIRS IN NORTHERN FRANCE

It has been suggested that subsp. *corbierei* might occur on sea cliffs in the western part of France (e.g. Cullen 1976, noting he had seen little material from this area). Corbière (1894) had noted variation in pubescence in Normandy similar to that described by Salmon & Travis (1917), but the name he had applied (var. *sericea* Bréb.) could not be clearly related to Salmon and Travis's taxon from Brébison's description. Couderc (1975) revised the French infraspecific taxa of *Anthyllis vulneraria*, and cited subsp. *corbierei* as synonymous with his subsp. *vulgaris* (Koch) Willk. & Lange var. *maritima* (Koch) Willk. His description included plants with a mixture of hair types, including those with spreading hairs throughout the stem: 'à pilosité généralement apprimé, mais parfois hirsute dans la moitié inférieure ou même sur toute leur longueur'.

Specimens from the Musée National d'Histoire Naturelle, Paris (**P**) and the Herbarium de la Société des Sciences Naturelles et Mathématiques de Cherbourg (**CHE**) were examined for material which might be regarded as subsp. *corbierei* (these herbaria contain Corbière's collections, the former having been transferred from Caen **CN**). Eight collections from the coast had dense spreading hairs below and at least sparse spreading hairs above (Appendix 2). These are regarded as falling within the variation noted in the British Isles (cf. above and Appendix 1). Corbière's annotations on the sheets indicate that he regarded such plants with spreading hairs as var. *sericea* Bréb., as surmised by Salmon & Travis (1917). Similarly, there are two more recent inland collections from the Pas-de-Calais in the Centre Régionale de Phytosociologie/ Conservatoire Botanique National de Bailleul herbarium.

