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CHAMAEIRIS, AN EARLIER NAME FOR *XYRIDION* (*IRIDOIDEAE, IRIDACEAE*)

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SUMMARY: The name *Chamaeiris* Medik. is revived for taxa belonging to *Iris* subg. *Xyridion* (Tausch) Spach, subg. *Gramniris* Spach and subg. *Spathula* Spach. It has priority over *Xyridion* (Tausch) Fourr., a genus name that has been recently reinstated in a sense that matches Medikus's original concept of *Chamaeiris*. A new arrangement is presented for this genus, which comprises 22 species, 3 subspecies and 2 varieties, in two sections and three series. 28 new combinations are stated, and the main synonymy is also included for all accepted taxa. **Key words:** *Chamaeiris*, *Xyridion*, *Spathula*, *Iris*, nomenclature, taxonomy.

RESUMEN: Se recupera el género *Chamaeiris* Medik. para los táxones pertenecientes a *Iris* subg. *Xyridion* (Tausch) Spach, subg. *Gramniris* Spach y subg. *Spathula* Spach. Dicho nombre genérico es prioritario frente a *Xyridion* (Tausch) Fourr., que ha sido utilizado recientemente en un sentido que coincide plenamente con la circunscripción que inicialmente dio Medikus a *Chamaeiris*. Se presenta una nueva ordenación taxonómica para el género, con 22 especies, 3 subespecies y 2 variedades, en dos secciones y tres series. Se realizan 28 combinaciones nuevas y para todos los táxones aceptados se presentan sus principales sinónimos. **Palabras clave**: *Chamaeiris*, *Xyridion*, *Spathula*, *Iris*, nomenclatura, taxonomía.

INTRODUCTION

In the account of *Iridaceae* for *Flora iberica*, the Iberian species of *Iris* (sensu lato) will be arranged in seven genera: *Iris* L., *Juno* Tratt., *Hermodactylus* Mill., *Limniris* (Tausch) Fourr., *Xiphion* Mill., *Chamaeiris* Medik., and *Gynandriris* Parl. (not included in *Moraea* Mill.). This treatment is based on the existence of important morphological differences among those aggregates, which allow recognition of diagnostic syndromes of morphological traits for each genus. A recent molecular work of WILSON (2011) brings new light to phylogenetic relationships among the widely accepted groups in the 'Iris flower clade' (*Iris* sensu lato), which have been treated at different taxonomic ranks in the last two centuries.

In the present contribution segregation of *Chamaeiris* Medik. is supported, a name having priority against *Xyridion* (Tausch) Fourr., recently revived at the genus rank by RODIONENKO (2005).

RESULTS AND DISCUSSION

Chamaeiris was described by MEDIKUS (1790) to segregate several iris species sharing peculiar flower and fruit features. He included in the new genus *I.*

graminea L., *I. spuria* L. and *I. foetidissima* L. (erroneously worded as '*foetida*'), and two additional names, *Ch. angustifolia* and *Ch. desertorum*, both without any description or reference to a previous one. The genus was characterised by producing flowers apparently lacking a perianth tube and with 6-ribbed fruits that usually ended in a sharp point.

That genus name was neglected by later authors, who rearranged this group of irises in different ways. SPACH (1846) included species of *Chamaeiris* in three of the subgenera he recognised in *Iris*, mostly based on preexisting sections of TAUSCH (1823): *I.* subg. *Xyridion* (Tausch) Spach for *I. spuria* plus seven related taxa, *I.* subg. *Gramniris* Spach for *I. graminea*, and *I.* subg. *Spathula* (Tausch) Spach for *I. foetidissima*. Later, FOURREAU (1869) treated *Xyridion* and *Spathula* as monotypic genera, respectively including *X. spurium* (L.) Fourr. and *S. foetidissima* (L.) Fourr.

KLATT (1872) adopted the name *Xyridion*, which he erroneously regarded as a new generic combination, in an expanded sense that implicitly included the earlier *Chamaeiris* and *Spathula*, though no direct mention was made to any of those names. He also included *X. flexuosum* (Murray) Klatt, *X. laevigatum* (Fisch.) Klatt, *X. pseudacorus* (L.) Klatt, *X. setosum* (Pall. ex Link) Klatt, *X. sibiricum* (L.) Klatt, *X. tridentatum* (Pursh) Klatt and *X. ventricosum* (Pall.) Klatt. This rendered *Xyridion* more heterogeneous and virtually synonymous to the earlier *Limniris* (Tausch) Fourr. (FOURREAU, 1869), a name that also should have been used for the resulting aggregate.

Later authors have treated *Chamaeiris* at different ranks in *Iris*, though usually merged with other unbearded, rhizomatous groups of irises. BAKER (1876) grouped Spach's subgenera *Xyridion*, *Spathula* and *Limniris* as *I.* sect. *Apogon* Baker, a name which he later (BAKER, 1877, 1892) raised to subgenus under the illegitimate name *I.* subg. *Apogon* Baker. This latter name was treated as a subsection by BENTHAM & HOOKER (1883), thus validating *I.* subsect. *Apogon* Benth. & Hook. f. Similarly, DYKES (1913) accepted *I.* sect. *Apogon* which he divided into 15 unformal groups, those named 'The scarlet-seeded iris' and 'The Spuria group' being devoted to species of *Chamaeiris*. That classification was adapted by DIELS (1930), who transformed Dykes's groups in 15 subsections, both above groups resulting in *I.* subsect. *Foetidissimae* and *I.* subsect. *Spuriae* respectively. This latter arrangement was followed basically by LAWRENCE (1953), though he revised the internal relationships of the infrageneric taxa and included both subsections in *I.* sect. *Spathula* Tausch as *I.* subsect. *Foetidissimae* Diels and *I.* subsect. *Apogon*, the latter with 15 series.

