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Galanthus trojanus: a new species of *Galanthus* (Amaryllidaceae) from north-western Turkey

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Galanthus trojanus, a new species endemic to north-western Turkey, is described and illustrated. The morphological differences between the new species and two similar species, *G. nivalis* and *G. rizehensis*, are discussed.

ADDITIONAL KEY WORDS: basalt – conservation – CITES – endemism – flora of Turkey – geophyte – IUCN Red List category – snowdrops.

INTRODUCTION

During a geophyte survey of western Turkey in May 1994 (N. Özhatay, A. Byfield and M. Johnson), M. Johnson collected seeds of an unidentified *Galanthus* (Johnson 983). Plants raised from the seed collection flowered in 1997, at the Alpine House of the Royal Botanic Gardens, Kew, and by the winter of 1998 the accession had reached maturity. Attempts to place Johnson's collection into one of the 18 species of *Galanthus* proved difficult, and it seemed to represent a new taxon related to either *G. nivalis* L. or *G. rizehensis* Stern. In 2000, E. Özhatay & N. Özhatay returned to the original site of collection to study populations of the new *Galanthus in situ*, during flowering time. These observations, in combination with a description made from the original accession, were enough to convince us that we were dealing with a new species.

We have given this new *Galanthus* the name *G. trojanus*, after the ancient region of Troad in north-western Turkey, which included within it the city of Troy. The specimen that formed the holotype of *G. trojanus* was collected in the eastern part of the Troad. The historical Troad approximately corresponds to the modern day province of Çanakkale.

MATERIAL AND METHODS

The measurements, colours and other details given in the description and discussion are based on living material, either examined in cultivation or directly from plants in their natural environment. The drawing of *G. trojanus* (Fig. 1) was made from living material.

The conservation status of each species was assessed by using the IUCN Red List Category criteria (IUCN, 2001 – after Mace & Stuart, 1994).

DESCRIPTION

Galanthus trojanus A. P. Davis & N. Özhatay
sp. nov.
(Fig. 1)

G. nivali L. affinis sed foliis (0.6–)0.8–1.6(–1.8) cm (nec 0.4–1(–1.4) cm) latis, viridibus (nec viridi-glaucis), in superficie abaxiali nitidis (nec opacis nec viridi-glaucis), segmentis interioribus perianthii in superficie abaxiali maculam viridem brevem (nec maculam in forma V vel U) ferentibus, distinguenda. *G. rizehensi Stern* affinis sed foliis (0.6–)0.8–1.6(–1.8) cm (nec

