# Conservation of Britain's biodiversity: *Hieracium cambricum* (Asteraceae), Welsh Hawkweed

T. C. G. RICH*

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

ABSTRACT

*Hieracium cambricum* is a rare endemic hawkweed known from only three sites in Wales. It is a distinct, polycarpic perennial which flowers mainly May–June, and regenerates readily from wind-dispersed seed. It is probably a calcicole. Surveys of its sites were carried out in 1998. No plants were found at Graig-fawr (v.c. 41) where it may be extinct due to a rock fall. On the Great Orme (v.c. 49), where it is well known, 75 plants were found in a c. 25% sample of sites suggesting a population of c. 300 plants. Thirty-eight plants were found at Creigiau Eglwyseg (v.c. 50), the first time it has been recorded since 1907. Although rare, it does not seem to be significantly threatened, and both extant sites are Sites of Special Scientific Interest.

KEYWORDS: Endemic, rare species, Wales.

## INTRODUCTION

*Hieracium cambricum* (Baker) F. J. Hanbury, Welsh Hawkweed, is a very rare endemic plant, known from only three sites in Wales (Fig. 1.). Sell & West (1968) reported that it was frequent on the Great Orme, Caernarvon (v.c. 49) but had not been seen in its other two sites at Treorchy, Glamorgan (v.c. 41) and Llangollen, Denbighshire (v.c. 50) for over 60 years. Along with a number of other rare hawkweeds, it has recently been included in the 3rd edition of the Vascular Plant Red Data Book (Wigginton 1999), but nothing was known about its current status. Therefore in 1998 surveys were carried out to find out how many plants there were and determine its needs for conservation (Rich 1999); the purpose of this paper is to summarise the work.

*H. cambricum* was first collected on the Great Orme by J. Ward in 1867, who sent material to F. J. Hanbury who thought it was a new species. In 1876, J. E. Griffith gave some specimens to W. H. Painter, who forwarded them to J. G. Baker for identification (Griffith 1895). This prompted Baker, who had known of the plant for many years but had not seen it, to describe it as *H. caesium* Fr. var. *cambricum* Baker (1879). Hanbury (1894) later upgraded it to a species, and placed it with *H. vagense* Ley in his group *Vulgata Caulescentia*. Linton (1905) transferred it to sect. *Oreadea*, its current position today. Pugsley (1948) included it in sect. *Oreadea* series *Argentea*.

*H. cambricum* is a distinct hawkweed not closely allied to any other British species, and is morphologically constant in cultivation over decades (e.g. Hanbury 1894; Marshall 1901). Its outstanding characters are that it is virtually glabrous (even from the first growth), has a pale green-glaucous hue, narrow, sharply toothed or laciniate leaves with dull green or purplish spots (well-developed on the larger leaves, less so on the smaller ones), and strongly imbricated, obtuse and relatively hairless phyllaries (Pugsley 1948). The main source of confusion is likely to be with *H. vagense*, from which it can be distinguished by the more divided, subglabrous leaves, grey-green phyllaries, and lighter yellow ligules (leaves deeply toothed or sub-pinnatifid, pilose beneath, phyllaries dark green and ligules yellow in *H. vagense*).

