A TAXONOMIC APPRAISAL OF GENUS IRIS L. (IRIDACEAE) IN KASHMIR HIMALAYA, INDIA

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From the Kashmir Himalaya, the Irises have been little investigated taxonomically. As a result of this, the species richness of irises reported from this region has been numerically variable and taxonomically confusing. In view of this, the present study has been undertaken to work out the taxonomy of *Iris* L. in this Himalayan region. A taxonomic account of fourteen (14) species of *Iris* recorded in the Kashmir Himalaya has been provided. Updated nomenclature, with basionym and synonyms (if any), description, altitudinal range, distribution pattern and colored illustration of the *Iris* species in the region is provided. The species: *Iris japonica, I versicolor* and *I. hollandica* are three new species records for the study area.

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Key words. Iris, taxonomy, species richness, Kashmir Himalaya.

ارزيابي تاكسونوميک جنس زنبق در كشمير هيماليا، هندوستان

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گونه‌های جنس زنبق در كشمير هيماليا از ديدگاه تاكسونومی مورد بررسی كمی قرار گرفته است، و در نتيجه تعداد گونه‌ها و رده‌بندی آنها با اشتباه همراه بوده است. به همين منظور، مطالعه حاضر به تاكسونومی جنس زنبق در منطقه كشمير هيماليا می‌پردازد. در اين منطقه ١٤ گونه تشخيص داده می‌شود و در اين مقاله نامهای صحيح و مترادف، شرح گونه‌ها، دامنه تغييرات ارتفاعی، انتشار آنها و همچنين تصاوير آنها ارائه می‌گردد. گونه‌های زير برای اولين بار برای منطقه گزارش می‌گردند.

INTRODUCTION

Iris L., commonly known as Iris, are perennial bulbous or rhizomatous plants belonging to the *Iridaceae*, a family placed under the order *Asparagales* (Stevens 2001). Almost cosmopolitan in distribution, it is one of the most important and prized group of plants in horticulture and floriculture. *Iris* is the genus of 260-300 species with showy flowers. The genus takes its name from the Greek word for a rainbow, referring to the beautiful and varied colours of flowers among the many species as well as countless garden cultivars (Coventry 1923).

In the Kashmir Himalaya, a region located in northwestern extreme of Himalayan biodiversity hotspot, the genus *Iris* occur from the valley bottom to high alpines along an altitudinal gradient ranging from 1600 to 4500 m. Various species of *Iris* grow abundantly in diverse habitats such as alpine and sub-alpine meadows, roadsides, stream banks, public gardens, orchards, saffron fields, graveyards and cemeteries (Zeerak & Wani 2007). From the Kashmir Himalaya, during over the last one century, a number of workers while carrying out general floristic studies from different areas of the region have reported the occurrence of Irises (Coventry 1923; Blatter 1928; Stewart 1972; Sharma & Kachroo 1981; Polunin & Stainton 1984; Singh & Kachroo 1976; Dhar & Kachroo 1983; Kachroo et al 1977; Singh & Kachroo 1994; Sharma & Jamwal 1998; Swami & Gupta 1998; Murti 2001; Zeerak & Wani 2007). However, the number of *Iris* species reported by these workers in the region varies considerably and lack taxonomic clarity. It is in this context that the present paper provides an updated taxonomic appraisal of genus *Iris* in this

Himalayan region with an updated nomenclature, description, local distribution, altitudinal range, and flowering phenology of each species.

MATERIAL AND METHODS

The present work is mainly based on the collection of *Iris* specimens during the floristic surveys in the region over the last one decade, supplemented with critical examination of the previous herbarium specimens deposited in Kashmir University Herbarium (KASH) and Northern Circle Botanical Survey of India (NC/BSI), Dehradun and perusal of relevant systematic literature. Recent nomenclature changes were incorporated by using the specialized online web resources. Altitudinal range for all the species has been worked out; and it refers to the minima and maxima of altitude within all the recorded localities of each species in the region. Chromosome number (2n) has been documented for each species using the online web source: Index to Plant Chromosome Numbers (IPCN).

