Conservation of Britain’s biodiversity: *Hieracium breconense* (Asteraceae), Brecon Hawkweed

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Abstract
The distribution and conservation status of *Hieracium breconense* P.D. Sell (Asteraceae), Brecon Hawkweed, has been assessed. It is a rare endemic restricted to the Brecon Beacons (v.c.42), Wales. A lectotype of the basionym *H. britannicum* var. *ovale* Ley is designated. Only one population of at least 74 plants is known in Craig y Cilau National Nature Reserve, and it has not been refound at two historic sites. *H. breconense* is assessed as ‘Critically Endangered’ under IUCN (2001) threat criteria.

Keywords: critically endangered; endemic; IUCN threat status; lectotype; Wales

Introduction
*Hieracium breconense* P.D. Sell (Asteraceae), Brecon Hawkweed, is a rare endemic restricted to the Brecon Beacons in Wales (Sell & Murrell, 2006; McCosh & Rich, 2018; Rich, 2020). There have been no previous studies on its distribution and ecology, or a detailed assessment of its conservation status.

*Hieracium breconense* was first described as *H. britannicum* var. *ovale* Ley (Ley, 1907). Ley had first collected it in 1894 at Craig y Cilau (as Craig Cille) and, after discussing further material collected in the company of H. J. Riddelsdell in June 1904 with E. F. Linton, gave it the new varietal name *ovale* (correspondence on specimens in BM; Druce, 1907). Ley (1907, 1909) also cited it from Cefn Coed and from two sites in Yorkshire. The Craig y Cilau plants were mapped as *H. dicella* P.D. Sell & C. West by Sell & West (1968), but during his review of *Hieracium*, P.D. Sell split Ley’s South Wales plants from *H. dicella sensu stricto* and gave them a new name, *H. breconense* P.D. Sell (Sell & Murrell, 2006). P.D. Sell selected a lectotype of the basionym *H. britannicum* var. *ovale* Ley from Ley’s herbarium (CGE) as the sheet collected at Craig Cille by A. Ley on 9 July 1894 but he did not publish it; this specimen is hereby designated as a lectotype on P.D. Sell’s behalf.

*Hieracium breconense* is a typical member of *Hieracium* section *Stelligera* Zahn. It is characterised by the greyish slightly glaucous and often red- or purple-flushed, ovate rosette leaves which have distinctive shallowly repand-dentate margins, acute apices and rounded to cuneate bases (sometime with small teeth at base on inner leaves), no or rarely 1 small stem leaf, the inflorescence branches held...
at an angle of 20-30 degrees, acute involucral bracts to 15 mm long with numerous long simple hairs, numerous medium to short glandular hairs and numerous stellate hairs especially on the margins (Figs. 1-3). It is similar to *H. subbritannicum* (Ley) P.D. Sell & C. West which has large teeth at the leaf base and inflorescence branches held at 70-80 degrees on larger plants. *Hi. cyathis* (Ley) W.R. Linton has a very short a cladium and entire leaves which are somewhat darker in leaf colour and often have spots.

**Distribution**

Historical records were compiled from herbaria (*BM, CGE, NMW, OXF*), the literature and the Hieracium database maintained by D.J. McCosh (October 2020 version); the records are summarised in Appendix 1. P.D. Sell cited *H. breconense* as only known only from limestone cliffs at Craig y Cilau and Dan-y-darren (Sell & Murrell, 2006), but was aware of the record from Dan-yr-Ogo. The historical records indicate it has been recorded in three sites, all in v.c.42 Breconshire, Wales (Fig. 4), which are listed from west to east below. These have been searched sporadically 2000-2022, usually whilst looking for other Hieracium species.

1. **Dan-yr-Ogo (c.SN8316)**
   It was collected by A. Ley at Dan-yr-Ogo, Callwen by A. Ley on 18 June 1899 and again at Callwen on 11 June 1904 but has not been collected again.

   The limestone gorge, accessible rocks within the Dan-yr-Ogo National Showcave Centre for Wales complex and open fells above (but not the cliffs directly above the public walk ways for safety reasons) were searched specifically for *H. breconense* on 29 June 2000 at the request of P.D Sell, without success. It is possible it could survive here in small quantity but the Showcaves area is much modified from Ley’s time, and a full survey of all the cliffs is unlikely to be practical for public safety reasons. I have visited other adjacent areas of limestone and rocks (Cribarth, Craig y Rhiwarth, Ogof Ffynnon Du, etc.) many times 2000-2018 when looking for whitebeams and other hawkweeds but no additional sites have been found.

