



A taxonomic revision of *Iris* section *Psammiris* (*Iridaceae*) in Russia

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Abstract

Until now, as few as 2–4 species of the genus *Iris* sect. *Psammiris* (*Iris bloudowii*, *I. humilis*, *I. mandshurica*, and *I. potaninii*) have been reported in Russia in botanical publications. We have analysed the diagnostic value of morphological characters. At the series level, features of the root system, the shape of basal leaves, the height of flowering scape, and the length of perianth tube are most significant. The shape and size of spathes are also usable for species identification. In the present contribution, a synopsis of *I. sect. Psammiris* in Russia is presented, including the description of a new series, *Vorobievia*. In that country, the section comprises 7 species belonging to 3 series and occurring mainly in Siberia and the Far East, one species extending to the Eastern Europe. A key for species determination is compiled, and the distribution areas of the accepted species are specified. Types are indicated for all involved names, two of which (lectotypes) are designated here. Furthermore, previous results of molecular studies including taxa in this section are analysed and discussed, which demonstrate that *I. sect. Psammiris* is indeed monophyletic according to the morphological and molecular data available so far.

Key words: Asian flora; *Iris* ser. *Vorobievia*, lectotypification, nomenclature, taxonomy

Introduction

There is no common opinion on the circumscription of the genus *Iris* Linnaeus (1753: 38) so far. Depending on the generic and/or specific concepts, the genus was treated as comprising about 262 species (Mathew 1981) including bulbous and bulbotuberous plants, or about 180 species (Rodionenko 1961), namely those with rhizomes and ensiform leaves only. Later, Rodionenko (2009) retained only 94 species in a recircumscribed genus *Iris* s.str., those corresponding exclusively to *I. subg. Iris*, which show many-celled trichomes (hair-like) or ridges on the outer perianth lobes (falls). Most species of *Iris* s.l. are distributed in Southwestern and Central Asia and the Mediterranean region. According to our data (cf. Alexeeva 2008), there are 40 species and 1 subspecies of the genus *Iris* (*sensu* Rodionenko 1961) in Russia.

When compiling the systematics of the genus *Iris*, most taxonomists appealed to the characters of underground organs, the presence or absence of many-celled hairs on the falls (bearded or “pogon irises”, and beardless or “apogon irises”, respectively), or the leaf shape (tetraquetrous or flat: ensiform or linear). Spach (1846) in his arrangement of the genus, used additional characters including the type of underground organs, the leaf shape, the perianth structure, and features of capsules and seeds. Within the group of the pogon irises, he distinguished *I. subgenus Psammiris* Spach (1846: 110) characterized by a straight flattened scape, the perianth spirally contorted when fading, and the seeds with an aril. He included into that subgenus the three species known to him, namely *I. arenaria* Waldstein & Kitaibel (1802: 57, tab. 57) described from the Eastern Europe (the type of the subgenus name, cf. Taylor 1976), *I. flavissima* Pallas (1776: 715) described from Transbaikalia area, and *I. bloudowii* Ledebour (1830: 5 & tab. 101), this name based on *I. flavissima* var. *umbrosa* Bunge (1829: 60) which was described from collections by Bunge and Ledebour in Altai. Later, Karavaev (1973) considered *I. flavissima* as conspecific with *I. humilis* Georgi (1775: 196) from Transbaikalia area.

Iris mandshurica Maximowicz (1880: 530) was described on the basis of materials collected by Gleditsch in Primorsky Krai, the Suifen (Razdolnaya) River in the district of Nikolsk (now Oktyabr'sky district). It was said to be a plant with a fleshy rhizome; its leaves were specified as similar to *I. bloudowii*, and the spathe, leaves and flowers as resembling *I. flavissima*. Dykes (1913) and Ugrinsky (1922) studied the complex group *I. flavissima* (= *I. humilis*). They correctly mentioned that the species *I. bloudowii*, *I. flavissima* and *I. mandshurica* are different in terms of their

morphology, distribution ranges, habitats and rhythms of development. *Iris potaninii* Maximowicz (1880: 528) was described on the basis of materials from collections by Turczaninow in Transbaikal area, by Bunge in Altai, and by Potanin in Mongolia.

Lawrence (1953), when revising the arrangement of the genus *Iris*, reduced the subgenus *Psammiris* to a synonym of *I.* subsection *Hexapogon* Bentham (1883: 687), but included there only the type species of the group, *I. flavissima* (incl. *I. arenaria*). He transferred the other species of this group to *I.* series *Pumilae* Lawrence (1953: 353) (subsection *Pogoniris* (Spach 1846: 103) Bentham 1883: 687), though a set of their features tends to *I.* subsection *Hexapogon*. Rodionenko (1961) without objecting to Lawrence's view, merged the species with a capsule opening by lateral clefts instead of divergent valves, plus the species with arillate seeds, in subsection *Regelia* (Dykes) Rodionenko (1961: 198) of *I.* section *Hexapogon* (Bunge) Baker (1876: 787).

Taylor (1976) mentioned four species in *I.* section *Psammiris*: *I. bloudowii*, *I. humilis*, *I. mandshurica* and *I. potaninii*. He placed *I. arenaria* in synonymy of the close *I. humilis*, so the latter was cited as a type of the section name.

Alexeeva (2008) undertook the first attempt to introduce "Turczaninowia" readers to representatives of irises growing in Russia. The list of species of the genus *Iris* in Russia following Grubov (1977) was represented by two sections: *I.* sect. *Apogon* Baker (1876: 143) and *I.* sect. *Pogoniris* Baker (1876: 647). Among 17 species of *I.* sect. *Pogoniris*, it was placed the *Psammiris* group: *I. arenaria*, *I. bloudowii*, *I. humilis*, *I. kamelinii*, *I. mandshurica*, *I. potaninii*, *I. psammocola*, and *I. vorobievii*.

