

1090. *Iris nusairiensis* Mouterde

Iridaceae

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Summary

The Syrian endemic *Iris nusairiensis* Mouterde is considered on the verge of extinction, but little available information exists for researchers, conservationists, and horticulturists. This diminutive and beautiful pale blue iris is illustrated and discussed in detail, with notes on taxonomy, biology and cultivation. The effects of armed conflict on its continued survival are described, and future actions are suggested.

Iris nusairiensis Mouterde is a dwarf bulbous iris with large pale blue flowers that grows only in the Nusayriah (إيرى نصيرى) or coastal (إحسان ل ل ا ب ج) mountain range of western Syria. This taxon is part of an extraordinary and distinct group, the juno irises, within genus *Iris* L.; Vvedensky (1963), Rodionenko (1987) and Crespo, Martinez-Azorin & Mavrodiev (2019) assigned them the rank of genus *Juno* Tratt within family Iridaceae. Dykes (1913) regarded the group as *Iris* section *Juno*. Lawrence (1953), Innes (1985), Mathew (1981), British Iris Society (1997), İkinci *et al.* (2011), Güner *et al.* (2022), World Flora Online (2024) and Plants of the World Online (2024) include this group within *Iris* L. at the rank of subgenus, as *Iris* subgen. *Scorpiris* Spach, Ann. Sci. Nat. Bot., ser. 3, 5: 91 (1846). This name is stable and has priority over subgen. *Juno* (Tratt.) Baker, Handb. Irid. 44 (1892).

In any case, juno irises, in the somewhat contradictory English vernacular, are distinguished from other irises by unique leaf, floral and storage organ morphology but retain the unmistakable floral traits of the genus *Iris*. The channelled leaves are arranged distichously, one above the other, and not in fans as in subgenus *Iris*, the ‘bearded’ irises, or quadrangular in section as in subgenus *Hermodactyloides*, the ‘reticulata’ group, or channelled as in subgenus *Xiphium*, the Spanish irises or ‘Hollandica’ group (Mathew, 1981). Juno leaves are truly bifacial even at the seedling stage, with distinct dorsal and ventral surfaces. The storage organ is unusual, comprising a true bulb with persistent finger-like fleshy storage roots arising from the basal plate (Figure 1). These swollen storage roots are consumed and replaced each year if the plant is healthy. Adventitious narrow feeder roots arise both from the basal plate and the storage roots and appear through winter, withering with the arrival of summer heat and drought. Finally, in

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FIGURE 1 Bulbs and storage roots of *Iris nusairiensis* (ID 1986–0668) during repotting at Gothenburg Botanical Garden. Photograph: Johan Nilson.

the juno group, the usually large and upright tepal lobes seen in bearded irises, known in English as standards, are reduced in size and usually held horizontally to fully reflexed (Plate 1090, Figures 2, 3, 4 & 5).

Iris nusairiensis is related to *I. aucheri*; Mathew (1981) retained it as a separate species but expressed some doubt as to whether the two are distinct, but Güner (2024), using a wider species concept, treats them as one species. *I. aucheri* has a wide range, found from S.E. Turkey eastwards into Iran and southwards into N.E. Syria and N. Iraq, and exists in several distinct colour forms. The Iraqi and Syrian native forms, named *I. sindjarensis* Boiss. & Hausskn. and *I. fumosa* Boiss. & Hausskn. were included within *I. aucheri* by Wendelbo and Mathew (1975). In cultivation several distinct wild clones of *I. aucheri* have been named, with ‘Olof’ and ‘Leylek Lilac’ two of the best known.

Observations by the authors of herbarium, cultivated and wild material combined with molecular and cytological studies suggest that although there is variation of characters between and within populations of *Iris nusairiensis*, wild hybrids with *I. aucheri* have not been seen and *I. nusairiensis* is stable in its gross morphology. We refer to *Iris aucheri* sensu stricto (s.s.) here as plants with a chromosome count of $2n = 22$ and regard *I. nusairiensis* as a distinct species with a count of $2n = 24$ (Johnson, Hall & Seisums, unpubl.). Around Aleppo, the related taxon (described as *Iris fumosa* Boiss. & Hausskn.) occurs close to *I. nusairiensis*, but not so near as to be within effective pollination distance. Cultivated experimental hybrids between *I. aucheri* s.s. \times *I. nusairiensis* at the Royal Botanic Gardens, Kew (hereafter Kew) and Göteborg Botaniska Trädgård (or GBT, Gothenburg Botanic Garden) in either direction indicate some incompatibility between the two taxa (Hall, pers. obs., Nilson, pers. obs.).