RESULTS

At the present stage of investigation, the genus *Iris* is represented by 14 species in the Kashmir Himalaya. Both the species growing in wild and those cultivated species, which have now become fully naturalized in the region, have been included. Each species has been provided with currently valid scientific name, followed by full author citation, English name, Kashmiri name, basionym and synonyms (if any), taxonomic description, flowering period, geographic distribution including local distribution and altitudinal range in meters (above mean sea level). A bracketed key has been also constructed.

Key to the species of *Iris* in the Kashmir Himalaya

1.+Plants with a rhizome; leaves usually flat 2
- Plants with a bulb; leaves folded at midrib 13

2.+ Plants with tiny rhizome and markedly swollen tuber-like, as well as fibrous roots; standards narrowly lanceolate, bent outwards and downwards like fall **1. *Iris decora***

- Plants with well-developed rhizome, sometimes slender and stolon-like, not swollen tuber-like; standards erect 3

3.+ Falls with a distinct beard of fairly long hairs 4
- Falls without a distinct beard but may have cock's comb-like crest, or rarely a fine pubescence of very short unicellular papillae on the haft. 7

4.+ Rhizomes stout; hairs on falls multicellular; seeds non-arillate 5
- Rhizomes slender and compact; hairs on falls unicellular; seeds arillate **2. *Iris hookeriana***

5.+ Flowers bi-coloured; standards yellow; falls purplish and creamy veined **3. *Iris variegata***
- Flowers other than above 6

6.+ Flowers usually white; bracts green, only a narrow margin scarious, outer one 7-11 cm long **4. *Iris kashmiriana***
- Flowers usually violet; bracts scarious at least in the upper half, outer one up to 5 cm long **5. *Iris germanica***

7. + Crest on fall of flowers present 8
- Crest on the fall of flowers absent 9

8.+ Rhizome dimorphic; leaves clustered into a broad terminal fan; flowers white or pale blue, falls and standards fringed **6. *Iris japonica***
- Rhizome not dimorphic; leaves alternate on stem, not clustered into a terminal fan; flowers pale reddish purple, falls and standards not fringed **7. *Iris milesii***

9.+ Capsule with 6 ribs running longitudinally; 2 ribs at each of the 3 corners; seeds with a loose papery coat 10
- Capsule other than above 11

10.+ Flowers deep golden yellow; blade of fall longer than haft **8. *Iris crocea***
- Flowers bright deep blue or violet blue with median yellow stripe; blade of fall equal to or shorter than haft **9. *Iris spuria***

11.+ Perianth tube very short (only 2-3 mm long); falls and standards appear almost free; capsule shortly beaked 12
- Perianth tube 1-1.2 cm long; capsule conspicuously beaked **10. *Iris versicolor***

12.+ Leaves ensiform, mid-rib prominent; flowers 9-10 cm in dia.; falls obovate, mottled yellow at centre; capsule ellipsoid; seeds semi-orbicular **11. *Iris ensata***
- Leaves linear, mid-vein absent; flowers 4-6 cm in dia.; falls oblanceolate, not mottled; capsule narrowly cylindric; seeds pyriform **12. *Iris lactea***

13.+Bulb covered by coarsely reticulate fibrous tunics; leaves quadri-angular, shiny **13. *Iris reticulata***
- Bulb covered by papery tunics; leaves strap-shaped, dull grayish green **14. *Iris* x *hollandica***

1. Iris decora Wall., Pl. As. Rar. 1:77. t. 86 ((1829). (Himalayan iris) (Fig. 1. a.)

I. nepalensis D. Don, Prodr. Fl. Nepal. 54 (1825) non Wall. (1824); *I. sulcata* Wall., Numer. List 5049 (1831).; *I. yunnanensis* H. Lev., Repert. Spec. Nov. Regni Veg. 6: 113 (1908).

