

## Conservation of Britain's biodiversity: *Hieracium linguans* (Zahn) Roffey (Asteraceae), Tongue Hawkweed

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### ABSTRACT

*Hieracium linguans*, Tongue Hawkweed, is a very rare endemic Welsh species. It was first found in 1898 by A. Ley in the Brecon Beacons (v.c. 42), Wales. It was initially named as a variety and later raised to species level, its current status. It is a distinct member of Section *Tridentata*. The historical herbarium and literature records were somewhat confusing, but indicate three localities in the Tawe Valley. In 1999 and 2000, only one population of about 80 plants was found in Cwm Haffes (the type locality); it was not refound in the other two localities. Records from Upper Nedd Glen, Llyn y Fan Fach and the Upper Tywi are probably errors. It is a polycarpic perennial which flowers in July–August, and regenerates readily from wind-dispersed seeds. Although it is very rare, it does not seem to be significantly at risk. Seed has been deposited in the Millennium Seed Bank and it is being cultivated at the National Botanic Garden of Wales.

KEYWORDS: Compositae, Endemic, Lectotype, rare species, Wales.

### INTRODUCTION

*Hieracium linguans* (Zahn) Roffey (Asteraceae), Tongue Hawkweed (from the Latin *lingua*, meaning tongue), is a very rare, endemic species. Along with 79 other rare hawkweeds, it has been included in the 3rd edition of the *Vascular Plant Red Data Book* (Wigginton 1999). In 1999 David McCosh, who provided the original list of species for the Red Data Book, suggested that this species would be worth re-surveying as there were no recent records. A joint project was therefore set up between the National Museum & Gallery, Cardiff and the Countryside Council for Wales to establish its current status and determine its need for conservation. In this paper the information about *H. linguans* is summarised; full details can be found in Rich (1999), updated here with additional field work in July 2000.

### TAXONOMY

Plants that are now called *Hieracium linguans* were first found by Augustin Ley in the Brecon Beacons on 2–3 August 1898. He subsequently distributed specimens through the Botanical Exchange Club (B. E. C.) as '*H. gothicum?*' (Ley 1900). When it became apparent that there was no name for the plants, Ley described them as var. *lingua* of *H. sparsifolium* Lindeb. in Linton (1905), and subsequently distributed many more cultivated specimens through the B. E. C. (Ley 1907, 1908). Zahn (1922) raised Ley's variety to subspecies level, but transferred it to *H. laevigatum* Willd. and provided it with the new subspecific name *linguans* Zahn in the process (probably to avoid confusion with another taxon of uncertain status, subsp. *lingua* Dahlst.). Roffey (1925) raised it to a species, its current status. The two synonyms of *H. linguans* (Zahn) Roffey are thus *H. laevigatum* Willd. subsp. *linguans* Zahn (basionym) and *H. sparsifolium* Lindeb. var. *lingua* Ley ex W. R. Linton.

A type specimen (probably selected by H. W. Pugsley and designated here as the lectotype), labelled 'Haffes Glen, West Brecon, 2 August 1898, A. Ley' is in the Natural History Museum (**BM**).

*Hieracium linguans* belongs to sect. *Tridentata* (Fr.) Arv.-Touv., of which there are at least twelve species in South Wales. Pugsley (1948) gave its distinguishing features as the oblong-elliptic to linear-oblong, sinuate-dentate medium stem leaves, the racemose-corymbose inflorescence with 4–8 large capitula on long, suberect branches, the greyish-green broad, densely floccose phyllaries with numerous unequal, short, dark-glandular and fewer longer dark-based pilose hairs, and dark styles. However, Pugsley's description includes cultivated material, which is more robust than the wild material. A comparison of plants in the field with wild-collected specimens in herbaria suggests that the latter were also selected as the larger plants. Most plants observed in the wild in 1999 (see below) were less than 20 cm tall, had only one stem (rarely two stems) and up to four capitula (rarely up to 12 capitula).

#### DISTRIBUTION

##### HISTORICAL INFORMATION

Locality and habitat information was extracted from herbarium sheets at **BIRM**, **BM**, **CGE**, **LIV**, **OXF** and **NMW** and from the literature (e.g. Perring 1968, Ellis 1983). Records from the *Hieracium* database were provided by D. McCosh. No records are held in the Rare Plants Database used to compile the Red Data Book (Wigginton 1999).