Furthermore, RODIONENKO (1961) in his first comprehensive revision of *Iris* (sensu lato) compared critically all previous treatments and generated a new classification that recognised five genera: *Iris*, *Iridodictyum* Rodion., *Hermodactylus*, *Gynandriris*, *Juno* and *Xiphion*. In *Iris* he accepted six subgenera, among which *I.* subg. *Xyridion* was recircumscribed to included two sections, *Xyridion* and *Spathula*, corresponding to FOURREAU's (1869) homonymous genera. The former section was divided into two series, *Xyridion* and *Graminea* (*I.* subg. *Gramniris* Spach).

MATHEW (1989) published a revised, integrated system for *Iris*, with 6 subgenera, 8 sections and 16 series. Species of *Chamaeiris* were classified into *I.* sect. *Limniris* ser. *Spuriae* (Diels) G.H.M. Lawr. and ser. *Foetidissimae* (Diels) B. Mathew. The resulting classification has widely been followed to date by many horticultural associations and gardeners around the world.

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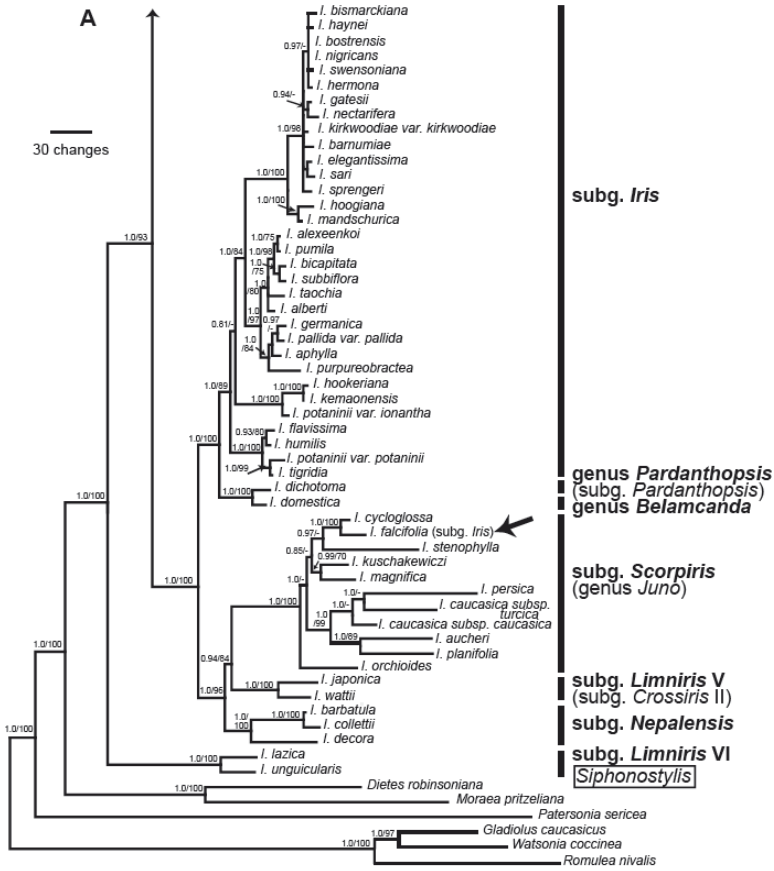

Fig. 1.- First part (lower portion, A) of the molecular tree (Maximum Likelihood) using cpDNA (*matK*, *trnK* and *ndhF*) sequence data for 104 species of *Iris* s.l. (vide WILSON, 2011).

Recently, RODIONENKO (2005) revived *Xyridion* at the generic rank, though in a more restrictive sense than KLATT (1872) did. Rodionenko treated this genus in a way that fully matched MEDIKUS's (1790) original concept of *Chamaeiris*, and presented an arrangement fitting the one he established for *I.* subg. *Xyridion* in 1961. This time however 19 species were included in two sections, *X.* sect. *Xyridion*, *X.* sect. *Spathula* (Tausch) Rodion, and one additional series, *X.* ser. *Ludwigia* (Doronkin) Rodion. (*I.* ser. *Ludwigia* Doronkin).