Boltenkov & Govaerts (2017) treat *Iris nusairiensis* as a colour form of *I. aucheri*, merging it with *I. fumosa* Decne. under *I. aucheri* var. *fumosa* (Decne.) Bolt., but we do not accept that here (POWO, 2024). The exposed ridge habitat, gross morphology, pollen architecture and



PLATE 1090 *Iris musairiensis*

JOANNA LANGHORNE



FIGURE 2 *Iris nusairiensis* showing pollination by beetles (Order *Coleoptera*) in habitat. Photograph: Angham Daiyoub.



FIGURE 3 *Iris nusairiensis* in cultivation at GBT, making more than one flower per stem. Photograph: Johan Nilson.

cytology of the yellow-flowered *Iris peshmeniana* Güner & T.Hall are very similar to that of the Syrian *I. nusairiensis*, although the foliage of *I. peshmeniana* is slightly less inflated at the base. Geography and initial DNA results (Ikinci *et al.*, 2011 – *Iris peshmeniana* = *Iris* aff. *nusairiensis*) place *I. peshmeniana* closer to *I. aucheri* s.s. itself. In cultivation, *I. nusairiensis* remains compact



FIGURE 4 *Iris nusairiensis* in cultivation at Kew, with the more frequently encountered single terminal flowers. The long tom style pot and sand plunge are also visible. Photograph: Thomas Freeth.

during flowering, although some elongation of the internodes are evident by the fruiting stage, a common character in the *Aucheri* group. These species appear to have evolved relatively recently and further studies of the wild populations may deepen our understanding of their relationships.

CONSERVATION

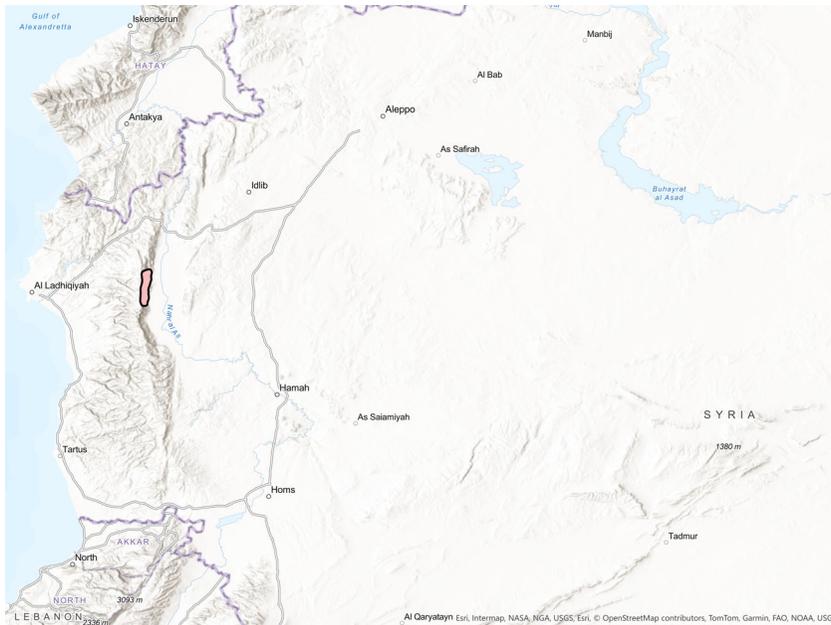
The most recent IUCN Red List assessment (2016) has *Iris nusairiensis* listed as Critically Endangered. The assessment identified a sharp decreasing trend in population and noted threats



FIGURE 5 *Iris nusairiensis* in habitat. Photograph: Angham Daiyoub.

were grazing and gathering by humans. However, the assessment acknowledged the limited available data. Recommendations were made that the taxon be immediately reassessed should more information become available. Recent survey work has now been undertaken and the results are presented here, ahead of a formal reassessment.

Iris nusairiensis is a narrow endemic (Figure 3 and Map 1), but some of the known populations occurred historically in protected areas which are critical for mitigating extinction risk (Juffe-Bignoli *et al.*, 2018). The ongoing armed conflict in Syria that erupted in 2011 has diminished the protection offered by these areas and reduced suitable habitat elsewhere



MAP 1 *Iris nusairiensis* distribution range according to the IUCN Red List assessment (Shater, 2016).

(Daiyoub *et al.*, 2024). Critical infrastructure within the Cedar and Fir protected area in Slunfe has been damaged, and wayward shells have on occasion ignited fires, with the safeguards no longer in place to extinguish such burns quickly. The absence of rangers renders access to protected areas uncontrolled and has resulted in habitat degradation. Power grid disruption has increased demand for solid fuel for heating and cooking, so trees in the forests of the Nusayriyah range are felled for burning.

Subsistence agriculture has intensified, increasing the number of grazing animals. Feral herbivores have increased in turn. Grazing pressure is felt by *Iris nusairiensis* throughout its range but is felt acutely at the Sheikh Hatem al-Tubani locality, with only a few mature individuals remaining. At the Maqamat Bani Hashim locality, caterpillars (order *Lepidoptera*) and grasshoppers (order *Orthoptera*) have been observed feeding on floral and vegetative parts, hindering the flowers from reaching maturity.