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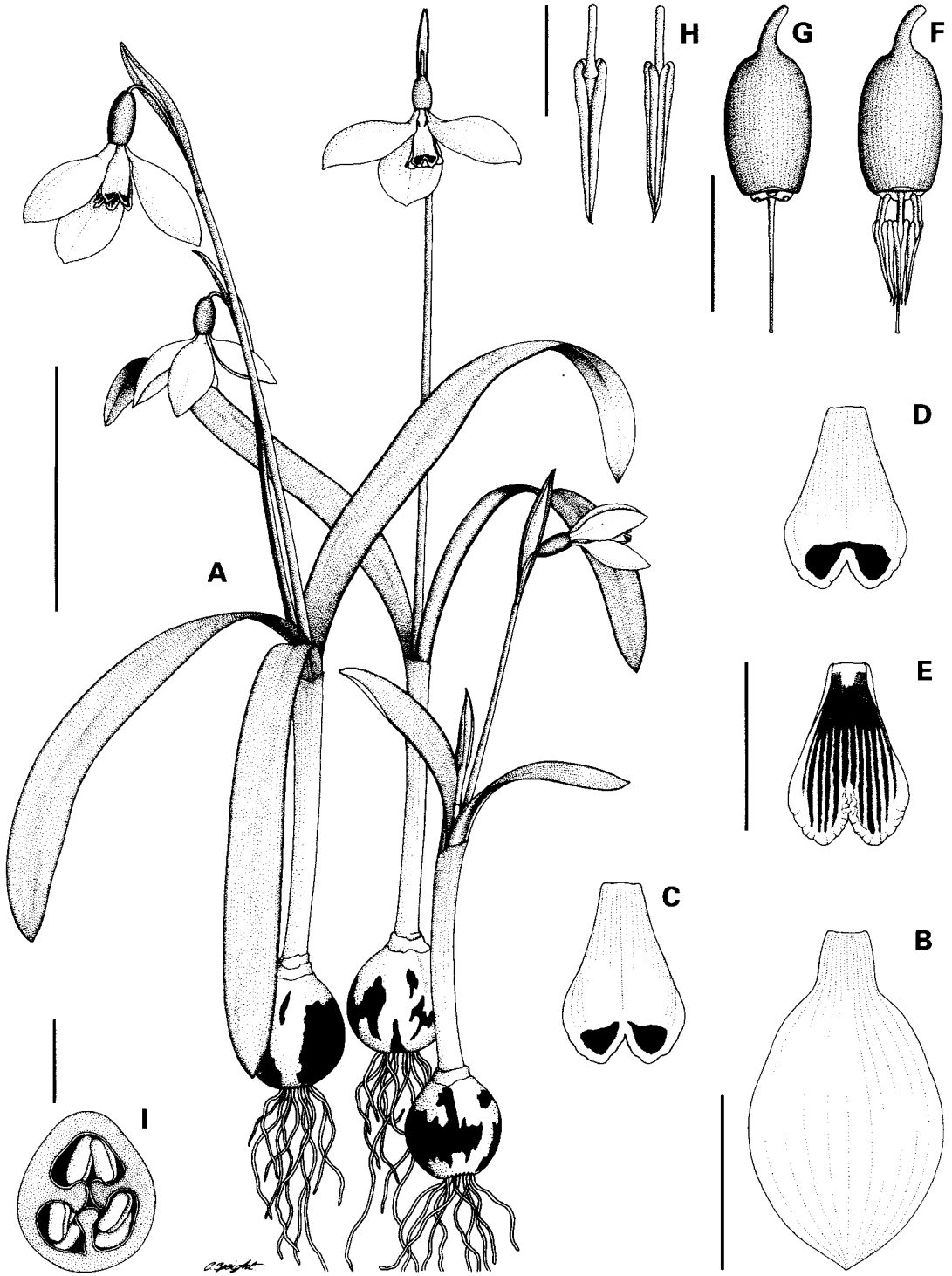

Figure 1. ***Galanthus trojanus*** **sp. nov.** A, habit. B, outer perianth segment. C and D, inner perianth segment (outer surface). E, inner perianth segment (inner surface). F, ovary, stamens, and style. G, ovary, with stamens removed. H, anthers, abaxial and adaxial views (left to right). I, transverse section through ovary. Figure drawn from Johnson 983, by Camilla Speight. Scale bars in A = 6 cm, B = 1.5 cm, C–E = 1.5 cm, F and G = 1 cm, H and I = 3 mm.

0.4–0.8(–1.4) cm) latis, segmentis interioribus perianthii in superficie abaxiali maculam viridem brevem (nec maculam in forma V vel U) ferentibus, segmentis etiam in superficie adaxiali maculam viridem magnam per partem maiorem segmenti usque ad basin extensam atque basin attingentem (nec maculae abaxiali persimilem) ferentibus, distinguenda.

Typus: Turkey: A1(A) Çanakkale: near Çan, 350–400 m, 13.iii.2000 (fl.), N. & E. Özhatay ISTE 79123 (holotypus ISTE!, isotypus K!).

