Conservation of Britain's biodiversity: *Hieracium cacuminum*, Summit Hawkweed (Asteraceae)

T. C. G. RICH*

Department of Biodiversity and Systematic Biology, National Museum of Wales, Cardiff CF10 3NP

and

P. A. SMITH

128 Llancayo Street, Bargoed, Mid Glamorgan CF81 8TP

ABSTRACT

Hieracium cacuminum, Summit Hawkweed, is a rare endemic Welsh hawkweed which has been confused with *H. siluriense*. A review of the records and field work showed that 240 plants are known in three sites; it was not refound in three other sites. It occurs on Old Red Sandstone cliffs and rocks in the Brecon Beacons. It is 'Endangered' under the IUCN Threat Criteria.

KEYWORDS: Brecon Beacons, Endemic, *Hieracium siluriense*, IUCN Threat Criteria, Lectotype, Wales

INTRODUCTION

Hieracium cacuminum (Ley) Ley, Summit Hawkweed or in Welsh Heboglys y Copa, and *H. siluriense* (F. J. Hanb.) P. D. Sell, Silurian Hawkweed or in Welsh Heboglys y Silwriaid, are two Welsh endemic hawkweeds which have been confused historically as a result of mixed material being cited with the original description of *H. cacuminum* by Ley (1895). Consequently, the distribution information in Ley (1895, 1909), Pugsley (1948) and Sell & West (1968) included both species. Sell & Murrell (2006) have recently clarified that the material on which *H. cacuminum* was based referred only to material collected in 1888 on the central Brecon Beacon cliff, and the other records cited belonged to *H. siluriense*. In order to clarify the distribution of *H. cacuminum*, a Red Data Book species (Wigginton 1999), and to provide an IUCN Threat Category as required under the Global Plant Conservation Strategy (Secretariat for the Conservation of Biodiversity 2002), the records and ecology of *H. cacuminum* were reviewed, along with fresh field surveys, and are reported in summary herein; full details are held by T. Rich and are available on request.

Hieracium cacuminum was first described as *H. diaphanum* var. *cacuminum* by Ley (1895). A lectotype has been selected by P. D. Sell from material collected from a stream side, Brecon Beacons, 8 August 1888, A. Ley (herb. Ley, **CGE**) and is hereby designated by P.D.S. Hanbury (1904) used Ley's epithet when he transferred the variety to *H. vulgatum*. Later Ley (in Linton 1905) transferred it to *H. demissum*, and then raised it to species status after the Scandinavian *Hieracium* expert G. A. H. Dahlstedt had seen material in 1907 (Ley 1909).

Summary of synonymy:

Hieracium cacuminum (Ley) Ley, *J. Bot.* **47**: 51 (1909).

=*H. angustatum* (Lindeb.) Lindeb. subsp. *cacuminum* Zahn, in Engl., *Pflanzenr*. **76 (IV**, **280)**: 471 (1921).

=*H. demissum* Strömf. var. *cacuminum* Ley in W. R. Linton *Brit. Hier*. 74 (1905).

=*H. diaphanum* Fries var. *cacuminum* Ley, *J. Bot*. **33**: 86 (1895).

=*H. vulgatum* Fries var. *cacuminum* Hanb. in Bab. *Man*. ed. 9, 258 (1904).

Pugsley (1948) regarded *H. cacuminum* as an anomalous member of section *Tridentata*. Sell & West (1968) and Sell & Murrell (2006) treat it as a member of section *Oreadea.* The English and Welsh names are derived from the Latin *cacumen* = peak, extreme top.