As said before, WILSON (2011) has recently generated a comprehensive phylogeny of *Iris* (sensu lato), based on plastid sequence data of 104 species, which covers most of currently accepted suprageneric groups. Her excellent results (Fig. 1 & 2) show that *Iris* is composed of ten well-supported clades that are accepted as subgenera, one of them being named *I.* subg. *Xyridion* (Tausch) Spach (= *Chamaeiris*). This synthetic treatment is similar to that of MATHEW (1983), though with a deep recircumscription of most subgenera, to which small segregates (e.g. *Pardanthopsis* (Hance) L.W. Lenz, *Belamcanda* Adans. and *Hermodactylus*) usually regarded as autonomous genera are now reduced to synonymy (cf. WILSON, 2011). This leaves the wide diversity of *Iris* in its current broad sense, and

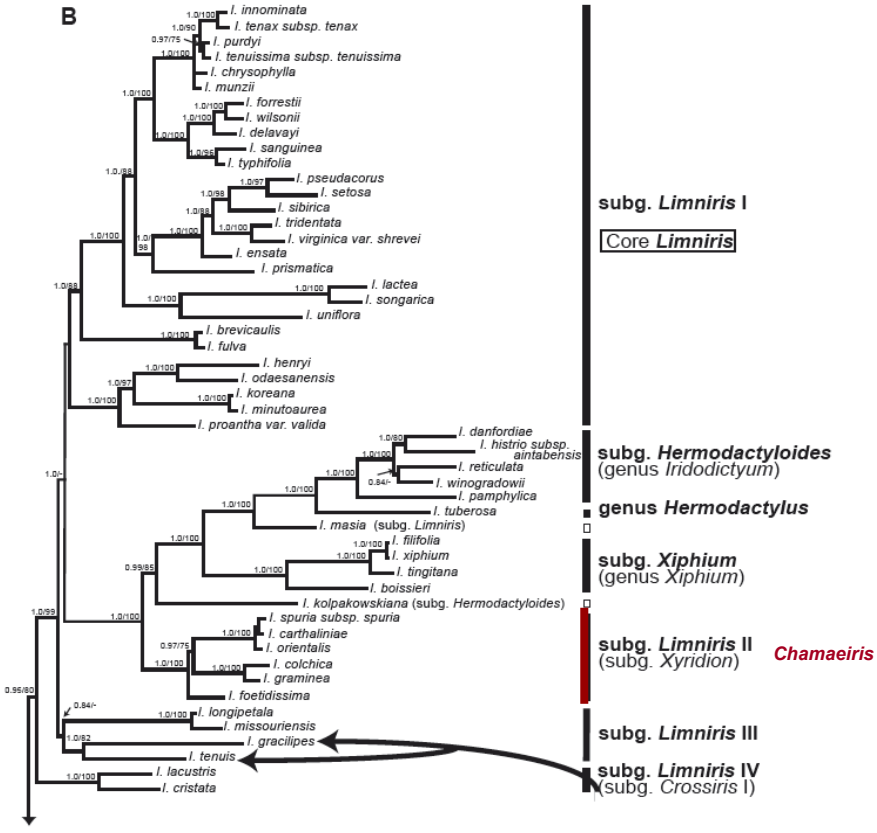

Fig. 2.- Second part (upper portion, B) of the molecular tree (Maximum Likelihood) using cpDNA (*matK*, *trnK* and *ndhF*) sequence data for 104 species of *Iris* s.l. (vide WILSON, 2011). The position of *Chamaeiris* (= *I.* subg. *Xyridion*) is marked in red.

introduces a not disruptive taxonomic framework that could be comfortable for many botanists.

Wilson's treatment is technically correct and revives successfully some morphologically natural groups such as '*Siphonostylis*', '*Nepalensis*', '*Crossiris*' or '*Lophiris*', which were widely neglected in recent times, or included in larger groups to which they are not closely related. However, it still generates heterogeneous subgenera which can only be defined by a number of variable morphological characters. This is the case for instance of *I.* subg. *Xiphium* (incl. *Hermodactylus* and *Iridodictyum*) or *I.* subg. *Pardanthopsis* (Hance) Baker (incl. *Pardanthopsis* and *Belamcanda*), both showing weak morphological support in their new circumscriptions.

Conversely, many of Wilson's newly defined subgenera are indeed composed of a number of monophyletic aggregates that are morphologically consistent when analysed individually. In the case of *I.* subg. *Xiphium*, Wilson includes small groups such as *Hermodactylus, Iridodictyum*, *Xiphion* and *Alatavia* Rodion., as well as *I. masia* Dykes, this resulting in a group hard to define as a whole from a morphological basis. Nonetheless, if each one is accepted as a genus, characterization is much easier and they become taxonomical units of a more practical use.

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As in other groups of *Iridaceaae*, morphology is highly convergent across the whole 'Iris flower clade', being very difficult to find apomorphies defining wider groups (e.g. Wilson's subgenera). On the contrary, syndromes of morphological traits exist allowing easy characterization of particular clades that can be segregated as genera, and that usually show particular geographic distributions. This is the case of *Juno*, *Xiphion*, *Hermodactylus*, *Evansia*, *Xiridion*, *Pardanthopsis*, *Belamcanda*, *Siphonostylis*, *Alatavia*, or *Limniris*, among others. Many of them are currently in use by horticulturists who can even identify their species in a vegetative state.

The case of *I.* subg. *Xyridion*

In WILSON's (2011) combined tree of three cpDNA regions, species of *Chamaeiris* (= *I.* subg. *Xyridion* sensu Wilson) form a strongly supported clade (Fig. 2), with also a strong internal support in all its branches, and a topology that is fully congruent with the infrageneric arrangement of RODIONENKO (2005).

Phylogenetically it is sister to an expanded *I.* subg. *Xiphium* clade formed by *Xiphion*, *Hermodactylus* and *Iridodictyum*. This latter genus however is not monophyletic, since *I. kolpakowskiana* Regel is sister to the rest of clades. This is congruent with morphological data. In fact, RODIONENKO (1961) placed this species in a particular section called *Iridodictyum* sect. *Monolepis* Rodion., which later he segregated as the genus *Alatavia* Rodion. Molecular data would support its recognition at the genus rank.