In his last treatment of the genus *Iris* s.str., Rodionenko (2009) included the discussed group into the new subgenus *Arillosae* Rodionenko (2009: 433). He placed *I. bloudowii* and *I. humilis* in *I.* section *Psammiris*, and "*I. mandshurica*" in *I.* section *Pseudoregelia* Dykes (1913: 129). It is noteworthy that Rodionenko most probably had not seen the type specimen of *I. mandshurica*. In 1967, he found an iris near the village of Kraskino (Primorsky Kray, Khasansky district), and mistook it for *I. mandshurica* (Rodionenko 2006). On the contrary, he determined *I. mandshurica* specimens collected in its locus classicus (Nikolsk environs at the Suifen River) as *I. flavissima* (= *I. humilis*).

Pavlova (1987) stated that the *Iris* populations in the vicinity of Kraskino village, which had been assigned by different researchers either to *I. bloudowii* or *I. mandshurica*, constituted a separate species, and described it as *I. vorobievii* Pavlova (1987: 424). The type specimen of *I. vorobievii* (VLA!) was collected by Vorobiev (02 June 1964) along the road to Kraskino, and was initially determined (11 December 1967) as *I. mandshurica*. Waddick & Zhao (1992) and Rodionenko (2006) did not acknowledge the species. So, the indications by Rodionenko (2006, 2009) on the occurrence of *I. mandshurica* in the southern Primorsky Kray, as well as those by Uginsky (1922), Fedtschenko (1935), Vorobiev (1966) and Waddick & Zhao (1992) on the distribution of *I. bloudowii* in the Far East actually refer to *I. vorobievii*.

Our study of the testa surface microstructure of the closely related species *I. bloudowii*, *I. humilis*, *I. mandshurica* and *I. vorobievii* (Alexeeva & Mironova 2007) revealed many new features and confirmed a specific status of the studied taxa. Phylogenetic studies of Kozyrenko *et al.* (2009), who applied a multigenetic molecular approach, also confirmed the specific status of *I. humilis*, *I. mandshurica* and *I. vorobievii*. These authors concluded that *I. humilis* is not found in Primorsky Kray, while *I. mandshurica* and *I. vorobievii* occur in that area. *Iris vorobievii* shows a vertical rhizome, though of a special structure with abundant radial adventitious roots; and its flower structure, the shape of leaves and capsule, as well as the arillate seeds give evidence of its affinity to species of *I.* sect. *Psammiris*. However, *Iris vorobievii* most probably constitutes a separate series within section *Psammiris*, as described below.

Reviewing Siberian species of the genus *Iris*, Doronkin (1990) divided the section into two series: i) *I.* ser. *Humilis* Doronkin (1990: 415) with two species, *I. bloudowii* and *I. humilis*, and ii) *I.* ser. *Potaninia* Doronkin (1990: 415) with one species, *I. potaninii* (including a new variety, var. *arenaria* Doronkin). Later, Doronkin & Shaulo (2007) reduced the latter variety to a synonym of *I. psammocola* Zhao (1992: 181).

Iris kamelinii Alexeeva (2006a: 116) was described from Russian Altai and assigned to the affinity of *I. potaninii* (*I.* sect. *Psammiris*). The species is characterized by a rhizome covered with membranous leaf sheaths at the base; its standards are rounded-elliptic with a deep excision on the top, their blade suddenly turning into claw; the falls with a dense net of violet veins.

After analyses of molecular sequence data (Tillie *et al.* 2001, Wilson, 2006, 2011, Mavrodiev *et al.* 2014, Crespo *et al.* 2015), our attention was drawn to the position of *I. potaninii* (*I.* sect. *Psammiris*) in some of the phylogenetic trees as sister in the same clade with *I. tigridia* Bunge (1829: 60) (*I.* sect. *Caespitosae* Alexeeva 2006b: 1095), as well as *I. potaninii* var. *ionantha* Zhao (1980: 59) embedded in a distant clade with species of *I.* sect. *Pseudoregelia*. The analyses by Wilson (2006) were based on our collection in the Altai in 2001, which we identified as *I. tigridia* (though as *I. potaninii* in the field diary). New gatherings and further study of the material showed that this collection was

indeed a new undescribed species, subsequently named *I. kamelinii* (cf. Alexeeva 2006a). Therefore, the data obtained by Wilson (2006), also corresponding to those by Mavrodiev *et al.* (2014) and Crespo *et al.* (2015), refer to that new species, which we really approached to *I. potaninii* (a member of *I. sect. Psammiris*). In the case of *I. potaninii* var. *ionantha*, after examination of herbarium specimens from the provinces of Qinghai and Tibet with violet flowers housed at PE (Beijing, China), I came to the conclusion that they are closer to *I. tigridia*. Considering these corrections, both *I. sect. Psammiris* and *I. sect. Pseudoregelia* would be resolved as monophyletic in the above cited previous molecular works (but see also Wilson 2017). The unexpected position of *I. mandshurica* sister to *I. hoogiana* Dykes (1916: 216) (*I. sect. Regelia* Dykes 1913: 123) probably is due to misidentification, an issue to be checked.

In the present contribution, on the basis of the aforementioned data, a revisionary study of the Russian members of *I. sect. Psammiris* is presented, which complements the information available on the Russian taxa of that group.

