Conservation of Britain’s biodiversity: status of the two Wye Valley endemics Hieracium pachyphyllloides, Carboniferous Hawkweed and H. vagicola, Tutshill Hawkweed (Asteraceae)

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ABSTRACT
Reviews of historical data combined with field surveys have been carried out to assess the status of two hawkweeds endemic to the Wye Valley, Hieracium pachyphyllloides and H. vagicola. H. pachyphyllloides has declined from six sites to one site, and H. vagicola from two sites to one site. Both species are ‘Critically Endangered’ under the I.U.C.N. threat criteria. The main threats are rock climbing, closure of woodland canopies and spread of alien plants. Conservation action is urgently required.


INTRODUCTION
There are two Hieracium species endemic to the lower Wye Valley on the border between England and Wales, H. pachyphyllloides (Zahn) Roffey, Carboniferous Hawkweed, and H. vagicola P. D. Sell, Tutshill Hawkweed (Sell & Murrell 2006). Both are rare plants about which very little is known, so a review of the historical data has been combined with field surveys to determine their current statuses and needs for conservation, as required under the Global Plant Conservation Strategy (Secretariat for the Conservation of Biodiversity 2002). The data are summarised here; full details can be found in Sawatschuk (2006).

The glaucous-leaved hawkweed in the Wye Valley gorge between Ross and Monmouth now known as H. pachyphyllloides was known to W. H. Purchas and A. Ley for many years under the name H. caesium Fries (Purchas & Ley 1889). Following the clarification that H. caesium was a Scandinavian plant which did not occur in Britain, and that the Wye Valley plants differed from other plants also once referred to H. caesium, Purchas described it as H. murorum L. var. pachyphyllum (Purchas 1895). Williams (1902) raised this variety to species rank as H. pachyphyllum but the combination was invalid as that name was already in use for a different European species described by Brenner in 1892. Zahn (1921) treated it as a subspecies of H. murorum, selecting the new epithet pachyphyllloides as the combination H. murorum L. subsp. pachyphyllum Brenner also already existed. Roffey (1925) then raised it to its current status as a species using Zahn’s epithet. It is a member of Section Hieracium.

Hieracium vagicola has only recently been described (Sell & Murrell 2006). Plants were formerly included under H. subbritannicum (Ley) P. D. Sell & C. West, another endemic of the Wye Valley and South Wales, but differ mainly in the dense stellite hairs on the involucral bracts. It is a member of Section Stelligera.

The species are illustrated in Figures 1 and 2, and are described in detail in Sell & Murrell (2006). Key identification features to help separate them from the other glaucous-leaved species recorded in the Wye Valley (H. schmidtii Tausch, H. subplanifolium Pugsley and H. subbritannicum) are for H. pachyphyllloides, the weakly toothed, truncate-based leaves with numerous pale, simple eglandular hairs abaxially and the greyish-green involucral bracts with many, black-based

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simple eglandular hairs, few glandular hairs and dense stellate hairs, and for *H. vagicola* the slender stems and strongly toothed basal leaves with the lowest teeth on either side somewhat reflexed at the truncate base with few to numerous simple eglandular hairs abaxially, and involucral bracts blackish-green with a long-drawn out filamentous apex and few to numerous simple eglandular hairs and glandular hairs, and dense stellate hairs.

**METHODS**

Historical data were compiled from herbaria (BEL, BIRM, BM, CGE, E, LIV, MANCH, NMW), the literature and correspondence with local botanists. The records traced are given in Appendices 1 and 2.

Field surveys were carried out between 2003 and 2007 using the historical records to target areas to search. As both species occur in Carboniferous Limestone cliffs and quarries, they were searched for by walking along the tops and bottoms of the cliffs, and by using binoculars. Some limited climbing with roped access was carried out at Symonds Yat. Access to rocks in one place at Symonds Yat was restricted due to nesting peregrines. Reasons for possible loss of populations and threats to extant populations were assessed in the field. Voucher specimens and photographs have been deposited in NMW.

Associated species were recorded in estimated 2 m × 2 m quadrats around the species. Soil pH was measured with a pHep2 Hanna pocket-sized pH meter in a 50:50 mixture with distilled water on soil samples collected from around the roots.

**RESULTS**

**HISTORICAL RECORDS**

About 12 populations of *H. pachyphylloides* have been recorded in six localities in three vice-counties (Appendix 1). In three localities it has only been collected once about 100 years ago and all are imprecise or ambiguous. The limestone cliffs near Chepstow on the Gloucestershire side of the Wye could refer to any of the cliffs and quarries from Tutshill to Ban-y-gor rocks. Brockweir Common is disussed name for the general area around St Briavels and the Hudnals, an area of hilly pastures (Peterken 2005), and it is not clear exactly where the hawkweed might have occurred as there are no obvious cliffs. The third record ‘Bigsweir opposite Tintern’ is ambiguous as Bigsweir is c. 5 km north of Tintern, and cannot be described as ‘opposite’; it is possible that the record refers to the Shom Cliff, opposite Tintern Abbey. The fourth *H. pachyphylloides* locality around Symonds Yat and Coldwell Rocks includes cliffs, quarries and the railway line, where it was frequently collected in several places in this area until the 1960s. It was collected four times at Piercefield Park but has not been seen for over 100 years. It has occurred in several places on the Great Doward, where it was last collected in 1910.

