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PLANT PORTRAIT

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# 1155. *Himantoglossum adriaticum* H.Baumann

## Orchidaceae

**Jacopo Calevo**[1,2] | **Alessandro Infuso**[3] | **Michael F. Fay**[1,4]

[1]Royal Botanic Gardens, Kew, Richmond, UK

[2]School of Molecular and Life Sciences, Curtin University, Bentley, Western Australia, Australia

[3]Freelance artist

[4]School of Plant Biology, University of Western Australia, Crawley, Western Australia, Australia

**Correspondence**
Jacopo Calevo,
Email: j.calevo@kew.org

**Summary**

*Himantoglossum adriaticum* is described and illustrated here as one of Europe's largest terrestrial orchids, bearing spectacular spiral-tailed flowers with a characteristic goat-like scent. Endemic to the central and northern Adriatic region but scattered as far north as Hungary, its fragmented populations have declined through habitat loss and illegal collection. We review its phylogeny, morphology, ecological interactions, and cultivation. Current assessments list it as Least Concern, but the taxon is also listed in Annex II and IV of 'Habitat Directive', and effective conservation will require safeguarding grassland refugia, monitoring genetic diversity, and supporting ex-situ symbiotic germination research.

## INTRODUCTION

*Himantoglossum* Spreng., commonly known as lizard orchids, was erected in 1826 for a small number of spectacular, large-flowered terrestrials with spiralling lips that recall a lizard's tail. The type for the genus is *H. hircinum* (L.) Spreng. (see, e.g., Wood and Bell, 1994), a widespread, western European taxon with a foetid, goat-like scent that was long noted by pre-Linnaean botanists. Whereas Linnaeus scattered these plants among *Satyrium*, *Serapias* and *Orchis*, molecular and morphological work since the 1990s has confirmed *Himantoglossum* as a well-supported Mediterranean-centred lineage nested in subtribe Orchidinae (see Bódis et al., 2019).

Reflecting morphological, karyological and molecular phylogenetic data, the concept of *Himantoglossum* was expanded by Delforge (1999) to include the small genera *Barlia* (two species) and *Comperia* (one species). Following the studies of Sramkó et al. (2014) and Bateman et al. (2017), POWO (2025) now recognises nine species of *Himantoglossum* in three subgenera: subgenus *Comperia* (only *H. comperianum* (Steven) P.Delforge), subgenus *Barlia* (*H. robertianum* (Loisel.) P.Delforge and *H. metlesiscianum* (W.P.Teschner) P.Delforge) and subgenus *Himantoglossum*, which is divided into three sections. These are section *Formosum*

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(only *H. formosum* (Steven) K.Koch), section *Hircinum* (*H. hircinum*, the type species of the genus, and *H. adriaticum*, the subject of this account) and section *Caprinum* (*H. calcaratum* (Beck) Schltr., *H. caprinum* (M.Bieb.) Spreng., and *H. montis-tauri Kreutz & W.Lüders*). *Himantoglossum caprinum* was the subject of an account in *Curtis's Botanical Magazine* (Wood, 1986).

*Himantoglossum sensu* Delforge (1999) has a range stretching from the Canary Islands and Morocco to the Caucasus and western Iran, with a marked centre of diversity in the Aegean and Anatolian regions (POWO, 2025). Its sister genus is probably the monospecific *Steveniella,* which occurs from Turkey and Crimea east to Iran (Delforge, 1999; Bateman et al., 2017, POWO, 2025). All species share characteristics such as gigantic inflorescences bearing 20–150 strongly resupinate flowers, a three-lobed labellum of which the mid lobe is longest, and a basic chromosome number of x = 18. Low pre-zygotic barriers and overlapping pollinator guilds (chiefly long-tongued *Osmia* and *Andrena* bees) have promoted natural hybridisation (Bódis et al., 2019). For example, *H.* × *samariense* C.Alibertis & A. Alibertis is the hybrid between *H. caprinum* and *H. calcaratum* (both section *Caprinum*), and at least two hybrids (*H.* × *agiasense* (Karatzas) Deniz. and *H.* × *ladikense* Viewegh) are intersubgeneric hybrids between *H. comperianum* and members of section *Caprinum* (POWO, 2025).

*Himantoglossum adriaticum* H.Baumann, the ADRIATIC LIZARD ORCHID, is the tallest European orchid (Plate 1155, Figures 1, 2). The species-level separation of *H. adriaticum* from its sister species, *H. hircinum*, has only recently been accepted with a combination of molecular and morphometric techniques (Bateman et al., 2017). Although the Caucasus is considered the centre of origin for the genus *Himantoglossum* (Sramkó et al., 2014), *H. adriaticum* probably originated in western/central-southern Europe (Bódis et al., 2019), probably more recently than the sister species *H. hircinum*, given the higher genetic variability of the latter, especially in the core of its range (Pfeiffer et al., 2009; Bateman et al., 2013; Sramkó et al., 2014). Described in 1978 from the karst grasslands above Trieste, *H. adriaticum* is now recognised from a discontinuous arc extending from north-eastern Italy and Slovenia south-eastwards to Croatia, Bosnia-Herzegovina and Montenegro and probably to coastal Albania.