Morphological affinities among those groups in *I.* subg. *Xiphium* (sensu Wilson) were exposed clearly by RODIONENKO (1961) and support phylogenetic relationships, though divergences exist that difficult characterization of the whole aggregate as circumscribed by Wilson.

All clades in WILSON's (2011) combined tree can be equally treated in different taxonomic ranks, the final decision being a matter of taxonomic preference. A reclassification of the 'Iris flower clade' in smaller, morphologically consistent groups that is being prepared by the author (CRESPO, in prep.), will reorganize *Iris* (s.l.) in more than 10 genera. This alternative analytic option admits most genera widely accepted within the 19th century (as shown before). Therefore, it does not increase significantly nomenclatural inflation, and brings some advantages for taxonomists. Every segregate can be easily characterised and referred by a single generic name (which contains morphological and biogeographic information), instead of a combination of infrageneric epithets that can difficult understanding.

According to the discussion by MARTÍNEZ-AZORÍN & al. (2011) on the genus concept and limits when molecular, morphological and geographical data are put together, *Chamaeiris* is reinstated here to stabilize its use at the genus rank, according to Medikus's original circumscription, since it has priority against *Xyridion* (sensu RODIONENKO, 2005). Additional data on the genus are presented by the latter author for *Xyridion*.

CONCLUSION

The new arrangement of *Chamaeiris* shown below agrees basically with RODIONENKO's (2005) concept of *Xyridion*, and will be followed in the forthcoming account of *Iridaceae* for '*Flora iberica*'. Two sections with three series are recognised that include 22 species, 3 subspecies and 2 varieties. The genus is here lectotypified on *Iris graminea* L., a plant that was called 'chamaeiris' by some pre-Linnean authors such as DODONAEUS (1583: 247), who was cited in the protologue by MEDIKUS (1790). By doing so, one of the natural groups in *Chamaeiris*

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can retain a name that is very popular among gardeners: 'The Spuria irises' (*Ch.* ser. *Spuriae*).

The taxonomic treatment presented below is based mostly on morphological, biogeographic and chromosome number evidence, as summarised by BOWLEY (1997), though a narrower species concept is favoured here. This tries to avoid construction of too wide and heterogeneous 'species' that will difficult taxonomic understanding and probably will render artificial groups not consistent after molecular analyses. Thus, the subspecies rank is applied to populations showing constant and evident morphological traits, which are restricted to particular geographical areas. The variety rank is used for populations with morphological peculiarities, mostly due to special local conditions, not related to geographical patterns.

A short diagnosis is presented for some taxa to justify their treatments.

Chamaeiris Medik. in Hist. & Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 417 (1790) − *Lectotypus generis* (here selected): *Ch. graminea* (L.) Medik. [*Iris graminea* L.]
= *Xyridion* (Tausch) Fourr. in Ann. Soc. Linn. Lyon, ser. 2, 17: 163 (1869); ≡ *Iris* sect. *Xyridion* Tausch, Hort. Canal. 1 [sine pag.] (1823), basion.; ≡ *I.* subg. *Xyridion* (Tausch) Spach in Ann. Sci. Nat., Bot. ser. 3, 5: 94 (1846)

Diagnosis: Rhizomatose perennial herbs. Leaves isobilateral, usually fetid when crushed. Flowers with perianth tube usually bearing nectar drops on the outer surface; outer tepals usually fiddle-shaped, with canaliculate haft; inner tepals usually erect, about equalling the length of outers. Stigma bifid, with 2 triangular, acute points. Capsule coriaceous, with 6 longitudinal ribs, sometimes shortly winged and arranged in 3 pairs, each one on each angle, and ending in an evident beak. Seeds without arile, either angulose with testa papiraceous, irregularly nerved and surcate on the back, or globose with testa fleshy, coloured, almost smooth.

It includes 22 species, widely distributed in Europe –excepting the northern territories–, SW and C of Asia, and N of Africa. Its highest diversity is found in the mountain ranges from Turkey and the Caucasus to western Himalaya.

a. *Chamaeiris* sect. ***Chamaeiris***

a1. *Chamaeiris* ser. ***Chamaeiris***
= *Iris* ser. *Graminea* Rodion., Rod Iris: 192 (1961); ≡ *Xyridion* ser. *Graminea* (Rodion.) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
= *I.* subg. *Gramniris* Spach in Ann. Sci. Nat. Bot. ser. 3, 5: 96 (1846)

1. *Chamaeiris graminea* (L.) Medik. in Hist. & Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 418 (1790); ≡ *Iris graminea* L., Sp. Pl.: 39 (1753), basion.; ≡ *Xiphion gramineum* (L.) Schrank in Flora (Regensb.) 7, Beibl. 2: 17 (1824); ≡ *Xyridion gramineum* (L.) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872); ≡ *Limniris graminea* (L.) Fuss, Fl. Transsilv.: 637 (1866); ≡ *I. compressa* Moench, Methodus: 529 (1794), nom. illeg. [syn. subst.]; ≡ *I. suavis* Salisb., Prodr. Stirp. Chap. Allerton: 44 (1796), nom. illeg. [syn. subst.]
= *Iris sylvatica* Balb., Cat. Stirp. Hort. Bot. Taurin. 1813: 44 (1813); ≡ *I. graminea* var. *sylvatica* (Balb.) Nyman, Consp. Fl. Eur.: 702 (1882); ≡ *I. graminea* subsp. *sylvatica* (Balb.) K. Richt., Pl. Eur. 1: 256 (1890); ≡ *Xiphion gramineum* subsp. *sylvaticum* (Balb.) Arcang., Comp. Fl. Ital. ed. 2: 157 (1894)

Chromosome number: $2n = 34$.