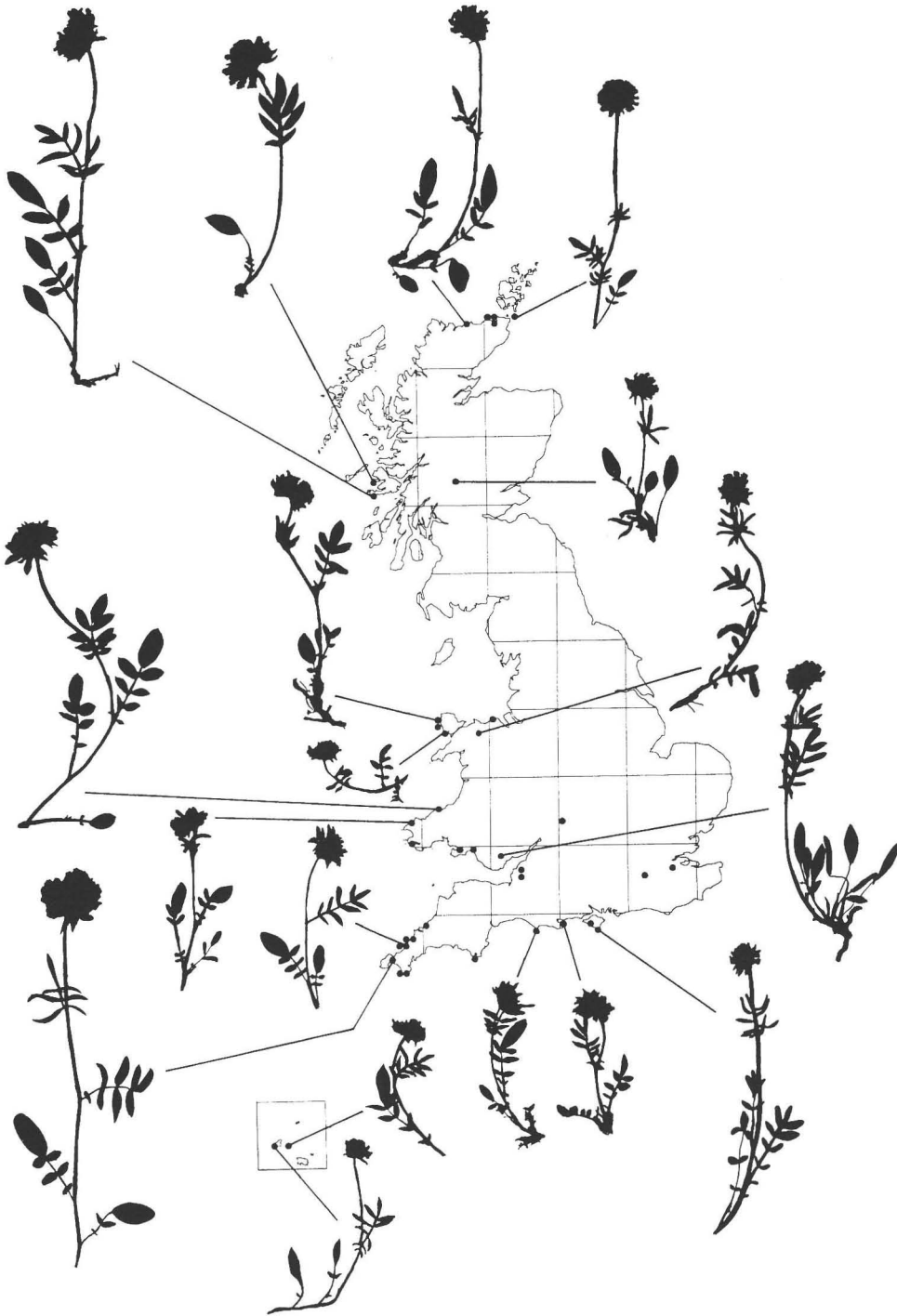


FIGURE 1. Map showing distribution of forms with spreading hairs in Britain with silhouettes drawn from selected specimens.

## FIELD INVESTIGATION OF KNOWN POPULATIONS

The variation in herbarium material prompted a more detailed investigation of variation in the field. Field work was carried out in four areas, concentrating on those from which Cullen had cited material: Anglesey (including the type locality 'grassy banks, cliffs near South Stack'), Cornwall and the Channel Islands (the latter by M. Marsden, B. Ozanne, R. Rabey and R. Veall in 1999), and also Dorset. At each site the phenotypes present were noted. The variation is summarised in Table 1 with phenotypes coded as follows:

*Corolla*: R = red, Y = yellow, W = red standard with white keel, O = orangey-red. This includes the most frequent phenotypes, though there is variation within them (cf. Marsden-Jones & Turrill 1933a).

*Stem and petiole hairs*: A = appressed, S = spreading to ascending. The hairs on stems of some plants can be spreading to ascending below but appressed above (cf above).

*Calyx*: G = whitish-green-tipped, T = red-tipped. These are the two variants, though the development of the redness in the tips is variable, and may sometimes be almost purple. I have not seen any plants with red or orangey corollas with green-tipped calyces.

Thus plants coded YAT have yellow corollas, appressed hairs and red-tipped calyces (typical '*vulneraria*'), those coded YSG have yellow corollas, spreading hairs and whitish-green-tipped calyces (subsp. *corbieri* sensu Cullen), etc. Representative specimens have been deposited in NMW.

## ANGLESEY

Most populations investigated were polymorphic, containing two or more phenotypes (Table 1). The composition of the populations differed between sites; for instance, populations from Aberffraw to Porth Trecastell were dominated by plants with appressed hairs and red standards with white keels (other forms being rare), whilst those at South Stack all had yellow corollas and a mixture of hair types.

Plants equating to subsp. *corbieri* were found only at South Stack, Addoloy-Penrhosfeilw chapel and Porth Trecastell. No plants were refound at Porth Nobla, Rhosneigr or Aberffraw, though the exact original sites are not known and vegetative plants with spreading hairs were found in the latter in 1993 (R. A. Jones, pers. obs.).

At the type locality at South Stack there was significant variation in the growth form. Some plants in deep turf sheltered by rocks were erect, but others in more exposed positions were decumbent (in cultivation, some variation in growth form is retained; photograph in NMW). The leaves were somewhat fleshy (thick by comparison with inland plants), but the cauline leaves did not appear to be noticeably concentrated in the lower part of the stem (this is also true of the type specimens at LIV and BM). All plants seen had  $\pm$  uniformly yellow corollas. Four phenotypes were present, differing in the combinations of spreading or appressed hairs and red-tipped or green-tipped calyces, but otherwise identical. For plants with spreading hairs, there was some variation in the density and distribution of hairs. Most plants had dense spreading hairs along the length of the stem, though a few had sparse spreading hairs, and one was noted with spreading hairs below and appressed hairs on the peduncles. There was also a little variation in the redness of the calyces, with some plants with only the very tips red.