*e-mail: tim.rich@museumwales.ac.uk

TABLE 1. REVISED HISTORICAL RECORDS OF *HIERACIUM CACUMINUM*

V.C. 42 BRECON			
'Brecon Beacons' (SO02)			
Brecon Beacons, central cliff	14 July 1886	A. Ley	**CGE**
Brecon Beacons, stream side	8 August 1888	A. Ley	**CGE** (Lectotype), **BM**, **NMW**
Brecon Beacons	25 August 1890	A. Ley	**BM**, Pugsley (1948)
Brecon Beacon, on the face of the cliff near the summit	26 August 1890	A. Ley	**BM**
Brecknock Beacon (=Brecon Beacon), precipice of the	26 August 1890	A. Ley & W. H. Purchas	**CGE**
Brecon Beacons, sandstone mountain cliff	15 August 1894	A. Ley & W. A. Shoolbred	**BM**, **CGE**, **LIV**, **NMW**
Brecon Beacons	28 July 1899	A. Ley	**BM**, **CGE**, **E**, **LIV**, **NMW**; Set of British *Hieracia* no. 116
Brecon Beacons, rocks near the path between the two beacons (original locality)	23 July 1902	W. R. Linton	**BM**, **CGE**, **E**, **LIV**, **NMW**; Set of British *Hieracia* no. 116; Linton (1903)
Cwm Tarrell (SN92)			
Cwm Tarrell, by a stream	24 July 1883	A. Ley	**BM**
Cwm Tarrell	August 1888	A. Ley	**BM**
Cwm Tarrell	1890	A. Ley	**BM**, Hanbury (1894)
Head of Cwm Tarrell, rocky mountainside	9 July 1895	A. Ley	**CGE**, Ley (1909)
Glyn Tarrell, cultivated	June 1953	P. D. Sell	**CGE**
Glen Tarrell, rocky outcrop at head of	10 July 1959	C. West	**CGE**
Taf Fechan (SO01)			
Taf-fechan, sandstone cliffs	15 August 1894	W. A. Shoolbred	**NMW**
Taf Fechan, 1 mile above the Ystrad	23 July 1900	A. Ley	**CGE**
Fan Gyhirych (SN8818)			
Y-fan-Gihirich	4 August 1898	A. Ley	**CGE**, Ley (1909)
Glyn Collwng (SO0519)			
Rocks at the head of Glyn Collwng (limestone)/ Collwng Daren, east side above railway	18 July 1908	A. Ley	**CGE**, Ley (1909)
V.C. 44 CARMARTHEN			
Llyn y Fan Fach (SN8021)			
Llyn y Fan Fechan, crags of	3 August 1899	A. Ley	**CGE**, Ley (1909)
Cultivated			
ex Brecon Beacons	June 1898, 28 July 1899	A. Ley	**BM**, **CGE**, **BEL**, **LIV**

IDENTIFICATION

Hieracium cacuminum is illustrated in Figure 1. Key field key identification features separating it from most other *Hieracium* species in South Wales are the flexuous stem with 3–6 stem leaves decreasing in size up the stem and without a clear basal rosette at flowering, and the few-headed inflorescence of capitula with dark involucres and very broad (1·7–2·3 mm wide), obtuse outer involucral bracts. Vegetative plants have similar rosette leaves to the lower leaves on the stems of flowering plants, but where similar species (such as *H. siluriense*) were present and there was doubt about the identification, these were not recorded.