*Address for correspondence: e-mail: Timothy.Rich@nmgw.ac.uk

TABLE 1. LIST OF RECORDS OF *HIERACIUM CAMBRICUM*

| Date | Collector | Site | Sources |
|---|---|---|---|
| v.c. 41 | | | |
| 29/6/1903 | H. J. Riddelsdell | Craig Fawr, Treorchy | **BM**, **CGE**, Riddelsdell (1907a) |
| 2/7/1906 | H. J. Riddelsdell | Craig Fawr, Treorchy | Riddelsdell (1907b) |
| v.c. 49 | | | |
| 6/1867 | S. H. Bickham | Llandudno | **CGE** |
| 1869 | J. Ward | Great Orme's Head; cultivated, root collected 1867 | **K** |
| (pre 1889) | J. Ward | Great Orme's Head | **K** |
| 30/8/1876 | J. Cryer | Great Orme | **NMW** |
| 1876 | J. Griffith | Great Orme | Griffith (1895) |
| 7/1879 | W. H. Painter | Great Orme's Head | **K**; possible syntype? |
| 7/1879 | J. Griffith | Great Orme | **CGE**; possible syntype? |
| 7/1880 | J. Griffith | Great Orme | **CGE**, **K** |
| 1885 | E. Starker | Orme's Head, cultivated Croydon A. Bennett | **OXF**, **K**, **NMW**, **OXF** |
| 7/1886 | J. Griffith | Great Orme | **BM**, **NMW**, **OXF** |
| 7/1888 | J. Griffith | Great Orme | **BM** |
| 1888 | E. Starker | Orme's Head, cultivated Croydon A. Bennett | **OXF** |
| 29/5/1889 | R. W. Scully | Great Orme | **BM** |
| 7/1890 | H. T. Mennell | Great Orme | **BM** |
| 7/1891 | J. Griffith | Great Orme | **BM** |
| 7/1891 | S. H. Bickham | In ravines amongst the rocks, Great Orme's Head | **CGE** |
| 25/6/1891 | J. L. Williams | Great Orme | **NMW** |
| 8/1891 | S. H. Bickham | Great Orme | **BM** |
| 6/1892 | E. F. Linton | Great Orme's Head, cultivated | **LIV**; Set of British Hieracia (1896, etc.) no. 92. |
| 3/8/1892 | A. H. Wolley-Dod | Great and Little Orme | **BM** |
| 5/1892 | J. Griffith | Great Orme | **BM**, **K** |
| 6/1892 | J. L. Williams | Great Orme | **BM** |
| 24/6/1896 | E.S. Marshall | Great Orme's Head, cultivated | **NMW**, **OXF**; Set of British Hieracia (1896, etc.) no. 92. |
| 1898 | E. F. Linton | Great Orme's Head, cultivated | **CGE**, **K**, **OXF** |
| 1898 | E.S. Marshall | Great Orme's Head, cultivated | **NMW** Set of British Hieracia (1896, etc.) no. 92. |
| 18/6/1901 | A. Ley | Great Orme's Head | **LIV**, **K**; BEC reports |
| 21/6/1901 | A. Ley | South of Great Orme | **K**, **OXF**, **NMW**; Ley (1901); Set of British Hieracia (1896, etc.) no 165. Baker (1879). |
| 21/6/1901 | E. F. & W. R. Linton | South of Great Orme | **BM**; Baker (1879). |
| 9/7/1904 | A. Ley | North flank of Great Orme | **CGE** |
| 27/5/1905 | J. Griffith | Highest corner of south west cliffs of Great Orme | **NMW** |
| 6/1905 | C. P. Hurst | Orme's Head | **OXF** |
| 26/6/1905 | H. W. Pugsley | Great Orme | **BM** |
| 17/6/1907 | A. Ley | North flank of Great Orme | **CGE** |
| 18/6/1907 | A. Ley | North flank of Great Orme | **CGE** |
| 8/1908 | F. A. Lees | Tyn-y-Coed, Great Orme | **BM** |
| 2/7/1912 | E. S. Marshall | Great Orme | **BM**, **CGE** |
| 1918 | S. H. Bickham | Great Orme, roots cultivated at Sedbury | **CGE**, **NMW** |
| 13/6/1919 | S. H. Bickham | Great Orme, roots cultivated at Sedbury | **OXF** |
| 20/5/1920 | J. Cryer | Great Orme | **NMW** |
| 27/5/1920 | J. Cryer | Great Orme | **BM**, **K**, **OXF**; BEC reports |