The *H. pachyphylloides* literature record for Stroud in Riddelsdell *et al.* (1948) is best not accepted without a voucher. There is a correctly identified specimen from Pwll Byffre in NMW which is likely to either be a confused label/specimen or a misidentification (no glaucous-leaved plants were present there in 2004 or 2005 and there are no other collections for this well known site). Records for Ireland refer to *H. basalticola* Pugsley.

*Hieracium vagicola* has been recorded in two areas in the Tutshill to Ban-y-gor rocks area (Appendix 2). Shoolbred (1920) cited it from Beaucliffe, an old name for Cockshott, but we have traced no voucher material (a possible specimen in NMW is labelled Bannagher [=Ban-y-gor?] cliffs but is not *H. vagicola*). The cliffs and quarries from Pen Moel to Lancaut form one large locality where it has occurred scattered in various subpopulations, and was last recorded in 1984. A record for the Symonds Yat area, whilst plausible, is based on a rather confusingly labelled specimen, and is best rejected.

**FIELD SURVEYS 2003–2007**

Both hawkweeds grow on cliffs and rocky places which are difficult to search thoroughly, and consequently we made several visits to sites to try to refine the plants in their historic sites (Kéry *et al.* 2006) found between two and four visits were usually required to be fairly certain of refining rare species). The quality of the historical information does not always make refining sites simple and we often had to use our intuition about *Hieracium* ecology to find suitable places to search.
Both hawkweeds lost much of their distinctive glaucous leaf coloration later in the season, and we recommend future surveys are carried out in May–June when the glaucous coloration on the early leaves is strong and the plants are flowering.

*Hieracium* pachyphylloides was refound in three subpopulations of 22, 32 and 19 plants in the Symonds Yat and Coldwell Rocks area, where they had not been recorded for nearly 50 years. It was not refound in the Tutshill to Ban-y-gor rocks area (3 visits), Brockweir Common (3 visits), Bigsweir (2 visits, including Shorn Cliff from below only), Piercefield Park (3 visits) or the Great Doward (7 visits).

*Hieracium* vagicola was refound in one population of 126 plants at Woodcroft Quarry. It was not be refound at Pen Moel (1 visit), Lancaut (2 visits) or Cockshoot, Ban-y-gor (1 visit).

The records are mapped in Figure 3.

HABITATS

Hieracium pachyphylloides occurred in crevices and ledges on vertical Carboniferous Limestone rock faces and on the flatter tops of rocky bluffs. Typical associated herbs included Asplenium trichomanes L., A. ruta-muraria L., Geranium robertianum L., Melica uniflora Retz., Scabiosa columbaria L. and other Hieracium species in scrappy, open, herbaceous vegetation in open woodland. Overall the vegetation is probably best attributed to the Wtg Fraxinus excelsior – Acer campestre – Mercurialis perennis woodland Teucrium scorodonia subcommunity of Rodwell (1991). Although this is a woodland community, the hawkweed is a light-demanding species which does not tolerate shade and is only found in the more open areas. Two soil pHs measured were pH 6.5 and 7.2.

Hieracium vagicola occurred in crevices and ledges on vertical Carboniferous Limestone rocks and on quarry spoil heaps. Associated species included Bromopsis erecta (Huds.), Fourn., Festuca ovina L. and Scabiosa columbaria L. The more natural crevice vegetation is probably best referred to the OV39 Asplenium trichomanes – A. ruta-muraria community of Rodwell (2000) but we have been unable to access it safely to record it in detail. On the quarry spoils heaps H. vagicola occurs in a disturbed, open, scrappy scrub community of Fraxinus excelsior L., Ligustrum vulgare L., Rosa spp. and Buddleja davidii Franch., probably best included in the W21d Crataegus monogyna-Hedera helix scrub, Viburnum lantana subcommunity of Rodwell (1991). The soil from a spoil heap was pH 7.1.

DISCUSSION

The field survey showed that Hieracium pachyphylloides has declined from six sites to one site, and H. vagicola from two sites to one site. Both species could occur elsewhere on the vast areas of cliff in the Wye Valley which we have not surveyed as there are no historical records.

Both species can be classified under the I.U.C.N. (2001) threat criteria as ‘Critically Endangered’ due to their small, declining populations and clear, continuing threats to their survival. Although much of the Wye Valley has numerous nature conservation designations at national (S.S.S.I.) and international (S.A.C.) level and large-scale conservation projects such as the Ravine WoodLIFE project, the designations will do nothing to protect either species; specific conservation action is urgently required for both.