Perennial herb; root stock stout, prostrate, swollen, tuber-like; stems 15-30 cm high, slender. Leaves 10-45 cm long, 2-5 mm wide, 2-3 nerved, base surrounded by brown fibres. Bracts (spathes) slender, 4-6 cm, acuminate, keeled, generally two flowered. Flowering stem (penduncle) 10-30 cm tall, often branched; Pedicel 2-2.5 cm long. Flowers pale lilac, short stalked,

3-3.5 cm in diameter. Falls 2.5 cm broad, stalked with a yellow ridge like crest; standards narrowly lanceolate and smaller, bent outwards and downwards like falls; tube 2.5- 6 cm long; crest triangular erect, exceeding falls and standards, whitish or yellowish, orange at tips. Filaments white, slightly white tinged; anthers cream coloured, violet tinged at base; ovary 3-sided, each side slightly concave; style broadly lobed, pale violet, toothed at edges; Stigma deeply bilobed. Capsule 2.5-3.5 cm long, oblong, beaked, enclosed in persistent spathes. Seeds brown, small, round; aril as long or longer than seeds.
Flowering period: May-July
Altitudinal range: 1600-4000 m
Chromosome number: 2n = 36
Distribution: Kashmir (Pahalgam); Pakistan and China.
Specimen examined: Pahalgam (Lidderwat), 28-5-1954, *Janki Prasad* 10935 (NC/BSI).

2. Iris hookeriana Foster in Gard. Chron., ser. 3. 1: 611 (1887). (Hooker's iris; 'jangli kreshim') (Fig. 1. b.)
I. gilgitensis Baker ex Hook. f., Fl. Brit. India 6: 264 (1892); *I. kemaonensis* Wall. ex D. Don var. *caulescens* Baker, Handb. Irid. 25 (1892).
Rhizome slender, solid, compact, light brown. Leaves linear, up to 40 cm long, pale green, apex rounded. Aerial stem (peduncle) 10-15 cm long, 2-flowered; pedicel very short. Bracts 4-6 cm long, broader than leaves. Flowers lilac or purplish blue, blotched. Floral tube green and spotted all over, 2-3 cm long. Falls clawed, obovate-oblong, stalked, white beard with thickened orange or yellow tips. Standards erect, clawed, shorter and smaller than falls, obovate, not variegated with blotches, tips emarginate. Stamens 3; filaments blue, as long as creamy anthers; anthers linear, divarticate at base. Ovary inferior, narrowed at both ends. Capsule long stalked, oblong, up to 6.5 cm long. Seeds pyriform, red, aril yellowish.
Flowering period: June-July
Altitudinal range: 2300-3700m.
Chromosome number: 2n= 24
Distribution: Kashmir; (Sonamarg, Gulmarg, Baltal, Sarbal, Ledwas, Khillenmarg, Khan mountain, Harwan, Pulwama, Gurais, Chorwan); India, Pakistan and Afghanistan.
Specimens examined: Baltal (2900 m), 15-6-1983, *G. H. Dar* 5737 (KASH); Harwan (2400 m), 1-5-1971, *Gurcharan Singh* 2513 (KASH).

3. Iris variegata L., Sp. Pl. 1: 38 (1753). **(**Hungarian iris) (Fig. 1. c.).
I. flavescens Delile, Liliac. 7: t. 375 1812.
Rhizome (underground stem) tuberous with fleshy roots. Leaves deep green, sword-shaped, slightly curved, 1-4 cm wide, around 30 cm long, glaucous. The flowering stems (scape) 30–45 cm high, branched or rarely unbranched, 3-4 flowered. Spathes dull green with scarious margins and tips. Flower 5–7 cm across, enclosed in spathes. Perianth tube yellowish green, smooth, 2-3 mm long. Standards (inner tepals) obovate, pale- lemon-yellow; falls (outer tepals) white to pale yellow, with violet or purple veins sometimes fusing into a purple blotch, beard hairs yellow at base and orange at tips; style branches yellowish. Seeds flattened.
Flowering period: April-May
Elevation range: 1600-1800m
Chromosome number: 2n=24
Distribution: Kashmir (Srinagar, Baramulla); native of North America.
Specimen examined: Dalgate (1630 m), 6-7-2010,Chesfeeda Akhter 706 (KASH).

