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64<sub>(1)</sub>



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**Iris rutherfordii Mart. Rodr., P. Vargas, Carine & Jury  
(Iridaceae, Iris subgen. Xiphium (Mill.) Spach), a new  
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# *Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury (Iridaceae, *Iris* subgen. *Xiphium* (Mill.) Spach), a new species from Morocco

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## Abstract

MARTÍNEZ RODRÍGUEZ, J., P. VARGAS GÓMEZ, M. CARINE & S. JURY (2009). *Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury (Iridaceae, *Iris* subgen. *Xiphium* (Mill.) Spach), a new species from Morocco. *Candollea* 64: 127-132. In English, English and French abstracts.

*Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury (Iridaceae, *Iris* subgen. *Xiphium* (Mill.) Spach), a new species from a single locality in N Morocco, is described. The species is known from a single small population growing in open grassland and on conglomerate rocky soil by the Mediterranean Sea. It is placed in subgen. *Xiphium* because of the presence of channeled leaves and a bulb lacking swollen and fleshy roots. *Iris rutherfordii* is close to the Iberian *Iris serotina* Willk., from which it may nevertheless be distinguished by a suite of characters. The morphological differences between *Iris rutherfordii* and related taxa are presented as well as a determination key to the species of subgen. *Xiphium*. The conservation of this single population of that new species is also here discussed.

## Key-words

IRIDACEAE – *Iris* – Morocco – Conservation – Taxonomy

## Résumé

MARTÍNEZ RODRÍGUEZ, J., P. VARGAS GÓMEZ, M. CARINE & S. JURY (2009). *Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury (Iridaceae, *Iris* subgen. *Xiphium* (Mill.) Spach), une nouvelle espèce du Maroc. *Candollea* 64: 127-132. En anglais, résumés français et anglais.

*Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury (Iridaceae, *Iris* subgen. *Xiphium* (Mill.) Spach) est décrite. Cette espèce est connue d'une seule petite population croissant dans une prairie ouverte sur des sols à conglomérats rocaillieux près de la Méditerranée. Elle est placée dans le subgen. *Xiphium* en raison de ses feuilles canaliculées et son bulbe sans racines gonflées et charnues. *Iris rutherfordii* est proche de *Iris serotina* Willk., dont elle peut être différenciée par une suite de caractères. Les différences morphologiques entre *Iris rutherfordii* et les taxons proches sont présentées ainsi qu'une clé de toutes les espèces du subgen. *Xiphium*. La conservation de l'unique population de cette nouvelle espèce est aussi discutée ici.

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## Introduction

*Iris* subgen. *Xiphium* (Mill.) Spach is a small group of geophytes distributed exclusively in the Western Mediterranean that is distinguished from other *Iris* subgenera by the presence of bulbs and channelled leaves (MATHEW, 1981; RODIONENKO, 1987; CHRISTIANSEN, 1997). Seven species (*I. boissieri* Henriq., *I. filifolia* Boiss., *I. juncea* Poir., *I. latifolia* Voss, *I. serotina* Willk., *I. tingitana* Boiss. & Reut. and *I. xiphium* L.) and 12 varieties are generally recognised within the subgen. *Xiphium* (MATHEW, 1981; CHRISTIANSEN, 1997). However, there remains no recent taxonomic revision of this subgenus and some local floras have recently raised some varieties to species rank (e.g. *Iris fontanesii* Gren. & Godr.; COLASANTE & al., 2002).

WILLKOMM (1861) described *I. serotina*, that displays small inner tepals (standards), based on material from Jaen Province in Spain. Some subsequent authors, notably DYKES (1913), however, considered it simply an aberrant form of *I. xiphium* but further research has consistently demonstrates that *I. serotina* can be distinguished from other members of the subgenus by the inner tepals that are reduced and bristle-like, in contrast to the well-developed standards in other species of subgen. *Xiphium* (FONT QUER, 1932; MATHEW, 1977, 1981). Indeed, in tepal morphology, *I. serotina* approaches *Iris* subgen. *Scorpiris* Spach (= *Xiphion* subgen. *Juno* Baker) (FONT QUER, 1932), although in *I. serotina* the inner tepals are erect whereas in subgen. *Scorpiris* they are patent or reflexed.