There has been significant confusion about the records, possibly partly due to a note from a B.E. C. report probably referring to *H. scoticum* F. J. Hanb. being attached to a *H. linguans* specimen in **BM**, and partly to some specimens which have subsequently been identified as different taxa. The B.E.C. note (Ley 1900) indicated that '*H. gothicum* Backh?' had been found in Cwm Haffes (Capel Cellwen, now Callwen), Upper Nedd Glen and above Llyn y Fan Fach, but the style colour was noted as pure yellow which is not a character of *H. linguans*. Ley in Linton (1905) noted *H. linguans* from Cwm Haffes and the Upper Nedd Glen when he described it as a new variety and later noted 'this remarkable plant has not yet been detected except in West Brecon' (Ley 1909). Pugsley (1948) only cited material from Cwm Haffes.

Sell & West (1968) stated *H. linguans* was only recorded from rocky ledges in three localities in Brecon, and records were plotted in SN81, SN82 and SN84 on the map. The Biological Records Centre, Monks Wood holds details of the records in the *Critical Supplement*, but the cards for *H. linguans* could not be traced in 1999 (J. Croft, pers. comm., 1999). The SN81 record appears to be based on the well-known specimens from Cwm Haffes. The SN82 record may be based on 1906 material cultivated by A. Ley from Fan Fechan (**CGE**) originally determined as *H. linguans* in 1958 by P. D. Sell and C. West, but later redetermined as *H. scoticum* by P. D. Sell in 1983. The SN84 record is probably based on a specimen collected in 1955 by J. E. Raven in Llanwrtyd (**CGE**), later redetermined as '*H. ?subcrocatum*' by P. D. Sell in 1983. Ellis (1983) cited a record from the Upper Tywi based on a specimen collected by A. Ley in 1906 in **CGE**; the only such specimen is from the Upper Tawe Glen, and thus probably a confusion with the two adjacent river valleys with similar names. Records for the Nedd Glen (which would probably have been plotted in either SN81 or SN91) do not appear to have been accepted by recent authors and no material has been traced.

The historical records traced are summarised in Table 1. Some of the records may be duplicates labelled slightly differently (e.g. 'streamside near Capel Cellwen' and 'Haffes Glen' on 2 August 1898; Ley was not consistent in his labelling of specimens), and some dates are suspiciously one month or one year apart. There appear to be three distinct sites:

1. waterfall at the head of Cwm Haffes;
2. stony delta of the Haffes ('streamside near Capel Cellwen' assumed to be this too);
3. riverside rocks, Upper Tawe Glen.

TABLE 1. RECORDS OF *HIERACIUM LINGUANS*

Date	Collector	Site	Source and notes
2/8/1898	A. Ley	Capel Cellwen, streamside near	<b>BIRM, BM, LIV</b> ; det. P. D. Sell & C. West.
2/8/1898	A. Ley	Haffes Glen, West Brecon	<b>BM</b> ; type of var. <i>lingua</i> Ley.
2/8/1898	A. Ley	Haffys Glen, near Callwen	<b>BM</b> ; det. D. McCosh.
27/7/1899	A. Ley	Haffys Glen	<b>CGE</b> ; det. P. D. Sell.
27/8/1899	A. Ley	Waterfall in the Haffes Glen	<b>BM</b> ; det. P. D. Sell & C. West.
4/7/1906	-	Haffes Glen, Callwen	<b>LIV</b> ; det. J. N. Mills.
5/7/1906	A. Ley	riverside rocks, Upper Tawe Glen*	<b>CGE</b> ; det. P. D. Sell.
10/7/1906	A. Ley	stony delta of the Haffes*	<b>CGE</b> ; det. P. D. Sell.
12/7/1906	H. J. Riddelsdell	R. Haffes	<b>BM</b> ; det. D. McCosh
25/7/1955	J. E. Raven	Cwm Haffes	<b>CGE</b> ; det. P. D. Sell & C. West.
25/7/1955	C. E. Andrews	head of Cwm Haffes, rocks by water-fall	<b>BIRM</b> ; conf. T. Rich.
28/7/1956	J. E. Raven	(unlabelled, assumed Cwm Haffes)	<b>herb. D. McCosh.</b>
26/7/1957	B. A. Miles	side of large waterfall, Cwm Haffes	<b>CGE</b> ; det. P. D. Sell & C. West.
Cultivated material			
23/6/1906	A. Ley	West Brecon, cultivated at Sellack	<b>BM, CGE, LIV, NMW, OXF</b> (Ley 1907).
1/7/1907	A. Ley	West Brecon, cultivated	<b>BM</b> (Ley 1908).
26/6/1908	A. Ley	Brecon, cultivated	<b>BM</b> (labelled incorrectly as syntype), <b>CGE</b> .
17/7/1909	E. F. Linton	cultivated at Edmondsham	<b>NMW</b> ; det. D. McCosh.
Errors			
2/8/1898	A. Ley	Cliffs of Llyn-y-fan-fechan	Ley (1900); confusion of B.E.C. labels.
3/8/1898	A. Ley	Nedd Glen, Breconshire	Ley (1900); cited Upper Nedd Glen by Ley in Linton (1905), no material traced.
1906	A. Ley	Upper Tywi	Ellis (1983); error for Upper Tawe.
14/6/1906	A. Ley	Fan fechan, Carmarthen, cultivated	<b>CGE</b> ; redetermined as <i>H. scoticum</i> , P. D. Sell 1983, <b>LIV</b> (lacks collector or 'cultivated').
24/7/1955	J. E. Raven	Llanwrtyd, Brecon	<b>CGE</b> ; redetermined as <i>H. ?subcrocatum</i> by P. D. Sell, 1983.