Materials and methods

The research is based on the author's own collections and observations (Alexeeva, 2004, 2006c, 2007, 2011) in situ (in Russia, e.g. Altai, Transbaikal area, the Russian Far East, and in Mongolia), as well as on material conserved in the herbaria B, BM, K, LE, MHA, MW, PE, P and VLA (acronyms according to Thiers 2017). We have thoroughly examined materials of this group including the types from Europe, Siberia, the Far East as well as China and Mongolia. In order to study morphological structure of vegetative and reproductive organs of the group, a collection of living plants (2000–2014) was made at the “Iridarium” of Peter the Great Botanical Garden, Komarov Botanical Institute of the Russian Academy of Sciences, in Saint Petersburg.

Results and discussion

The conducted studies allow to conclude that *I. sect. Psammiris* is represented by 7 species in Russia: *I. bloudowii*, *I. humilis*, *I. kamelinii*, *I. mandshurica*, *I. potaninii*, *I. psammocola* and *I. vorobievii*. They are distributed in Asia, though *I. humilis* also occurs in the Eastern Europe (Fig. 1–2). All species in the section are low plants with more or less thin rhizome, procumbent scapes, and linear, sometimes falcately curved leaves; flowers are yellow, they fade soon and wither spirally. All members of the section produce arillate seeds.

The shape of the inner and outer perianth lobes, their colour, and the size of the blade and claw are important diagnostic features. The shape, size and colour of spathes are also critical. All species in *I. sect. Psammiris* exhibit yellow flowers. The perianth is sulphur-yellow in *Iris potaninii*, whereas it is light yellow in *I. psammocola*. Flowers are yellow with a dense net of violet veins on the falls in *Iris kamelinii*, while veins are indistinct in *I. potaninii* and *I. psammocola*. The other species are characterised by a dense net of brown-violet veins at the base of fall blade, and on its claw. At the series level, the features of the root system, the shape of basal leaves, the height of flowering scape, the length of perianth tube are of diagnostic value.

Furthermore, morphological features of rhizomes, leaves, flowers, fruit and seeds largely correlate and allow to distinguish groups of related species. *Iris vorobievii* is the most detached due to its short creeping vertical rhizome. It resembles *I. bloudowii* in its flowering scape 20–30 cm tall, swollen spathes, and seeds with a distinct aril. Characters common to *I. bloudowii*, *I. humilis* and *I. mandshurica* are the creeping rhizomes forming loose clumps, a distinct scape 10–15 cm tall, pedicellate flowers, and the perianth tube shorter than the blade. After longer studying, we placed *I. arenaria* in the synonym of the morphologically close *I. humilis* (e.g. rhizome thin, short-creeping, stoloniferous, forming clumps with brown fibrous remains of old leaves, flowering scape 15 cm, and spathes pergamaceous). The remaining species, *I. kamelinii*, *I. potaninii* and *I. psammocola*, produce short creeping rhizomes forming clumps thicker than the previous group, short scapes, and sessile flowers with the perianth tube longer than the blade. All those characters can be used for species identification.