*Iris serotina* is scattered in Spain where it is distributed in Cuenca, Jaen and Granada Provinces (MATHEW, 1977, 1981). It has also been recorded from Morocco specifically from the Rif (JAHANDIEZ & MAIRE, 1934; MAIRE & QUÉZEL, 1959; FENNANE & IBN TATTOU, 1998) and Middle Atlas (EMBERGER & MAIRE, 1941; MAIRE & QUÉZEL, 1959; FENNANE & IBN TATTOU, 1998), where it is reported growing in damp forest clearings and stony pastures between 1500 and 1800 m. However, neither MATHEW (1977, 1981) nor COLASANTE & al. (2002) were able to examine any Moroccan material and the occurrence of *I. serotina* in northern Africa, therefore, remains to be confirmed.

During the course of a recent collaborative field expedition to northern Morocco in June 2004, staff from the Institut Agronomique et Veterinaire, Hassan II, Rabat, The University of Reading and The Natural History Museum, London discovered a population of *Iris* that displayed similar characteristics to *I. serotina*. In contrast to earlier reports for this species in Morocco, the population was discovered at 90 m, on conglomerate rocks, at a locality in the extreme northeast of Morocco (north of the Kebbana Mountains). A second field trip to the same locality was undertaken by the staff of the Real Jardín Botánico de Madrid in 2006. As part of an ongoing revision of subgen. *Xiphium*, a subsequent detailed morphological, phylogenetic and karyological research has revealed clear and consistent differences between the newly

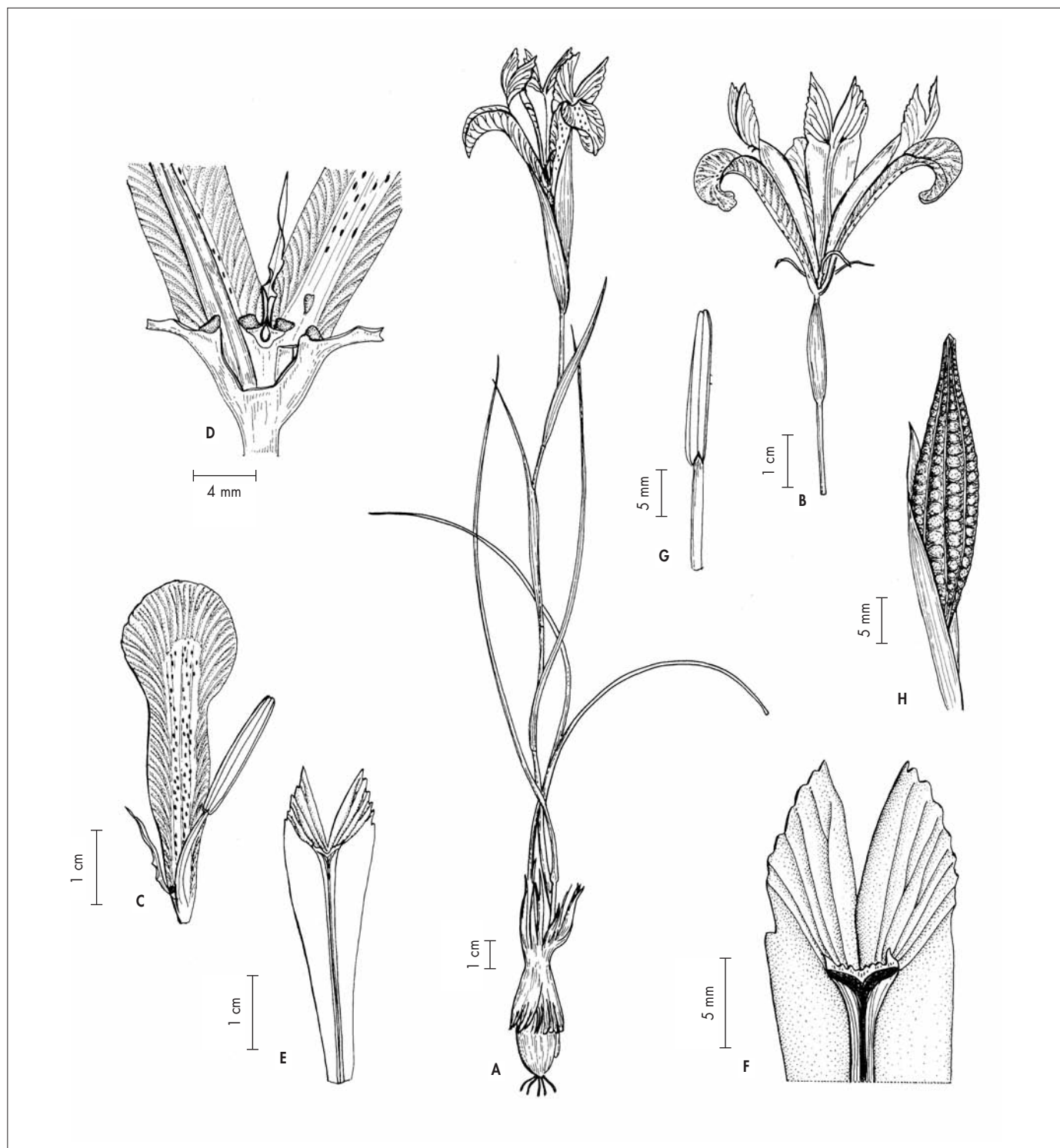
discovered Moroccan population and *I. serotina* from Spain. Material of both *I. rutherfordii* and *I. serotina* has been cultivated at the Real Jardín Botánico de Madrid and these differences are maintained under glasshouse conditions. The distinctiveness of these plants is also supported by differences in ecology and phenology and merits recognition at specific rank. In this paper, we describe this new Moroccan endemic species of *Iris* and provide a revised key to the species of subgen. *Xiphium*.