2. **Cefn-coed-cymmer (Cefn Coed; c.SO0209)**
   No voucher specimen of H.J. Riddelsdell’s Cefn Coed record has been traced, but the record is provisionally accepted as it was cited by Ley (1907, 1909) when he described his new species; it is possible that Riddelsdell material may yet be refound.

   The limestone north of Merthyr Tydfil (Cefn Coed, Darren Fach, Darren Fawr, Coed Pen Maillard, etc.) has been visited many times 2000-2016 when looking for whitebeams and other hawkweeds but no *H. breconense* has been found.
Figure 1. *Hieracium breconense*. A, plant. B, typical rosette leaf with shallowly repand-dentate margins. C, capitulum. D, involucral bract with numerous long simple hairs, numerous medium to short glandular hairs and numerous stellate hairs especially on the margins. Scale bars A-C = 1 cm, D = 1mm
3. Craig y Cilau (Craig Cille) to Dan-y-Darren (c. S01816-S01915)
It was first collected in 1894 at Craig y Cilau by A. Ley, and was noted as abundant on limestone (Ley 1907, 1909). It has since been recorded many times since; judging from the many different ways the locality is cited, it has only occurred in the central area of the escarpment. During surveys of *H. cyathis*, *H. asteridiophyllum* and *H. cillense* in 2000 (Rich, 2002; Rich et al., 2008), it was found sparsely around Craig y Cilau, mainly restricted to the central area on the main cliff and the lower tier of open rocks above and on calcareous sandstone west of Eglwys Faen.

The main cliff was surveyed in detail from below on 21 June 2016 whilst collecting seeds for the Millennium Seed Bank; 47+ plants were found (39 flowering, 8 vegetative). A second wider survey was carried out on 11 June 2022 with the help of David Gibbs and John Holt; 74 plants were found in areas where previously recorded but as many of the cliffs are large and difficult to survey accurately the population size could be at least double or triple this.

Errors and other records
I have an image of a specimen collected at Dyffryn Crawnon by V. Jones with B. Burrow on 23 June 2010 labelled as possible *H. breconense* but with notes pointing out the short 11 mm phyllaries and the narrow leaves; I suspect this is *H. sanguineum* (Ley) W.R. Linton which is frequent at this site but have been unable to check the original specimen (possibly in herb. V. Jones in LES; the record cited from Craig Cerrig-gleisiad in McCosh & Rich (2011, 2018) is my error resulting from a misunderstanding of the origin of this specimen). The record for hectad S021 in
Sell & West (1968) and McCosh & Rich (2011, 2018) is a result of the 'limestone cliffs south of Crickhowell' locality being plotted for Crickhowell rather than Craig y Cilau S011 to which it undoubtedly refers. The Yorkshire records cited by Ley (1907, 1909) are *H. dicella*.

Figure 3. *Hieracium breconense*. A, capitulum. B, leaf showing tooothing. C, rosette
Figure 4. Distribution map of *H. breconense*. 1 Dan-yr-Ogof. 2 Cefn Coed-cymmer. 3 Craig y Cilau. Red dot 2022. Red circle pre-1907.

**Life cycle and Ecology**

*Hieracium breconense* is a perennial which is probably quite long-lived. Some plants have been seen with the remains of the previous year’s flowering stalks indicating it flowers annually once mature. The main flowering period is from (May-) early June to early July (-September). It is probably a polyplploid apomict like most other British *Hieracium* species; Sell & Murrell (2006) state it is apomictic but this was not actually tested. Most seed is ripe by July and August. The seeds have a small pappus and are wind-dispersed, but as many of the sub-populations are clustered dispersal is probably limited.

At Craig y Cilau it characteristically occurs on the steep or vertical, bare Carboniferous limestone rocks or calcareous sandstone rocks, rooted directly into rock crevices with no apparent soil, or sometimes on the shattered limestone outcrops (Fig. 5). It occurs in partial shade or in the open associated with *Asplenium trichomes*, *Ctenidium molluscum*, *Festuca ovina*, *Hieracium acuminatum*, *H. asteridiophyllum*, *H. cyathis*, *H. pellucidum*, *H. subbritannicum*, *Hylocomium splendens*, *Melica nutans*, *Mycelis muralis*, *Rubus fruticosus* agg., *Scabiosa columbaria*, *Solidago virgaurea*, *Taraxacum* spp. and *Teucrium scorodonia*. It occurs in vegetation on the ledges and rock faces of the OV39 *Asplenium trichomanes* - *Asplenium ruta-muraria* community, on grassy outcrops in CG10 *Festuca ovina* - *Agrostis capillaris* - *Thymus praecox* grassland, and on the lightly wooded cliffs W9.
Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis woodland (Rodwell et al., 1991–2000). It also occurs in small quantity on open scree with Calluna vulgaris, Deschampsia flexuosa, Racomitrium lanuginosum and Galium saxatile. No plants have been found in the quarried areas at this site perhaps showing limited colonising ability.

