

Hieracium portlandicum (Asteraceae), a new endemic hawkweed from the Isle of Portland, England related to *Hieracium leyanum*

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ABSTRACT

A new species of hawkweed is described. *Hieracium portlandicum* differs from *H. leyanum*, within which it was previously included, in being less hairy, and in having narrower, acute, light greyish-green, less hairy involucre bracts. It is a triploid apomict. *Hieracium leyanum* is a tetraploid apomict. *Hieracium portlandicum* is endemic to the Isle of Portland, Dorset, England, where it occurs on Portland Limestone rocks, and on soils derived from it. 103 plants are currently known from two sites, and a comparison against historical data indicates that it is declining. It is 'Endangered' under the IUCN Threat Criteria. Some distribution data are also given for *H. leyanum* which is 'Vulnerable' under the IUCN Threat Criteria. A lectotype for *H. pollinarium* var. *platyphyllum* on which *H. leyanum* is based is designated from Wales.

KEYWORDS: Compositae, chromosome number, lectotype, pollen viability, reproductive biology.

INTRODUCTION

The identity of a *Hieracium* species of the Isle of Portland, Dorset (v.c. 9) has been uncertain since it was first found by W. C. Medlycott in 1879. Ley *et al.* (1908) referred it to *H. leyanum* (Zahn) Roffey (under the synonym *H. platyphyllum*), and noted that the Portland record was a curious extension of range for what was otherwise an endemic species of

South Wales and the adjacent English counties. E. F. Linton (in Ley *et al.* 1908) also noted that the Portland plant differed from *H. leyanum* in characters which might have been due to climate and situation, and suggested it would be worthwhile cultivating the two forms side by side to test the identification. Linton's differences between the taxa noted on a herbarium sheet in **BM**, updated with modern terminology and with missing words added in square brackets, are as follows:

H. leyanum (as *H. platyphyllum*): Leaves with stellate hairs and scattered [simple eglandular] hairs beneath and on the margins; capitula rather large, thick truncate-based; involucre bracts big, broad, with long [simple eglandular] hairs and sparse stellate hairs.

Portland plant: Leaves hairy on both surfaces; capitula medium (not large); involucre bracts [small, narrow], with short, black-based [simple eglandular] hairs and stellate hairs; shortish glands very few on base of involucre bracts and peduncles.

Pugsley (1948) noted that the Portland plant differed materially from *H. leyanum* in having much narrower involucre bracts and deserved further investigation. Sell & West (1968) agreed it differed slightly but not enough to merit specific rank, and noted that the plant had not been seen in Portland 'in recent years'. Bowen

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(2000) listed it from four localities, including two recent ones, and noted that his use of the name *H. leyanum* was provisional, and his card index (currently held by D.A.P.) gives an additional site. Sell & Murrell (2006) retain it within *H. leyanum* and also suggest that the Portland plants are a good match for *H. rubicundiforme* (Zahn) Roffey.

In 2003, T. C. G. Rich began collating information on *H. leyanum* as part of a project on critical Welsh taxa and, intrigued by the isolated Portland locality, asked B. Edwards and D. A. Pearman to collect Portland seed to grow for comparison with Brecon material. Seed was duly collected, and following cultivation of plants beside each other, as suggested by Linton (Ley *et al.* 1908), the Portland plant is now considered to merit recognition as a species in its own right.

METHODS

MORPHOLOGY

Seeds were collected from the one fruiting plant seen at West Weare, Portland on 20 July 2003 by B. Edwards and D. A. Pearman, and from several plants in each of Craig Cerrigleisiad, Cwm Tarrell and Darren Fach in Brecon in 2003 by T. C. G. Rich. Seeds were sown in damp John Innes no. 1 potting compost in a greenhouse and the resulting plants were grown on. Most seeds of the Brecon plants germinated in autumn 2003. Seedlings remained green during the winter, and they first flowered in June 2004. Three seeds of the Portland plant germinated in the spring of 2004 and flowered about three weeks after the Brecon plants. In 2005, one Portland plant flowered about five weeks after the Brecon plants (the other plant did not flower). The plants were compared side by side, and one specimen from each site was pressed (NMW).

Plants were also examined in the field, and herbarium material was examined in **BEL**, **BIRM**, **BM**, **CGE**, **DOR**, **E**, **LIV**, **MANCH**, **NMW** and **RNG**. Material of *C. West* in **MNE** has not been examined.

Terminology of hair lengths follows Sell & Murrell (2006).

CHROMOSOME COUNTS

Tips of actively growing roots were collected mid-morning and pre-treated in a 8-hydroxylquiniline for 20–24 hours in the fridge. They were then fixed in a 3:1 mixture of absolute ethanol: glacial acetic acid and stored until

needed in the fridge. Root tips were then hydrolysed in concentrated 5N HCl for 10 minutes at room temperature, then stored in 70% industrial methylated spirits. Meristems were dissected out in 45% acetic acid, and squashed between a microscope slide and coverslip in 0.1% aceto-orcein stain with brief flame treatment.

