

## *Hammarbya paludosa* L.

### Bog Orchid

*Hammarbya paludosa* is a small yellow-green orchid with pale stems, oval leaves (sometimes fringed with tiny bulbils), and ‘upside down’ flowers due to the flower stalk twisting through 360°. It is associated with very wet, infertile peaty soils, often growing with or on *Sphagnum* in boggy areas with some lateral flow of water, on the edges of runnels, and on moist peat close to standing water. In the British Isles it is widely scattered in northern and western Scotland, more thinly so in northern England and Wales, and is uncommon in Ireland. It is assessed as Least Concern in Great Britain, Vulnerable in England and Endangered in Wales.



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#### IDENTIFICATION

The pale yellow-green spikes of *Hammarbya paludosa* are easily overlooked and require careful searching of suitable habitat. The erect hairless stems 3-8(-15) cm bear an inflorescence of up to 20 flowers (2 × 4 mm) that have an ‘upside down’ appearance due to the flower stalk twisting through 360°. This results in the lanceolate-acute labellum facing upwards (Foley & Clarke 2005; see photo above). Flowers also have two waxy pollinia, ovate outer perianth segments, and linear-lanceolate inner perianth segments with recurved tips.

Individual plants have 2-3(5) oval, bluntly rounded pale green leaves that are deeply channeled and prominently veined (Harrap & Harrap 2005). The leaves enclose two pseudobulbs from which the flower spike arises, and the tips of leaves are



The elusive *Hammarbya paludosa* in its typical habitat with *Narthecium ossifragum* at Bowthick, Cornwall. ©David Fenwick.

often fringed with a row of small bulbils.

#### SIMILAR SPECIES

*Hammarbya* is a monospecific genus, but perhaps may be confused with *Liparis loeselii*. However, the two species prefer very different habitats, with *H. paludosa* occurring in acidic upland flushes, and *L. loeselii* in base-rich lowland fens and dune slacks. If vegetative plants are found, *L. loeselii* has one opposite pair of relatively large (2.5-8 cm) leaves that arise from the base of the stem, whereas *H. paludosa* has 3-5 very small sub-opposite leaves placed one above the other.

#### HABITATS

*H. paludosa* is a very diminutive orchid of open, wet, acidic and extremely infertile soils. It is associated with boggy areas that have some lateral flow of water (Porter 1994), on the edges of runnels, or in open habitats on moist peat and close to the shores of lakes and lochs, up to an c. 500 m at Llyn Anafon in Abergwyngregyn and at Millfore in Dumfries and Galloway. It is occasionally present in moderately base-rich flushes (e.g. Pearman et al. 2008).

In upland areas *H. paludosa* frequently grows on *Sphagnum* or on the margins of dense *Sphagnum* hummocks, although Chater (2010) and others have reported plants growing in a substrate of decayed mosses that were mostly not *Sphagnum*. In Britain, *H. paludosa* is associated with NVC M1 *Sphagnum auriculatum* bog pool communities and M21 *Narthecium ossifragum-Sphagnum papillosum* valley mire (Rodwell 2000). Frequent associates include *Carex echinata*, *Erica tetralix*, *Eriophorum angustifolium*, *Molinia caerulea*, *Pinguicula vulgaris*, *Potamogeton polygonifolius* and

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*Rhynchospora alba*.

## BIOGEOGRAPHY

*H. paludosa* has a Circumpolar Boreal-montane distribution (Carey & Dines 2002), occurring in northern and central Europe, extending from 69°N in Scandinavia, to the Italian Alps (where there is just one location) and Romania. There are also records from North America where it occurs from Alaska eastwards to Ontario and south to Minnesota, and in Asia where locations are scattered across southern Siberia to Japan (Harrap & Harrap 2005).

Its British range is generally northern and western, with notable exceptions including south Hampshire and Dorset, and in particular the New Forest. It is also very thinly scattered in the lowlands of eastern and south-east England, although many of these populations have not been recorded in recent years, and in 2000 plants were stolen from the sole remaining site in eastern England.

*H. paludosa* is relatively widespread in north-western Scotland, but is rare in Ireland, currently known from only six sites (Foley & Clarke 2005). It is also now uncommon in Wales, occurring at just a few scattered localities (c. 20) across Breconshire, Radnorshire, Carmarthenshire, Pembrokeshire, Cardiganshire and Caernarvonshire.

## ECOLOGY

*H. paludosa* is a very small perennial hemicryptophyte of

open, extremely infertile soils, flowering from June to September (occasionally into October), although flowering is erratic from year to year, making the recording of this species challenging.