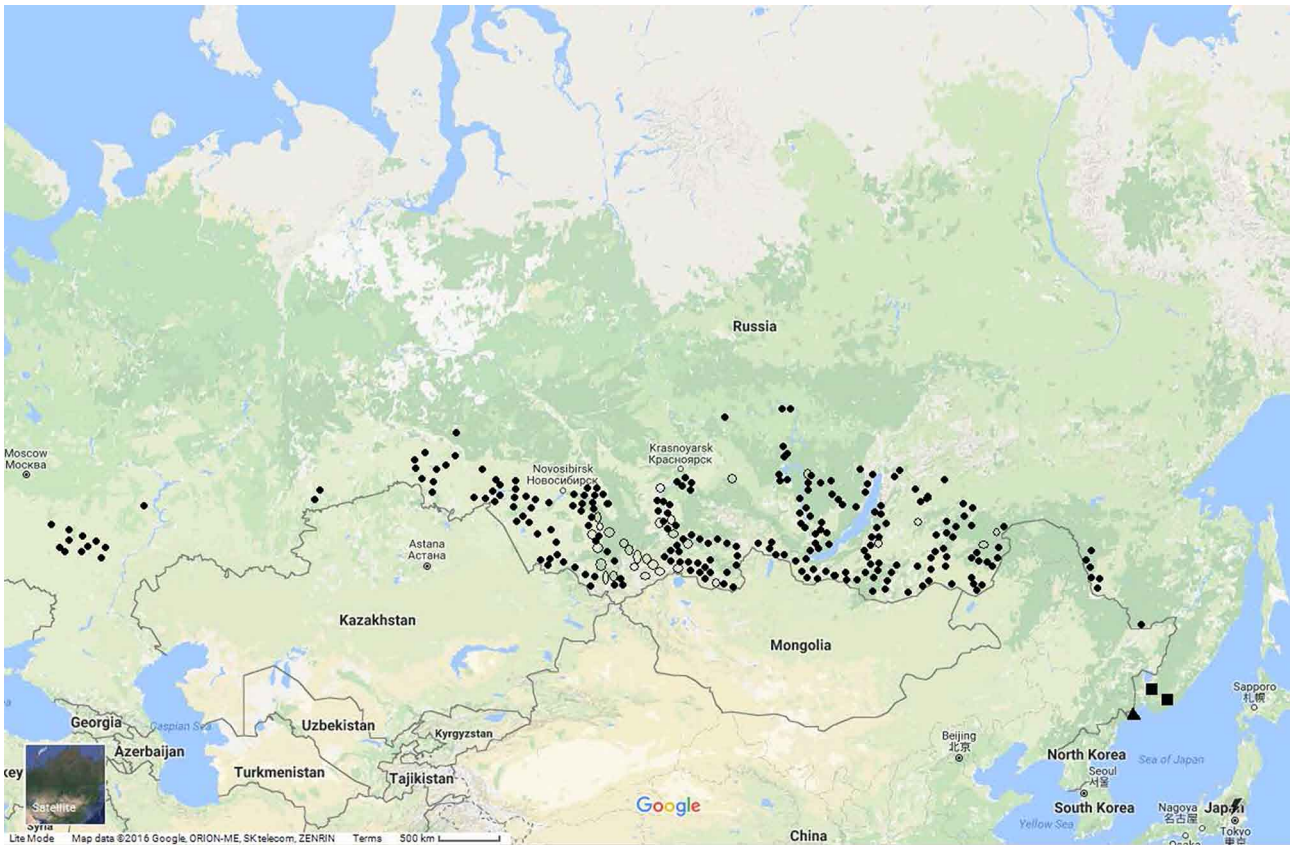


FIGURE 1. Distribution of members of *Iris* ser. *Humilis* and *I.* ser. *Vorobievia* in Russia according to the specimens examined: *I. bloudowii* (open circles), *I. humilis* (solid circles), *I. mandshurica* (squares), and *I. vorobievii* (triangles).

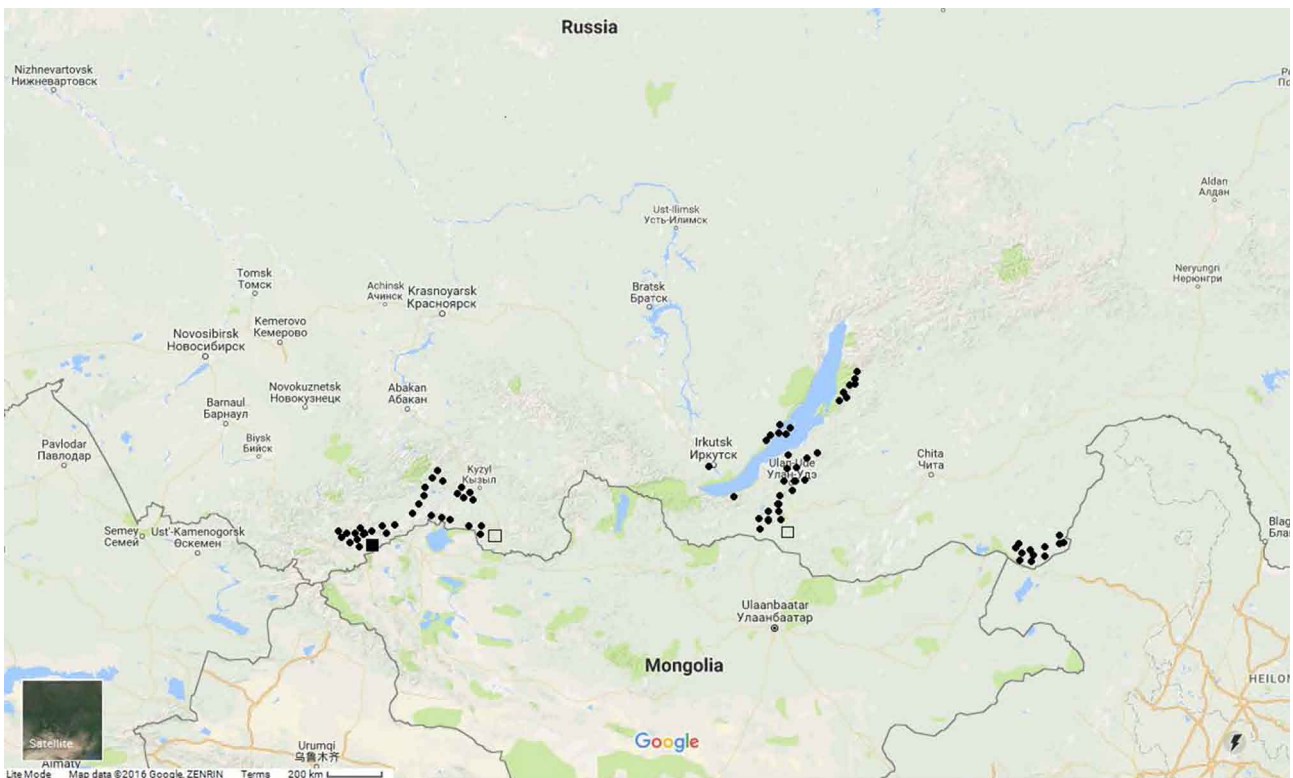


FIGURE 2. Distribution of *Iris* ser. *Potania* in Russia according to the specimens examined: *I. kamelinii* (solid squares), *I. potaninii* (circles), and *I. psammocola* (open squares).