4. Iris kashmiriana Baker in Gard. Chron. Ser. 2. 8:744. 1877. (Kashmir Iris; 'safed mazarmond') (Fig. 1. d.)
I. bartonii Foster, Gard. Chron. 1883 (1): 275 1883.
Rhizome thick and stout. Leaves 4-6, up to 60 cm long, 3-5 cm broad, straight, glaucous, acute, margins scarious. Aerial stem (peduncle) 50-100 cm tall, with 1-2 branches, each branch 2-3 flowered. Bracts and bracteoles 7-11 cm, green with only a narrow papery margins. Perianth fragrant, white with blue markings and yellow green veins; floral tube 2-2.5 cm long; falls 6-10 cm long, obovate, rounded or cuneate, narrowed into a short claw which has a dense, narrow white or yellow tipped beard along the midrib; standards 6-10 cm long, 2-5 cm broad, obovate to oblong, elliptic with a short yellowish claw. Ovary green with ridges and grooves; stigma entire. Filament 1-2 cm long, white, anther 1.5 cm long. Capsule rarely formed. Seeds globular, red-brown, wrinkled.
Flowering period: April-May
Altitudinal range: 1600-2200m
Chromosome number: 2n = 44
Distribution: Endemic to Kashmir.
Specimens examined: Ganderbal (1650 m), 1-5-1981, *G. H. Dar* 1207 (KASH); Kashmir University Botanical Garden (1600 m), 28-4-1978, *A. R. Naqshi* 6489 (KASH).

5. Iris germanica L., Sp. Pl. 38. (1753). (German iris; 'mazarmond') (Fig. 1. e.)
I. deflexa Knowles & Westc., Fl. Cab. 2: 19 (1838); *I. officinalis* Salisb., Prodr. Stirp. Chap. Allerton 43 (1796); *I. pallida* Ten., Fl. Napol. 3: 36 (1811).
Rhizome thick, many branched, light brown, smooth. Aerial stem up to 90 cm tall, longer than the leaves,

glabrous, glaucous, erect, herbaceous, simple. Leaves equitant, ensiform, 30-40 cm long, ±3 cm broad, glabrous, glaucous, acute, entire. Inflorescence terminal, 2-3 flowered. Flowers subtended by reduced bracts. Bracts 2-5 cm long, foliaceous in basal half and scarious in the apical half, often with a purplish tinge in the apex. Flowers fragrant; perianth lavender, violet or bluish with brownish veins in lower parts; floral tube 1.5-3 cm; falls 3, spreading, drooping, obovate, cuneate at base, 7-10 cm long, 5-6 cm broad at the apex with white or yellow beard along midrib. Standards 3, 7-9 cm long and 4-5 cm broad, erect, obovate or elliptic with a narrow claw at the base, glabrous. Ovary roundly triangular, 1.5-2 cm long, slightly wider than floral tube. Filaments c. 1.8 cm long, pale purple; anthers white, subequal. Capsule 3-5 cm long and 2.5 cm broad, roundly 3-lobed, ellipsoid, apex with short remnant of floral tube; seeds oval, pyriform, red-brown, 3-4 mm, wrinkled.
Flowering period: April-June
Altitudinal range: 1600-1850m
Chromosome number: 2n=44
Distribution: Widespread and naturalized species throughout the world.
Specimens examined: Ganderbal (1650 m), 1-5-1981, *G. H. Dar* 1210(KASH); Pulwama (near Keller), 21-6-1985, *A. R. Naqshi* 4211(KASH).

6. Iris japonica Thunberg, Trans. Linn. Soc. London, Bot. 2: 327 (1794). (fringed or crested iris) (Fig. 1. f.)
I. chinensis Curtis, Bot. Mag. 11: t. 373 1797.; *I. fimbriata* Vent., Descr. Pl. Nouv. t. 9 1800.
Perennial; rhizomes dimorphic, suberect, thick, creeping, long, slender. Leaves basal, sword shaped, evergreen, arranged in a broad terminal fan, 30-80 cm long and 2.5-5 cm wide, shiny green above, paler beneath, reddish purple at base, simple, entire, midvein absent. Aerial stem erect, branched near apex; spathes 3-5, broadly lanceolate, obtuse, 3-4 flowered. Flowers pale bluish, 4-6 cm wide; pedicel 1.5-2.5 cm, stiff, persistent. Floral tube up to 1.8 cm long; falls obovate or elliptic, spreading, 2.5-3 cm long, lavender-blue, with conspicuous yellow-orange crest and blue blotching around central, margin denticulate (fringed), undulate, apex retuse; standards spreading obliquely, elliptic or narrowly obovate, up to 3 cm long, clawed, margin denticulate (fringed), undulate. Stamens 0.8-1.2 cm; anthers white. Ovary 7-10 mm. Style branches pale blue; terminal lobes fimbriate. Capsule ellipsoid-cylindric, 2.5-3 × 1.2-1.5 cm, apex not beaked. Seeds dark brown, with small aril.
Flowering period: March-April.
Elevation range: 1600-1700 m
Distribution: Kashmir (Srinagar); Native to Japan, Central China and Myanmar.
Chromosome number: 2n = 24, 28, 34, 36, 54, 56
Specimen examined: Srinagar (1600 m), 29-04-2012, *Anzar A. Khuroo* 1975 (KASH).