***Iris rutherfordii*** Mart. Rodr., P. Vargas, Carine & Jury, **spec. nova** (Fig. 1 & 2)

**Typus: MOROCCO. Nador:** Gareb, 35°04'N 02°37'W, 90 m, 20.VI.2006, Vargas & al. 184PV06 (holo: MA [752248]!; iso: MA [752249]!, BM!, RAB!, P!).

*Profilo rubicundo-obscuribus; hipsofilá immaculata; (perigonii tubus) extensio hipantiae brevioribus; tepala interiora laciniata; tepala exteriora longa et lata, limbo et unguis convolutus; labia stigmatica minor lata rama stylae.*

*Plant* erect, geophyte. *Roots* filiform, not swollen. *Bulb* 19–27 × 12–18 mm, pyriform; outer tunics more or less papery and fibrous, opened at the base, dark brownish, ascending and surrounding the floral stem along its subterranean part; inner tunics papery, yellow-brownish; bulbils 0–1, sometimes emerging at the lower portion of the floral stem; bulb leaves 2–3, whitish; bulb radicular plate 3–5 mm wide. *Floral stem* 40–50 cm long; first leaf 1, pale-purple; leaves 3–4, 350–400 × 1.2–3.5 mm at mid-point, channelled, apex hooded; uppermost leaves 1–3, acute, ochre when dry. *Inflorescence* spathes 2, 4–11.5 cm long. *Flowers* 1(–2), blue, pedicel 25–45 mm long; perianth tube 1.5–4 mm long; nectar pouch 3.5–8 × 3–5.5 mm, cup-shaped; interior nectar pouch tooth at the inner tepal base but overlapping the base of the outer tepal, fang-shaped, acute or rounded. *Outer tepals* (falls) fiddle-shaped; claw 25–34 mm long, erect, oblong-ovate with recurved margins, longer than the limb; limb 15–23 × 13–18 mm wide, reflexed, suborbicular to ovate, sometimes lobed, purple-bluish with white nerves, adaxial surface minutely papillate, small knob at the base, abaxial surface glabrous, with a wide green nerve; nectar guide wide, with no defined borders, white on the limb and yellow with purple spots on the claw. *Inner tepals* (standards) 7–18 × 0.2–1 mm, lacinate, apex acute, blue as the outer tepals. *Ovary* 24–40 × 2.5–4.5 mm, cylindrical, green. *Style* branches 43–50 × 9–12 mm, elliptic-obovate, parallel over the outer tepals, purple-bluish; stylar tube 31–35 mm long, stylar lobes 10–17 × 5–7 mm; stigmatic lip 4–6 mm wide, clearly narrower than style branch. *Stamens* 26–31 mm long, pale purple; anther 13–18 × 1–2.5 mm, with a whitish (connective) line between the two theca; filament 11–14 mm long. *Pollen* yellow. *Capsule* 25–35 × 7–10 mm, sub-cylindrical, partially surrounded by the spathes.



**Fig. 1.** – *Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury. **A.** Habit; **B.** Complete flower; **C.** Outer tepal showing its respective stamen and inner tepal from an individual of the population; **D.** Detailed outer and inner tepal bases, including a section of the nectar pouch; interior nectar pouch teeth at both sides of the outer tepal bases, as well as the central knob at the outer tepal base, can be observed; **E.** Style branch abaxial surface; **F.** Stigmatic lip zone of the abaxial side of the style branch; **G.** Stamen; **H.** Young capsule, partially surrounded by de spathes from an individual of the population.