Key to the species of *I.* section *Psammiris* in Russia

1. Rhizome vertical, short, with a dense bundle of radial adventitious roots, never forming clumps, scapes up to 20–35 cm, seeds with aril 2.4 (\pm 0.2) long, 2.2 (\pm 0.1) mm wide (ser. 1. *Vorobievia*).....1. *Iris vorobievii*
- Rhizome horizontal, creeping or short-creeping, forming clumps with numerous thin-fibrous or membranous remains of old leaf sheaths, scapes up to 10–15(25) cm, seeds with aril 1.1 (\pm 0.3) long, 1.2 (\pm 0.4) mm wide2
2. Rhizome thin, short-creeping, stoloniferous, plants up to 20(25) cm tall, flowering scape distinct, perianth tube shorter than blade (ser. 2. *Humilis*)3
- Rhizome poorly developed, short and small, plants 10–15 cm tall, flowering scape short, perianth tube longer than blade (ser. 3. *Potaninia*)5
3. Stoloniform offshoots short, forming dense clumps, flowering scape 15 cm, spathes green, herbaceous or pergamaceous, not swollen4
- Stoloniform offshoots extended, forming loose clumps, flowering scape 20–25 cm, spathes herbaceous, green, swollen2. *Iris bloudowii*
4. Spathes pergamaceous, scape base surrounded by brown fibrous remains of old leaves3. *Iris humilis*
- Spathes herbaceous, light-green, scape base surrounded by grey fibrous remains of old leaves4. *Iris mandshurica*
5. Rhizome covered with fibrous remains of old leaf sheaths6
- Rhizome covered with membranous remains of old leaf sheaths5. *Iris kamelinii*
6. Old leaf sheaths hair-like, sometimes winding, flowers sulphur-yellow6. *Iris potaninii*
- Old leaf sheaths coarsely fibred, erect, flowers light yellow7. *Iris psammocola*

Synopsis of *Iris* sect. *Psammiris* in Russia

Iris sect. *Psammiris* (Spach) Taylor (1976: 417).

Rhizomes more or less thin, usually stoloniferous or at least shortly-creeping, with thin-fibrous or membranaceous old leaf sheaths, forming loose or dense clump, scapes never branched, short. Leaves linear, sometimes falcate, gathered in a fan or a bunch. Flowers yellow, very soon fading and spirally curling. Spathes herbaceous or pergamaceous, swollen or not. All species with arillate seeds. The aril much smaller or twice smaller than the body of the seed.

Type:—*I. humilis* Georgi (= *I. arenaria* Waldst. & Kit.)

Series 1. *Vorobievia* Alexeeva ser. nov.

Rhizome vertical, short, with dense bundle of radial adventitious roots, never forming clumps. Plants up to 20–35 cm tall, with 1–2 flowering scapes. Leaves linear, green, wide, 6–18 mm wide, strap-shaped, sometimes falcate, arranged fan-like. Aril twice smaller than the body of the seed.

Type: *Iris vorobievii* N.S. Pavlova

1. *Iris vorobievii* N.S. Pavlova (1987: 424).

Holotype:—RUSSIA. Prov. Primorskensis: distr. Chassan, prope Craskino in declivibus lapidosis, 2 June 1964, *Stepanova, K. et al.* (VLA 10388!) (Fig. 3).

Description:—*Rhizome* vertical and short, 1 cm long, with a cirlet of radially diverging adventitious roots. It does not form clumps. *Leaves* 15–20 \times 0.8–1.8(2) cm, ensiform and equal to or longer than the scapes at flowering, and up to 35 cm long at fruiting, green. *Flower scape* 20–35 cm high with the base surrounded by many old leaves that persist as fibrous brown remains. *Bracts* herbaceous with a membranous edge. *Flowers* pale yellow with brown-veined patterns on the falls. *Perianth tube* one-half to one-third the length of the ovary. *Capsule* 3-sided, 5–5.5 cm long and 1.5–1.7 cm wide with a beak of about 0.5 cm; *seeds* 4.4 \times 2.3 mm, dark brown, almost round, with a large aril.

Phenology:—Flowering in May, fruiting in late June–July. In cultivation does not produce any seeds.

Distribution:—Only one population of the species occurs in Russia, namely in the Primorsky Kray, in the southern Khasan district, just north of the village Kraskino. Abroad Russia it occurs in the Northeastern China and Northern Korea.

Habit and ecology:—*Iris vorobievii* grows on grassy hill slopes, in steppe meadows, among the grass under sparsely standing oaks or other trees.

Series 2. *Humilis* Doronkin (1990: 415).

Rhizome creeping, forming loose clumps. Plants up to 20(25) cm tall. Leaves linear, green, narrow, 6–8 mm wide, arranged fan-like. Flowering scape distinct, 1–2-flowered, the flowers pedicellate. Perianth tube shorter than a blade. Aril much smaller than the body of the seed.

Type:—*I. humilis* Georgi



FIGURE 3. Holotype of *Iris vorobievii* (VLA 10388).

2. *Iris bloudowii* Ledebour (1830: 5 & tab. 101).

≡ *I. flavissima* a *umbrosa* Bunge (1829: 60), repl. syn.; ≡ *I. flavissima* var. *bloudowii* (Ledeb.) Baker (1892: 29).

Lectotype (designated by Alexeeva 2012: 416):—KAZAKSTAN. Ad Grammatucham. 4 May 1826, N° 95, *Bloudowii* m. Hb. Ledebour (LE 01010770!) (Fig. 4).

Description:—*Rhizome* short, form loose clumps. *Leaves* 25–30 × 0.6–1.8 cm, green, sickle-shaped. *Flower scape* 20 cm high, with the base surrounded by many old leaves that persist as a sheath-like membrane. *Bracts* herbaceous, green, swollen. *Flowers* yellow, with brown-veined patterns on the falls. *Perianth tube* short, more or less equal to the ovary. *Capsule* fusiform, on a stalk and more than 15 mm long; *seeds* 5.8 × 3.5 mm, dark brown.

Phenology:—Flowering in May, fruiting in late June.

Distribution:—It is widely distributed in Russia, but is represented by relatively small populations in Western and Central Siberia. Its range also extends into China, Mongolia and Northeast Kazakhstan.

Habit and ecology:—*Iris bloudowii* occurs in the lower alpine zone, growing in alpine meadows. At lower elevation within the forest zone, it is found in meadows, on slopes, forest fringes, and in the valleys of mountain rivers. Populations also exist occurring on dry, sandy soils of southern slopes (Transbaikal region).