Distribution: C, W and S Europe, Turkey, S Ukraine and the Caucasus.

1a. *Chamaeiris graminea* subsp. ***pseudocyperus*** (Schur) M.B. Crespo, ***comb. nov.***
≡ *Iris pseudocyperus* Schur, Enum. Pl. Transsilv.: 657 (1866), basion.

Chromosome number: $2n = ?$

Distribution: SE Europe (Romania, Slovakia and neighbouring areas).

Observations: It differs from the type by its more robust habit in all its parts; leaves broader and thicker; flowers lar-

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ger, not scented; falls with blade and haft subequal in size.

2. *Chamaeiris pontica* (Zapał.) M.B. Crespo, ***comb. nov.***; ≡ *Iris pontica* Zapał., Consp. Fl. Galic. Crit. 1: 191 (1906), basion.; ≡ *Xyridion ponticum* (Zapał.) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 59 (2005)
= *Iris humilis* M. Bieb., Fl. Taur.-Caucas. 1: 33 (1808), nom. illeg. [non Georgi, Bemerk. Reise Russ. Reich 1: 196 (1775)]; ≡ *I. marschalliana* Bobrov in Bot. Mater. Gerb. Bot. Inst. Komarova Akad. Nauk S.S.S.R. 20: 7 (1960) [syn. subst.]
Chromosome number: 2*n* = 72.
Distribution: SE Europe to S Ukraine and the Caucasus, extending into Russian Central Asia. Still incompletely known.

3. *Chamaeiris sintenisii* (Janka) M. B. Crespo, ***comb. nov.***; ≡ *Iris sintenisii* Janka in Természetrajzi Füz. 1: 244 (1877), basion.; ≡ *I. graminea* subsp. *sintenisii* (Janka) K. Richt., Pl. Eur. 1: 256 (1890); ≡ *Xyridion sintenisii* (Janka) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005), comb. inval.
Chromosome number: 2*n* = 16, 32.
Distribution: SE Europe (Balkans), SW Russia and Turkey.

3a. *Chamaeiris sintenisii* subsp. ***lorea*** (Janka) M.B. Crespo, ***comb. nov.***; ≡ *Iris lorea* Janka in Természetrajzi Füz. 1: 245 (1877), basion.; ≡ *I. foetidissima* subsp. *lorea* (Janka) K. Richt., Pl. Eur. 1: 258 (1890)
Chromosome number: 2*n* = 72.
Distribution: C and S Italy.
Observations: It differs from the type by its longer spathes (6-7 cm long, instead of 4-6 cm in the type), strongly keeled; standards narrower, subacute.

4. *Chamaeiris urumovii* (Velen.) M.B. Crespo, ***comb. nov.***; ≡ *Iris urumovii* Velen. in Oesterr. Bot. Z. 52: 155 (1902), basion.
Chromosome number: 2*n* = 20.
Distribution: SE Europe (Bulgaria and neighbouring areas).

4a. *Chamaeiris urumovii* subsp. ***brandzae*** (Prodán) M.B. Crespo, ***comb. nov.***; ≡ *Iris brandzae* Prodán in Bul. Grad. Bot. Univ. Cluj 15: 103 (1936); ≡ *I. sintenisii* subsp. *brandzae* (Prodán) Webb & Chater in Bot. J. Linn. Soc. 76(4): 315 (1978)
Chromosome number: 2*n* = 20.
Distribution: SE of Europe (Romania and neighbouring areas).
Observations: It differs by being more robust and less glaucous; leaves linear, wider (up to 4 mm wide), less abundantly nerved; spathes more strongly inflated. Endemic to central-eastern Europe.

a2. *Chamaeiris* ser. ***Spuriae*** (Diels) M.B. Crespo, ***comb. nov.***; ≡ *Iris* subsect. *Spuriae* Diels in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 502 (1930), basion.; ≡ *I.* ser. *Spuriae* (Diels) G.H.M. Lawr. in Gentes Herb. 8(4): 361 (1953)
= *Iris* sect. *Xyridion* Tausch, Hort. Canal. 1 [sine pag.] (1823); ≡ *I.* subg. *Xyridion* (Tausch) Spach in Ann. Sci. Nat., Bot. ser. 3, 5: 94 (1846)

5. *Chamaeiris. aurea* (Klatt) M.B. Crespo, ***comb. nov.***; ≡ *Xyridion aureum* Klatt in Bot. Zeitung (Berlin) 30: 501 (1872), basion.; ≡ *Iris spuria* subsp. *aurea* (Klatt) Dykes, Gen. Iris: 64 (1913); ≡ *I. aurea* Lindl. in Bot. Reg. 33: t. 59 (1847), nom. illeg. [non Link, Enum. Hort. Berol. Alt. 1: 59 (1821)]; ≡ *I. crocea* Jacquem. ex R.C. Foster in Contr. Gray Herb. 114: 41 (1936) [syn. subst.]
= *Iris crocea* Jacquem. ex Baker in J. Linn. Soc., Bot. 16: 141 (1877); in Gard. Chron. ser. 3, 6: 584 (1876); Handb. Irid.: 15 (1892) [nom. omnia inval.]
Chromosome number: 2*n* = 40.
Distribution: Kashmir, above 1500 m altitude.