REPRODUCTIVE BIOLOGY

Two florets were taken from each herbarium sheet to assess potential pollen viability (Clea & Rich 2004). Anther rings were removed from florets with tweezers under a low-power binocular microscope, and placed onto a slide with a drop of Alexander's Stain (Alexander 1969), warmed briefly on the hotplate, then broken up with the tweezers to release the pollen. The preparation was then covered with a cover slip and replaced on the hotplate to improve the uptake of the stain. The slides were examined under a high-power compound binocular microscope for areas of dense pollen grains. Potentially viable grains were counted as those which were spherical with thick papillate cell walls which stained green and had cytoplasm inside which stained uniformly bright red. Deformed grains (rare) or those staining green only with very little or no red staining inside (i.e. with little or no cytoplasm) were considered infertile.

To test for apomixis, young but well-developed capitula were cut with scissors at about their middle to excise the anthers and styles, before the florets opened, and seed set recorded. Control capitula on adjacent peduncles were left for comparison.

FIELD SURVEYS

Historical and recent records from Portland (Appendix 1) were used to plan the field survey in 2005. These indicated that *H. leyanum* sensu lato had been recorded in three areas on Portland: West Weare, Verne plateau, and more extensively down the east side from East Weare to Church Ope Cove. On 22 June 2005 these sites were visited by B. Edwards and T. Rich, and data were collected on habitat, population sizes, soils and associated plant 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.

Details of *H. leyanum* were collected during field surveys of other rare Welsh hawkweeds between 2000 and 2003 by T. Rich, with more detailed surveys being carried out specifically for it in 2004 and 2005.

RESULTS

MORPHOLOGY

Cultivated plants from Portland and from Brecon were vegetatively similar in leaf shape and size, with the exception that the Portland plants lacked the glaucous bloom of Brecon *H. leyanum* and had more simple eglandular hairs on the stems, petioles and leaves. Both taxa had hairs on both sides of the leaves, but the Portland plants were more densely hairy. The youngest leaves of both species tended to be glabrescent on the upper surface. In flower, all plants had capitula with at least some of the characteristic stylose florets (i.e. the ligules do not fully develop and remain tubular with exerted styles), though more of the florets were stylose in the Brecon plants (this can however be quite variable even within a population, e.g. as observed at Cwm Tarrell in 2004, or Dyffryn Crawnon in 2005). The Brecon plants had capitula with broader bases and slightly larger ligules – to 25 mm long – compared to more rounded bases and ligules to 21 mm in the Portland plant, but the variation in extent of development of stylose florets made systematic comparison difficult. The involucre bracts were clearly different; those of the Portland plants were narrower (as noted by Pugsley 1948), acute, lighter greyish-green with fairly numerous, short (to 0.4 mm), black-based glandular hairs, a few, scattered, long simple eglandular hairs and fairly numerous, appressed stellate hairs, and those of the Brecon plants were broader, obtuse, darker greyish-green, with dense, short to medium length (to 0.6 mm), black glandular hairs, some scattered, long simple eglandular hairs and dense, appressed stellate hairs.

The main differences between herbarium specimens from Portland and from Brecon-Hereford were largely as set out by Linton on the BM herbarium sheet (cf. above) and as observed in the cultivated material. The density of stellate hairs on the leaves of Brecon-Hereford *H. leyanum* was variable, ranging from virtually absent in some plants to sparse in others; most specimens of the Portland plants lacked stellate hairs on the leaves, but a few had very sparse stellate hairs near the edges. The leaves of the Portland plants were noticeably more hairy on the upper surface than those of Brecon-Hereford *H. leyanum*, some plants of the latter being \pm glabrous on the upper surface, and the leaves of both taxa were

hairy below. Overall, the wild material was quite variable in hairiness at least at West Weare; sometimes plants were moderately hairy, sometimes they had dense, long, villose hairs. Portland plants were consistently more hairy than Brecon-Hereford plants. Long simple eglandular hairs were much more frequent on the involucre bracts of Brecon-Hereford material than in Portland material. The mean width of the long middle involucre bracts measured at about their middle was $1.54 \text{ mm} \pm 0.06 \text{ s.e.}$ ($n = 21$, range 1–1.8(–2.4) mm) for Brecon-Hereford *H. leyanum*, and $0.96 \text{ mm} \pm 0.12 \text{ s.e.}$ ($n = 25$, range 0.7–1.3 mm) for the Portland plants; a t-test showed that these widths were significantly different ($p < 0.001$).

Comparison of the herbarium material with cultivated material of the same origin showed consistent differences between the Portland and Brecon plants, indicating that the cultivated plants are representative of the character differences in wild plants, though there was overall more variation in hairiness in the wild. The glandulosity of the involucre bracts were more difficult to determine, probably due to drying and storage of the plants, and the differences in leaf coloration between fresh plants were not apparent in herbarium material.

In the field, the most immediately apparent gross differences between Portland and Brecon plants were the differences in size, basal rosette leaves and development of the stylose capitula. Most of the Portland plants were small (up to 15 cm high) and slender (Barrett (1912) quotes measurements taken by Mr Fulleylove in 1911 from the east side as ranging from 7.5–45 cm, and averaging 27 cm), compared to the bigger Brecon plants – usually at least 35–70 cm tall, with two or three robust stems. The Brecon plants had noticeably glaucous, larger and relatively broader basal rosette leaves with few or no hairs on the upper surface, whilst the Portland plants had basal rosette leaves green, smaller and narrower, and hairy on both surfaces. Most capitula of the Portland plants seen in 2005 were normal and well-developed, whilst most of the Brecon plants had most capitula stylose, with a few normally developed capitula.