3. *Iris humilis* Georgi (1775: 196).

Lectotype (designated by Alexeeva & Mironova 2007: 924):—RUSSIA. *Iris pumila*, ad Baikal, 1772 (MW 0021793 [digital image!], herb. Trinius) (Fig. 5, fragments numbered 1 & 2); isolectotype: BM 000832585!

= *I. flavissima* Pallas (1776: 715).

Lectotype (designated by Alexeeva & Mironova 2007: 217):—RUSSIA. Siberia: *Iris lutea biflorae affinis* Dahuria (BM 000832584!).

= *I. arenaria* Waldstein & Kitaibel (1802: 57, tab. 57).

Lectotype (designated here):—HUNGARY. Carpathians: [icon in] Waldstein & Kitaibel (1802, tab. 57).

= *I. pineticola* Klokov (1950: 407).

Holotype:—UKRANIA. Kharkov, Horoshevo: RSS Ucr., dit. Charcoviensis, in pineto prope pag. Choroshevo, 5–6 May 1855, *B.M. Czernjajev* (KW).

Description:—*Rhizome* short and form loose clumps. *Leaves* 25 × 0.3–0.7 cm, dove-green and ensiform. *Flower scape* 15 cm height and surrounded by brown fibrous remnants of many old leaves. *Bracts* membranous. *Flowers* pale yellow, with purple-veined patterns on the falls, giving a blush to the flowers. *Perianth tube* short, more or less equal to the ovary. *Capsule* elliptic, tapering at both ends, with a beak; *seeds* 3.8 × 2.5 mm, light brown.

Phenology:—Flowering in May, fruiting in late June.

Distribution:—It is widely distributed both in Russia and abroad. In Russia, it occurs in East and West Siberia. It is also found in the southern European Russia. Its range also extends into Central Europe: Austria, Czech Republic, Hungary, Romania; Middle and Central Asia: Kazakhstan, Kyrgyzstan, China and Mongolia.

Habit and ecology:—*Iris humilis* grows on the steppe (mainly sandy), often rocky slopes, in forest glades and coastal meadows, among shrubs.

4. *Iris mandshurica* Maximowicz (1880: 530).

Lectotype (designated by Alexeeva 2012: 417):—RUSSIA. In der Nösa von Nikolske... 14 May 1872, N° 19; Suifun. Mandshuria. *Goldenstadt* (LE 01025688!) (Fig. 6); isolectotype: LE 01010784! *Note:* The lectotype specimen is accompanied by a pencil drawing of a flower analysis made by Maximowicz himself.

Description:—*Rhizome* short and form loose clumps. *Leaves* 15 × 0.3–0.7 cm wide, at flowering, up to 25 cm long at fruiting and are green-dove and ensiform. *Flower scape* short, 15 cm height, with the base surrounded by many old leaves that persist as a sheath-like membrane. *Bracts* herbaceous, not swollen, membranous on the edge. *Flowers* yellow with purple-veined patterns on the falls, giving a brown shade to the flowers. *Perianth tube* short, more or less equal to the ovary. *Capsule* oval, tapering at both ends, with a very short beak; *seeds* 3.5 × 2.3 mm, dark brown and pear-shaped.

Phenology:—Flowering in early June; fruiting in July.

Distribution:—It is distributed in the Russian Far East. Abroad Russia, it occurs in the Northern China and Korea.

Habit and ecology:—*Iris mandshurica* grows on dry slopes, rocky peaks, and in steppe meadows.



FIGURE 4. Lectotype of *Iris bloudowii* (LE 01010770).



FIGURE 5. Lectotype of *Iris humilis* from Trinius's collection (MW 0021793, fragments numbered 1 & 2).



FIGURE 6. Lectotype of *Iris mandshurica* (LE01025688).

Series 3. *Potaninia* Doronkin (1990: 415).

Rhizome shortly-creeping, clump-forming. Plants up to 10–15 cm, flowering scape 1-flowered, short, not emerging above ground. Leaves linear, green or bluish, narrow, 1.5–4 mm wide, gathered in a bunch. Perianth tube longer than blade. Aril is much smaller than the body of the seed.

Type:—*Iris potaninii* Maxim.

5. *Iris kamelinii* Alexeeva (2006a p. 116).

Holotype:—RUSSIA. Prov. Kohagach: jug. Chihacheva, lac. Boguti, alt. 2500 m. 6 July 2001, *N. Alexeeva et al.* (LE 01010775!); paratype:—RUSSIA. St. Petersburg: Instituti Botanici nom. V.L. Komarovii Hortus Botanicus, col. Iridarii. 11 May 2002, *N. Alexeeva*^a (LE 01010776!) (Fig. 7).

Description:—*Rhizome* very short, forming more or less loose clumps. *Leaves* 15–20 × 0.5 cm, green-dove, linear, with the base of leaves in bunches. *Flower* scape short, 10–15 cm height, with the base surrounded by many old leaves that persist as a sheath-like membrane. *Bracts* membranous. *Flowers* yellow, with purple-veined patterns on the falls, giving a blush to the flowers. *Perianth tube* longer than the ovary. *Capsule* rounded-oval; *seeds* 5.6 × 3.1 mm, brown.

Phenology:—Flowering in May, fruiting in late June.

Distribution:—It is distributed in Russia in small populations in Siberia (Altai). Abroad Russia, it occurs in the Northern Mongolia, and also probably in China.

Habit and ecology:—*Iris kamelinii* grows in stony steppes, on gravelly and rocky slopes of mountains and foothills, reaching elevations up to 2500 m a.s.l.