6. *Chamaeiris carthaliniae* (Fomin) M. B. Crespo, ***comb. nov.***; ≡ *Iris carthaliniae* Fomin in Věstn. Tiflissk. Bot. Sada 14: 44 (1909), basion.; ≡ *I. spuria* subsp. *carthaliniae* (Fomin) B. Mathew, Iris: 117 (1981); ≡ *Xyridion carthaliniae* (Fomin) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
Chromosome number: 2*n* = 44.
Distribution: Caucasus to W Georgia

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(near Tiflis and Gruzia).

7. *Chamaeiris halophila* (Pall.) M.B. Crespo, ***comb. nov.***; ≡ *Iris halophila* Pall., Reise Russ. Reich. 2, Anh.: 733 (1773), basion.; ≡ *I. spuria* var. *halophila* (Pall.) Ker Gawl. in Bot. Mag. 28: tab. 1131 (1808); ≡ *I. ochroleuca* subsp. *halophila* (Pall.) Asch. & Graebn., Syn. Mitteleur. Fl. 3: 497 (1906); ≡ *I. spuria* subsp. *halophila* (Pall.) B. Mathew & Wendelbo in Rech., Fl. Iranica 112: 23 (1975); ≡ *Xyridion halophilum* (Pall.) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872)
= *Iris gueldenstaedtiana* Lepech. in Acta Acad. Petr. 1: 292 (1781); ≡ *I. gueldenstaedtiana* subsp. *gueldenstaedtiana* Nyman, Consp. Fl. Eur. 4: 702 (1882); ≡ *I. spuria* subsp. *gueldenstaedtiana* (Lepech.) Soldano in Thaiszia 4(2): 121 (1994); ≡ *Xyridion gueldenstaedtianum* (Lepech.) Klatt in Bot. Zeitung (Berlin) 30: 501 (1872)
= *Iris desertorum* Gueldenst., Reis. Russland 1: 80. 1787. ≡ *I. spuria* var. *desertorum* (Gueldenst.) Ker Gawl. in Bot. Mag. 28: tab. 1131 (1808)
= *Iris stenogyna* F. Delaroche in Redouté, Liliac. 6: t. 310 (1811); ≡ *Xyridion stenogynum* (F. Delaroche) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872)

Chromosome number: $2n = 44$.

Distribution: SE Europe, Caucasus, Siberia, Iran, Afghanistan, W Mongolia and N-NW China (Gansu and Xinjiang).

8. *Chamaeiris haussknechtii* (Bornm. ex Baker) M.B. Crespo, ***comb. nov.***; ≡ *Iris haussknechtii* Bornm. ex Baker, Handb. Irid.: 4 (1892), basion.
= *Iris graminifolia* Freyn in Oesterr. Bot. Z. 44: 326 (1894)
= *Iris kerneriana* Asch. & Sint. ex Baker, Handb. Irid.: 16 (1892), nom. inval.; ≡ *Xyridion kernerianum* (Asch. & Sint. ex Baker) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005), comb. inval.

Chromosome number: $2n = 18$.

Distribution: N Turkey (Balikesir to Enzincan and neighbouring areas).

9. *Chamaeiris lilacina* (Borbás) M.B. Crespo, ***comb. nov.***; ≡ *Iris lilacina* Borbás in Math. Termész. Közlem. 13: 49 (1875), basion.

Chromosome number: $2n = 44$.

Distribution: Still unknown; probably Kashmir, C Asia and Mongolia.

10. *Chamaeiris longepedicellata* (Czeczott) M.B. Crespo, ***comb. nov.*** ≡ *Iris longepedicellata* Czeczott in Acta Soc. Bot. Poloniae 9: 44 (1932), basion.

Chromosome number: $2n = ?$

Distribution: Turkey (Galatia, in the Eldiven-Cagh mountains).

11. *Chamaeiris monnieri* (DC.) M.B. Crespo, ***comb. nov.***; ≡ *Iris monnieri* DC. in Redouté, Liliac. 5: t. 236 (1808), basion.; ≡ *I. spuria* subsp. *monnieri* (DC.) Dykes, Gen. Iris: 63 (1913); ≡ *Xiphion monnieri* (DC.) Alef. in Bot. Zeitung (Berlin) 21: 297 (1863); ≡ *Xyridion monnieri* (DC.) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872)

Chromosome number: $2n = 40$.

Distribution: Rhodes and Crete (Greece) and possibly Cilicia (S Turkey).

12. *Chamaeiris notha* (M. Bieb.) M.B. Crespo, ***comb. nov.*;** ≡ *Iris notha* M. Bieb., Cent. Pl. Ross. Merid. 3: t. 77 (1843), basion.; ≡ *I. spuria* subsp. *notha* (M. Bieb.) Asch. & Graebn., Syn. Mitteleur. Fl. 3: 496 (1906); ≡ *I. spuria* var. *notha* (M. Bieb.) R.R. Stewart, Annot. Cat. Vasc. Pl. W. Pakistan & Kashmir: 65 (1972); ≡ *Xyridion nothum* (M. Bieb.) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872)

Chromosome number: $2n = 38$.