## CORNWALL

Plants with spreading hairs equating to subsp. *corbieri* were found at five of the previously-reported localities (Hayle Towans, Tubby's Head, Perranporth, Porth Joke and Pentire Point East), and at two new sites (Watagate Bay and Rocky Valley) (Table 1). No plants were refound at Bedruthan Steps or Tintagel, but they could still be present. Plants with spreading hairs may be widespread around the Cornish coast, but they are not present in every population.

The north Cornish *Anthyllis* populations are highly polymorphic, and probably the most variable in Britain. In all localities, spreading hairs occurred with practically all other combinations of corolla and calyx colour, and such plants could not otherwise be separated from the variation in plants with appressed hairs. They were quite variable in growth form, probably related to exposure.

TABLE 1. PHENOTYPES OF *ANTHYLLIS* PRESENT IN SELECTED SITES IN ANGLESEY, CORNWALL AND DORSET

SITE	PHENOTYPES
<b>Anglesey (June 1999)</b>	
Tywyn Aberffraw (SH356688)	WAT
Ynys Meibion, cliffs opposite (SH327686)	RAT, WAT
Porth Trecastell, cliffs and roadside (SH3370 area)	OAT, RAT, WAT, YAG, YAT, YST
Rhosneigr, roadside (SH319726)	YAT
Rhosneigr, roadside (SH324739)	YAT
Black Creek, Bodior, Rhoscolyn, rocks (SH294757)	YAG, YAT
Gromlech, Rhoscolyn, cliffs and tracks (SH262764 area)	OAT, RAT, WAT, YAT
Porth Diana, Trearddur (SH253782)	WAT, YAT
Porth-y-post, Trearddur, roadside (SH243796)	WAT, YAT
Addoloy-Penrhosfeilw chapel, roadside (SH226806)	YAT, YST
Pen-y-bonc, Penrhosfeilw, roadside (SH217812)	YAT, YAG
South Stack, cliffs (SH2082 area)	YAT, YAG, YSG, YST
Porth Tywyn-mawr, rocks (SH285850)	YAG, YAT
Ynys y Fydlyn, Llanfairynghornwy, cliffs (SH292917)	RAT, WAT, YAT
<b>Cornwall (June 2000)</b>	
Hayle Towans, fixed dune grassland (SW554385)	OAT, RAT, WAT, YAG, YAT, YSG, YST
Porthtowan, cliffs (SW692481)	OAT, RAT, WAT, YAG, YAT
Chapel Porth, cliffs (SW697495)	OAT, RAT, WAT, YAG, YAT
Tubby's Head, cliffs (SW698505)	OAT, WAT, YAG, YAT, YSG, YST
Droskyn Point, Perranporth, cliffs (SW755545)	OAT, WAT, YAG, YAT, YSG
Porth Joke, cliffs (SW772604)	OAT, OST, WAT, YAG, YAT, YSG, YST
Pentire Point East, grassland (SW782615)	OAT, OST, RAT, RST, WAT, WST, YAG, YAT, YSG, YST
Watergate Bay, cliffs (SW841648)	OAT, OST, RAT, WST, YAG, YAT, YSG, YST
Bedruthan Steps, cliffs (SW8469)	OAT, RAT, WAT, YAG, YAT
Tintagel, cliffs (SX0589)	OAT, RAT, WAT, YAG, YAT
Rocky Valley, cliffs (SX073896)	OAT, YAG, YAT, YSG, YST
<b>Dorset (July 2000)</b>	
South of Fortuneswell, Portland, old quarry (SY693731)	YAG, YSG, YST
Easton, Portland, car park (SY696723)	YAG, YAT, YSG, YST
Handfast Point, Ballard Down, grassland (SZ054825)	YAG, YAT, YSG, YST

See text for coding of phenotypes

#### DORSET

Three sites were investigated, all of which had a mixture of phenotypes (Table 1). Plants equating to subsp. *corbierei* were found in all three, though they had less dense spreading hairs than plants in Anglesey and Cornwall, and all had appressed hairs above. Again, plants with spreading hairs covered the same range of variation in corolla and calyx colour as those with appressed hairs. Growth form also varied markedly between sites.

#### CHANNEL ISLANDS

Plants on Sark had spreading hairs, yellow corollas and red-tipped calyces (M. Marsden, R. Veall, pers. comms., 1999). Plants with appressed hairs have also been recorded on the island (K; see above). Similarly, on Guernsey the plants with spreading hairs had yellow corollas and red-tipped calyces, and occurred in mixed populations with plants with appressed hairs (B. Ozanne, R. Rabey, pers. comms., 1999).