The inflorescence arises from a basal swelling (pseudobulb) that is formed at the tip of a vertical rhizome and is subsequently enclosed by the leaf sheaths. Following flowering and fruiting, the inflorescence dies off and a new pseudobulb is formed from continued rhizomatous growth originating from a bud at the base of the old pseudobulb. Although theoretically it is possible to produce and retain a long line of these pseudobulbs in successive years, in practice only the two most recent survive (Harrap & Harrap 2005).

The pseudobulbs also act as storage organs for nutrients that **'infect'** the root-hairs and leaf bases and provide the orchid **with most of its 'food'**. These nutrients are supplied via a mycorrhizal fungus, including species belonging to the *Epulorhiza* genus (Illyés et al. 2010).

Although not a nectar-rewarding orchid, cross-pollination is thought to involve small insects, including the gnat *Sciara thomae*, with the **'dust-like' seeds later dispersed via wind and water**. *H. paludosa* is also capable of reproducing and dispersing vegetatively via tiny bulbils; bud-like structures that develop and can be abundant on the leaf margins. These bulbils eventually detach and, if they then become infected with the mycorrhizal fungus, may eventually lead to the formation of new plants. This probably accounts for the **presence of 'clumps' of *H. paludosa*** that are often observed in the field.

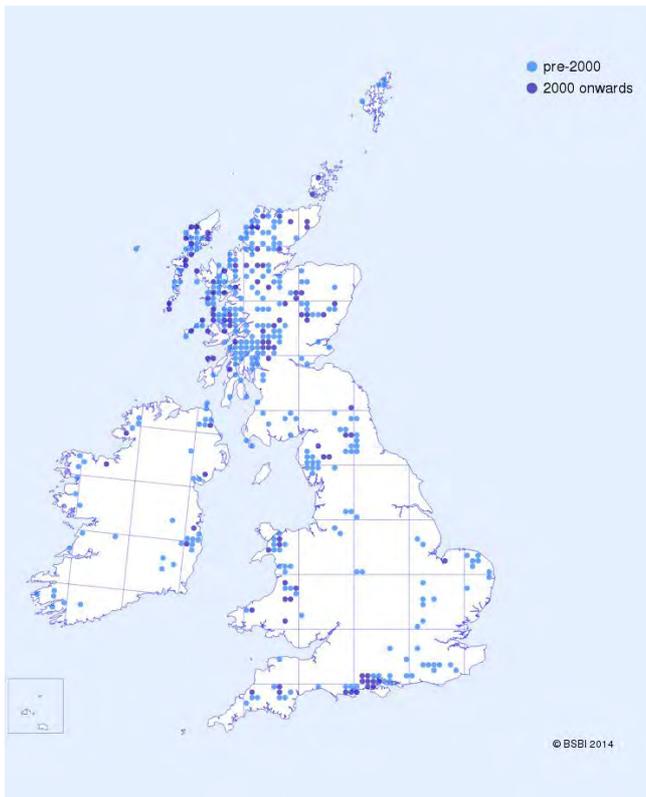
## THREATS

The main threats are linked to habitat destruction or degradation through drainage, overgrazing (particularly in the uplands) and undergrazing (mainly in the lowlands). High grazing pressure can damage and compact soils, restrict flowering and seed production as well as dislodging plants that are only loosely attached to the substrate. It is not just livestock that trample plants and damage soils, and botanists should take great care when monitoring existing populations.

The destruction and subsequent fragmentation of *H. paludosa* populations, particularly in southern England, has also greatly restricted the ability for propagules to colonise new locations outside of its existing range. Unfortunately, the threat of theft is also very real.

## MANAGEMENT

Grazing is required to maintain open conditions and may also be needed to create suitable micro-habitat for the germination of propagules, but grazing pressure should not lead to the erosion or excessive poaching of vulnerable peat soils and vegetation, and if possible should be avoided altogether in the summer months to allow the majority of plants to flower and set seed/detach bulbils. *H. paludosa* is found on very infertile



Distribution of *Hammarbya paludosa* in Great Britain and Ireland.

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soils, and the removal of grazing for a few months should not lead to an excessive growth of competitive vegetation.

In combination with soil structure, the retention of suitable hydrological conditions is also a vital factor in the maintenance of populations, and artificial drainage will certainly have negative repercussions.

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### AUTHOR VERSION

Peter Stroh. Version 1: 31 January 2015.

### SUGGESTED CITATION

Stroh, P.A. 2015. *Hammarbya paludosa* L. Bog Orchid. Species Account. Botanical Society of Britain and Ireland.