[A, C-G: Vargas & al. 184PV06, MA] [Drawn by Juan Castillo]



*Etymology.* – Named in honour of Ronald Rutherford, Deputy Curator of the University of Reading Herbarium, who discovered the only known population of this species.

*Chromosome number.* –  $2n = 30$  (Martínez & al., pers. comm.).

*Phenology.* – Flowering in June, fruiting in July.

*Distribution and habitat.* – Northeast Morocco. Open grassy fields, pastures. Conglomerates, with rocky ground from 50-100 m altitude.

*Additional specimens examined.* – **MOROCCO. Nador:** Gareb, 13 km E from Kariat-Arkmane on road to Ras-el-Maa, SE facing slope above road, 93 m, 14.VI.2004, *Carine, Ait Lafkih, Rumsey & Rutherford 334* (BM [000881527]!, IAV!, RNG [P0018573]!).

## Discussion

*Iris rutherfordii* is unequivocally a member of *Iris* subgen. *Xiphium* because it displays all the diagnostic characters of this group, notably the presence of canaliculated leaves and a bulb lacking swollen and fleshy roots (Fig. 1). The presence of a bulb distinguishes this species and other members of the subgen. *Xiphium* from subgenera *Iris*, *Limniris* (Tausch) Spach and *Nepalensis* (Dykes) G. H. M. Lawr. whilst the channelled leaves separate it from those of subgen. *Hermodactyloides* Spach. Whilst the reduced inner tepals are similar to those of *Iris* subgen. *Scorpiris*, the absence of swollen and fleshy roots and the erect, rather than patent or reflexed inner tepals of *I. rutherfordii* readily distinguish this species from subgen. *Scorpiris* (INNES, 1985; GOLDBLATT & al., 1994). Phylogenetic analysis of nuclear and plastid sequences also supports the placement of *I. rutherfordii* within subgen. *Xiphium* (unpublished data).

Morphological differences between the species of subgen. *Xiphium* are summarised in Table 1. *Iris rutherfordii* is undoubtedly closely related to *I. serotina*. However, it is larger in all features, displaying a wider outer tepal limb and much more convolute claw margins (Fig. 2). Furthermore, the nectar guide is white in *I. rutherfordii*, and lilac in *I. serotina*, the first leaf is red in *I. rutherfordii* rather than green, and the number of the uppermost leaves is less than 5 in *I. rutherfordii* and 5 or more in *I. serotina*. The condition of the leaves during flowering is a further diagnostic trait as almost all leaves are green at flowering in *I. rutherfordii*, whereas they are dry and brown in *I. serotina*. Some individuals of *I. rutherfordii* possess a bulbil at the base of the flowering stem that may be a swollen basal leaf base. Within subgen. *Xiphium*, the N African *I. fontanesii* is the only other species to exhibit this trait. The capacity of this kind of bulbil to generate autonomous individuals has not been confirmed.

In addition to morphological differences, the chromosome number of *I. rutherfordii* ( $2n = 30$ ) also differs from that of *I. serotina* ( $2n = 34$ ). A lower chromosome number in northern Africa species of subgen. *Xiphium* than in Iberian taxa appears to be a general pattern.

The only known population of *I. rutherfordii* is confined to a hill in the Gareb region of Morocco. The locality is adjacent to a recently widened road and it would appear that the population is limited in size (approximately 50 plants in 2006). In this respect, *I. rutherfordii* meets the criteria for “Critically Endangered” (C2a(ii)) (IUCN, 2001, 2004). If this proves to be the only population of this species, there is indeed a high risk of extinction in the wild and it is therefore appropriate that ex-situ conservation of this species is being undertaken through cultivation of material at Real Jardín Botánico de Madrid, The University of Reading and Cambridge University Botanic Gardens.

During the course of our research on *I. rutherfordii*, material was examined at RAB and MPU that was collected from the Middle Atlas (Forêt de Quercus Ilex au dessus de la source dite “Vittel” près Ifrane, 1600 m, 30.VII.1933, *Emberger 28230* (RAB, MPU); Moyen Atlas, Anocour, 15.VIII.1929, *Sauvage 1151* (MPU)) and was preliminary identified as *I. serotina*. There is no doubt that the material collected by Emberger is referable to the *I. serotina*-*I. rutherfordii* complex. However, a precise determination is not possible given the manner in which the material has been preserved. It is notable however that these collections were made at high altitude (more than 1500 m) and in a very different habitat to that of *I. rutherfordii*. Efforts to recollect from these localities are necessary to establish the precise identity of these plants.