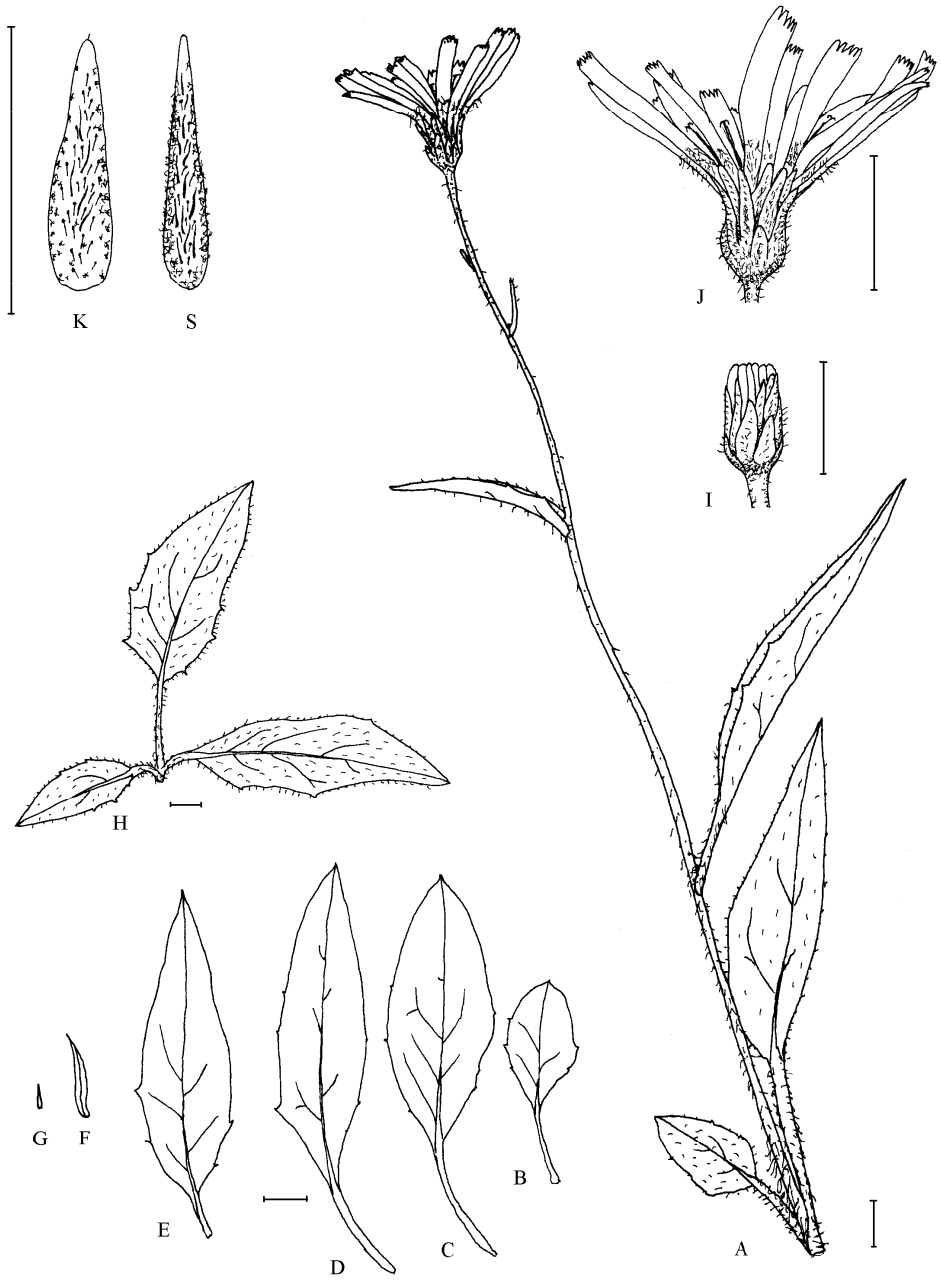

FIGURE 1. *Hieracium cacuminum* and *H. siluriense.* A–K, *Hieracium cacuminum.* A, Whole shoot. B–G, Stem leaves from base showing decrease in size up stem (details of hairs not shown). H, First year rosette. I, Bud. J, Capitulum. K, Involucral bract. S, Involucral bract of *H. siluriense*. Scale bars 1 cm. Del. T. Rich.

Hieracium siluriense differs from *H. cacuminum* in usually having at least a loose basal rosette with 0–2(–3) stem leaves and narrower (to 1·7 mm wide), acute or subacute outer involucral bracts. The number of stellate hairs on the margins of the involucral bracts varies in both species, but in general there are more in *H. siluriense*. Full descriptions of both species are given by Sell & Murrell (2006).

DISTRIBUTION

Historical records were compiled from herbaria (**BEL, BM, CGE, E, LIV, NMW**), literature and the *Hieracium* database maintained by D. J. McCosh. The revised records of *H. cacuminum* are given in Table 1. *Hieracium cacuminum* has been recorded in six sites in two vice-counties in the Brecon Beacons in Wales, where it is endemic.

The historical records were used to direct field work, principally carried out in July 2004. Voucher specimens have been placed in the Welsh National Herbarium (**NMW**).

BRECON BEACONS (CENTRAL CLIFFS)

105 flowering *H. cacuminum* plants were found scattered along the cliff ledges on the NE facing side of Pen-y-fan on Old Red Sandstone between SO013215 and SO017212. They were often in clustered subpopulations, characteristically occurring on the sides of steep 'alcoves' formed by streams eroding the cliffs. The population estimate is a minimum as the crumbling sandstone cliffs are difficult to access safely. *Hieracium siluriense* is also present on the cliffs in greater numbers.

Other crags of the central Brecon Beacons were also searched. Cribyn (SO0221) had some suitable ledges, with some *H. siluriense* and an unknown species. Craig Cwm Cynwyn (SO0220) had locally frequent *H. siluriense* and one clump of *H. argenteum* Fr. The rocks on the NE side of Fan y Big (SO0320) and Craig Cwarell (SO0420) were rather acidic and no *Hieracium* was seen. Corn Du (SO0021) had no suitable ledges.