BULBOUS, SCAPOSE PERENNIAL, entirely glabrous. Bulb ± spherical, 2.2–2.7 × 2.2–2.6 cm. whitish; tunic thin, peeling, brown to dark brown. Sheath tubular, 5–5.6 × 0.5–0.6 cm, membranous, minutely striped, whitish. VERNATION applanate. LEAVES 2, rarely 3, ± linear but usually slightly broader in the middle to upper third, at flowering (5–)8–20(–24) × (0.6–)0.8–1.5(–1.8) cm, developing in length and slightly in width during and after flowering; erecto-patent to recurving at maturity; midrib conspicuous; margin flat or subrevolute; apex ± acute to obtuse, flat to very slightly cucullate; adaxial surface medium to darkish green, approaching glaucescent, matt, abaxial surface medium green, shiny. INFLORESCENCE: scape 1 or 2, (8–)15–23 cm long, circular to oval in cross section, green; erect in flower, prostrate in fruit. Spathe 1, of 2 connate valves, separated by a whitish, translucent, membranous tissue, curved forward at anthesis, 2.9–4 × 0.4–0.5 cm, apices cucullate. Pedicel 1, shorter than the scape at anthesis, 1.5–2.5 cm long, circular in cross section, *c.* 0.5–0.7 mm in diam. FLOWER solitary, 1 per scape, pendent, mainly white, fragrant. Perianth segments 6, unequal, in 2 whorls, free, the outer segments larger than the inner ones. Outer perianth segments 3, obovate, 2.5–2.9 × 1.5–1.7 cm, cochleariform, longitudinally striated, white; base slightly unguiculate, claw 5–8 mm long. Inner perianth segments 3, ± broadly obovate-obtriangular, 1.1–1.5 × 0.7–0.8 cm, emarginate (apical notch), slightly curved outwards, longitudinally striated, mostly white, each segment with an apical, short, ± V-shaped green mark, usually broadest at the tips (enlarged in the lobes, either side of the apical notch), or this mark reduced to two small, angular, eye-like marks (either side of the apical notch), sometimes with two eye-like marks at the base; adaxial face of each segment with a faint green mark covering the entire segment. STAMENS 6, arranged in 2 close whorls, free, shorter than inner perianth segments, 6–7 mm long, basifixed; filaments short, *c.* 1–1.2 mm long, whitish. Anthers *c.* 5–6 × 1.2 mm, lobed at the base, tapering to a distinct apiculum, yellow. OVARY ellipsoid to obovoid, 8–10 × 4–6.5 mm. Style slender, *c.* 7–9.4 mm long; stigma small, acapitate to capitate. CAPSULE insufficiently known, ± ellipsoid, *c.* 1.2–1.5 × 0.9–1 cm., green. Seeds not seen.

Distribution. Endemic to north-western Turkey. Known only from the type locality, in the province of Çanakkale.

Habitat. In undisturbed, open woodlands, under *Quercus cerris*. Occurring with *Quercus coccifera*, *Juniperus oxycedrus*, *Paeonia peregrina*, *Ruscus* sp., *Scilla bithynica*, *Fritillaria bithynica*, *Anemone blanda*, *Crocus* spp., *Colchicum* sp., *Arum* sp., and *Ranunculus ficaria*. Occurring on basalt, in humus-rich soil. Altitude *c.* 350–450 m.

Phenology. In the wild: flowering in March, fruiting in May. In cultivation: flowering in January or February, fruiting in March.

Conservation status. IUCN Red List Category (provisional): Critically Endangered (CR). B1 a,b and B2 a,b: extent of occurrence less than 100 km^2; area of occupancy less than 10 km^2; known to exist at only a single location; inferred decline in the number of mature individuals.

Additional specimen examined. Turkey: A1(A) Çanakkale: near Çan, 450 m, 1.v.1994 (fr.) – voucher: 16.ii.1998 (fl.), Johnson 983 (cult. K).

DISCUSSION

On morphological grounds, *G. trojanus* is most closely allied to *G. nivalis* and *G. rizehensis*. These three species are winter to spring flowering, have applanate vernation, more or less linear leaves, and a single mark at the apex of each inner perianth segment, although *G. trojanus* sometimes has two small, green marks at the base of the segment.

Galanthus trojanus differs from *G. nivalis* by its rather broad green leaves, and by the short green mark at the apex of each inner perianth segment. The leaves of *G. trojanus* are approximately 0.8 to 1.6 cm wide; the adaxial (upper) surfaces are medium to darkish green with a slight grey bloom, and the abaxial (lower) surfaces are medium green and shiny. The leaves of *G. nivalis* are approximately 0.4 to 1 cm wide; the adaxial surfaces are glaucescent (medium green-grey) and the abaxial surfaces glaucescent to almost glaucous and matt. The inner perianth segment mark of *G. trojanus* is very short, and is usually restricted to the apical quarter of the segment, whereas in *G. nivalis* the mark usually covers at least the apical third of the segment.