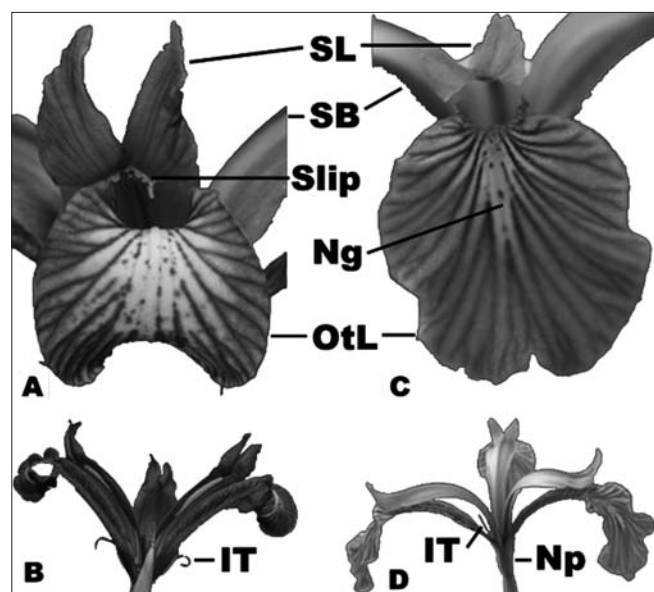
The description of *I. rutherfordii* increases the number of species recognised in subgen. *Xiphium* to nine, with equal numbers present on either side of the Strait of Gibraltar. Within subgen. *Xiphium*, three species are highly localised endemics (*I. rutherfordii*, *I. boissieri* and *I. filifolia*) and molecular phylogenetic analyses would be of interest to investigate the evolution of local endemics in the group. *Iris rutherfordii* is one of several new species of *Iris* recently discovered in the Mediterranean (MITI, 2002; CHRISTENSEN & AKPULAT, 2006). Phylogenetic analyses need to be combined with further fieldwork and revisionary studies to better document and understand the diversity of this genus in the Mediterranean region. In light of the description of *I. rutherfordii*, a revised key to subgen. *Xiphium* is necessary and is provided below.



**Key to the species of *Iris* subgen. *Xiphium***

1. Inner tepal less than 20 mm long, lacinate ..... 2
- 1a. Inner tepal more than 20 mm, spatulate to ovate-lanceolate ..... 3
2. First leaf reddish, nectar guide whitish, inner tepals with a fang-shape widening at the base, uppermost leaves fewer than 5, outer tepal equal to or more than 45 mm long, width of style branch more than 1.5 times the stigmatic lip, outer tepal limb more than 14 mm wide ..... *I. rutherfordii*
- 2a. First leaf greenish, nectar guide lilac, inner tepals not widening at the base, uppermost leaves 5 or more, outer tepal less than 45 mm long, width of style branch generally less than 1.5 times the stigmatic lip wide, outer tepal limb less than 14 mm wide ..... *I. serotina*
3. Inner tepals clearly spatulate, outer tepal fiddle-like with deep sinus, outer tepal claw equal to or shorter than the limb, nectar pouch tooth as a fold at the base of the tepals, bulb tunics fringed at the top ..... *I. latifolia*
- 3a. Inner tepals ovospatulate to oblanceolate, not clearly spatulate, outer tepal spatulate- or fiddle-like (not clearly with deep sinus), outer tepal claw longer than the limb, nectar pouch fang-shaped, more or less rounded, at the base of one of the tepals, bulb tunics not fringed at the top ..... 4