*Himantoglossum adriaticum* features in a wall painting by Francesco Ubertini ("Bachiacci") *c*. 1545 in a study in the Palazzo Vecchio in Florence used by Cosimo I de' Medici (Rossi & Signorini, 1994). More recently, due to its dramatic dimensions and restricted distribution, *H. adriaticum* has become a flagship species for grassland conservation across Europe. For example, Kovačević et al. (2024) proposed continuous monitoring and data collection to enable effective management of the species in the Slavonian highlands of Croatia.

## CULTIVATION

According to Bódis et al. (2019) seedling recruitment is highly dependent on meteorological conditions (encouraged by wet and cool autumns and discouraged by cold winters); most of the seedlings appear, near the mother plants after three years, potentially spending the first years as protocorms/dormant tubers. Also, according to these authors, the vegetative/reproductive status of the mother plants influences seedling development, supporting the hypothesis of a nutrient transfer facilitated by mycorrhizal fungi from mother plants to surrounding seedlings (Read et al., 2024). *Himantoglossum adriaticum* is not usually cultivated, in part due to its conservation status. The taxon, together with *Orchis patens*, was a flagship species for the European LIFEorchids project (LIFE17 NAT/IT/000596), and it has therefore been the focus of *in vitro* propagation studies. Like most orchids, seedlings form obligate mycorrhizae with fungi, at least



**PLATE 1155** *Himantoglossum adriaticum* ALESSANDRO INFUSO



**FIGURE 1** Inflorescence of *Himantoglossum adriaticum*. Photograph Alessandro Infuso.

for germination of dust-seeds; not many studies are available on geographical variation of fungal associates for *H. adriaticum*. However, Pecoraro et al. (2013) found a consistent colonisation of fungi belonging to the family Tulasnellaceae in individuals from central Italy. Similar fungal taxa were found also in protocorms from Hungary (Gilián, 2015). Bazzicalupo et al. (2025) showed that *H., adriaticum* is self-compatible although cross pollination yielded significantly higher germination percentages.



**FIGURE 2** *Himantoglossum adriaticum* in Saliceto (CN), Italy. Photograph Alessandro Infuso.

## NOMENCLATURE AND DESCRIPTION

***Himantoglossum adriaticum*** H.Baumann, Die Orchidee (Hamburg) 29(4): 171. (1978).

Homotypic synonym: *Himantoglossum hircinum* subsp. *adriaticum* (H.Baumann) H.Sund. – Eur. Medit. Orch. Ed. 3:40 (1980).

Heterotypic synonym: *Himantoglossum adriaticum* f. *albiflorum* Vöth in Mitt. Arbeitskreis Heimische Orchid. Baden-Württemberg 22: 345 (1990).

Tuberous perennial and winter-growing orchid, up to 120 cm tall, bearing up to 150 pale-green flowers, each with a long ribbon-like lip banded purple and green. The rosette consists of an average of 2–5 lanceolate pale green leaves. The stem is cylindrical, stout and green at the base, and can become reddish toward the apex. The basal leaves are green, whereas the upper,

sheathing leaves can be tinged with reddish hues. The inflorescence is lax and multiflowered. Flowers have a faint scent produced by colourless papillae that are osmophores (Vöth, 1999) and produce no nectar (Molnár, 2011); their overall colouring is white/greenish and purple. The spur is short, c. 2–3 mm long; its entrance is reduced by the presence of papillae and there is a single viscidium (Claessens & Kieynen, 2011). Petals and sepals measure c. 7–9 mm in length and 4–6 mm in width, and they converge or fuse to form a light green to pale-pink hood lined with purple streaks inside. The labellum is three-lobed, spotted with purple papillae: the median lobe is linear, 35–70 mm long and c. 2 mm wide, flat or somewhat spiralled, and bifid at the tip, whereas the lateral lobes are only one-third to one-quarter as long as the median. Capsules are c. 12-16 mm long and 2–5 mm wide, with an estimated number of fusiform seeds per capsule ranging from c. 1,100 to 23,000 (Bódis et al., 2019). Figure 3.

CYTOLOGY. 2n = 36, as for *H. hircinum* (Murín & Májovsky, 1976; Capineri & Rossi, 1987; D'Emerico et al. 1993).

PHENOLOGY. *Himantoglossum adriaticum* usually flowers between May and July, depending on latitude, elevation and weather during the previous vegetative season, with the earliest and latest flowering observations being the beginning of May in Italy and in mid-July in Austria, respectively (Bódis et al. 2019).