In addition, the direct effects of war are significant. Though not a disputed territory, the Nusayriyah range is a strategic high point that overlooks the al-Ghab plains (Figures 6 & 7). Consequently in 2014 the protected area came under the control of Syrian government forces. Installation of heavy machinery took place on the eastern slopes of the mountains, and evidence of tanks and service trenches can be seen in the habitat. The authors witnessed first-hand individuals growing on piles of soil excavated for construction of military infrastructure (Figure 8).

Strengthening the protection of natural areas and improving habitat management during conflict necessitates collaboration with local and international conservation organisations. The key first goal is to enhance monitoring and restore surveillance through increased forest ranger presence. Securing funding from various sources is vital to catalyse this action. Engaging local communities is crucial to raising awareness and discouraging harmful activities like logging and overgrazing. Restoration of damaged habitats is essential and creating buffer zones around protected areas can reduce spillover effects from conflict and human activities. Ongoing monitoring and research to document this species' populations and habitats will guide conservation efforts and inform necessary measures (Daiyoub *et al.*, 2024). Finally, *ex situ* conservation



FIGURE 6 The al-Ghab plains viewed eastwards from the coastal range. Photograph: Angham Daiyoub.



FIGURE 7 The coastal range in northwestern Syria facing south. Photograph: Angham Daiyoub.

practices, such as cultivation of plants in botanic gardens, seed banking and germination studies are also urgent should the species become extinct in the wild.

The authors secured funding from the Mohammed bin Zayed Fund for Species Conservation to formally reassess the extinction risk to *Iris nusairiensis*. Population size, distribution, life history and ecology have been studied and threats, especially armed conflict, have been assessed. The current IUCN Red-List assessment (Shater, 2016) will be updated based on these findings. Conservation and management actions will be proposed to ensure the protection of *I. nusairiensis* and its delicate ecosystem. The conservation science and living collections departments of both Kew and GBT have been engaged to offer expertise, resources, and *ex situ* cultivation.

Monitoring *Iris nusairiensis* is difficult. One of the primary challenges is the short flowering season directly after snowmelt, which restricts the window for conducting fieldwork and gathering critical data. The natural topography of the mountains and the absence of proper roads renders access troublesome. Securing appropriate transportation and sufficient fuel within this



FIGURE 8 Excavated soil within the Cedar and Fir protected area near Slunfe. Photograph: Angham Daiyoub.

narrow window is problematic, and some regions remain entirely inaccessible, being military zones. Despite these challenges, recent efforts have deepened knowledge of the current wild state of this iconic species.

CULTIVATION

Iris nusairiensis is recorded as grown at Gothenburg Botanical Garden (GBT), The Royal Botanic Gardens, Kew and The Royal Botanic Garden Edinburgh (GBIF, 2023), and is known by the authors to be represented elsewhere, if only in specialist botanical collections. It is long-lived in pot culture in the western and northern European climate. Representation in seed banks appears to be restricted to only twelve seeds in Kew's Millennium Seed Bank, generated from plants in Kew's living collection in 2019. In addition, no published work exists concerning long-term storage behaviour and the capacity of stored seed of this species to grow into healthy plants. Stored seeds of other juno irises have been raised into mature plants at Kew in an orthodox manner (RBGK, 2024), and fresh seeds in general propagate reliably, if slowly, from outcrossed wild or cultivated sources.

Finally, it is worth remarking that the current *ex situ* conservation is not sufficient to restore *Iris nusairiensis* to the wild should the worst happen. At a minimum it requires more seed to be stored, while causing as little as possible disturbance to wild populations. Seed should be generated from living collections, using only carefully controlled pollination, as well as an assessment of genotypic diversity made of the plants in cultivation worldwide.

In cultivation *Iris nusairiensis* behaves much like the bulk of juno irises, and an overview is given here from the perspective of both Kew and GBT who have collaborated in the study of bulbous plants for many years. For detailed instruction on the whole juno group follow Hall (1998, revised and expanded 2018).

Iris nusairiensis will require overhead protection from rain in temperate regions such as northern Europe, whether planted in a bulb frame or grown in pots. In climates more akin to its natural setting, raised bulb beds with specialist horticultural composts have been successful. Bulbs of *I. nusairiensis* have persisted at Kew for more than 20 years in an experimental raised hypertufa trough without any overhead protection alongside some of its more robust cousins (for example *I. vicaria*, *I. magnifica* and *I. aucheri*). This trough is about 20 cm deep and at this

point the compost almost exclusively mineral with all traces of organic matter having long disappeared. Otherwise at Kew and GBT plants are grown in long terracotta pots (Figure 4) in raised sand plunge beds with overhead protection. At Kew a structure comprising only a high-pitched glass roof (the All-Weather Frame) is used to allow free movement of air (Figure 9). GBT's nursery structure has permanent walls but with ample ventilation.

