

Herminium monorchis (L.) R. Br.

Musk Orchid

Herminium monorchis is a small orchid of short infertile grassland on chalk and limestone. Flower spikes hold numerous tiny yellow-green honey-scented flowers. Each flower lip is 3-lobed, with the middle lobe longer than the outer two, and perianth segments converge to form a loose 'hood'. It is pollinated by a range of insects, although the main means of reproduction is vegetative via tubers attached to long, slender stolons. Considered Regionally Extinct in Wales, the species is now restricted to southern areas of England, and is assessed as Endangered due to substantial and continuing decline.



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IDENTIFICATION

Herminium monorchis is a small, glabrous orchid with yellowish-green erect stems up to 25–30 cm, but often less than 15 cm tall. Plants have 2 or 3 bluish-green, elliptic-oblong entire main leaves 2–7 cm long positioned near the base of the stem. The leaf tip is obtuse or acute; 1 or 2 bract-like leaves may also be present higher up the stem (Sell & Murrell, 1996; Stace, 2010).

The slender inflorescence is often one-sided and holds numerous tiny yellow-green, honey-scented ± bell-shaped flowers. Each flower has a tri-lobed labellum with 2 short lateral lobes that point forwards or diverge, a longer, broader, linear middle lobe (to 4 mm), and perianth segments that slightly converge to form a loose, tapering hood. The spur is absent.



Searching for early leaves of *Herminium monorchis* at Totternhoe Knolls, Bedfordshire. ©Richard Revels.

SIMILAR SPECIES

Habitat rules out most other orchids that have small, yellow-green flowers. *Coeloglossum viride* (Frog Orchid) has larger flowers that often turn a reddish-brown colour, a longer (to 9 mm) tri-lobed lip, and a middle lobe that is much shorter than the outer lobes. When not in flower, *H. monorchis* is distinguished by main leaves that are slightly channeled and with one very obvious and four weak veins each side of the midrib (Poland & Clement, 2009).

HABITATS

In Britain *H. monorchis* is restricted to short, dry, unimproved calcareous grassland on chalk or oolitic limestone. It is found on the small terraces of steep slopes, the floors of old quarries, ancient earthworks and limekiln spoil heaps, the sloping sides of raised greens on golf courses, and, more rarely, dune slacks (Wells, 1994; Carey & Dines, 2002; Foley & Clarke, 2005; Boon, 2011).

Herminium monorchis is associated with grazed NVC CG2 *Festuca ovina*-*Avenula pratensis* grassland, CG4 *Brachypodium pinnatum* grassland and CG5 *Bromopsis erecta*-*Brachypodium pinnatum* grassland, and is often found with other threatened species that favour warm, short turf such as *Hippocrepis comosa*, *Neotinea ustulata* and *Orchis anthropophora*.

Across its global range *H. monorchis* is not confined to dry calcareous soils and can also be present in much damper places such as low-lying marshes or species-rich calcareous alpine sedge fens with associates including *Blysmus compressus*, *Carex davalliana*, *C. microglochis*, *Epipactis palustris* and *Parnassia palustris*.

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BIOGEOGRAPHY

Herminium monorchis has a Eurasian-temperate distribution (Preston & Hill, 1997) from the Pyrenees, Apennines, Crimea and Caucasus to northern Scandinavia and the Kola Peninsula in northwest Russia, and northern and central Asia eastwards to China, Korea and Japan (Sell & Murrell, 1996). Its altitudinal range is from sea level to 2,400 m (Delforge, 1994), but in Britain *H. monorchis* is a lowland species with an altitudinal limit of c. 240 m at Mountains Knoll Wood in East Gloucestershire.

Herminium monorchis is assessed as Regionally Extinct in Wales (Dines, 2008), with the last record from Kenfig Burrows, Glamorgan (1968) and consequently is now restricted to southern areas of England. It was previously known from East Anglia as far north as Snettisham in North Norfolk, but these populations are long extinct. Its extant northern limits are found at Cleeve Common in the Cotswolds, Totternhoe Knolls in the Chiltern Hills of Bedfordshire, and possibly Tingley Wood in Hertfordshire, although it has not been seen at the latter location since 1987 (James, 2009).

Herminium monorchis has declined substantially in England since 1930 (Stroh *et al.*, 2014), and many extant locations now have very small numbers of plants. Post-2000 records show that the majority of sites are located in Surrey, Hampshire, Kent, Sussex and Gloucestershire. It is very thinly scattered in Wiltshire and Dorset, and only single sites persist in Berkshire (West Woodhay Down Chalk Pit), and Bedfordshire. It may

now be lost from both Hertfordshire and Oxfordshire.

Noar Hill in North Hampshire contains possibly the largest population of *H. monorchis* in England, with many thousands of flowering spikes recorded in recent years.