4. Perianth tube less than 5 mm long ..... *I. xiphium*
- 4a. Perianth tube more than 5 mm long ..... 5
5. Outer tepals with a line of hairs on the adaxial face, nectar guide at the base of the outer tepal, inner tepals usually widening at the base ..... *I. boissieri*
- 5a. Outer tepals glabrous, nectar guide at the base of the inner tepal, inner tepals not widening at the base ..... 6
6. Bulb tunics coriaceous, outer tepals usually more than 1.2 times longer than the inner tepals, flower yellow ..... *I. juncea*
- 6a. Bulb tunics fibrous, outer tepals usually less than 1.2 times longer than the inner tepals, flower lilac, purple or blue ..... 7
7. First leaf transparent-greenish more or less densely purple spotted, basal leaves less than 2 mm wide, flower more or less dark purple, nectar guide with a bluish flange, outer tepal limb width equal to or up to 1.4 times the inner tepal width, inner tepals ovate-spatulate ..... *I. filifolia*
- 7a. First leaf pale to dark maroon with no spots, basal leaves usually wider than 2 mm, flower bluish or lilac, nectar guide either without flange or with a whitish flange, outer tepal limb width usually > 1.4 times inner tepal width, inner tepals from oblanceolate to lanceolate ..... 8
8. Radicular plate >7 mm wide, basal leaves > 6 mm wide, perianth tube > 20 mm long ..... *I. tingitana*
- 8a. Radicular plate < 6 mm wide, basal leaves 6 mm wide, perianth tube 20 mm long ..... *I. fontanesii*



**Fig. 2.** – Comparison between *Iris rutherfordii* Mart. Rodr., P. Vargas, Carine & Jury (A, B) from Morocco and *I. serotina* Willk.; (C, D) from Sierra de Cuenca (Spain); **SL**. Style lobes; **SB**. Style branches; **Slip**. Stigmatic lip; **Ng**. Nectar guide; **OtL**. Outer tepal (“fall”) limb; **IT**. Inner tepal; **Np**. Nectar pouch.

[A, B: photo from Pablo Vargas; C, D: photo from Jorge Martínez]

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**Table 1.** – Comparative table between chromosome counts and taxonomically important morphological traits in different species *Iris* subgen. *Xiphium* (Mill.) Spach

Taxon	2n <sup>*</sup>	bulb tunics	flowering stem bulbils	first leaf colour	midth length leaves width [mm]	no. of uppermost leaves	flower bracts	perianth tube length [mm]	nectar pouch tooth position <sup>a</sup>	inner tepals shape	inner tepals length [cm]	outer tepals shape	outer tepals limb width [cm]	outer tepal adpressed to stylar branches	stigmatic lip shape
<i>Iris latifolia</i> Voss	42	f, fr	no	g	1-14	3	no(s)	1-7	TE, TI	sp	4.6-5	p	3-5	no	tr
<i>I. boissieri</i> Henriq.	36	f, r	no	g	1-3	1-2	no(s)	15-25(-35)	TE	ov-ob	3-4	lan-f	1-2	no	tr
<i>I. serotina</i> Willk.	34	f, r	no	g	2.5-3	5-8	(s)	0-4	TE	lac	0.5-0.8	f	0.7-1.3	no	tr
<i>I. rutherfordii</i> Mart. Rodr. & al.	30	f, r	yes	r	1.2-3.5	1-3	s(s)	1.5-4	TE	lac	0.7-1.8	f	1.3-1.8	no	tr
<i>I. juncea</i> Poir.	32	c, r	no?	–	1-3	2-3	no(s)	35-45	–	ob	2.3-4.3	sp-p	1.8-2.7	no*	tr
<i>I. xiphium</i> L.	34	f, r	no	r, g	(1-)3-5	1-4	s(s)	1-4	TI	ob-ov	5-8.5	f	1-3	yes	sem
<i>I. filifolia</i> Boiss.	34	f, r	no	g, (s)	1-2	(1-)2-4	no(s)	10-20(-35)	TI	ob-ov	4-7.5	f	1.5-3.5	yes	sem
<i>I. fontanesii</i> Gren.	30	f, r	yes	r	1.5-5.5	1-3	no(s)	(6-)13-25(-40)	TI	ob-ov	4-7.5	f	1.5-3.5	yes	sem
<i>I. tingitana</i> Boiss.	28	f, r	no	r	10-23	1-3	no(s)	17-42	TI	lan-ob	5.5-9	f	2.5-4	yes	sem

Abbreviations: not observed or doubtful traits are marked with question marks; f: fibrous; fr: fringed; r: ripened; c: coriaceous; g: greenish; r: redish; (s): spotted; no(s): not spotted; s(s): scarcely spotted; TE: outer tepal; TI: inner tepal; sp: spatulate; ov: ovospatulate; ob: oblanceolate; lac: lacinate; lan: lanceolate; p: fiddle-like with deep sinus; f: fiddle-like with shallow sinus tr: triangular; sem: semicircular.

\*: data taken from DESFONTAINES (1798).

\*\* : data taken from CHRISTIANSEN (1997), except for *Iris serotina* Willk. and *I. fontanesii* Gren.

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