In addition, *Iris nusairiensis* was grown successfully outdoors with overhead protection for many years in the Wendelbo bulb display garden, itself a development of the concept of the



FIGURE 9 The All-Weather Frame at Kew. Deep waist-high sand beds in which pots are plunged. A glass roof allows for protection from rain without modifying temperature or air movement. Photograph: Thomas Freeth.

Kew structure. This is the key to siting juno irises out of habitat: provision for rain protection but otherwise cool and breezy. Humidity, high temperatures at night or at the roots and excessive overhead water all make cultivation rather difficult and, for some of the smaller irises, quite impossible. *Iris nusairiensis* is cold hardy, with night-time temperatures below zero Celsius in habitat (Daiyoub, 2023, pers.obs.). It is covered by snow in winter in habitat so is protected from the lowest temperatures. Winter mortality in cultivation will usually be caused by excessive water around the bulbs along with freezing soil temperatures, a combination not frequently experienced in nature.

REPOTTING. Pot cultivation necessitates regular exchange of old growing media for new. Repotting is done annually in September at both Kew and GBT, contemporary with hypothetical natural autumn rains. The aim is to give the bulbs the optimum life cycle in which they can both flower and recoup any lost energy before the next dormant period. Annual repotting is not an absolute necessity, rather a quirk of keeping large botanical collections of bulbs. It enables a health check, and for congested clumps to be cleaned, separated and stock to be multiplied. In some cases, annual repotting is detrimental to potted bulbous collections, and must be done with utmost care. Juno iris are more fragile than most at this stage; the fleshy storage roots liable to break if handled in a rough fashion, providing entry points for pathogens. For the same reason compost must be built up delicately around the storage roots when placing into the new pots. It is at the grower's discretion to decide when to separate a tangled mass of juno bulbs and storage roots. It is painstaking work, although handling *I. nusairiensis* is relatively easy. 'Long Tom' pots are used (Figure 4), a name for terracotta pots that are sometimes three times deeper than they are wide. The bulbs should be placed half-way down these pots with the storage roots extending towards the base, and the total volume occupied by the bulbs should leave a little room between the outermost surface of the bulbs and the edge of the pot. Matching pot size correctly to the mass of bulbs within the pot is crucial. A well-matched pot will allow space for growth but will not be so cavernous so that the roots will suffer from excess moisture following watering. Too small a pot and the plants will exhaust the available moisture and nutrition and are more likely to enter early dormancy, limiting the replenishment of bulbs and storage roots.

COMPOST. Several different composts have been used successfully by different growers, but all prescribe an open and gritty mix. *Iris nusairiensis* is average in both vigour and stature relative to the rest of the juno group. Lacking the robustness of *Iris aucheri* s.s., *I. vicaria* or *I. magnifica*, it is certainly more vigorous than diminutive species such as *I. persica*, *I. stenophylla* or *I. edomensis*. At Kew equal parts grit (2–6 mm), pumice (1–2 mm and 3–8 mm), expanded clay, composted wood fibre and loam is used for *Iris nusairiensis*. To these mixes are added bonemeal and trace element fertiliser. GBT use equal parts unfertilised peat, sharp sand (0–6 mm), grit (2–6 mm) and sterilised compost with additional grit. A grittier more open mix has the additional benefit of being easier to separate from the rootstock at repotting time. Some growers advocate using compost up to the level of the bulbs, and then topping the rest of the pot with grit, so that the bulbs are encased in an aerated mineral-only layer. Other growers are successful potting in a more conventional way without these layers. In any case, a minimum 30 mm layer of grit is used to top dress the pots for both practical and decorative purposes.

WATERING. Pot-grown plants are watered in following re-potting in September, and then water should be withheld until leaves are developed, normally January at Kew. At Kew and GBT a sand plunge is used, which regulates and stabilises both root temperature and moisture. The sand is kept uniformly moist at this early stage. If growing these plants in cooler climates this phase is critical as mortality risk is at its highest. There needs to be enough moisture to allow development of feeder roots but at no time should the bulbs be sitting in wet compost. In British and Swedish winters temperatures are often low and air humid, and accurate management of moisture is a delicate operation. The way in which the unfurling leaves are

shaped appear to funnel overhead water down into the neck of the bulb, which can be lethal in cultivation, though it is absurd to suggest plants cannot handle overhead water in nature. Irrigation is applied directly to pots and bright sunny weather will guarantee the plants are respiring and reduce the risk of overwatering. Particular care must be taken on bright January and February days following cold dark periods, as the plants can respire and develop more quickly by several orders of magnitude. Likewise on grey cool days with high humidity watering should be applied cautiously, and only when certain the plants are ready to drink.