\* = one specimen on a herbarium sheet representing two localities.

#### FIELD SURVEYS 1999–2000

The historical records were used to direct field work. Llyn y Fan Fach and the Nedd Glen were also investigated as there were some possible records.

#### 1. Cwm Haffes (also known as Glen Haffys, etc.)

Cwm Haffes is a large ravine cut by the River Haffes through the hillside above Callwen. It is the type locality for *H. linguans*, and also contains at least two other species, variously named it seems, one as *H. diaphanum* Fries, *H. submutabile* (Zahn) Pugsley and *H. anglorum* (Ley) Pugsley, and the other as *H. nidense* (F. J. Hanbury) Roffey (incorrectly), *H. substrigosum* (Zahn) Roffey and *H. uiginskyense* Pugsley s.l. (including *H. trinitatis* Pugsley).

The gorge was searched on 30 July 1999 by T.C.G.R. and G.S.M.. *H. linguans* was found on east-facing ledges of Sgwd Ddu, the upper waterfall, at SN829179, c. 450 m altitude, none being found elsewhere in the Cwm or its tributaries. The ledges occupied by *H. linguans* varied from dry rocky ledges to wet moss carpets depending on proximity to the waterfall. Fifty-three flowering and three vegetative mature plants were recorded. There were about 30 seedlings, mostly on moss carpets on the north side of the waterfall, indicating abundant potential for regeneration, though most mature plants occurred in mineral soil at the back of the ledges.

## 2. Stony delta of Cwm Haffes

The River Haffes delta below the Cwm Haffes gorge is about 300 m long and consists of many huge boulders and shingle with patches of grassland and scrub. The upper part is heavily grazed and no *Hieracium* plants were found on 30 July 1999. The lower part is partly included in a grazed field, and partly in an ungrazed caravan site; *H. cf. diaphanum* was the only species found at the latter on 19 July 2000.

## 3. Upper Tawe Glen

Ley appears to have recorded several *Hieracium* species from 'Upper Tawe Glen', but his meaning is unclear. It might refer generally to the Tawe valley north of Callwen, or perhaps more strictly to Nant y Llyn (SN8420) as he cited the locality of *H. tavense* using the same words (see Rich & Houston 2000), or might even refer to Cwm Haffes. The unique combination of habitat and locality (cf. Table 1) suggests it is a distinct site from the Cwm Haffes sites.

On 19 July 2000 all tributaries and ravines of the Tawe above Callwen were searched without success, though at least seven other *Hieracium* species were found.

## 4. Llyn y Fan Fach

Whilst there is some potential for confusion, it seems very likely that the corrie above Llyn y Fan Fach (c. SN8021) is the same site that A. Ley called 'Fan-fechan, Carmarthen' as there are many of his other records which equate to this site (a Brecon 'Fan Fechan' at SN8319 has no suitable habitat). Although the historical records are known to be in error a search was considered worthwhile due to its proximity to Cwm Haffes and large areas of potential habitat. The cliffs above the lake were searched from below on 5 August 1999 without success, although six other *Hieracium* species were seen.

## 5. Upper Nedd Glen

The unconfirmed historical records for Nedd Glen and Upper Nedd Glen suggested a search would be worthwhile. The area above Blaen-nedd Isaf (SN9114) is a shallow valley with some ravines and waterfalls on the west side; it was searched twice unsuccessfully in 1999 (five other *Hieracium* species seen, including *H. scoticum*). The area to the south, a wooded gorge over limestone, was searched once but is unsuitable habitat (only one *Hieracium* species seen).

The fact that Ley specifically stated this was a site for his new variety is puzzling, but in the absence of material no firm conclusion can be drawn as to whether it was there or not; it is currently thought to be an error.