Distribution: Caucasus to Armenia, Georgia and Azerbaijan.

13. *Chamaeiris orientalis* (Mill.) M.B. Crespo, ***comb. nov.***; ≡ *Iris orientalis* Mill., Gard. Dict. ed. 8: nº 9 (1768), basion.; ≡ *Xyridion orientalis* (Mill.) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
= *Iris ochroleuca* L., Mant. Pl. Altera: 175 (1771); ≡ *I. spuria* subsp. *ochroleuca* (L.) Dykes, Gen. Iris: 64 (1913); ≡ *Xyridion ochroleucum* (L.) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872)

Chromosome number: $2n = 40$.

Distribution: NE Greece, the Aegean Islands, and Turkey (to Kayseri). Collec-

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tions from the Balkans and Syria are probably garden escapes.

14. *Chamaeiris prilipkoana* (Kem.-Nath.) M.B. Crespo, ***comb. nov.***; ≡ *Iris prilipkoana* Kem.-Nath. in Grossh., Opred. Rast. Kavk.: 635 (1949), basion.
= *Iris demetrii* Achv. & Mirzoeva in Trans. Bot. Inst. Acad. Sci. Armen. SSR 7: 27 (1950); ≡ *I. spuria* subsp. *demetrii* (Achv. & Mirzoeva) B. Mathew, Iris: 117 (1981); ≡ *Xyridion demetrii* (Achv. & Mirzoeva) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
Chromosome number: 2*n* = 38.
Distribution: S Caucasus (Armenia, Azerbaijan, and neighbouring areas).

15. *Chamaeiris pseudonotha* (Galushko) M.B. Crespo, ***comb. nov.***; ≡ *Iris pseudonotha* Galushko, Fl. Severn. Kavk.: 9 (1983), basion.; ≡ *Xyridion pseudonothum* (Galushko) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
Chromosome number: 2*n* = ?
Distribution: Caucasia (S Russia).

16. *Chamaeiris reichenbachiana* (Klatt) M.B. Crespo, ***comb. nov.***; ≡ *Iris reichenbachiana* Klatt in Linnaea 34: 613 (1868), excl. syn., basion.; ≡ *Xyridion reichenbachianum* (Klatt) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872); ≡ *I. spuria* var. *reichenbachiana* (Klatt) Dykes, Gen. Iris: 60 (1913)
= *Iris maritima* Lam., Fl. Franç. 3: 497 (1779), nom. illeg. [non Mill., Gard. Dict. ed. 8: nº 11 (1768)]; ≡ *I. spuria* var. *maritima* Dykes, Gen. Iris: 59 (1913) [syn. subst.]; ≡ *I. spuria* subsp. *maritima* (Dykes) P. Fourn., Quatre Fl. Fr.: 190 (1935); ≡ *Xyridion maritimum* (Dykes) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
= *Iris spathulata* Lam., Encycl. 3(1): 300 (1789), nom. illeg. pro parte [non L. f., Suppl. Pl.: 99 (1782)]
Chromosome number: 2*n* = 38.
Distribution: W Mediterranean (SE France, E Spain, Algeria).

16a. *Chamaeiris reichenbachiana* var. ***hispanica*** (Bernátsky) M.B. Crespo, ***comb. nov.***; ≡ *Iris spathulata* f. *hispanica* Bernátsky in Oesterr. Bot. Z. 60: 343 (1910), basion.; = *I. spuria* var. *hispanica* Dykes, Gen. Iris: 60 (1913)
Chromosome number: 2*n* = 38.
Distribution: Saline, drier soils of C-E Spain.
Observations: It differs by its shorter, robust stems; leaves shorter and narrower, almost completely concealing the stem internodes; flowers smaller.

17. *Chamaeiris sogdiana* (Bunge) M.B. Crespo, ***comb. nov.***; ≡ *Iris sogdiana* Bunge in Mém. Acad. Imp. Sci. St.-Pétersbourg Divers Savans 7: 507 (1847) basion.; ≡ *I. gueldenstaedtiana* var. *sogdiana* (Bunge) Baker, Handb. Irid.: 14 (1892); ≡ *I. halophila* var. *sogdiana* (Bunge) Skeels in Bull. Bur. Pl. Industr. U.S.D.A. 223: 61 (1911); ≡ *I. spuria* subsp. *sogdiana* (Bunge) B. Mathew, Iris: 118 (1981); ≡ *Xyridion sogdianum* (Bunge) Nevski in Trudy Bot. Inst. Akad. Nauk S.S.S.R., ser. 1, Fl. Sist. Vyssh. Rast. 4: 331 (1937)
Chromosome number: 2*n* = ?
Distribution: C Asia, Kazakhstan, NE Iran, Afghanistan, Pakistan, Kashmir and NW-N China.

18. *Chamaeiris spuria* (L.) Medik. in Hist. & Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 417 (1790); ≡ *Iris spuria* L., Sp. Pl.: 39 (1753), basion.; ≡ *Xyridion spurium* (L.) Fourr. in Ann. Soc. Linn. Lyon nov. ser., 17: 163 (1869)
= *Iris subbarbata* Joo in Verh. Mitth. Siebenbürg. Vereins Naturwiss. Hermannstadt 2: 98 (1851), basion.; ≡ *I. gueldenstaedtiana* subsp. *subbarbata* (Joo) Nyman, Consp. Fl. Eur. 4: 702 (1882) ≡ *I. spuria* var. *subbarbata* (Joo) Dykes, Gen. Iris: 62 (1913)
Chromosome number: 2*n* = 22, 38.
Distribution: N, C and E Europe (from Sweden to Hungary).