7. Iris milesii Foster in Gard. Chron., ser. 2. 20: 231 (1883). (Red flower iris).
Roots fleshy. Rhizomes thick, fleshy, greenish, with distinct nodes, bearing a terminal leafy flowering stem and two lateral non-flowering leafy stems. The lateral stems become active shoots for next year's growth thus the old and the new rhizomes result in a series of dichotomies. Leaves alternate, grayish green, broadly ensiform, firm, strongly curved, 40-60 cm long, 2.5-5 cm broad. Flowering stems erect, 2-4-branched, 60-90 cm, leafy proximally; branches 15-20 cm long; spathes several, 2.5-3.5 × 2-2.5 cm, 3- or 4-flowered. Flowers pale reddish purple, 7-8 cm in diameter; pedicel 2.5-4 cm long. Perianth tube 1-1.5 cm long; Falls obovate, marked with dark lines and mottling proximally; crest orange-yellow; standards narrowly obovate, 4-5 cm long, apex retuse. Stamens ca. 2.5 cm long; anthers creamy white. Ovary cylindric, ca. 3 cm long, 3-angled. Style branches pale reddish purple, ca. 3 cm long. Capsule ovoid-globose, reticulate veined. Seeds black-brown, pyriform, with white aril.
Flowering period: May-June
Altitudinal range: 1600- 2700 m
Chromosome number: 2n = 26
Distribution: Kashmir (Aish Muqam, Pulwama), Ladakh, Udhampur; Pakistan, Afghanistan, China.
Specimens examined: Gool (Udhampur), 23-6-1987, *Ajai Swami* 1291 (NC/BSI); Sauziea-Gagriea (2000-2500 m), 18-9-1985, *J. N. Vohra* & *B. D. Naithani* 78377 (NC/ BSI).

8. Iris crocea Jacquem. ex R.C. Foster in Contrib. Gray Herb. 114: 41 (1936). (German Iris) (Fig. 1. g.).
I. aurea Lindl., Edwards's Bot. Reg. 33: t. 59 (1847) non Link (1821); *I. spuria* subsp. *aurea* Dykes, Gen. Iris 65 (1913).
Rootstock stout, prostrate, brown. Stems 100-130 cm high, stout, round, with leafy sheaths. Leaves 60-90 cm long, erect, stiff, dark green, ribbed, linear-ensiform. Spathes 7.5-10 cm long, 2-3 flowered. Flowers deep golden yellow, long stalked. Blade of falls 4-5 cm long, oblong, as long as claw, tapered, crimpled at margins, narrowing to 3-3.5 cm long haft; standards 7.5 cm long, inversely lens-shaped, waved at edges. Style 3.8 cm, crested; ovary as long as the perianth tube. Capsule 3.5-4 cm long, oblong, 6-angled, beaked.
Flowering period: June-July
Altitudinal range: 1600-1900 m
Chromosome number: 2n= 40

Distribution: Kashmir (Dachigam, Harwan, Gulmarg, Vishunag, Mudegaum, Pir Panjal); Pakistan, China, Bhutan.
Specimen examined: Matay Gand (1725 m), 9-5-2001, *G. H. Khanday* 1202 (KASH).