6. *Iris potaninii* Maximovicz (1880: 528).

Lectotype (designated by Alexeeva 2012: 417):—RUSSIA. Dahuria: 1830, *Turcz.* (LE 01010785!) (Fig. 8, both fragments on the lower part of the voucher).

= *I. flavissima* β *rupestris* Bunge (1829: 60).

Lectotype (designated here):—RUSSIA. Altai: Hb. Meyer, *I. potaninii*, N° 45, Altai. *Iris flavissima* β Bge. An species nova? (LE 01025692!) (Fig. 9).

Description:—*Rhizome* very short, forming dense clumps. *Leaves* 15 × 0.3–0.5 cm, pale green with the bases of leaves in bunches. *Flower* scape up to 15 cm in height with the base surrounded by the fibrous remnants of many old leaves. *Bracts* membranous. *Flowers* pale sulphur-yellow with a few purple veins on the falls. *Perianth tube* longer than the ovary. *Capsule* oval with an elongated tip; *seeds* 3.5 × 2.6 mm, oval, brownish-red.

Phenology:—Flowering in late April-early May; fruiting in June.

Distribution:—It is widely distributed in Siberia (Altai and Transbaikal area), but represented by relatively small populations. Abroad Russia, it occurs in China and Mongolia.

Habit and ecology:—*Iris potaninii* grows on steppe gravelly and rocky slopes of mountains and foothills, reaches elevations up to 2500 m a.s.l.

7. *Iris psammocola* Zhao (1992: 181).

Holotype:—CHINA. Lingwu: Baijatan, 10 April 1959. *Anonymous and no number* (NETU). *Note:* I have not seen the type specimen of *I. psammocola*. Dr. Mingli Zhang, who kindly helped me in searching the specimen, got an information from Dr. Ming-Zhou Sun (the Herbarium of NE Normal University, Changchun, Jilin Province) that “the type of *Iris psammocola* has not been found; probably it was lost while the herbarium was moved to a different room several years ago”. So, we can judge its characteristics only after the original description and illustration in the protologue (Zhao 1992: 182).

= *I. potaninii* Maxim. var. *arenaria* Doronkin (1990: 415).

Holotype:—RUSSIA. East Siberia: East. Sib. Transbaikal region. Troizkosavsk distr., shtab-lekarskaya zaimka, 10 km from city. 21 May 1915 [fr.], *Mihno T.* (TK).

Description:—*Rhizome* very short and form loose clumps. *Leaves* 8–13 × 0.2–0.4 cm, linear, acute at the top and with the base of the leaves in bunches. *Flower* scape short and the base surrounded by many old leaves that persist as a webbed sheath. *Bracts* membranous. *Flowers* pale yellow. *Perianth tube* thin, many times larger than the ovary. *Capsule* oval; *seeds* c. 4.5 × 2.1, oval, dark brown.



FIGURE 7. Holotype of *Iris kamelinii* (LE 01010775).