CWM TARRELL, CRAIG Y FRO

Cliffs, rocks and gullies at the head of Cwm Tarrell were searched and *H. cacuminum* was found in two places on Craig y Fro. Nineteen flowering and c. 100 vegetative plants occurred on Old Red Sandstone cliffs by a waterfall at SN973203, and 4 flowering and 10 vegetative plants occurred on a small west-facing cliff at SN970206. At least five other *Hieracium* species were also present including *H. siluriense*.

FAN GYHIRYCH

The north-facing corrie has a low line of cliffs with a strongly calcifuge flora, and the only hawkweed seen was one patch of *H. sparsifolium* Lindeb.

GLYN COLLWNG

Two flowering plants of *H. cacuminum* were found on the rocks on the west side of the waterfall of Nant Bwrefwr, immediately outside the car park at SO055175, with *H.* cf. *diaphanum* agg. Two other *Hieracium* species were collected further upstream. No *H. cacuminum* was found elsewhere.

TAF FECHAN

The imprecise nature of the records made searching difficult, and no *H. cacuminum* was found in areas searched. *Hieracium siluriense* occurred at and below Neuadd Reservoir, and other species were found downstream in shaded woodlands. No *H. cacuminum* was seen on Graig Fan Ddu (SO0119) or Craig Gwaun Taf (SO0020).

LLYN Y FAN FACH

No *H. cacuminum* was found during extensive searches of the cliffs above the lake in 1999 and 2002, and it is probable that intensive sheep grazing has eliminated this and up to seven other hawkweeds which were recorded/collected by A. Ley 100 years ago.

The records are mapped in Figure 2. A total of c. 240 plants were seen in three sites in three hectads in one vice-county. It was not refound in three sites, but some of the localities are very imprecise and the original site may not have been found.

BIOLOGY AND ECOLOGY

Hieracium cacuminum is a polycarpic perennial which is dispersed by seed. Buds of two capitula were excised with scissors to remove the stigmas and anthers in a green-house, and covered; seeds were set in both excised and control buds, showing that reproduction is apomictic (voucher in **NMW**). The chromosome number is not known, but it is likely to be polyploid.

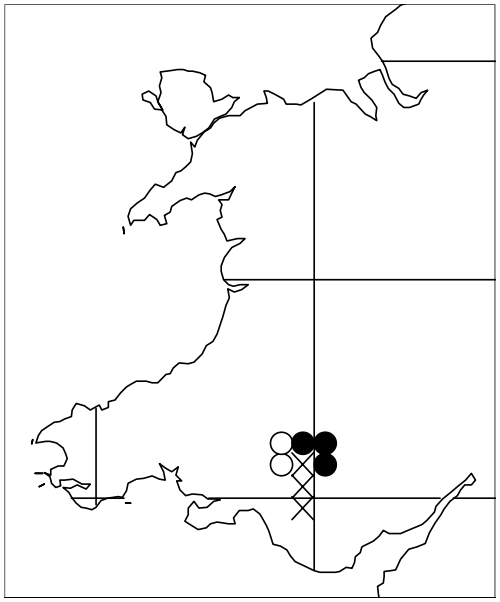

FIGURE 2. Distribution of *Hieracium cacuminum*. (● 2004–2005. O pre-2004. × = errors, mostly referable now to *H. siluriense*).

All populations of *H. cacuminum* occurred on low cliffs of Old Red Sandstone, either rooted in crevices or on immature soils derived from the sandstone. The ledges have vegetation 10–30 cm tall, with a moderate mixture of species. Typical species associated with *H. cacuminum* were *Festuca ovina* L. agg. (including *F. vivipara* (L.) Sm.), *Solidago virgaurea* L., *Luzula sylvatica* (Huds.) Gaudin, *Deschampsia flexuosa* (L.) Trin, *Rhytidiadelphus loreus* (Hedw.) Warnst. and *Polytrichastrum alpinum* (Hedw.) G.L. Sm. In a few places *H. cacuminum* is also associated with more calcicolous species such as *Campanula rotundifolia* L. and *Thymus polytrichus* A. Kern. ex Borbás. The upland cliffs of Pen-y-fan in which *H. cacuminum* occurs are probably best ascribed to the U16 *Luzula sylvatica – Vaccinium myrtillus* cliff ledge vegetation of the national vegetation classification (Rodwell 1992).