The field work showed that most of the larger populations are polymorphic, and that plants with spreading hairs were otherwise identical to those with appressed hairs and always grew with them.

## VARIATION IN FREQUENCY OF PHENOTYPES WITHIN POPULATIONS

The variation of the corolla, calyx and hair characters prompted further analysis to see if plants with spreading hairs were most commonly associated with yellow corollas and green-tipped calyces (cf. Cullen's 1986 description), or occurred in random combinations with all corolla and calyx colours. The frequency of characters was scored for 100 plants along transects at four sites.

The numbers of plants with each combination of characters recorded in three transects at the type locality in Anglesey are shown in Table 2 (all plants had yellow corollas). 27% of the plants had spreading hairs (range on transects 24–32%), and 69% of the plants had green-tipped calyces (range 66–74%). All phenotypes were scattered  $\pm$  randomly along the transects, though often patchily. A  $\chi^2$  analysis showed that the calyx and hair characters occur together in random combinations independent of each other ( $\chi^2 = 0.42$ ,  $p > 0.1$ ), and there is no particular association of green-tipped calyces with spreading hairs (typical '*corbieriei*') or red-tipped calyces with appressed hairs (typical '*vulneraria*').

Single transects were recorded at Hayle Towans, Pentire Point East and Watergate Bay in Cornwall (Table 3). The composition of the populations differed between sites, and the population was especially variable at Pentire Point East. The percentages of plants with spreading hairs at these sites were 14%, 28% and 15% respectively. Again, a  $\chi^2$  analysis showed that the corolla, calyx and hair characters occurred together in random combinations ( $\chi^2 = <0.001$ ,  $p > 0.9$ ;  $\chi^2 = 0.58$ ,  $p > 0.5$ ;  $\chi^2 = 0.03$ ,  $p > 0.9$  respectively).

TABLE 2. NUMBER OF PLANTS OF EACH PHENOTYPE RECORDED IN EACH OF THREE TRANSECTS OF 100 PLANTS AT TYPE LOCALITY, SOUTH STACK, JUNE 1999

Phenotype	NW facing grassy slope	SW facing grassy slope	SW facing rocks	Mean
YAG	49	55	44	49.33
YAT (' <i>vulneraria</i> ')	27	19	24	23.33
YSG (' <i>corbieriei</i> ')	17	19	23	19.66
YST	7	7	9	7.70

See text for coding of phenotypes

TABLE 3. NUMBER OF PLANTS OF EACH PHENOTYPE RECORDED IN TRANSECTS OF 100 PLANTS AT CORNISH SITES, JUNE 2000

Phenotype	Hayle Towans	Pentire Point East	Watergate Bay
OAT	1	18	9
OST	0	8	1
RAT	0	11	3
RST	0	2	0
WAT	0	3	0
WST	0	4	2
YAG	25	6	58
YAT (' <i>vulneraria</i> ')	60	34	16
YSG (' <i>corbieriei</i> ')	9	2	8
YST	5	12	3

See text for coding of phenotypes

## DISCUSSION

The herbarium material showed that plants with spreading hairs vary in morphology between sites in Britain (cf. Figure 1) and France. The field investigation also showed that much variation occurs within populations, in which plants with spreading hairs could not otherwise be separated from the variation in those with appressed hairs. Whilst there were always some plants with spreading hairs and yellow corollas which conformed to Cullen's description of subsp. *corbierei* in the populations investigated (allowing for the variation in calyx colour which I do not regard as of taxonomic significance), there were other plants with spreading hairs which did not. The analysis of the frequency of phenotypes within four populations showed that spreading hairs occurred in apparently random combinations with corolla and calyx colour.

Cullen (1976) described the type population of subsp. *corbierei* at South Stack as homogeneous, but the field work showed that this is not true for hair type, the essential character on which the original variety was based. Indeed, Salmon & Travis (1917) had already noted that most of the plants were typical with regard to hair-clothing (i.e. had appressed hairs).

Genetic experiments are required to establish the basis of inheritance of the spreading and appressed hair characters, though the complex variation in pubescence seen suggests it is unlikely to be a simple Mendelian inheritance controlled by one gene. Marsden-Jones & Turrill (1933a) cultivated plants to investigate the genetic basis of variation (primarily corolla colour), but the only observation reported on hair type was that three out of 20 plants cultivated from wild seed collected from one plant at Par Harbour (R.21) had spreading hairs on the stems, the others having appressed hairs. Three seedlings grown by T.C.G.R. from seed collected from a plant with spreading hairs at South Stack also had spreading hairs showing that it can breed true.