TABLE 1. CONTINUED

| Date | Collector | Site | Sources |
|---|---|---|---|
| 31/7/1922 | H. W. Pugsley | Great Orme | **BM** |
| 8/6/1923 | S. H. Bickham | Great Orme, roots cultivated at Sedbury | **K, OXF** |
| 23/6/1928 | T. J. Foggitt | Great Orme | **BM** |
| 19/5/1946 | J. A. Whellan | Great Orme | **BM** |
| 12/6/1947 | J. E. Lousley | Cliffs near light house, Great Orme | **K** |
| 3/7/1949 | P. D. Sell | SW side of Great Orme | **CGE** |
| 26/6/1952 | P. D. Sell | NE side of Great Orme | **CGE** |
| 11/7/1954 | V. Gordan | Great Orme, limestone cliffs | **NMW** |
| 25/6/1955 | P. F. Yeo | Near Gogarth, Great Orme, limestone rocks c. SH/763.831, c. 350' | **CGE** |
| 8/6/1964 | U. K. Duncan | Great Orme | **CGE** |
| 25/7/1969 | W. Ramsden | Great Orme's Head on the plateau above the marine drive near the light house | **LIV** |
| 14/5/1988 | J. Bevan | Great Orme's Head, west facing cliffs | *fide* D. McCosh *Hieracium* database |
| 29/5/1996 | V. Jones | Great Orme's Head, south facing cliff | *fide* D. McCosh *Hieracium* database |
| 11/9/1998 | T. C. G. Rich & W. McCarthy | Great Orme, cliffs above marine drive from SH/767.842 to SH/756.835; 75 plants | **NMW** |
| v.c. 50 | | | |
| 25/6/1901 | A. Ley | Cefn Fedw, Denbigh | **BM, CGE, K, OXF, NMW**: Set of British Hieracia (1896, etc.) no. 165. |
| 16/7/1903 | A. Ley | Limestone cliffs opposite Eglwyseg Church, Cefn Fedw | **BM** |
| 25/6/1907 | A. Ley | Cefn Fedw, opposite the new church, ridges | **CGE** |
| 10/9/1998 | T. C. G. Rich | Creigiau Eglwyseg SJ/22.45; 38 plants | **NMW** |

## DISTRIBUTION

### HISTORICAL INFORMATION

Locality and habitat information was taken from the literature and herbarium sheets at **BM**, **CGE**, **K**, **LIV**, **OXF** and **NMW**. Information from the Countryside Council for Wales database of Red Data Book species was provided by R. A. Jones, and from the *Hieracium* database by D. McCosh. The records in Table 1 were used to direct field surveys in 1998. It is quite possible that it occurs in other currently unknown localities.

Graig-fawr, Treorchy (SS/92.95 to SS/92.96), v.c. 41

*H. cambricum* has only been collected once from Graig-fawr by H. J. Riddelsdell in 1903. Graig-fawr is a large cirque above Treorchy composed of Pennant Sandstone, most of which is very acidic but with occasional calcareous outcrops associated with coal and other seams. This site is so different to and so disjunct from the two known sites on Carboniferous Limestone in North Wales (see below) that the record looks erroneous, were it not for the consistency of Riddelsdell's specimens and literature references.

Graig-fawr is a huge site which is difficult to search thoroughly. It has been investigated for hawkweeds on at least four occasions since the 1950s (e.g. Wade *et. al.* 1994) but *H. cambricum* has not been refound. Riddelsdell (1907b) reported it growing with *H. argenteum* Fr., which is now confined to one gully at SS/927.956. The rocks in this gully are unstable, and potentially a small colony of *H. cambricum* could have been lost to a rock fall (one significant fall was noted). *H. cambricum* is probably extinct at this site.

Great Orme (SH/7.8), v.c. 49

*H. cambricum* was first found by S. H. Bickham in 1867, and is still well known to local botanists.

On 10 and 11 September 1998, a search was made by T.C.G.R. and W. McCarthy stopping at regular intervals along Marine Drive, and surveying sections of c. 50–100 m of cliffs, depending on ease of access. In a c. 25% sample of sites along 2·5 km of cliff, 75 plants were found scattered between SH/767.842 and SH/756.835. This suggests that the total population on the Orme is approximately 300 plants.