CHROMOSOME COUNTS

One count of $2n = 27$ (triploid) was obtained for each of two different plants grown from the seed collected from one plant at West Weare, Portland in 2003. Three counts of $2n = 36$ (tetraploid) and one of $2n = c. 37$ were obtained

TABLE 1. POTENTIAL POLLEN VIABILITY IN *H. LEYANUM* S.L. ASSESSED USING ALEXANDER'S STAIN

Locality	Accession no.	Date	% viable*
Black Mountains, Brecon	NMW.25.149.5446b	1898	22, 52
Black Mountains, Brecon	NMW.25.149.5446	1898	0, 6
Black Mountains, Brecon	NMW.25.149.5446c	1898	6, 22
Craig Cerrig-gleisiad, Brecon	NMW.V.2003.1.9	2003	8, 14
Craig Cerrig-gleisiad, Brecon, cultivated	NMW.V.2004.3.184	2004	4, 48
Darren Fach, Brecon	NMW.V.2000.9.710	2000	66, 68
Darren Fach, Brecon, cultivated	NMW.V.2004.3.183	2004	10, 40
Storey Arms, Brecon	NMW.V.2004.3.180	2004	40, 56
		Average	28.9 (\pm 5.92 s.e.)
Church Ope Cove, Portland	BM000792509	1931	6, 12
Portland	NMW.85.58.3164	1907	12, 16
Portland	BM000792507	1907	10, 32
Portland	BM000792504	1907	10, 24
West Weare, Portland, cultivated	NMW.V.2004.3.182	2004	6, 8
		Average	13.6 (\pm 2.65 s.e.)

* Two florets examined for each accession

for plants grown from seed from Craig Cerrig-gleisiad, Brecon and one count of $2n = 36$ (tetraploid) for plants grown from seed from Darren Fach, Brecon.

REPRODUCTIVE BIOLOGY

Neither taxon produced much pollen; potential pollen viability was generally more variable in Brecon-Hereford *H. leyanum* than in the Portland plants (Table 1). Although Brecon plants on average had about twice as much viable pollen as the Portland plants, a t-test showed no significant difference in potential pollen viability between the two taxa ($P > 0.06$).

One excised capitulum on each of two plants from Brecon and on one plant from Portland, and all control capitula, set seed, indicating that reproduction is apomictic in both Brecon and Portland plants, as it is for most other British *Hieracia* (vouchers in NMW). Pollen may therefore not be involved in seed production.

FIELD SURVEY 2005

At West Weare, Portland, 98 plants were found in block boulder scree in five scattered subpopulations of varying size (2, 3, 22, 35 and 36 plants). On the east side of the island, where there were probably once extensive populations, only five widely-separated plants were found between Church Ope Cove and Durdle Pier (population sizes 1, 1, 1 and 2 plants) on the side or tops of larger boulders on the more prominent ridges in the boulder field. Both of

these areas were very difficult to search, due to the nature of the terrain, and there is little doubt that more plants are present, but the decline from being 'plentiful' between Durdle Pier and Church Ope Cove (Barrett 1912) to 'rare' in 2005 is real. No plants were found at East Weare or Verne, most of the latter area either having been quarried or modified since it was recorded in 1925. Full details of the populations have been deposited at the Dorset Environmental Records Centre, English Nature and the B. S. B. I. Threatened Plants Database.

The Portland plants varied in size from small plants c. 10 cm tall with no or one stem leaf and two or three capitula, on the tops and sides of boulders, to larger plants 30–40 cm tall with one or rarely two stems leaves and many stems and capitula, on the deeper soils between boulders or in sheltered crevices. The plants were mostly in full flower at the time of survey, and one or two capitula had already set seed (flowering has been observed continuing until at least mid-July in previous years). Of the 103 plants found, 92 were flowering and 11 were vegetative, and the remains of some dead stems from 2004 showed that many plants, but not all, had flowered in successive years. Examination of the whorls of old leaf scars on the rootstock and stems below the current year's rosette of one plant indicated that it was at least 15 years old. Regeneration was noted in two of the sub-populations at West Weare, but

not in any of the other sub-populations. The block boulder screes and rocks are relatively unstable as the underlying Jurassic clays slip and move, and the populations probably are somewhat dynamic within this area.

The Portland plants were usually either growing directly on boulders of Portland Limestone, rooting into tiny cracks or crevices, or between boulders or in crevices in fine grit derived from the limestone. Two soil samples collected from West Weare had pH values of 6.7 and 6.8. Plants growing directly on rocks with virtually no soil are extremely drought-prone, and sea mist may be important in providing significant water during the summer. The current altitudinal range is c. 10–40 m, though historically the record from Verne plateau would have been at c. 100 m altitude.

The vegetation on the rocks or boulder scree was typically very open (from less than 1% to 10% cover) and varied in aspect and slope. It could not be equated to any recognisable plant community. The associated species were various combinations of *Asplenium rutamuraria* L., *Buddleja davidii* Franch., *Centranthus ruber* (L.) DC., *Cymbalaria muralis* P. Gaertn., B. Mey. & Scherb., *Festuca rubra* L., *Geranium robertianum* L., *Hedera helix* L., *Inula conyzae* (Griess.) Meikle, *Ligustrum vulgare* L., *Lonicera periclymenum* L., *Lotus corniculatus* L., *Mycelis muralis* (L.) Dumort., *Pilosella officinarum* F. W. Schultz & Sch. Bip., *Plantago lanceolata* L., *Rubia peregrina* L., *Sonchus oleraceus* L., *Viburnum lantana* L. and rarely *Euphorbia portlandica* L.