9. Iris spuria L., Sp. Pl. 39 (1753). (Blue Iris) (Fig. 1. h.)
Xiphion spurium (L.) Alef., Bot. Zeitung (Berlin) 21: 297 (1863).
Perennial herb. Rootstock stout, branched, creeping rhizome; aerial stem erect, stout, 60-100 cm tall, overtopping the leaves. Leaves linear, 65-75 cm long, 1.25-3 cm broad, stiff, glaucous; spathes green with scarious tips, erect, 1-3-flowered. Perianth tube up to 2 cm long, funnel shaped. Flowers deep blue to violet blue with median yellow stripe down the middle of the falls; pedicel 2-8 cm long. Falls rounded ovate narrowing sharply into the haft, haft length equal to or longer than that of blade, with dark purple veins, orbicular-oblong, 3-8 cm long, 2-3 cm broad, unbearded; standards oblanceolate, almost vertical, 3-6 long, 1.25 cm broad. Stamens 3; filaments 1-1.5 cm long, flattened; anthers 2.5 cm long with orange-yellow pollen grains. Ovary 6-ribbed, the style arms 3, about 3 cm long, with reflexed, triangular crest. Capsule 6-ribbed, beaked, 3-7 cm in length.
Flowering period**:** June-July
Altitudinal range: 1400-1800 m
Chromosome number: 2n=44
Distribution: Kashmir (Bijbehara, Pattan, Harwan); Pakistan, West Asia and Europe.
Specimen examined: Harwan (1700 m), 20-4-1971, *Gurcharan Singh* 3339 (KASH).

10. Iris versicolor L., Sp. Pl. 1: 39 (1753). (wild iris, blue flag) (Fig. 1. i.).
Xiphion versicolor (L.) Alef., Bot. Zeitung (Berlin) 21: 297 (1863).
Perennial herb. Rootstock creeping rhizome, freely branching, forming large clumps, 1-2.5 cm wide. Plants 10-80 cm high. Stems 1–2-branched, solid. Leaves firm, linear to sword-shaped, prominently veined, 36 cm long 2.5 cm wide, glaucous. Inflorescences compact, 2–4-flowered; spathe never foliaceous, 3–6 cm, unequal, outer shorter than inner, thickly chartaceous to scarious, margins shiny, darker in color. Flowers light-deep blue; perianth tube funnelform, constricted above ovary, 1–1.2 cm long; falls ovate, up to 7.5 cm long, hairless, often with a greenish yellow to green basal spot; standards lanceolate, erect, shorter than the falls, firm textured, not readily wilting. Ovary inferior, bluntly angled; style 3–3.5 cm, base not auriculate, margins entire or toothed, crests reflexed, 0.7–1.5 cm; stigmas unlobed, triangular or rounded-triangular, margins entire. Capsule 3-celled, ovoid to oblong-ellipsoid, bluntly angled, conspicuously beaked, shiny. The seeds are dark brown, D-shaped, shiny and regularly pitted and relatively thin.
Flowering period: May-July
Altitudinal range: 1600-1800 m
Chromosome number: 2n=108
Distribution: Kashmir (Kashmir University Botanical Garden, Sopore); native of North America.
Specimen examined: KUBG (1600 m), 16-7-2011, Chesfeeda Akhter 1303 (KASH).

11. Iris ensata Thunb., Trans. Linn. Soc. London 2: 328 (1794). (Japanese iris; 'kreshim') (Fig. 1. j.)
I. kaempferi Siebold ex Lemaire, Ill. Hort. 5: t. 157 (1858); *I. kaempferi* var. *spontanea* Makino, Bot. Mag. (Tokyo) 23: 94 (1909); *I. ensata* var. *spontanea* (Makino) Nakai, Veg. Apoi 78 (1930); *I. graminea* Thunb., Fl. Jap. 34 (1784) non L. (1753).
Rhizomes creeping, stout, prostrate. Leaves ensiform, 25-70 cm long, straight, tough with prominent midrib, margins scarious, apex acuminate, base dark purple. Aerial stem tufted, short, 20-100 cm high, stout or slender, bearing a single terminal or lateral head; spathes 3, unequal, lanceolate, 4-7.5 cm long, 1-3 flowered, veins distinct, raised; basal spathe shorter, apex usually acute; apical spathe longer, apex usually obtuse. Flowers lilac or reddish purple; pedicel 1.5-3.5 cm long. Falls and standards often with purplish veins, stalked. Perianth tube absent or very short; blade of falls rhomboidly ovate, entire, shorter than the claw, molted yellow at centre; standards erect, oblanceolate. Stamens about 3.5 cm long; anthers purple. Ovary cylindric; style purple, 5 cm long. Capsule ellipsoid, 6-ribbed, beaked. Seeds reddish-brown, semi orbicular, flat.
Flowering period: May-July
Altitudinal range: 1600-2600 m
Chromosome number: 2n = 24
Distribution: Kashmir (Pulwama, Harwan, K.U. Campus, Srinagar, Pampore, Kunzer, Tangmarg, Ganderbal), Ladakh (Leh, Kargil, Nubra, Hemis, Khalsi); Pakistan, Afghanistan, China and Myanmar.
Specimens examined: Prang (1800 m), 1-5-1983, *G. H. Dar* 1207 (KASH); Nunar (1750 m), 5-5-1982, *G. H. Dar* 3335 (KASH).