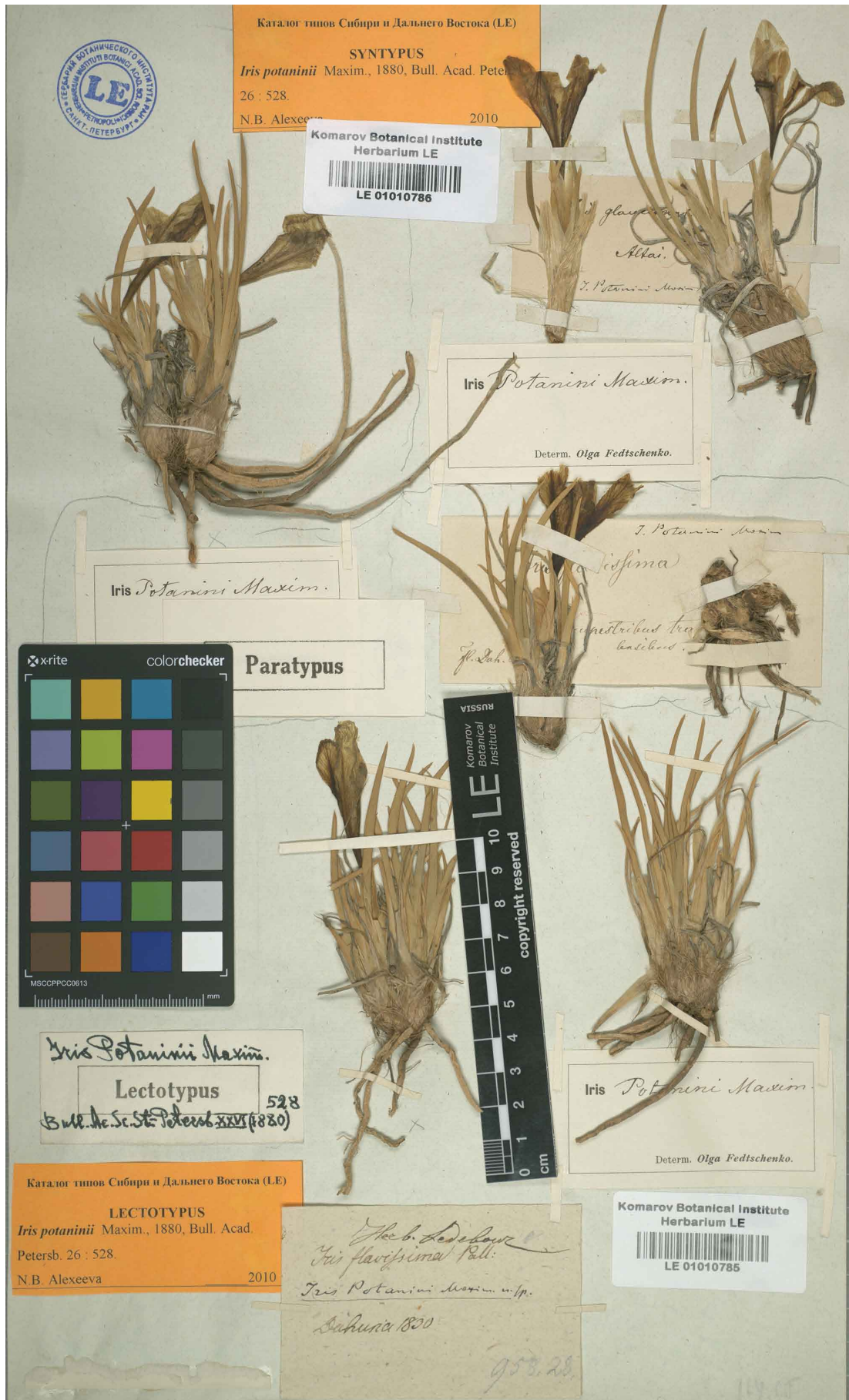


FIGURE 8. Lectotype of *Iris potaninii* (LE 01010785, both fragments on the lower part of the voucher).

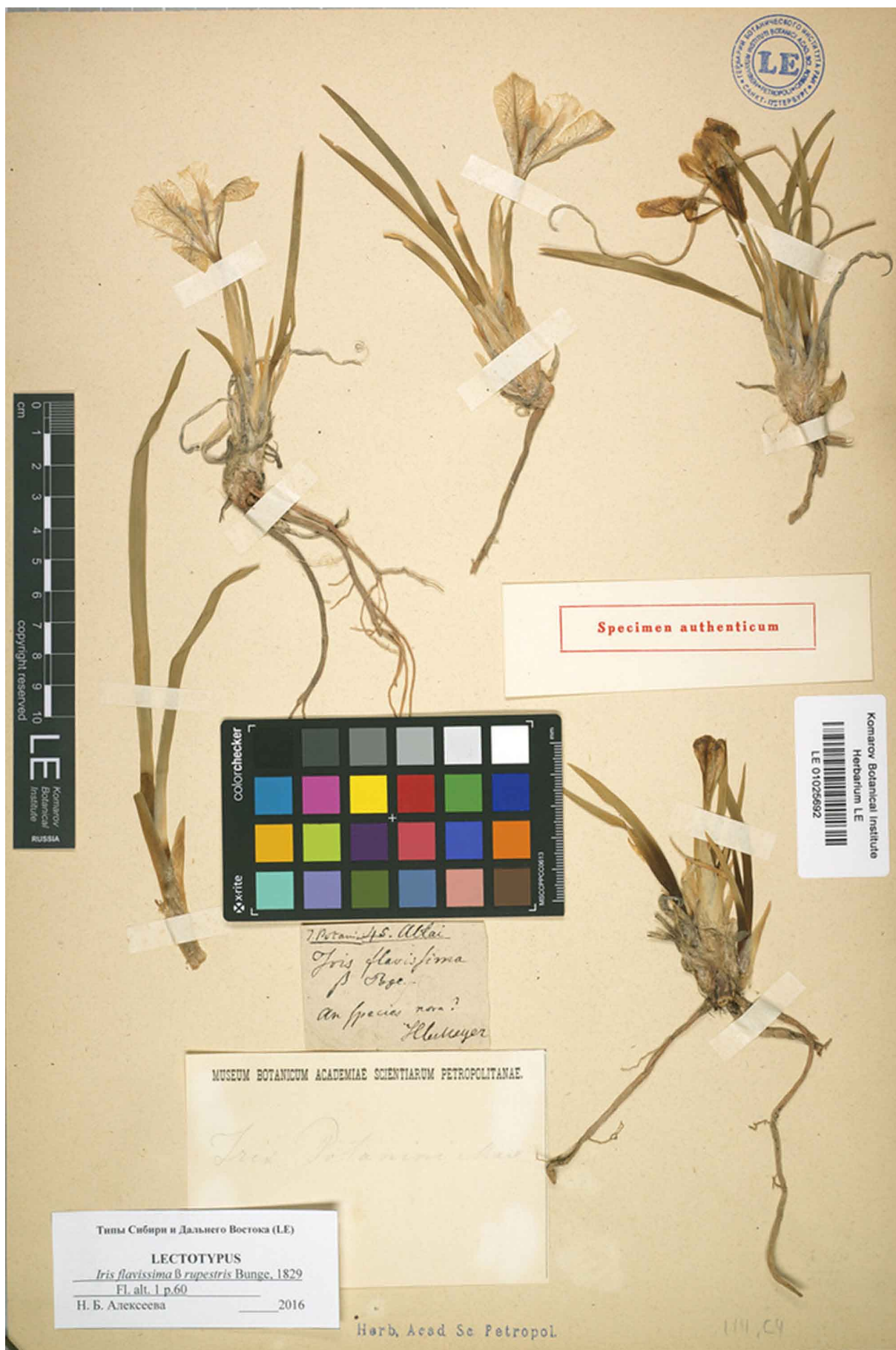


FIGURE 9. Lectotype (designated here) of *Iris flavissima* β *rupestris* (LE 01025692).

Phenology:—Flowering in May, fruiting in late June.

Distribution:—It is found in Russia in the very south of the Republics of Buryatia and Tyva. Abroad Russia, it occurs in China and Mongolia.

Habit and ecology:—*Iris psammocola* grows in sandy areas.

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