Historical and recent records of *Hieracium leyanum* sensu stricto are listed in Appendix 2. It was re-found in most localities and it could still occur at Red Daren and Fan y Big where there are large areas of inaccessible, crumbling rocks, but is unlikely to be still present at Craig y Cilau. It typically occurs in scrub or open rocks on Carboniferous Limestone or Old Red Sandstone, often in small, restricted populations.

DISCUSSION

To ascertain whether a new name is needed for the Portland plant, it is first necessary to lectotypify *H. leyanum* (Zahn) Roffey. The name *Hieracium ley[i]anum* (Zahn) Roffey was based on *H. sagittatum* Lindb. ex Stenstr. subsp. *leyianum* Zahn. This was a new name for the plant originally described as *H. pollinarium* F. J. Hanb. var. *platyphyllum* Ley (= *H. platyphyllum* (Ley) W. R. Linton) (Zahn

1921–1923), which was described from South Wales and Herefordshire by Ley (1898). A lectotype for *H. pollinarium* F. J. Hanb. var. *platyphyllum* is hereby designated as the sheet in herb. A. Ley (currently in CGE) collected by him and labelled ‘Taren ‘r Esgob, Breconshire, 12 July 1897’, with the corrected proofs of Ley’s (1898) *Journal of Botany* note attached. Thus *H. leyanum* is based on Welsh material.

The Portland plants differ consistently from Brecon-Hereford *H. leyanum* in morphology of the leaves and involucre, and in chromosome number. They merit recognition as a separate taxon, which for apomictic *Hieracium* is usually most appropriate at species rank:

***Hieracium portlandicum* T. C. G. Rich sp. nov.**

HOLOTYPE: on boulder in block boulder scree, West Weare, Portland, Dorset (v.c. 9), England, SY684730, 22 June 2005, B. Edwards & T. C. G. Rich, NMW (accession number V.2005.1.1).

Ab Hieracio leyanum foliis triste viridibus, in parte superiore pilis simplicibus eglandulosis satis numerosis vestitis, et involucri squamis angustis (circa 0.7–1.3 mm latis) acutis dilute cinereo-oviridibus, pilis stellatis appressis satis numerosis pilisque glanduliferis brevibus nigris satis numerosis vestitis, differt.

Differs from *H. leyanum* in having dull green leaves with fairly numerous simple eglandular hairs above, and narrow (c. 0.7–1.3 mm wide), acute, light greyish-green involucre bracts with fairly numerous appressed stellate hairs and fairly numerous short black glandular hairs.

Vernacular name: Portland Hawkweed.

Herbaceous, polycarpic, phyllopodous hemi-cryptophyte with branched rootstock and 1–6 stems, stems 9–45 cm high, with sparse to dense, medium length to long (to 3 mm), white simple eglandular hairs throughout and dense stellate hairs above. Basal rosette leaves to 8(–12) cm long, dull green on the upper surface with minor reddish-purple tints, green or flushed reddish-purplish below, the petioles to 2 cm, winged, ± villous with medium length to long simple eglandular hairs and occasionally sparse stellate hairs, the lamina 3–6(–8) cm × 2–4(–5) cm, broadly elliptic or ovate, truncate to rounded at the base, obtuse-mucronate to acute or acuminate at the apex, the margins sparsely but sharply denticulate towards the

base with forward-pointing teeth and remotely glandular-denticulate to entire towards the apex and with dense, ciliate, medium length simple eglandular hairs, moderately hairy with curved, medium length simple eglandular hairs on the upper and lower surfaces, especially on the lower midrib, sometimes densely so, and often more hairy below, the youngest leaves more or less glabrous on the upper surface. Stem leaves usually 0–1(–2), similar to basal leaves but usually lanceolate and acuminate at the apex and more sharply toothed, often with much smaller, linear-lanceolate or filamentous bracts at the base of the synflorescence branches (when present). Synflorescence racemose-corymbose with (1–)2–9(–17) capitula, with long, ascending to spreading branches and peduncles, with dense stellate hairs and scattered short, black-based simple eglandular hairs and very short, dark glandular hairs above. Capitula medium-sized c. 35–45 mm in diameter, rounded to truncate at the base. Involucral bracts connivent in bud, in flower 10–12 mm long (11–13 mm to base of involucre), light greyish-green with paler margins, narrow (middle involucral bracts 0.7–1.3 mm wide at middle), linear-triangular, acute, with fairly numerous, appressed stellate hairs especially on the margins, and with fairly numerous short, black glandular hairs and very few to few, short to medium length, black-based simple eglandular hairs. Ligules to 21 mm (or to 26 mm to base of involucre) but central florets often discoid and shorter, mid-yellow, glabrous at the tips, the tips often variably cut into linear-oblong lobes. Styles discoloured with greyish-black papillae and stigmas. Margins of receptacle pits weakly dentate. Seeds 3.0–3.8 mm, purplish-black. Flowering time: June–July.

Hieracium portlandicum is endemic to the Isle of Portland, Dorset (v.c. 9), England, where it has been recorded in at least three localities (Figure 1). The population survey in 2005 revealed a total of 103 plants, and it has clearly declined on the east side of Portland during the last 100 years, suggesting that it is best treated as 'Endangered' under the IUCN Threat Criteria (IUCN 2001). The main threats are currently development of scrub, and especially the spread of alien *Cotoneaster* species and possibly *Hedera helix* over its rocky outcrops near Church Ope Cove. The other alien species associated with *H. portlandicum* do not currently pose a significant threat. No other species of *Hieracium* are recorded from the Isle of Portland.