12. Iris lactea Pallas, Reise Russ. Reich. 3:713 (1776). (Milky iris).
I. lactea var. *chinensis* (Fisch.) Koidz., Bot. Mag. (Tokyo) 39: 300 1925.; *I. oxypetala* Bunge, Enum. Pl. China Bor. 63 (1832).
Rootstock stout, creeping rhizome with reddish purple

fibres. Leaves basal, grayish green, linear, 14–70 cm × 3–7 mm, tough, prominently ribbed, midvein absent. Flowering stems 5–50 cm; spathes green, lanceolate, 4.5–10 × 0.8–1.6 cm, 2–4-flowered, apex acuminate. Flowers bluish purple, pale violet, or partly milky white or yellow; pedicel 4–7 cm long. Perianth tube very short, up to 3 mm long. Falls clawed, 4.5–5.5 × 0.8–1.2 cm, claw slightly longer than obovate blade; standards erect, narrowly oblanceolate, 4.2–4.5 cm × 5–7 mm. Stamens 2.5–3.2 cm long; anthers yellow. Ovary narrowly fusiform, very long, 3–4.5 cm, grooved, stigma small, triangular. Capsule narrowly cylindric, 2.5–7.5 cm long, 6-ribbed, apex shortly beaked. Seeds round smooth maroon-brown, pyriform.
Flowering period: April–June
Altitudinal range: 1500-3300 m
Chromosome number: 2n=40
Distribution: Kashmir (Guraiz); Pakistan and Afghanistan, China, Central Asia and Korea.
Specimen examined: Chorwan (Guraiz), 10-8-1989, *Naqshi*, *Showkat* & *Kachroo* 10300 (KASH).

13. Iris reticulata M. Bieb., Fl. Taur.-Caucas. 1: 34 (1808) (Reticulated Iris) (Fig. 1. k.)
Iridodictyum reticulatum (M. Bieb.) Rodion, Rod Iris-Iris 202 (1961); *Xiphion reticulatum* (M. Bieb.) Klatt, Linnaea 34: 572 (1866).
Rootstock slender, underground bulb with reticulate outer scales. Plants 10-25 cm tall. Leaves 1-3 from each bulb, quadrangular, folded at midrib, not longer than flowers, later up to 45 cm long, 1.5-3.0 mm broad. Aerial stem obsolescent. Flower solitary, violet-scented. Spathe up to 9.0 cm long, 1-flowered. Pedicel up to 4.0 cm long. Perianth very variable in colour, pale blue to violet, purple; perianth tube 4-12 cm long, mostly covered by spathe; falls ovate, 3.2-5.5 cm long, 1.25 cm wide; haft 2.1-3.8 cm long, darker than rests of the flower; crests yellow; standards 3-5.2 cm long, 0.5 cm wide, erect, oblanceolate. Stamens with filaments 1-2cm long; anthers 6-11 mm long. Stylar branches 3-5 cm long, with lobes 1-1.5 cm long; stigma deeply bilobed. Capsule 3.0-5.5 cm long, ellipsoid, shortly beaked, more or less at the ground level. Seeds arillate.
Flowering period: February-April
Altitudinal range: 1700-1850 m
Chromosome number: 2n = 20
Specimen examined: Mirbagh (Ratnipur), 4-4- 1999, *A. R. Naqshi* 11053 (KASH).