The probable major reason for loss or decline of both Hieracium species from many of the wooded cliffs, quarries and railway lines is shading due to closure of canopy by trees or by scrub invasion. Historically the woodlands in the Wye Valley would have been managed, with the coppicing and clearance regularly creating suitable open habitat for many light-demanding species such as H. pachyphylloides and H. vagicola. Old photographs of the Wye valley (Helme 1989; Rainsbury 1989) show some of the rocks and cliffs, especially around Symonds Yat and at Pen Moel, to have been much more open in the past when the areas were quarried or managed. Some scenic pathways giving access to areas such as Piercefield or Coldwell Rocks are no longer maintained for the views and have shaded over. To what extent both hawkweeds have been lost directly due to quarrying of their limestone rock habitat is unclear, but both have benefited at least temporarily from the open conditions created by quarrying. The cessation of quarrying has allowed scrub and woodland to reinvade and has resulted in loss. Hieracium pachyphylloides was also lost from the Great Doward quarry by infilling after quarrying had ceased. The closure of the Wye Valley railway has allowed scrub invasion of the cuttings (previously kept open to minimise fire risk) where H. pachyphylloides once occurred. The reason for loss from the Brockweir Common area is not known but it could have been a transient population.

There are two immediate threats to survival of H. pachyphylloides. First, the continuing closure of the canopy which will cause further loss by shading at Coldwell Rocks. Second, two subpopulations at Symonds Yat are seriously endangered by, yet partly maintained by, rock climbing. Climbing is very popular at Symonds Yat (Willson 1999) and during the good weather there are regularly large groups of school children on adventure activities during the week, and literally hundreds of recreational climbers may be present at the weekends. On the one hand the climbers trample the vegetation (including H. pachyphylloides) underfoot and sometimes very locally remove plants from the cliff faces (McMillan & Larson 2002; Müller et al. 2004;
Kuntz & Larson 2006), but on the other hand they help to maintain the cliff bases and tops open by their access paths. The balance between damage and benefit is very fine. Stopping the climbing activities completely would probably result in the plants being shaded out within a few years. The best way to protect *H. pachyphylloides* in this area is to regularly monitor the populations and work with the rock climbing community to control access to specific climbs when threats are perceived.

There are three main threats to *H. vagicola*. First, climbing, which is not as popular at Woodcroft Quarry as at Symonds Yat, and does not include school groups. At this quarry, the forthcoming fourth edition of Willson’s (1997) climber’s guide will specifically mention *H. vagicola* with a request for its conservation and advise climbers of its occurrence including re-routing of some climbs. Second, further development of the quarry, which still has extant extraction permissions, could result in further loss. The quarry is excluded from the Lower Wye Gorge S.S.I. and thus *H. vagicola* is very vulnerable. Third, spread of alien plants such as *Buddleja* or *Cotoneaster microphyllus* Wallr. which are both already well-established in the quarry.

Further work is required to ensure ex-situ conservation of both these hawkweeds. A small batch of seed material of *H. pachyphylloides* has been deposited in the Millennium Seed Bank. One plant of *H. vagicola* is currently held in cultivation.

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**REFERENCES**


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HIERACIUM PACHYPHYLLOIDES AND H. VAGICOLA

APPENDIX 1. HISTORICAL RECORDS OF HIERACIUM PACHYPHYLLOIDES

V.C. 34 WEST GLOUCESTERSHIRE

Near Chepstow (ST59). Limestone cliffs and quarry base, Gloucestershire side of Wye, near Chepstow, 18 September 1893, W. A. Shoolbred (NMW).

Brockweir (SO50). Brockweir Common, wood, 20 June 1894, W. A. Shoolbred (NMW).


V.C. 35 MONMOUTHSHIRE

Piercefield (ST59). Piercefield, limestone cliffs above the Wye, 5 May and 3 September 1893, W. A. Shoolbred (NMW; Wade 1970).

V.C. 36 HEREFORDSHIRE


DOUBTFUL RECORDS:

Doubtful records:

Stroud, banks near, v.c. 34 West Gloucester (Riddelsdell et al. 1948).

Pwll Byffre, v.c. 42 Breconshire, 10 July 1929, H. J. Riddelsdell (BM); possibly a confused label.
APPENDIX 2. HISTORICAL RECORDS OF *HIERACIUM VAGICOLA*

V.C. 34 WEST GLOUCESTERSHIRE:
Cockshoot, Ban-y-gor (ST59). Beaucliffe (Shoolbred 1920).

DOUBTFUL RECORDS:
Symonds Yat, date ‘forgotten’ with 1 June 1895 added later, A. Ley (BM; sheet has a series of mixed and confusing labels).