Hieracium portlandicum is illustrated in Figure 2, which also shows involucral bracts of *H. leyanum* for comparison. There is an excellent photograph of *H. portlandicum* in Bowen (2000, Plate 37). Pugsley (1948) and Sell & Murrell (2006) give descriptions of *H. leyanum*. Sell & West (1968) noted that *H. leyanum*, *H. angustisquamum* (Pugsley) Pugsley and *H. holophyllum* W. R. Linton had many characters in common with *H. caledonicum* F. J. Hanbury, which could be the parent from which they were derived; this is also likely to be the case with *H. portlandicum*. *Hieracium caledonicum*, which occurs in northern Scotland, differs from *H. portlandicum* in having smaller capitula with broader, obtuse involucral bracts, *H. holophyllum* differs in having obtuse involucral bracts and yellow styles, and *H. angustisquamum* differs in having usually three stem leaves and obtuse involucral bracts. Sell & Murrell (2006) suggested that the Portland plants were a good match for *H. rubicundiforme* (formerly *H. rubicundum* F. Hanb.), but they differ in having green, not deep bluish-green, leaves which are hairy on both sides and in the acute, not obtuse involucral bracts. No chromosome counts are available for these other related taxa.

Pugsley (1948) placed *Hieracium leyanum* in Section *Vulgata* (Griseb.) Willk. & Lange, but Sell & West (1968) placed it in Section *Oreadea* (Fr.) Arv.-Touv.; *Hieracium portlandicum* is best included with *H. leyanum* in the latter.

Hieracium leyanum sensu stricto has been recorded from 12 sites in four vice-counties (Fig. 3). It has been seen between 2003 and 2005 in eight sites in four hectads, all in v.c. 42 Brecon, with a total population size of at least 800 plants (Appendix 2). It was not refound in Monmouthshire or Herefordshire. It qualifies for listing in the current British vascular plant red data book (Wigginton 1999), and it is best classified as 'Vulnerable' under the IUCN Threat Criteria until comprehensive surveys can be carried out (IUCN 2001).

ACKNOWLEDGMENTS

We would like to thank the Keepers of the Herbaria cited, and John Bailey, Helen Cleal, Jenny Cripps, Trevor Evans, Lady Rosemary FitzGerald, Peta Hayes, Stephen Jury, Alex Lockton, David McCosh, Gina Murrell, Philip Oswald, Mike Porter, Chris Preston and Peter Sell for their help.