Galanthus trojanus differs from *G. rizehensis* by its rather broad green leaves, and by the shape of the green inner perianth mark. The leaves of *G. rizehensis*

are approximately 0.4 to 0.8 cm wide, or infrequently 1 to 1.4 cm wide, which is on average narrower than *G. trojanus*. The leaf colour of *G. rizehensis* is like *G. trojanus* except that there is usually a distinct glaucescent median stripe on the adaxial surface. The inner perianth segment mark of *G. rizehensis* is U- or V-shaped, but in *G. trojanus* the mark is usually a short, ill-defined V-shape. On the inner (adaxial) face of each inner perianth segment, the mark of *G. trojanus* covers most of the segment, and extends more or less to the base (see Fig. 1E). In *G. rizehensis* this mark is more or less the same shape and size as that on the outer (abaxial) face, and never reaches the base of the segment (see Davis, 1999: fig. 8t).

The inner perianth segment mark of *G. trojanus* is more like that of *G. nivalis* than *G. rizehensis*, because the ends of the mark are usually expanded into the lobes at the apex of the segment, either side of the apical notch (see Fig. 1D). In *G. rizehensis* the ends of the mark are not expanded, or very rarely so (see Davis, 1999: fig. 8t). The inner perianth mark of *G. trojanus* sometimes resembles the most common type of mark found in *G. woronowii* A. Losinsk. (see Davis, 1999: fig. 8s). Some specimens of *G. trojanus* have two very small marks at the base of each inner perianth segment, which resemble a pair of eyes. This is not a frequent or stable feature of *G. trojanus*, but it has not been recorded in wild populations of either *G. nivalis* or *G. rizehensis*.

Galanthus trojanus is taller (length of scape) than *G. nivalis* and *G. rizehensis*, and has larger leaves and flowers than these species.

Galanthus nivalis is not found in the part of north-western Turkey that lies in Asia, and is rare, or possibly absent, in Turkey-in-Europe. Most records of *G. nivalis* from Turkey-in-Europe represent the hybrid between *G. nivalis* and *G. plicatus* subsp. *byzantinus* (see Davis, 1999: 87; Davis *et al.*, 2001). *Galanthus rizehensis* is found mainly in the eastern Black Sea Coast region, in north-eastern Turkey, western Georgia and southern Russia. Recent field observations (A. Byfield, pers. comm.) extend the range of *G. rizehensis* further west along the Black Sea Coast, to the central part of northern Turkey, but no populations have yet been found in north-western Turkey, near *G. trojanus*. The only known population of *G. trojanus* is thus very well isolated from either *G. nivalis* or *G. rizehensis*. *Galanthus gracilis* is probably the only other species that occurs in the province of Çanakkale, but this is very different from any of the species being discussed here.

It is possible to speculate that *G. trojanus* is a hybrid between *G. rizehensis* and *G. nivalis*, or similar parent species. The evidence for this assumption would include shared morphological characteristics of each putative parent species, larger dimensions that the parents (hybrid vigour), and the occasional presence of two weak marks at the base of each inner perianth segment, a feature that is found in some wild hybrids and some garden hybrids. The distribution of *G. trojanus* is not consistent with a recent hybrid origin, given the poor dispersal range of *Galanthus* pollen and seed (Davis, 1999).

The IUCN Red List Category assessment made here is provisional, because the flora of north-western Turkey is still insufficiently known. On the information presently available we consider *G. trojanus* to be critically endangered (CR B1 and B2). Field work in 1999 (A. Byfield and A. Davis) failed to locate further populations of *G. trojanus* in the province of Çanakkale, but further surveys are required in this area before a confident conservation assessment can be made. We have not given the precise locality of *G. trojanus* in this paper, because we are concerned that this species could be a target for unlawful plant collecting.

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