FEEDING. Juno irises are hungry plants in the growing season once leaves are developed and unfurled. *Iris nusairiensis* is no different. Both Kew and GBT feed with every watering in the growing season, with a high potassium mineral feed and a biostimulant such as seaweed extract invariably used in one form or another. In-line dosing equipment is used, and mix is diluted to half manufacturer's recommendation. This is to account for the great variety of bulbous species being cared for at this time, to ensure none are missed requiring irrigation on a non-feeding day. It doesn't necessarily reflect the preferences of *I. nusaireinsis* itself and a more conventional feeding regime will do just fine. One final note is that high nitrogen feed creates softer longer leaves, which is undesirable in the battle against fungal pathogens, whilst potassium encourages both flower and seed production.

PROPAGATION. At repotting time, healthy *Iris nusairiensis* bulbs may have made offsets which can be separated carefully in the manner one would do any bulb. Seed propagation is a little more involved. Junos, unlike some of their relatives in genus *Iris*, are only completely self-sterile from a single selfed flower but do exhibit conventional inbreeding depression when selfed between flowers on the same plant or when pollen is transferred between plants of the same clone. Careful monitoring and recording of genotypic diversity within a living collection is therefore a must to enable one to distinguish between different clones. Success rate is always better when different clones are crossed, and hand-pollination will yield better seedlings. Hand-pollination necessitates the use of a mesh bag or similar, delicate enough that light, air and water may pass through, and plant damage is not caused during attachment or removal, but strong and fine enough to keep out any potential pollinators.

At Kew success has been achieved not with bags, but with timely and deft removal of the falls of a recipient plant, robbing the pollinator of its landing pad. The pollination mechanism in *Iris* is quite specialised; when hand-pollinating, the greatest success is had by removing the stamen entirely from the donor plant and rubbing it persistently on both surfaces of the stigmatic flap. In the cold temperatures of winter, respiration rates and development rates are low; therefore for a night or two following pollination in cold weather the pollinated plant is sometimes brought inside an unheated glasshouse to give the pollen improved chance of successful fertilisation.

A successful fertilisation can result in more than 50 small seeds, with scalloped indentations when examined closely. In cultivation fruits mature and dehisce by mid-summer so a pollination bag has the benefit of catching seeds as they are released. Seed is sown fresh, soaked for 24 hours, onto the same compost that the mature plants will grow in and covered with a layer of fine sieved grit. Small long tom pots are used, and these are plunged in sand outside with no protection, and the elements are allowed to work on them. Fresh seed will germinate either immediately or later that autumn, older seed in the following spring or even the year after that. Pots with no germination after three years are discarded.

As far as is known, at Kew juno iris seeds exhibit orthodox storage behaviour at -20° Celsius and 5% relative humidity, the standard Millenium Seed Bank protocol. They have a naturally low moisture content and can tolerate desiccation. Although *I. nusairiensis* has not been raised from seed subjected to long-term storage, related species have been germinated in recent years at Kew and nothing would suggest these shouldn't reach maturity. This indicates that long-term storage in seed banks is a viable *ex situ* strategy and should be considered an urgent need for this species.

Juno irises in cultivation vary from robust perennials that return year on year with individual bulbs that live long e.g. *Iris aucheri* s.s., *I. vicaria* and *I. magnifica* to those where the individual is shorter-lived and more ephemeral, often dying after producing seeds e.g. *I. persica* or *I. galatica*. In wild populations, if good seed is set then the colony will live on even if the individual perishes. Relentless and proactive seed propagation of these types is therefore essential for long-term persistence in cultivation.

PESTS AND DISEASES. Fungal and bacterial diseases of the bulbs and foliage are a challenge to overcome but are not as significant as the management of plant viruses. It is difficult to manage fungal and bacterial diseases completely organically, so the best strategy will include an acceptance that some bulbs will be lost, and by maintaining a diverse collection through frequent controlled seed propagation, one can mitigate this risk. A good integrated regime involving sterile horticulture, careful handling and watering, appropriate nutrition and organic-approved soil drenches can manage fungal and bacterial pathogens effectively.

Viruses are easily transferred both within and between related plant families, a terrifying proposition for any grower of large bulb collections. The key vectors are horticultural tools and ant-tended aphids and other sucking insects (order *Hemiptera*). Regular seed propagation, frequent introduction of new clones and prompt and judicious disposal of affected bulbs is often the only way to overcome viral infection, provided the virus hasn't infected the reproductive organs. To reduce the risk of virus transfer on horticultural tools working with one's hands as much as possible is advocated, only removing tissue that will come away naturally. If a wound must be made, then tools should be sterilised scrupulously between each action.