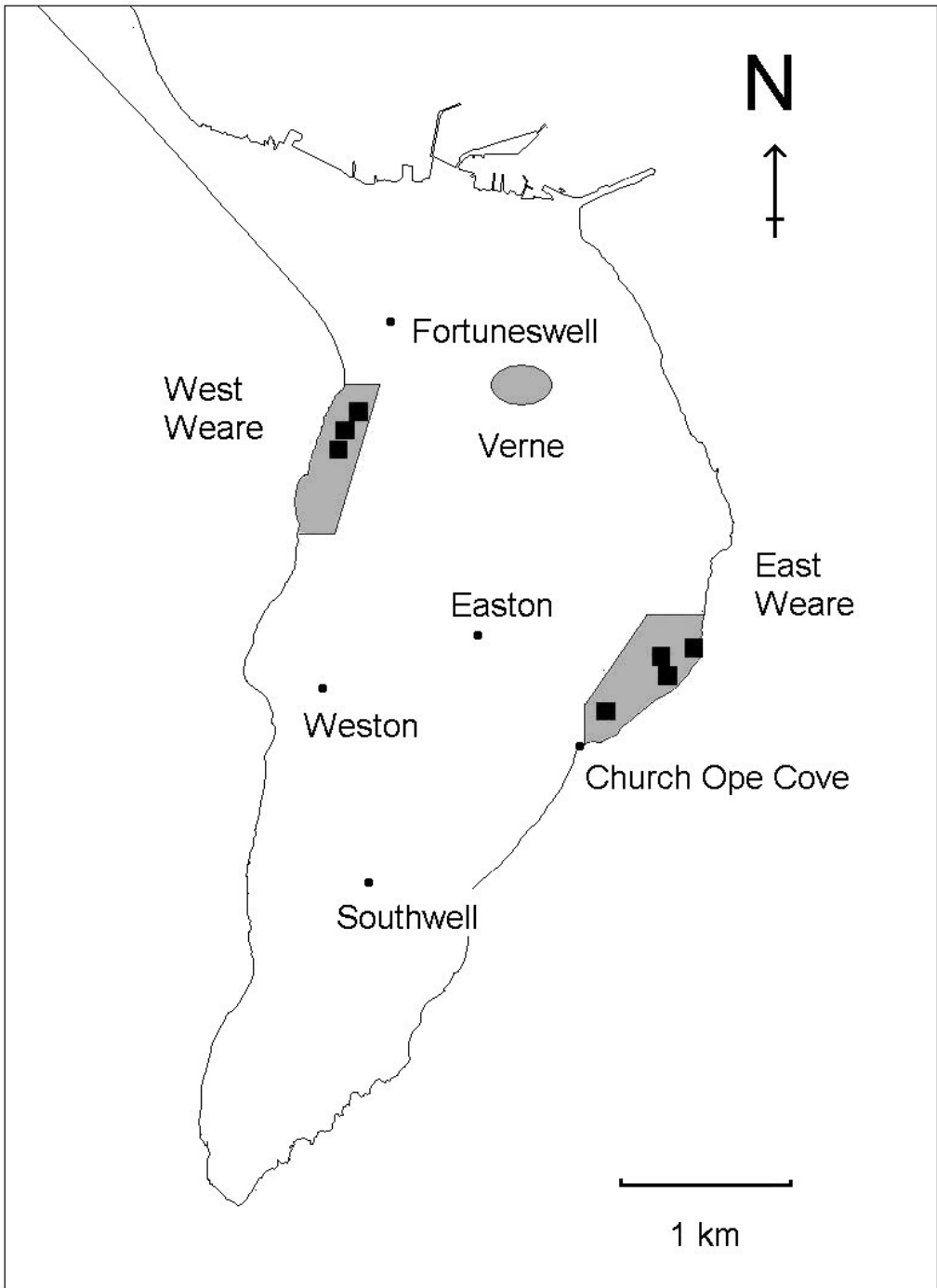


FIGURE 1. Distribution of *Hieracium portlandicum* on Portland, Dorset. ■, 2005. Grey shaded, approximate areas where it was recorded historically.

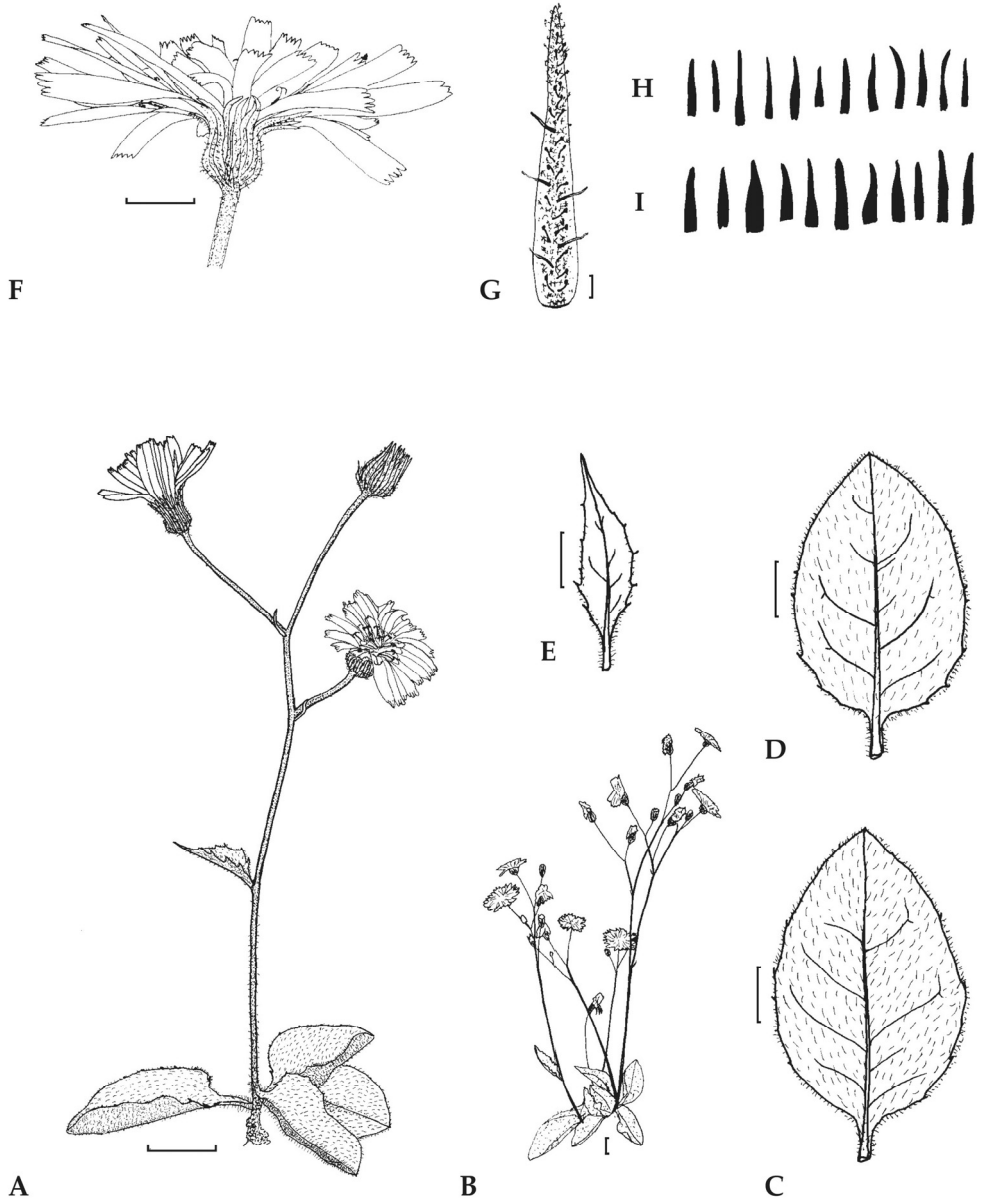


FIGURE 2. *Hieracium portlandicum*. A, Typical plant growing on a boulder. B, Habit of a larger plant growing in deeper soil. C, Lower side of rosette leaf. D, Upper side of rosette leaf. E, Upper side of stem leaf. F, Side view of capitulum. G, Involucral bract showing hairs types. H, Silhouettes of involucral bracts of *H. portlandicum*. I, Silhouettes of involucral bracts of *H. leyanum*. Scale bars: A, 2 cm; B–F, 1 cm; G, 1 mm. Del. T. C. G. Rich.