I am thus unable to delimit a homogeneous taxon which can be equated with Cullen's subsp. *corbierei*, and which can be consistently distinguished from variation in other *Anthyllis vulneraria* with which it always grows. My current interpretation of the hair characters in Britain is that they are polymorphic, and that plants with spreading hairs do not merit recognition at subspecific rank. Indeed, plants with spreading hairs occurred in collections which would otherwise be treated as subsp. *vulneraria* or subsp. *lapponica*. What is interesting is that spreading hairs occur most frequently in populations of the western Atlantic coast, indicating some ecological and distributional integrity. There is little value in giving names to each random combination of characters (ten names would be required to name the different combinations of hair, corolla and calyx characters observed at Pentire Point East alone, cf. Table 3), and I follow Marsden-Jones & Turrill's (1933b) advice in refraining from making new combinations until the genetic basis has been resolved. Meanwhile, I regard subsp. *corbierei* as synonymous with subsp. *vulneraria* and suggest it should be removed from the Red Data Book (Wigginton 1999).

## ACKNOWLEDGMENTS

This work was stimulated by Andy Jones who kept asking questions that were difficult to answer, at least initially, and I am grateful for his prompting and assistance. I would like to thank the Keepers of the herbaria for loan of or access to material, and Arthur Chater, John Edmondson, Sally Ellis, Trevor Evans, Vera Gordon, Richard Gornall, Gwyll Lewis, Alex Lockton, Marcia Marsden, David McClintock, Andy McVeigh, Bridget Ozanne, Alison Paul, Chris Preston, Rachel Rabey, Benoit Toussaint, Roger Veall, Rosie White and Goronwy Wynne for assistance with field work or specimens, Andrew Pang for drawing the silhouettes, and Jane Croft for details of records at the Biological Records Centre. The field work in England was funded by the Threatened Plants Database. The map in Figure 1 was plotted using DMAPW by Alan Morton.

## REFERENCES

- AKERROYD, J. R. (1998). *Anthyllis vulneraria*, in RICH, T. C. G. & JERMY, A. C. (1998). *Plant Crib 1998*. pp. 181–182. Botanical Society of the British Isles, London.
- ALLEN, A. & HILTON, B. (1994). *Flowers of Sark*. Privately published, Barnstaple.
- CORBIÈRE, L. (1894). *Nouvelle Flore de Normandie*. Caen.



- COUDERC, H. (1975). Contribution à la révision des taxons infraspécifiques de l'*Anthyllis vulneraria* L. en France. *Revue Générale de Botanique (Paris)* **82**: 93–118.
- CULLEN, J. (1967). *Anthyllis vulneraria* L. *Watsonia* **6**: 295.
- CULLEN, J. (1968). *Anthyllis* L. in TUTIN, T. G. *et al.* eds., *Flora Europaea* **2**: 177–182. Cambridge University Press, Cambridge.
- CULLEN, J. (1976). The *Anthyllis vulneraria* complex: a résumé. *Notes from the Royal Botanic Garden Edinburgh* **35**: 1–38.
- CULLEN, J. (1986). *Anthyllis* in the British Isles. *Notes from the Royal Botanic Garden Edinburgh* **43**: 277–281.
- JERMY, A. C. & CRABBE, J. A., eds., (1978). *The island of Mull*. British Museum (Natural History), London.
- MARGETTS, L. J. & DAVID, R. W. (1981). *A review of the Cornish flora*. Institute of Cornish Studies, Redruth.
- MARSDEN, M. (1994). A new check list of flowering plants and ferns wild on Sark. *Report and Transactions Société Guernesiaise* **1994**: 754–783.
- MARSDEN-JONES, E. M. & TURRILL, W. B. (1933a). Studies in variation of *Anthyllis vulneraria*. *Journal of genetics* **27**: 261–285.
- MARSDEN-JONES, E. M. & TURRILL, W. B. (1933b). Notes on the taxonomy of British material of *Anthyllis vulneraria*. *Journal of botany* **71**: 207–213.
- MCCCLINTOCK, D. (1975). *The wild flowers of Guernsey*. Collins, London.
- ROBERTS, R. H. (1982). *The flowering plants and ferns of Anglesey*. National Museum of Wales, Cardiff.
- SALMON, C. E. & TRAVIS, W. G. (1917). Notes from Carnarvon and Anglesey. *Journal of botany* **55**: 320.
- STACE, C. A. (1997). *New Flora of the British Isles*. 2nd ed. Cambridge University Press, Cambridge.
- WIGGINTON, M. J. (1999). *Anthyllis vulneraria* ssp. *corbierei* (Salmon & Travis) Cullen (Fabaceae), in WIGGINTON, M. J., ed., *Red Data Books of Britain and Ireland 1: Vascular plants*. 3rd ed. p. 40. Joint Nature Conservation Committee, Peterborough.