Ant-tended aphids are more difficult to control, and if left unchecked can sweep through a plant collection. Pesticides can be used, but at Kew management of aphids to acceptable levels is achieved with parasitic wasps and intensive monitoring. The genera *Aphidius* and *Aphelinus* are used to good effect, and the key appears to be to release them before the aphid colonies are established, as they will find the individuals before they are easily visible to the growers. When using this method of control, one must be brave and not remove every aphid present; the wasps require them for food and reproduction. If timing is right a population of wasps can establish which will give good control throughout the season. Because junos dislike having standing water on the leaves or directed down the neck of the bulb, foliar pesticide applications are not used, with systemic drenches the only other available option for both insect pests and fungal diseases. It is more difficult to find agrochemicals approved for soil drenches, and often licenses are only granted or modified for places where non-target insects can be excluded. Pesticides are therefore used only when all other options for conserving the scientific collection have been exhausted for environmental, human risk and financial reasons.

NOTES FROM SOCIETY RECORDS

Iris nusairiensis gained a Preliminary Commendation from the Royal Horticultural Society in 1970, grown by Dr. J.G. Elliott of Ashford, Kent (AGS, 2024), indicating the taxon was not widely known in the UK (understandable, given it was described to science only in 1966) but the judges deemed it to have potential. It was later given an Award of Merit, a recognition of high horticultural performance and persistence in cultivation in 1990, grown by Mr. R.J. Lilley of Caithness, Scotland. However, it may be that the latter material was of hybrid origin. Certainly, for the last 20 years or more material exhibited at Alpine Garden Society shows are all sterile hybrids between *I. nusairiensis* and presumably *I. aucheri*. The true fertile species is confirmed by some specialist growers and botanic gardens.

IRIS NUSAIRIENSIS HYBRIDS

In late November 2015, a spontaneous hybrid between *Iris nusairiensis* and *I. planifolia* flowered at Kew for the first time (Hall, 2017), a cross which has since been named ‘Cadenza’ and would seem to indicate a close relationship between the *Aucheri* group and the *Planifolia* group – a supposition strongly supported by floral and vegetative morphology, pollen studies (Harley, Saito & Hall, 2024, in manuscript) and DNA results (Ikinci *et al.*, 2011). Other hybrids include *I. aucheri* ‘Olof’ \times *I. nusairiensis*, and *I. nusairiensis* \times *I. aucheri* ‘Olof’, both controlled crosses made in 2012 by Arnis Seisums of Salsapils Botanic Garden, Latvia; *I. nusairiensis* \times *I. aucheri*, was raised by Michael Kammerlander from a spontaneous cross which occurred in his garden in 2003; a controlled cross, *I. nusairiensis* \times *I. peshmeniana*, was made at Kew in 2006 by Tony Hall.

NOMENCLATURE AND DESCRIPTION

Iris nusairiensis Mouterde, Nouv. Fl. Liban Syrie 1: 311 (1966). Type: [Syrian Arab Republic]: Slenfé, April 24th, 1953, leg. Pabot (holotype: Herbarium Mouterde, P186).

Juno nusairiensis (Mouterde) Soják, Cas. Nár. Mus., Odd. Prír. 150: 138 (1982).