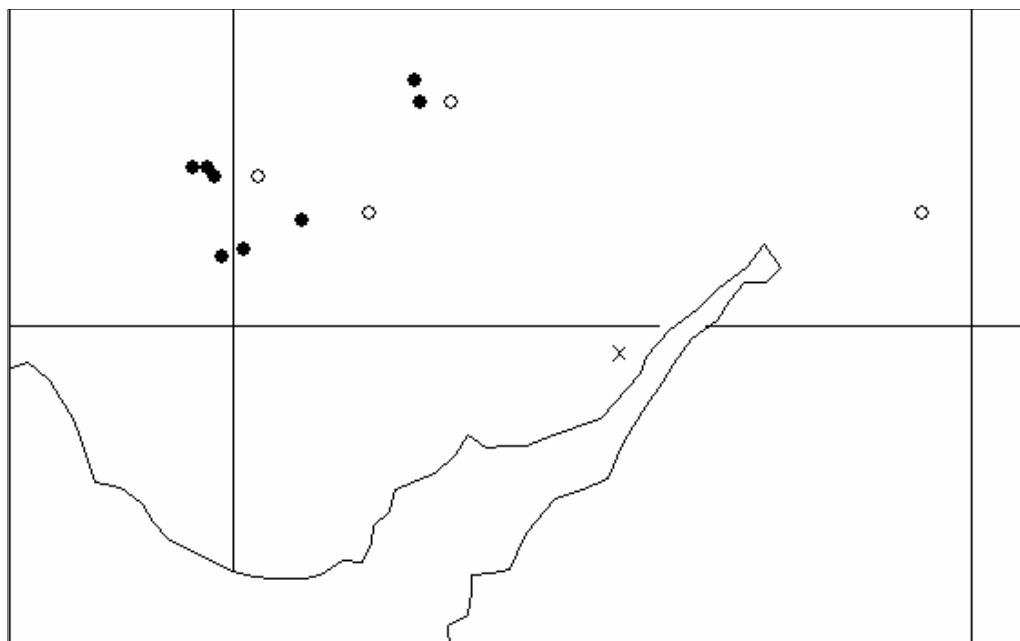


FIGURE 3. Distribution of *Hieracium leyanum* sensu stricto in South Wales and England. Records are for 1 km squares with symbols plotted at twice that size for clarity. ●, 2003–2005. ○, pre-1950. ×, error.

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(Accepted April 2007)

APPENDIX 1 - HISTORICAL AND RECENT RECORDS OF
H. PORTLANDICUM SP. NOV. FROM PORTLAND

V.C. 9, DORSET

Portland, 11 June 1910, W. B. Barrett (**BM**, Barrett (1912) cited it as ‘Durdle Pier to Churchope, plentiful. Sparingly in West Weare’)

East Weare. Church Ope Cove, 2 September 1931, R. Meinertzhagen (**BM**); between Pennsylvania and the prison, June 1879, W. C. Medlycott (**DOR**); on the south side of the descent from the ... by Shepherds Dinner, 15 June 1886, J. C. Mansel-Pleydell (**DOR**); 20 June 1910, G. E. Fulleylove (**CGE**).

The Verne Plateau, 1925, M. J. Andrews (Haines 1926; Bowen 2000).

West Weare. 1885, W. B. Barrett *et al.* (Bowen 2000); Chesil Beach, amongst quarry debris at the foot of the cliffs, near the neck, 20 July 1907, H. J. Riddelsdell (**BM**, **CGE**, **NMW**); 21 August 1911, C. E. Salmon (**BM**); Hallelujah Cove, 1925, M. J. Andrews (Haines 1926); limestone rubble, 4 June 1988, R. FitzGerald, S. L. Jury, J. Bevan, R. Pankhurst *et al.* (B. S. B. I. field meeting; photograph in **RNG** as Fortuneswell, and incorrectly cited elsewhere as East Weare, pers. comm. R. FitzGerald 2005); 1989, H. J. M. Bowen (Bowen 2000); block boulder scree SY684730, 20 July 2003, B. Edwards & D. A. Pearman.

APPENDIX 2 – RECORDS OF *HIERACIUM LEYANUM* S.S.

V.C. 34, WEST GLOUCESTERSHIRE

Six plants in roadside quarry between Birdlip and Crickley Hill, undated, H. J. Riddelsdell, and not refound again (Riddelsdell *et al.* 1948). No voucher has been traced, but given that *H. leyanum* is so distinctive and that Riddelsdell had collected it elsewhere, the record is accepted.

V.C. 35, MONMOUTHSHIRE

Tarren yr Esgob in “Breconshire and Monmouthshire” (Ley 1902; Wade 1970); still present in the Brecon part of this site but not seen recently at the extreme eastern end in Monmouthshire, if it ever indeed occurred in v.c. 35.