14. Iris ×hollandica Hort. [probable parents: *I. xiphium* × *I. tingitana*] (Dutch iris) (Fig. 1. l.).
Rootstock slender; underground bulb with dark brownish papery scales. Plants 30-60 cm tall; scape clothed with broader leaves. Leaves linear, strap-shaped, longitudinally-parallel-veined, entire, 40-55 cm long, 0.5-1.5 cm broad, folded at midrib, two ranked, and overlapping at their bases. Flowers showy, solitary, blue or purple blue, 7-12 cm long. Perianth tube 4-5 cm long, ellipsoidal, tapering at ends. Falls purple blue with yellow lip/splotch near the base, oval-circular, projecting downwards; standards narrow, erect, lilac blue. Filaments purplish white, base yellow, 1.5 cm long; anther 1.2-1.5 cm long, basifixed. Ovary yellowish green, triangular with depression in centre. Capsule oblong, many seeded.
Flowering period: April-May
Elevation range: 1600-1700 m
Distribution: Cultivated and naturalized throughout the world, garden origin.
Specimen examined: Srinagar (1600 m), 20-4-2011, *Chesfeeda Akhter* 701(KASH).

DISCUSSION

Previously, the occurrence of *Iris* species has been reported by a number of workers while carrying out the floristic studies in different localities of the Kashmir Himalaya (Coventry 1923; Blatter 1928; Stewart 1972; Sharma & Kachroo 1981; Polunin & Stainton 1984; Singh & Kachroo 1976; Dhar & Kachroo 1983). However, there has been no taxonomic clarity on the number of species of the genus in the region. The present study for the first time has brought clarity to the taxonomy of genus *Iris* in Kashmir Himalaya. *Iris japonica* Thunberg, *I. versicolor* L. and *I. hollandica* Hort. are three new records for the flora of Kashmir Himalaya. Many previous records such as: *Iris tectorum* Maxim, *Iris albicans* Lange, *Iris flavescens* DC. are invalid names because of incorrect author citation. Several species namely: *Iris xiphium* L., *Iris aitchisonii* (Baker) Boiss., *Iris pallida* Lam. that were reported by earlier workers (Stewart 1972; Koul 1977; Zeerak & Wani 2007) have been excluded by the present investigation. The present study has clarified the misidentification of the Himalayan endemic species, *Iris kemaonensis* Wall. ex D. Don, from the region. On critical examination of all the herbarium specimens identified as *I. kemaonensis* from the region, it came to be a case of misidentification of *I. hookeriana*. The synonymy is also widespread in the genus, leading to taxonomic confusion, e.g., *Iris nepalensis* D. Don and *I. aurea* Lindl. are variously used in the taxonomic literature (Blatter 1928; Stewart 1972), however, both are synonyms of *I. decora* Wall. and *I. crocea*, respectively.

The genus is represented by several wild, cultivated and some endemic species. Several species (e. g. *Iris kashmiriana* Baker, *I. hookeriana* Foster, *I.*

Fig. 1. a. *Iris decora*; b. *I. hookeriana*; c. *I. variegata*; d. *I. kashmiriana*; e. *I. germanica*; f. *I. japonica*; g. *I. crocea*; h. *I. spuria*; i. *I. versicolor* ; j. *I. ensata*; k. *I. reticulata*; l. *I.* ×*hollandica* .

milesii Foster, *I. crocea* Jacq.), that grow wild throughout the Kashmir Himalaya, are endemic to the Himalayan region (Dhar and Kachroo, 1983). Majority of the cultivated irises were introduced as ornamentals by the Mughals and the Britishers to adorn graveyards and public parks, many of which have now become fully naturalized (e.g., *I. variegata* L., *I. germanica* L.). Several cultivated species such as *I. germanica* show great phenotypic flexibility mainly because of their perennial clonal habit and hardy bulbs which can survive even during harsh winter climate. Some species such as *I. reticulata* have been unintentionally introduced into the region as a satellite weed along with saffron crop.

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