Plant (8–) 10–12 (–15) cm tall at anthesis, with stem usually compressed. *Bulb* 1.5–2.5 cm diam., (3–) 4–5 cm long, either ovoid and abruptly long-necked, or slenderer and wine-bottle-shaped with a shorter tapering neck, producing several offsets; tunics membranous to papery, outer tunics often blackish, inner tunics charcoal-grey, pale yellowish-brown or dull olive-green, extended into a neck. *Storage roots* fleshy to slightly swollen above, gradually tapering below. *Cataphylls* 2 (–3). *Leaves* (5–) 6–8 (–9), well developed, long-sheathing, broad-lanceolate, tapering fairly abruptly at the tip, glossy mid to dark green above, grey-green to blue-green beneath, margins narrow, cartilaginous, smooth; the largest leaf from 7–10.5 cm long, 1.4–3 cm broad, later expanding to 12–16 \times 1.5–3.5 cm, the lower leaves strongly falcate, often slightly coiling, margins undulate, upper leaves progressively more erect, short and lanceolate, markedly inflated and pale at the base, sometimes not sheathing; in cultivated material at least, internodes are usually visible by the end of the fruiting stage. There are 4–5 basal leaves without flowers. *Bracts* submembranous, subequal, 4.1–5.4 cm long, usually inflated below, clasping at the tip, margins scarious, outer bract grey-green or blue-green above, pale green below with darker veins, inner bract slightly thinner textured, more scarious at the tip, often pale green throughout, with darker veins below; tube 4–5 cm long. *Flowers* (1–) 2–5 (–6), faintly to sweetly scented, usually of almonds, (5–) 6.6–8 cm diam., whitish (more rarely pure white with a fuzzy yellow blotch surrounding a yellow crest), pale lavender-blue, powdery-blue to bright lavender-blue, with fine to smudged blue or sea-green veining to blade and/or winged portion of falls and occasionally to blade of standards; blade of falls usually with a large pale or whitish shield-like blotch around crest; crest creamy-white to creamy-yellow, sometimes with ridge to lower portion of crest marked in orange-yellow, brown-yellow, greenish-blue or blue, midrib below pale creamy-yellow, sometimes with a pale yellow or brownish-yellow central line and a scattering of short, erect, bristle-like dark brown hairs. *Falls* (3.5–) 4.6–4.9 cm long, margins undulate, often crenulate, wings of haft ascending to strongly clasping, (2.4–) 2.9–3.8 cm broad, sloping abruptly to base of haft, more gently towards blade; blade spreading to strongly reflexed, rounded to obovate, 1.2–2 cm long, (1.6–) 2.3–2.65 cm broad, sinus absent or only slight; crest barely to fairly well raised, entire to unevenly crenate, sometimes papillose towards the lower end. *Standards* (1.6–) 2.3–2.6 cm long, spreading to slightly reflexed, spatulate to obovate; haft short, usually narrow, blade (0.7–) 1–1.2 cm broad, margins sometimes unevenly scalloped, apex apiculate or 3-lobed. *Style branches* 3.8–4.1 cm long, 1–1.2 cm broad, sometimes with blue or sea-green staining/veining to arms and lobes, style lobes (1.1–) 1.3–1.6 cm long, (0.8–) 0.9–1.15 cm broad, ascending, overlapping, margins

crenulate; *stigma* emarginate to strongly bilobed. *Stamens* 2–2.8 cm long, filaments pale blue to whitish, anthers 1–1.2 cm long, anthers and pollen white to creamy-white. *Capsule* narrowly triangular-ellipsoid, often slightly wider at the base, (2.8–) 3–4.5 cm long, 0.7–1 cm diam., sometimes with a short beak; *seeds* subspheroid and acute at one end, or ovoid-ellipsoid and acute at both ends, 0.3–0.45 cm x 0.2–0.35 cm, pale to dark brown, slightly rugulose. $2n = 24$ (Margaret Johnson, Tony Hall & Arnis Seisums, [unpubl.](#)) (Figure 10).

DISTRIBUTION. Northwest Syria. Coastal mountain range known historically as the Nusayriyah Range or Jebel Nusairi (يبري قسنلا لاج). Mouterde (1966) described the type locality of *I. nusairiensis* from the Nusayriyah range, specific to one area of Mount Slunfe near Chatha in Latakia Governate. In 2022, the authors identified four extant localities for *I. nusairiensis*