The record plotted in ST59 in Sell & West (1968) is based on a specimen from rocks at the north point of Piercefield Park, 6 June 1900, A. Ley (**CGE**), determined by Sell & West, but which T. C. G. Rich believes to be *H. pachyphylloides* (Zahn) Roffey. Neither species was present on 5 July 2005, T. C. G. Rich.

V.C. 36, HEREFORDSHIRE

Red Daren, Hatteral Hills, 1892, 15 August 1893, 24 June 1896 and 9 June 1905, A. Ley (Ley 1898, **CGE**, **NMW**); there is also cultivated material from this site dated June 1896 and June 1897 (**BEL**, **CGE**, **MANCH**, **NMW**). A specimen from Longtown, 31 August 1886, A. Ley (**CGE**) is assumed to be from this site. Not refound, 27 June 2005, T. C. G. Rich, or on the adjacent Black Daren.

V.C. 42, BRECKNOCKSHIRE

Craig Cerrig-gleisiad (as Craig Gledsiau) central upper part, 1 August 1890 and 9 July 1895, A. Ley (**BM**, **CGE**); 7 July 1896, F. J. Hanbury (**BM**); August 1951, C. West (?**MNE**); Cliffs, 3 October 1962, B. Seddon (**NMW**); Cliff ledges SN961218-9, 4 July 1964, J. N. Mills (**MANCH**); Old Red Sandstone cliffs, SN961219, scarce, 24 June 2003, T. C. G. Rich & P. Hill (**NMW**).

Craig Cwm-du (as Craig du), Senni Valley, 13 June 1893, A. Ley (**BM**, **CGE**); cliffs, SN943211, 22 July 2004, M. Porter (**NMW**).

Craig y Cilau (as Craig Cille), undated, A. Ley (Ley 1898). This site has been extensively searched between 2000 and 2002 for *Hieracium* by T. C. G. Rich; presumed lost to the extensive quarrying. Cwm Tarrell, head of, 8 September 1888, and roadside rocks at head of, 9 and 10 July 1895, A. Ley (**BM**, **CGE**); 7 July 1896, F. J. Hanbury (**BM**); roadside, 13 June 1953, C. E. A. Andrews (**BIRM**); 22 June 1953, C. E. A. Andrews, J. R., & P. D. Sell (**BIRM**); July 1959, C. West (**MNE?**); damp cliff by road, SN9720, 18 June 1965, J. N. Mills & J. R. J. M. (**MANCH**); abundant on roadside and in quarry, SN973207, June 2004, T. C. G. Rich; this may be H. W. Pugsley’s site “roadside SW of Brecon”, 3 July 1935 (**NMW**).

Darren Fach (as Cefn Coed, Dan-y-Graig, Vaynor and possibly Cefn Cil-Sanws), limestone cliffs, 7 June 1894, 8 June 1894 and 28 May 1896, A. Ley (**BM, CGE, NMW**); 17 June 1932, H. A. Hyde & A. E. Wade (**NMW**); 20 June 1932, A. J. Wilmott (**BM**); 10 June 1957, C. E. A. Andrews (**BIRM**); scattered along top of cliff, SO019107, 9 June 2000, T. C. G. Rich (**NMW**). Ley (1898) cites also 'and other spots near Merthyr Tydfil'.

Darren Lwyd (as Taren Llwyd), 24 June 1896, 15 June 1897 and 8 July 1898, A. Ley (**BM, CGE**). Two populations of 10 plants at SO243330 and c. 40 plants at SO241339, 27 June 2005, T. C. G. Rich (**NMW**).

Dyffryn Crawnon, lime rocks at head of, 12 June 1893 and 11 July 1900, A. Ley (**BIRM, BM, CGE**); Sandstone cliffs, 27 May 1896, A. Ley & W. A. Shoolbred (**NMW**); 21 June 1953, C. E. A. Andrews (**BIRM**); July 1954, C. West (?**CGE**); 22 plants, old red sandstone crag, SO091154, 26 June 1975, P. D. Sell & L. Farrell (NCC rare species form). c. 45 plants, SO095149, 27 June 2005, T. C. G. Rich (**NMW**).

Fan y Big, 31 July 1900, A. Ley (**CGE**). Not refound, T. C. G. Rich 2004.

Sychbant, swallow hole near, 28 May 1896, A. Ley (**NMW**). About 300 plants on cliffs above and by cave, Cefn Sychbant, SN98570962, 6 July 2005, T. C. G. Rich (**NMW**).

Tarren yr Esgob (also as Black Mountains), 12 July 1893, June 1896, 12 July 1897, 1 July 1898, 7 July 1898, 8 July 1898, 4 July 1901, 12 August 1903, 17 September 1907, A. Ley (**BEL, BM, CGE, E, LIV, MANCH, NMW**, some of which may be cultivated but is not necessarily marked as such); 29 July 1902, W. R. Linton (Set of British *Hieracia* no. 90; **NMW**, etc.); 9 June 1905 and 4 July 1907, A. Ley (**BM, NMW**); 23 July 1923, H. J. Riddelsdell (**MANCH, NMW**); 20 June 1933, C. E. A. Andrews (**BIRM**); Old Red Sandstone, June 1953, C. West (**MNE?**); 20 June 1953, J. E. Raven (**E**); 20 June 1953, J. E. Lousley (**RNG**); Scattered on top cliff, c. 30 plants at SO250308, 27 June 2005, T. C. G. Rich (**NMW**), but there are likely to be more extensive populations to the west on this large site.