(Accepted February 2001)



## APPENDIX 1. ANTHYLLIS VULNERARIA VARIANTS IN THE BRITISH ISLES WITH MOST OF THE STEM WITH SPREADING HAIRS

## WEST CORNWALL, V.C. 1

Lizard, 4 June 1926, A. H. Wolley-Dod; plants with red calyces, some of which have spreading hairs but the sheet is named by C. E. Salmon as var. *coccinea* and not var. *corbierei* (**BM**). Housel Bay, Lizard, 6 June 1926, A. H. Wolley-Dod (**BM**). Caethillean Bay, Lizard, 2 June 1900, no collector (**BRISTM**). Cadgwith, cliffs, 26 May 1900, no collector (**BRISTM**). St Agnes cliffs, 27 and 28 May 1913, F. Rilstone; red corollas, appressed hairs on peduncles (**NMW**). St Agnes cliffs, 19 June 1913, F. Rilstone (**NMW**). St Agnes Head, 28 May 1989, C. D. Preston/BSBI meeting; very variable population, some plants of which det. as subsp. *corbierei* by J. R. Akeroyd, 1992 (**CGE**). Mullion, cliff top on serpentine, 11 June 1969, P. D. Sell, D. E. Coombe & S. Wegmüller; dense spreading hairs except top peduncle (**CGE**). Perranporth cliffs, 22 May 1952, T. J. Wallace; mixture of phenotypes present in small area (**LIV**). Headland by Droskyn Castle Hotel, Perranporth, 26 May 1952, D. A. Reid (**K**). Hayle Towans, 8 June 1933, A. A. Bullock, red-tipped calyces, and both red and yellow corollas (**K**; Cullen 1976, cited incorrectly as Hazel Towans). It was also reported from Bedruthan Steps, 1958, J. H. Chandler (Margetts & David 1981; no material traced) and at Porth Joke and Pentire Point East in 1962 (Biological Records Centre; no further details known).

## EAST CORNWALL, V.C. 2

Tintagel, 23 May 1961, I. W. Evans (**BRISTM**).

## SOUTH DEVON, V.C. 3

Salcombe Regis beach, June 1845, R. Cupnell; mixture of plants with spreading and appressed hairs (**TCD**).

## NORTH SOMERSET, V.C. 6

Railway embankment near Winscombe, 10 June 1933, H. S. Thompson; spreading hairs throughout, though sparse above (**LIV**). Congresbury, May 1882, D. Fry; sparsely hairy (**BRISTM**).

## DORSET, V.C. 9

Portland Bill, 21 May 1938, herb. Dunston (**BM**). Old quarry south of Fortuneswell, Isle of Portland, 16 May 1987, S. L. Jury & M. F. Watson no. 8195; four plants with red-tipped calyces, det. J. A. Akeroyd, 1988 (**RNG**). Car park bank, Easton, Portland, 1999, R. White (specimens shown to T. Rich, not retained). Ballard Down, Studland, 17 May 1959, W. S. Cattling; one plant with red-tipped calyces 'varying towards subsp. *vulneraria*...', det. J. R. Akeroyd, 1988 (**RNG**).

## ISLE OF WIGHT, V.C. 10

Woody Point, 3 July 1925, R. Melville (**NMW**). Ventnor, June 1888, J. H. A. Stueart; red-tipped calyx, spreading hairs all way up (**LIV**). Carisbrook Castle, 13 June 1827, no collector (**CGE**) and 1865, F. Stratton (**OXF**); material in other herbaria from this site is more variable.

## KENT, V.C. 15 AND 16

Material with sparse spreading hairs, sometimes along the whole length of the stem, has usually been determined as *A. vulneraria* subsp. *vulneraria* var. *vulneraria* forma *polyphylloides* Sagorski in a number of herbaria (e.g. Durham Downs, 29 May 1948, J. E. Lousley; det. J. Cullen, **CGE**).