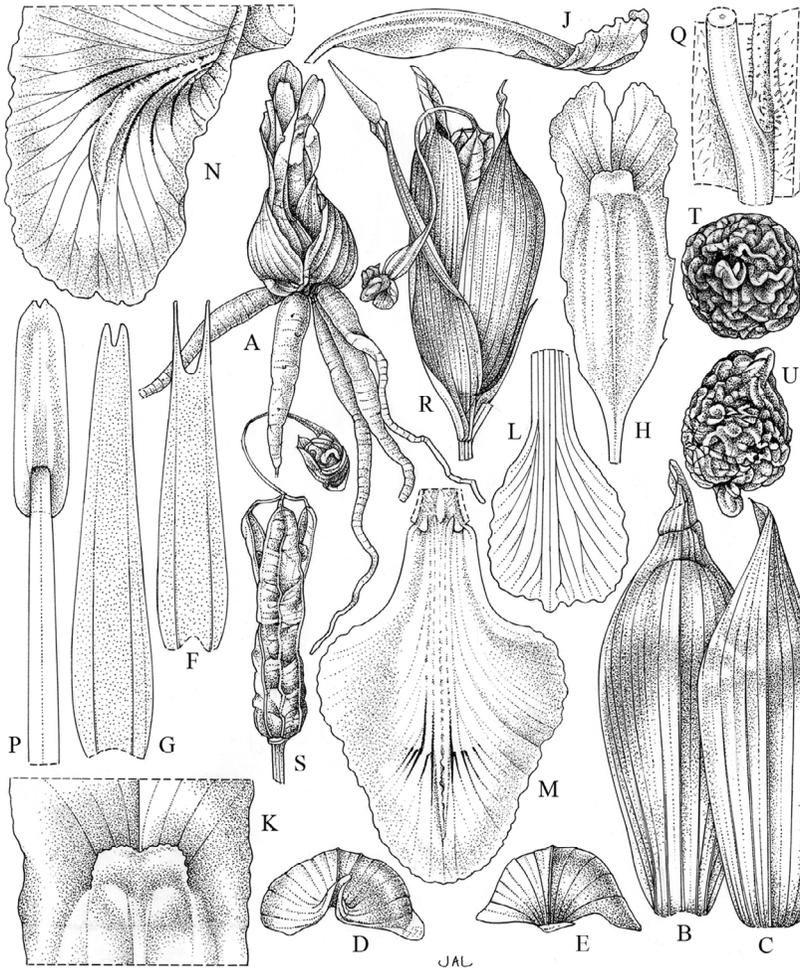


FIGURE 10 *Iris nusairiensis*. A, rootstock $\times 2/3$; B, outer floral bract $\times 1.5$; C, inner floral bract $\times 1.5$; D outer floral bract from above $\times 1.5$; E, inner floral bract from above $\times 1.5$; F, prophyll $\times 3$; G, prophyll $\times 3.5$; H, style arm from front $\times 1.5$; J, style arm from side $\times 1.5$; K, stigmatic flap $\times 3.5$; L, standard displayed $\times 1.5$; M, fall from front $\times 1.5$; N, blade of fall with crest $\times 3$; P, stamen from back $\times 4$; Q, base of filament & fall $\times 6$; R, capsule in papers $\times 1$; S, capsule from side $\times 1$; T, seed from above $\times 20$; U, seed from side $\times 20$. Magnifications when viewed at 110 mm wide. Plants illustrated: A–F, H–Q: Kew2002-2744; G, R–U: Kew1984-4568. Drawn by Joanna Langhorne from plants cultivated at Kew.

one of which aligned with Mouterde's type locality. This locale is now within a protected area called Cedar and Fir (حوشل او زرال ايفمحم). Three new localities were discovered in southern Slunfe. These newly discovered areas include Jawbat Burghal (لأغرب قنوج), Sheikh Hatem al-Tubani (يخ حاتم الطوبان يشل) and Maqamat Bani Hashim (مشاه ينزب تاممقم).

HABITAT AND ECOLOGY. Rocky slopes and soils on exposed mountain limestone ridges, 1200–1600 m. Plants in nature occur both as solitary individuals and in larger populations in clumps. Plants are often with single terminal flowers, although multiple flowers on a stem have been witnessed in cultivation (Figure 3). Beetles (order *Coleoptera*) have been observed pollinating in habitat (Figure 2), and bees (order *Hymenoptera*, clade *Anthophila*) are frequently observed visiting plants in cultivation. Plants have been observed forming fruit in nature by the authors, with seedling recruitment still evident in extant populations.

The species is winter-green and summer dormant with seeds being released in summer and germinating with autumn rain. It may take several years for a seedling to reach flowering size, and seedlings are desiccation intolerant until their storage organ is developed, usually after one full growing season. In common with other bulbs the plants will progressively pull themselves deeper into the ground. The storage roots play an important role in this and may also aid in anchoring the plants in their rocky habitat (Figures 7 & 5).

FLOWERING TIME. In nature late March and into April, shifting with the snowmelt; in cultivation in UK and Sweden between the end of January and end of March.

ETYMOLOGY. Named for the Coastal Range (Nusayriyah Range or Jebel Nusairi) of northwestern Syria.

MOUTERDE'S PROTOLOGUE IN *NOUVELLE FLORE DU LIBAN ET DE LA SYRIE* 1: 311 (1966), TRANSLATED FROM THE FRENCH

Bulb 1 cm., ovoid, surrounded by blackish tunics. Stem short, 7–10 cm. with two membranous leaf sheaths at its base, followed by six distichous, con-volute, arching, smooth-margined, glossy light-green leaves, 1½ cm. wide (spreading), the uppermost with an expanded sheath. Spathe double, pale green, membranous in consistency. Ovary 1 ¾ cm. long, lanceolate, gradually narrowing at the base of the tube, the tube much longer than the ovary, and longer than the perianth. Perianth blue. Inner tepals weakly unguiculate, seemingly spreading rather than reflexed, blue, relatively long, lanceolate. Outer tepals not narrowed above the first half, rounded at the tip, reaching 1¾–1 ¾ cm. wide, spreading, slightly arching, crossed in the middle by a strongly striated yellow median stripe. Stigmas with entire margins, only slightly shorter and not as wide as the tepals. Stamens with filaments shorter than the anthers, these being 1.25 cm long.

Flowering period: Spring. Rocky soils. S. Mm. Slenfé (Pb, Mt). Chatha Pass (Pb). Type: Slenfé, April 24th, 1953, leg. PABOT (Herbarium Mouterde, P 186). Geogr. range - Endemic.

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Maps were created using ESRI ArcGIS Pro 3.2 under the ESRI master license agreement.

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