Creigiau Eglwyseg (Cefn Fedw), Llangollen (SJ/22.45), v.c. 50

*H. cambricum* was found at this site in 1901 by A. Ley, and again in 1903 and 1907. There are no more recent records (one 1952 record held at the Biological Records Centre is a result of confusion with the Great Orme).

On 10 September 1998, Creigiau Eglwyseg was visited specifically following up the localities on the herbarium sheets 'opposite the new church' and 'Limestone cliffs opposite Eglwyseg Church'. Thirty-four plants were rediscovered scattered over c. 200 m of the major cliff between SJ/221.457 and SJ/222.459, at an altitude of c. 400 m. On the ridge above, another four plants were found at c. SJ/222.458, 430 m altitude. The plants were generally tucked into tiny crevices in the limestone on ± vertical rock faces, with no competition from other species. There could be more plants elsewhere on this massive site.

Unconfirmed sites

One 1892 specimen by A. H. Wolley-Dod is labelled 'Great and Little Orme' (Table 1). There are no other records from the Little Orme, and the one label appears to have been used for all material collected from both sites by Wolley-Dod.

Specimens distributed as the *Set of British Hieracia* no. 165 bear the label 'south of Great Orme'. Whilst there are limestone outcrops to the south of the Orme (e.g. Bryn Maelgwyn SH/796.805, The Vardre SH/782.795), *H. cambricum* has not been reported when investigated for other hawkweeds. The locality could mean south of the Great Orme summit, which would relate to localities known on the Orme itself.

A 1908 specimen collected by F. A. Lees from Tyn-y-Coed, Great Orme (c. SH/774.826; this distinguishes it from Tyn-y-Coed, a farmstead in the valley south of the Orme at SH/792.797). W. McCarthy lives in Tyn-y-Coed and has never seen the plant, but it is possible that it could have occurred there in the past.

## HABITATS

*Hieracium cambricum* is a plant of dry rock ledges and crevices, with little competing vegetation in open, exposed, predominantly ungrazed situations. It appears to tolerate at least light shade.

The soil in the rock crevices are impossible to extract, but on the limestones at least are likely to be immature rendzinas with high pH. Soil collected from the base of the cliff at Creigiau Eglwyseg with seedlings immediately below mature plants was a black, fine, organic rendzina, pH 7·8 (measured with a pHep2 Hanna pocket-sized pH meter in a 50:50 mixture with distilled water). At the possible historical site on Pennant Sandstone in Graig-fawr, the soils were rankers derived from shale, pH 6·8.

The vegetation of the limestone rocks at the Great Orme and Creigiau Eglwyseg is very similar, with typical limestone ledge communities with *Asplenium ruta-muraria, Solidago virgaurea* and *Festuca ovina* (referable to the OV39 *Asplenium trichomanes - Asplenium ruta-muraria* community of *British Plant Communities*; Rodwell *et al.* 1991 *et seq.*). On the Great Orme, a few plants were also found with *Helianthemum canum* in ledge communities transitional to the N.V.C. community CG1 *Festuca - Carlina* grassland, and rarely in the lower MC4 *Brassica oleracea* maritime cliff community. At both sites, vegetative plants were seen in grazed CG10 *Festuca-Agrostis-Thymus* grassland. At Graig-fawr, the vegetation of the calcareous ledge where *H. cambricum* may have occurred is different to the acidic *Calluna/Vaccinium*-dominated vegetation of the remainder of the site but was not investigated.

The more accessible plants had their inflorescences eaten by feral goats or rabbits on the Great Orme but the basal rosettes otherwise appeared tolerant of grazing. There was little sign of slug or snail herbivory in the wild, though seedlings are susceptible in cultivation. Plants at Creigiau Eglwyseg had severe leaf roll caused by aphids.