## SURREY, V.C. 17

Field on chalk near Merstham, 28 April 1945, N. Y. Sandwith (**BRISTM**).

## MONMOUTH, V.C. 35

Coastal bank, Sudbrook, June 2000, T. G. Evans (**NMW**).

## WORCESTER, V.C. 37

Broadway, 8 June 1898, L. Rea; sparse spreading hairs throughout (**BM**).

## GLAMORGAN, V.C. 41

Baldwin's Tip, Crymlyn Burrows, 19 June 1939, J. A. Webb; corollas purplish, one of five specimens with spreading hairs (NMW). Taffs Well, railway embankment, 21 June 1927, A. E. Wade (NMW).

## CARMARTHEN, V.C. 44

Machynys, urban waste ground, 23 June 1992, I. K. Morgan (NMW).

## PEMBROKE, V.C. 45

Trevine, grassy cliff, 16 June 1963, T. A. W. Davis (BSBI field meeting) 'calyx concolorous, one plant with calyx-tipped reddish. Plants rather small, those with hairy stems a small proportion of a large population..'; 'shaggy form of subsp. *vulneraria* var. *langei*... J. Cullen 1963'; some plants also with spreading hairs below only (LIV; NMW). St Anne's Head, Dale, 5 June 1963, T. A. W. Davis; peduncle with appressed hairs (LIV).

## CARDIGAN, V.C. 46

Shaley cliffs above the sea west end of Cribach Bay, R. A. E. site, Aber-porth 5 June 1994, A. O. Chater; calyces purple-tipped, plants with appressed hairs also present (NMW). Dry, shaley bank by track above Cribach Bay, R.A.E. site, Aber-porth, 25 May 1997, A. O. Chater; calyx purple-tipped (NMW). Dry shaley track side bank near west end of R. A. E. site, Aber-porth, 3 May 1997, A. O. Chater; calyx purple-tipped (NMW).

## DENBIGH, V.C. 50

Bryn Euryn, Colwyn Bay, 1966, W. E. Hughes; appressed hairs on peduncles (NMW)

## FLINT, V.C. 51

Prestatyn, 1923, Miss B. Allen; with plant with appressed hairs (**herb. G. Wynne**).

## ANGLESEY, V.C. 52

Holyhead Island, Anglesey, June 1850, J. Ball; red corollas (E). Holyhead, Anglesey, 4 June 1859, J. Ball; det. J. R. Akeroyd 1986 (E). South Stack, June 1916, W. G. Travis (syntype of var. *corbierei* and holotype of subsp. *corbierei* LIV; syntype also at BM; with the type at LIV is another specimen with the same details but with appressed hairs, cf. Salmon & Travis 1917). Trearddur Bay, July 1970, A. Jones; mixed forms with spreading and appressed hairs (NMW). South Stack, 28 July 1998, R. A. Jones; with plants with appressed hairs (NMW). Cliffs near Holyhead, 3 June 1960, V. Gordon (exact site not noted, possibly c. ½ mile south of South Stack; pers. comm. 1999); mixed gathering, one plant with red corollas and spreading hairs (NMW). Coast near Aberffraw, 9 July 1927, A. Wilson; one specimen only with red corollas and spreading hairs, sparsely so on peduncle (NMW). According to Cullen (1976) there are specimens he collected from South Stack, 29 March 1958 and Rhosneigr, 22 March 1961 in Liverpool University herbarium (LIVU); this collection was transferred to Liverpool Museum (LIV) but the specimens could not be traced in 1999. A collection from Rhosneigr, 9 May 1961, J. M. Scott has all plants with appressed hairs only and was det. by J. Cullen as intermediate between subsp. *corbierei* and subsp. *vulneraria* (LIV).

## MID PERTH, V.C. 88

There are several collections of plants with spreading hairs either all the way up or not including the last peduncle from the Breadalbane Mountains which would otherwise be referable to subsp. *lapponica*. (e.g. rock ledges, Creag na Caillich, 6 August 1933, J. E. Lousley; RNG, and other forms with spreading hairs all way up in OXF and NMW).

## MID EBUDES, V.C. 103

Staffa, 2 July 1969, British Museum Mull Survey, no. 3706; 'basically subsp. *lapponica* .. but also reminiscent of subsp. *corbierei*, J. Cullen, 1971' (BM; Jermy & Crabbe 1978). Ardanish, Mull, 22 May 1971, A. G. Kenneth & A. McG. Stirling; noted both by J. Cullen and J. R. Akeroyd to be subsp. *lapponica* but varying towards subsp. *corbierei* (BM).