Like most Hieracium species it is likely to be sensitive to grazing, and is not found within easy reach of sheep at Craig y Cilau. The intensive sheep grazing may have reduced its quantity since Ley’s time who described it as abundant, but it is certainly not that now. On 21 June 2016, many of the seedheads had been eaten by invertebrates, and aphids were observed feeding on the stems and heads.

The altitudinal range is c.390-450 m at Craig y Cilau, and may have been c.250 m at Dan-yr-Ogof and c.200+ m at Cefn Coed.

**Figure 5. Typical habitats of H. breconense at Craig y Cilau NNR**

In many respects, the habitats and ecology of H. breconense are very similar to those of H. asteridiophyllum at Craig y Cilau (Rich, 2002), and they often grow together on the main cliff.

**Discussion**

Hieracium breconense is now restricted to Craig-y-cilau. It is assessed as ‘Critically Endangered’ under IUCN (2001) threat criteria based on its occurrence in one locality (the ‘Endangered’ status conferred by McCosh & Rich, 2018, was based on there being two recent localities, the Craig Cerrig-gleisiad locality now being known to be my error). Although it may have declined from three sites to one site, the decline appears to be historic rather than current, though admittedly there is very
little information on which to assess when the decline actually occurred. However, it has declined at Craig y Cilau since Ley described it as abundant.

Although Critically Endangered, it appears to be under little direct threat due to the occurrence on Craig y Cilau National Nature Reserve/Mynydd Llangatwg (Mynydd Llangattock) Site of Special Scientific Interest. Craig y Cilau is one of centres of diversity of Hieracium in South Wales supporting at least 15 species including the single-site endemics H. asteridiophyllum and H. cillense (Rich, 2002). Rare hawkweeds are noted in general in the SSSI site management statement but are not mentioned as features of interest for the SSSI (Natural Resources Wales 2020); it is recommended these should be added at the next revision. All hawkweeds would undoubtedly benefit from a reduction in grazing on this site, as they have at Craig Cerrig-gleisiad National Nature Reserve.

A small collection of seeds has been deposited in the Millennium Seed Bank (Rich, 2018).

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References
Appendix 1. Summary of records


Craig-y-cilau (Craig Cille): 9 June 1894, A. Ley (CGE); 15 June 1904, A. Ley (BM, CGE, OXF; Druce 1905, as H. britannicum, F.J. Hanb. page 28); 15 June 1904, H.J. Riddelsdell (BM, CGE, NMW, OXF; Druce 1907, as H. britannicum, F.J. Hanb. page 232); August 1908, G.C. Druce (OXF); 15 June 1909, A. Ley (NMW); limestone cliff south of Crickhowell, 11 September 1932, H.G.A. Alston (BM); 3 July 1935, H.W. Pugsley & N.D. Simpson (BM); 3 July 1935, H.G.A. Alston (BM); above Coed Pen-twyn, local on rocks, 21 June 1939, A.J. Wilmott (BM); cliffs, 27 July 1957, B. A. Miles (CGE); Dan-y-darren: SO188159, 22 May 1963, P.D. Sell (CGE); central area, SO186163, 8 June 1972, P.D. Sell & J.G. Murrell (CGE); west of Llangattock quarries, 14 June 1974, U.K. Duncan (CGE); central area, SO188157, 23 June 1975, P.D. Sell & L. Farrell (CGE); calcareous sandstone rocks, SO184164, 29 June 2000, T.C.G. Rich (CGE); rare on rocks, SO1815, 7 June 2000, T.C.G. Rich (NMW); main cliff, shaded, SO1816, 16 June 2000, T.C.G. Rich (NMW); SO18341651 to SO18701597, 21 June and 15 July 2016, T.C.G. Rich (K).

Dan yr Ogo: 18 June 1899, A. Ley (BM); Cellwen, 11 June 1904, A. Ley (BM; Druce 1905, as H. stenolepis, Lindeb. page 29).