Thus *H. linguans* is now only known from one locality, with a total population of about 80 plants in 1999, and it could not be refound at the other two localities. Given the general difficulty of identifying *Hieracium* and the large areas over which it might occur, it would not be surprising if other unknown populations existed. An updated distribution map is given in Figure 1.

## ECOLOGY

### LIFE CYCLE

*Hieracium linguans* is a perennial. It flowers in late July and early August and is probably an obligate apomict like the other *Hieracium* species. The mean number of capitula per plant at Sgwd Ddu in 1999 was 2.6 (ranging 1–12); over half of the plants had only one or two flowering heads. Of the 53 flowering plants, five had aborted inflorescences. It produces abundant fruit, and the seeds have a small pappus and are generally wind dispersed. Some seeds may have been washed down Cwm Haffes, occurring on shingle far below the classic waterfall site. Seedlings were observed in mid-summer before fruit was shed suggesting that germination mainly occurs in the spring.

Ley (1908) noted it grew readily in the garden and increased by seed.

### HABITAT

The rocks of the Sgwd Ddu waterfall are composed of the Plateau Beds of the Farlow Series of the Devonian Upper Old Red Sandstone (Geological Survey of Great Britain 1979), which form a hard



FIGURE 1. Distribution map of *Hieracium linguans*. ● 1999; × probable erroneous records. Plotted using DMAPW.

outcrop with ledges and exposed rocks. The *H. linguans* plants were rooted in immature rankers on the ledges, directly into rock crevices with no apparent soil, or into moss carpets in the wetter areas near the waterfall itself. Soil from the base of one plant was pH 5.7 (measured with a pHep2 Hanna pocket-sized pH meter in a 50:50 mixture with distilled water).

Vascular plants recorded on the ledges associated with *H. linguans* were *Ajuga reptans* L., *Anemone nemorosa* L., *Arrhenatherum elatius* (L.) P. Beauv. ex J. & C. Presl, *Asplenium viride* Huds., *C. pulicaris* L., *Carex viridula* Michx., *Cirsium palustre* (L.) Scop., *Festuca rubra* L., *Filipendula ulmaria* (L.) Maxim., *Galium palustre* L., *Holcus lanatus* L., *H. mollis* L., *Lychnis flos-cuculi* L., *Molinia caerulea* (L.) Moench, *Phegopteris connectilis* (Michx.) Watt, *Pinguicula vulgaris* L., *Rumex acetosa* L., *Taraxacum* sp., *Valeriana officinalis* L., *Vicia sepium* L. and *Viola riviniana* Rchb., with the bryophytes *Aneura pinguis* (L.) Dumort., *Bryum pseudotriquetrum* (Hedw.) P. Gaertn., B. Mey. & Scherb., *Ctenidium molluscum* (Hedw.) Mitt., *Dicranella palustris* (Dicks.) Crundw. ex E. F. Warb., *Fissidens adianthoides* Hedw., *Palustriella commutata* (Hedw.) Ochyra var. *commutata*, *Pellia endiviifolia* (Dicks.) Dumort., *Philonotis fontana* (Hedw.) Brid. and *Preissia quadrata* (Scop.) Nees. The vegetation on the ledges is somewhat heterogeneous and did not fit any community of the National Vegetation Classification (Rodwell *et al.* 1991 *et seq.*). Only a few small shrubs were present and the waterfall was essentially unshaded.

#### CONSERVATION

*Hieracium linguans* 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. The Cwm Haffes waterfall is included within the Mynydd Du (Black Mountain) S.S.S.I., and is also part of the Brecon Beacons National Park. These designations give a significant degree of protection to the site, and thus to the species. The land is common land managed under an agreement by the Brecon Beacons National Park Authority. Re-surveys every five years are likely to be sufficient to monitor its survival.

Although the area around the waterfall is intensively grazed, the *H. linguans* cliff is inaccessible to sheep, and thus essentially unmanaged. No management is currently required, and the only potential management in the future might be control growth of scrub or trees.

The main threats to its survival in Cwm Haffes are potential rock falls (here considered relatively unlikely) and hydroelectric schemes with consequent changes in water regime (a scheme was proposed for this river in 1997). It is difficult to be certain of causes for loss elsewhere, but grazing might have contributed to its disappearance from the delta below Cwm Haffes. Responses to long-term climate change are also unknown, but as it grows readily in cultivation it is likely to survive warmer temperatures. There are minor potential threats from collecting by botanists (most of the plants are out of reach) or potential damage by rock climbers (most likely to be ice climbing in cold winters).

Seeds from seven plants were collected on 30 July 1999 and sent to the Millennium Seed Bank at the Royal Botanic Gardens, Wakehurst Place for long-term storage. It is also being cultivated at the National Botanic Garden of Wales.

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