## WEST SUTHERLAND, V.C. 108

Bettyhill, July 1951, F. Rose; variably hairy, spreading hairs sparse or absent on peduncle (NMW).

## CAITHNESS, V.C. 109

Duncansby Cliff, Caithness, May 1928, R. Meinertzhagen; a distinctive plant with lemon-coloured corollas, and close to *corbierei* but intermediate with subsp. *lapponica* (**BM**). Sea cliffs east of Port of Brims, 1 August 1988, T. C. G. Rich & G. M. Kay, det. J. R. Akeroyd, 1988 (collected as subsp. *lapponica*; specimen not traced). Holborn Head, 1 July 1936, J. E. Lousley, det. as subsp. *vulneraria* but varying towards *corbierei*, J. R. Akeroyd (**RNG**). Dunbeathe, riverbank near the sea, 11 July 1968, M. McC. Webster; sparse patent hairs (**CGE**).

## CHANNEL ISLANDS

*Guernsey*. Le Jaonnet, 31 May 1970, D. McClintock, det. J. Cullen (**herb. Société Guernesiaise**; not seen T.C.G.R.). Le Jaonnet, base of steps, June 1999, B. Ozanne; all with spreading hairs, calyx red-tipped (**NMW**). Le Jaonnet summit, 27 June 1999, R. Rabey; mixed population with spreading and appressed hairs, all corollas yellow and calyx red-tipped (**NMW**). It was also reported from La Bette Bay adjoining Le Jaonnet Bay by M. English, 1957 (McClintock 1975), but was not refound in 1999 and no material has been traced.

*Sark*. Cliff at Creux harbour, 11 June 1929, F. Ballard & E. A. Golby; red-tipped calyces, and some material with appressed hairs (**K**; Cullen 1976). Creux harbour, 14 May 1999, R. M. Veall; two plants with red-tipped calyces (**NMW**). La Coupée, 25 May 1965, A. A. Bullock (**K**). La Coupée, 4 June 1986, R. J. Murphy; one plant with red-tipped calyx (**BM**). La Coupée, 11 June 1999, Mrs M. H. Marsden; three plants with red-tipped calyces (**NMW**). According to some of the literature, only subsp. *corbierei* is present on the island (Allen & Hilton 1994; Marsden 1994).

## IRELAND

No material has been found in all the herbaria examined, though a very few plants with sparse spreading hairs below have been seen (e.g. Killiney Hill, 1849, no collector, **TCD**). J. R. Akeroyd has also not seen any plants with spreading hairs in the field (pers. comm., 2001).

APPENDIX 2. *ANTHYLLIS VULNERARIA* FORMS WITH SPREADING HAIRS IN  
NORTHERN FRANCE

## MANCHE

Jobourg et Herqueville, 4 Juillet 1883, herb. L. Corbière (as var. *sericea* Breb.); mixed collection, one with spreading hairs throughout and others with spreading hairs below (**CHE**). Herqueville, falaises, 20 Juin 1886, herb. L. Corbière (as var. *sericea* Breb.); spreading hairs throughout though sparsely above (**CHE**).

## CALVADOS

Côtes de Calvados, dans le falaises, 1838, A. Lenormand (**P**). Pentes des falaises calcaires du rivage de la Manche à Fontenailles, 18 Juin 1890, Bertot; spreading hairs throughout (**CHE**, **P**). Falaises maritime, Longues près Bayeux, 8 Aout 1872, L. Corbière (as var. *sericea* Breb.); spreading hairs throughout though very sparsely above (**CHE**). Falais d'Arromancher, Calvados, Juillet 1846, E. Cosson, det. 'forma inter subsp. *vulgaris* (Koch) Hayek et subsp. *polyphylla* (Kit.) Cab.' by J. Cullen, 1961 (**P**).

## SIENE-MARITIME

Falaises de Fécamp, Siene-Inferieur, 12 Juin 1892, I. Thériot & L. Corbière (as var. *sericea* Breb.); sparse spreading hairs throughout (**CHE**, **P**) and I. Thériot; one plant with spreading hairs throughout and others with spreading hairs below (**CHE**).

## PAS-DE-CALAIS

Pernes, 19 July 1995, B. Destines (Herbarium CRP/CBNBL). Setques, 8 June 1995, B. Toussaint (Herbarium CRP/CBNBL).