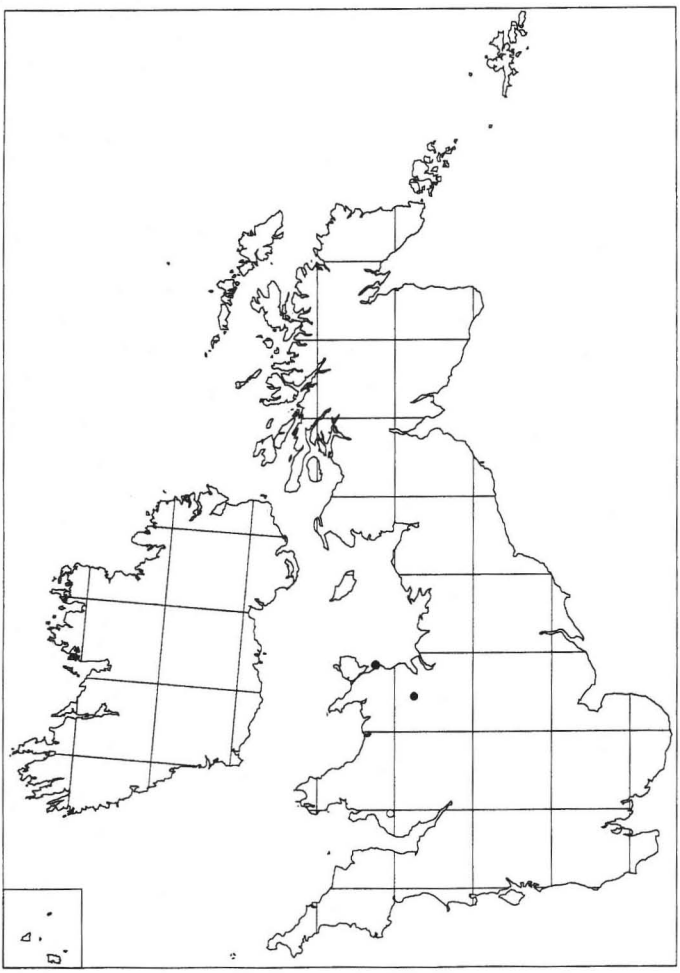

FIGURE 1. National distribution map of *Hieracium cambricum*. ● 1998, O pre-1950. Plotted using DMAPW by Alan Morton.

## LIFE CYCLE

*Hieracium cambricum* is a perennial which regenerates by seed. The main flowering period is June and early July, but plants at both Creigiau Eglwyseg and Great Orme had a second flowering period in the autumn (this often happens in Section *Oreadea*; Sell & West 1968). Plants at Creigiau Eglwyseg flowering in 1998 had some dead flowering stems from 1997 indicating that they are polycarpic. Hawkweeds are usually regarded as obligate apomicts but this has not been tested specifically in *H. cambricum*. The seeds are wind-dispersed, and tests in windless conditions show that seeds fall at a velocity of c. 150–200 cm per second, but can be kept afloat in the air by a breeze. There was ample evidence of regeneration from seed at the Great Orme, and some possible seedlings at Creigiau Eglwyseg. Seedlings have broader, nearly entire, sparsely hairy leaves.

## CONSERVATION

*Hieracium cambricum* is not protected under Schedule 8 of the Wildlife and Countryside Act 1981, but is included in the Vascular Plant Red Data Book (Wigginton 1999), which should draw attention to its rarity and be sufficient to ensure its survival. All three sites also have statutory

protection as S.S.S.I.s. At both Creigiau Eglwyseg and the Great Orme the populations grow on cliffs, where there is effectively no requirement for management (grasslands around both sites are grazed).

*H. cambricum* does not appear to be under any immediate threat, though rock climbing, scrub invasion, spread of alien plants, rocks falls and rock safety work could potentially affect the plants in the longer term at both extant sites. It is suggested that the populations should be monitored every five years.

Seed has been collected from Creigiau Eglwyseg and the Great Orme and deposited in the Millennium Seed Bank at the Royal Botanic Gardens, Wakehurst Place.

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