All the sites are heavily grazed by sheep, and *H. cacuminum* is confined to ungrazed ledges and rocks. It is likely to be susceptible to grazing, like most other *Hieracium* species.

Soil pH, measured with a pHep2 Hanna pocket-sized pH meter in a 50:50 mixture with distilled water of soil samples collected from around the roots, were pH 3·9 (ledge) and 7·1 (by waterfall) at Craig y Fro, and pH 3·7, 4·2 and 4·5 from ledges on Pen-y-fan. This range suggests that it is tolerant of both acid and calcareous soils. The soils were all damp but not waterlogged.

The altitudinal range was c. 480 m at Craig y Fro to c. 650 m on Pen-y-fan.

CONSERVATION

Under the IUCN (2001) Threat Criteria, *H. cacuminum* qualifies as 'Endangered' (total population less than 250 individuals, population declining). The remaining populations on Pen-y-fan and Craig y Fro are probably tolerably safe, as they are within the Brecon Beacons SSSI and SAC within the Brecon Beacons National Park. Although these designations offer no specific protection for *H. cacuminum*, the SAC is designated for the acidic and calcareous chasmophytic vegetation and the cliff ledge vegetation, in which *H. cacuminum* occurs. The two plants at Nant Bwrefwr are not in any designated sites, are close to a public car park and picnic area, and are highly threatened.

The biggest threats to *H. cacuminum* are from rock-falls, which could eliminate local populations, and over-grazing. It is possible that the decline in the three sites is attributable to over-grazing, though without knowledge of the precise original localities this is difficult to assess. Forestry or development of reservoirs could also be responsible for the loss from Taf Fechan. A reduction in grazing throughout the Brecon Beacons would benefit this and other *Hieracium* species.

Seed was collected from Craig y Fro and Pen-y-fan for the Millennium Seed Bank on 23 July 2004. No live collections are currently held in cultivation in botanic gardens.

ACKNOWLEDGMENTS

We would like to thank Joe Daggett and the National Trust, Andy Jones, David McCosh, Graham Motley, Mike Porter, Robin Walls and the Keepers of the Herbaria for access to libraries and specimens, and Peter Sell for allowing us to publish his lectotypification. The Countryside Council for Wales funded collation of the historical records.

REFERENCES

HANBURY, F. J. (1894). Notes on British *Hieracia*. *Journal of Botany* **32**: 225–229.
HANBURY, F. J. (1904). *Hieracium*, in Babington, C. C. (1904). *Manual of British Botany*. 9th ed. Gurney & Jackson, London.
IUCN (2001). *IUCN Red list categories and criteria. Version 3.1*. IUCN, Gland.
LEY, A. (1895). Short notes. *Hieracium diaphanum* Fr. var. *cacuminum*, n. var. *Journal of Botany* **33**: 86–87.
LEY, A. (1901). *H. nitidum*, Backh., var. *siluriense*, F. J. H. *Report of the Botanical Exchange Club of the British Isles for 1900*: 637.
LEY, A. (1909). Brecon and West Yorkshire hawkweeds. *Journal of Botany* **47**: 8–16 and 47–55.
LINTON, W. R. (1903). *Hieracium vulgatum*, var. *cacuminum*. *Report of the Botanical Exchange Club of the British Isles for 1902*: 54.
LINTON, W. R. (1905). *An account of the British Hieracia*. West, Newman & Co., London.
PUGSLEY, H. W. (1948). A prodromus of the British *Hieracia*. *Journal of the Linnean Society of London (Botany)* **54**: 1–356.
RODWELL, J. S., ed. (1992). *British plant communities*. *Volume 3. Grasslands and montane communities.* Cambridge University Press, Cambridge.
SECRETARIAT FOR THE CONSERVATION OF BIODIVERSITY (2002). *Global strategy for plant conservation*. Secretariat for the Conservation of Biodiversity, Montreal.
SELL, P. D. & MURRELL, G. (2006). *Flora of Great Britain and Ireland*. Volume 4. Cambridge University Press, Cambridge.
SELL, P. D. & WEST, C. (1968). *Hieracium* L., in, PERRING, F. H., ed., *Critical Supplement to the Atlas of the British flora*. BSBI, London.
WIGGINTON, M. J., ed. (1999). *British Red Data Books. 1. Vascular Plants.* 3rd ed. Joint Nature Conservation Committee, Peterborough.

(*Accepted January 2007*)