ECOLOGY

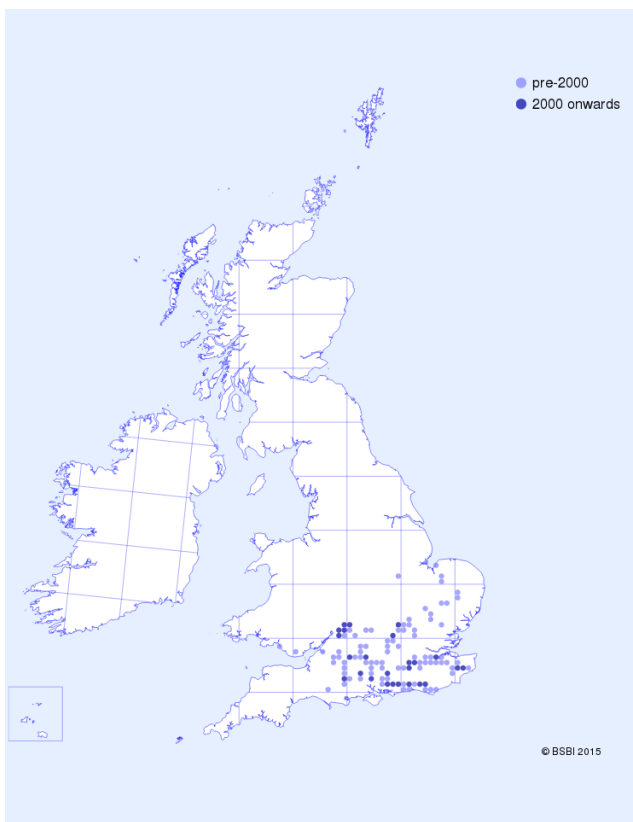
Herminium monorchis is a small, perennial, nectar-producing orchid with leaves appearing in late May and dying off by the end of September. The primary means of reproduction is vegetative. Each year a plant develops two or more new tubers, each one attached to the tip of a long slender stolon (to 10 cm). Usually only one of the new tubers will go on to produce a shoot, although strong plants may produce two (Foley & Clarke, 2005). Attachment to long stolons means small clonal colonies can form around the 'mother plant' under suitable conditions and over time (Wells, 1994).

Plants flower from mid-June through to late July, although flowering performance varies greatly from year to year, with a decline in flowering rate associated with lower than average rainfall and temperature in the preceding year (Wells *et al.*, 1998). Such conditions lead to smaller leaf area or the death of leaves, resulting in diminished food reserves stored in the tubers and a subsequent inability to provide the energy required to produce a flowering shoot in the following year. In drought years, flowering may cease altogether, although non-flowering plants can survive as small rosettes (Wells, 1994). Flowering performance increases with rainfall, but over the course of the 30 year study by Wells *et al.* (1998) flowering never exceeded 36% of the population.

Herminium monorchis is pollinated by a wide range of minute insects, mainly members of the Hymenoptera, Diptera and Coleoptera orders. The structure of the flower means that pollinators must enter sideways, with the outer surface of the femur of one of the front legs of the insect making contact and removing the viscidium. This is detached with the pollinium and transferred to the stigma of the next flower visited (Darwin, 1877). Self-fertilisation is also possible if fragments of the pollinia fall onto the protruding stigma (Foley & Clarke, 2005).

Capsules are produced and seeds are wind-dispersed by late August. *H. monorchis* is capable of forming a short-term persistent soil seed bank (at least 2.5 years; de Hert, 2012). Although seedlings are rarely recorded, *H. monorchis* is known to be capable of colonising new sites such as old quarry floors.

Unfortunately, no information on fungal associates is available, but in an experiment to investigate recruitment limitation in restored dune slack habitat, introduced *H. monorchis* seeds developed into protocorms in areas where *H. monorchis* was absent. However, germination was more frequent in burial experiments undertaken in slacks that contained *H. monorchis* (de Hert, 2012b). These results, together with its capacity to naturally colonise new sites, suggest low specialisation between *H. monorchis* and its



Distribution of *Herminium monorchis* in Great Britain and Ireland.

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fungal associate(s), and/or perhaps a widespread occurrence at low levels of the associated mycorrhizal fungi.

THREATS

Herminium monorchis requires open, short turf, and consequently a reduction or cessation of livestock grazing, and/or a crash in rabbit numbers will lead to the development of rank grassland, the spread of invasive scrub, and the loss of suitable habitat. Direct habitat destruction through ploughing has also led to losses, most notably in East Anglia. Changing climatic conditions may also have a negative effect, with hotter, drier summers predicted in the UK (Anon. 2014).

MANAGEMENT

Management usually involves grazing with hardy breeds of sheep, or occasionally goats, in the early autumn and winter months, sometimes into early spring. Ideal management will produce a short sward whilst allowing *H. monorchis* and other threatened plants to flower and set seed throughout the spring and summer months.

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