DISTRIBUTION. Described in 1978 from the karst grasslands above Trieste, it is now recognised from a discontinuous arc extending from mainland Italy across Slovenia, Croatia, Austria,

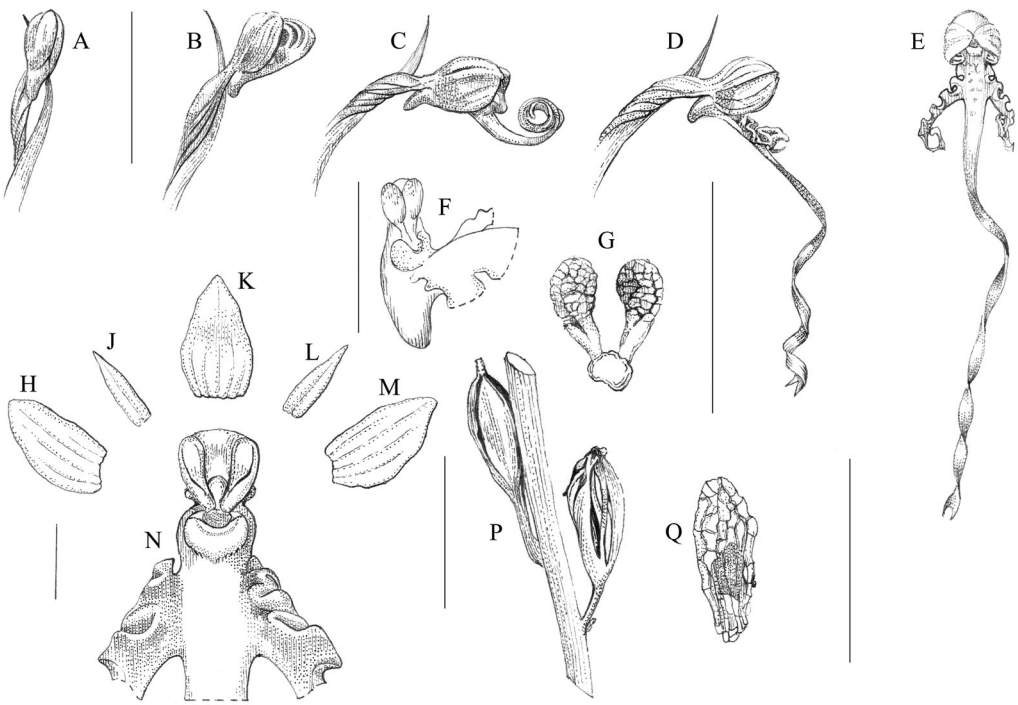



**FIGURE 3** *Himantoglossum adriaticum*. A, flower bud; B, C, D, sequential stages of flower opening; E, fully open flower; F, column, spur, part of labellum; G, pollinia; H, M, lateral sepals; K, dorsal sepal; J, L, petals; N, upper portion of the labellum, with column and pollinaria; P, capsules; Q, seed. Scale bars: A, B, C, D, E, 2 cm; F, 1 cm; G, 0.5 cm; H, K, J, L, M, N, 2 mm; P, 2 cm; Q, 0.5 mm. Drawn by Alessandro Infuso.

Hungary and the Czech Republic (Kühn et al., 2019). It has been also reported in Albania (Barina & Pifkó, 2009), but this should be treated as an ambiguous occurrence as the herbarium specimens are unsuitable for adequate determination (Bódis et al., 2019).

Habitat. *Himantoglossum adriaticum* does not have strong phytocoenological preferences, meaning it could persist in a range of different habitats (Bódis et al., 2019), including habitats such as semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia, Natura habitat 6210). However, the species seems to favour calcareous soils, with pH varying from 6.3 to 7.5 and great variability of nutrient content (Bódis et al., 2019), and it occurs at elevations from sea level to 1900 m. It is found in open forests, bushes and poor grasslands, occupying xeric, lightly grazed pastures, road verges and degraded *Quercus pubescens* scrub where competition is low and insolation high. Population surveys record marked local fluctuations tied to spring precipitation, yet long-term trends are downward in intensively cultivated lowlands (Kreutz & Scrugli, 2020).

Conservation. *Himantoglossum adriaticum* is listed in Annex II and IV of 'Habitat Directive' (92/43/ECC). Annex II and IV of the Directive lists the species (animals and plants) that require particular conservation attention and that need to be included in the list of Endangered or Critically Endangered species, respectively. The species is also protected by national laws in most of the countries where it occurs. It is listed as Least Concern in the IUCN Red List (Dostalova et al., 2011). Given its frequently recorded presence in dry grasslands dominated by *Bromus erectus* (Natura 2000 Habitat 6210), *Himantoglossum adriaticum* was chosen with *Orchis patens* (also in this number) as a flagship species for the European conservation project LIFEorchids (LIFE17 NAT/IT/000596), a project co-funded by the EU with the aim to restore and conserve orchid rich grasslands, reinforce the populations of nine orchid species, and engage "orchid stewards" in orchid conservation (Calevo et al., 2018). Principal threats include grassland abandonment (leading to scrub encroachment), road widening, and illegal bulb-digging spurred by the plant's imposing stature, and potentially climate change (see Bódis et al., 2019).

## ORCID

*Jacopo Calevo* https://orcid.org/0000-0002-1717-2365
*Michael F. Fay* https://orcid.org/0000-0003-3491-9093

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