18a. *Chamaeiris spuria* var. ***danica*** (Dykes) M.B. Crespo, ***comb. nov.***; ≡ *Iris spuria* var. *danica* Dykes, Gen. Iris: 61 (1913), basion.
Chromosome number: 2*n* = 38.
Distribution: N Europe (Saltholm Island, Denmark).
Observations: It differs by its more

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robust habit in all its parts; stems taller, with broader leaves; flowers larger.

19. *Chamaeiris violacea* (Klatt) M.B. Crespo, ***comb. nov.***; ≡ *Xyridion violaceum* Klatt in Bot. Zeitung (Berlin) 30: 500 (1872), basion.; ≡ *Iris violacea* Klatt in Linnaea 35: 384 (1867), nom. illeg. [non Savi, Bot. Etrusc. 2: 9 (1815), nec Sweet, Hort. Brit.: 393 (1826)]; ≡ *I. klattii* Kem.-Nath. in Grossh., Opred. Rast. Kauk.: 635 (1949) [syn. subst.]
= *Iris daenensis* Kotschy ex Baker in J. Linn. Soc., Bot. 16: 140 (1877)
= *Iris musulmanica* Fomin in Věstn. Tiflissk. Bot. Sada 14: 46 (1909); ≡ *I. spuria* subsp. *musulmanica* (Fomin) Takht. in Takht. & Fed., Fl. Erevana ed. 2: 330 (1972); ≡ *Xyridion musulmanicum* (Fomin) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
Chromosome number: 2*n* = 44.
Distribution: E Turkey, N Caucasus, Georgia, E Azerbaijan, and N and W Iran.

20. *Chamaeiris xanthospuria* (B. Mathew & T. Baytop) M.B. Crespo, ***comb. nov.***; ≡ *Iris xanthospuria* B. Mathew & T. Baytop in Garden (London) 107(11): 446 (1982), basion.; ≡ *Xyridion xanthospurium* (B. Mathew & T. Baytop) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 58 (2005)
Chromosome number: 2*n* = 40.
Distribution: C and S Turkey.

a3. *Chamaeiris* ser. ***Ludwigia*** (Doronkin) M.B. Crespo, ***comb. nov.***; ≡ *Iris* ser. *Ludwigia* Doronkin in Bot. Zhurn. (Moscow & Leningrad) 75(3): 413 (1990), basion.; ≡ *Xyridion* ser. *Ludwigia* (Doronkin) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 59 (2005)

21. *Chamaeiris ludwigii* (Maxim.) M.B. Crespo, ***comb. nov.*** ≡ *Iris ludwigii* Maxim. in Bull. Acad. Imp. Sci. Saint-Pétersbourg 26: 508(-509) (1880), basion.; ≡ *Xyridion ludwigii* (Maxim.) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 59 (2005)
Chromosome number: 2*n* = ?
Distribution: Altai Mountains (E Kazakhstan).

b. *Chamaeiris* sect. ***Spathula*** (Tausch) M.B. Crespo, ***comb. nov.***; ≡ *Iris* sect. *Spathula* Tausch, Hort. Canal. 1 [sine pag.] (1823), basion.; ≡ *Iris* subg. *Spathula* (Tausch) Spach in Ann. Sci. Nat., Bot. ser. 3, 5: 97 (1846); ≡ *Spathula* (Tausch) Fourr. in Ann. Soc. Linn. Lyon, ser. 2, 17: 163 (1869); ≡ *Xyridion* sect. *Spathula* (Tausch) Rodion. in Bot. Zhurn. (Moscow & Leningrad) 90(1): 59 (2005)
= *Iris* sect. *Apogon* subsect. *Foetidissimae* Diels in Engl. & Prantl, Nat. Pflanzenfam. ed. 2, 15a: 502 (1930); ≡ *I.* sect. *Limniris* ser. *Foetidissimae* (Diels) B. Mathew, Iris: 14 (1983)

22. *Chamaeiris foetidissima* (L.) Medik. in Hist. & Commentat. Acad. Elect. Sci. Theod.-Palat. 6: 418 (1790) [sphalm. '*foetida*']; ≡ *Iris foetidissima* L., Sp. Pl.: 39 (1753), basion.; ≡ *Xiphion foetidissimum* (L.) Parl., Nuov. Gen. Spec.: 45 (1854); ≡ *Spathula foetidissima* (L.) Fourr. in Ann. Soc. Linn. Lyon ser. 2, 17: 163 (1869); ≡ *Xyridion foetidissimum* (L.) Klatt in Bot. Zeitung (Berlin) 30: 500 (1872)
= *Iris foetida* Lam., Encycl. 3(1): 299 (1789)
Chromosome number: 2*n* = 40.
Distribution: N Africa (Morocco and Algiers), W and S Europe (from Ireland, Scotland and Portugal to S Italy and Malta), Azores and the Canary Islands.

Observations: MEDIKUS (1790) referred this species as '*Ch. foetida*', though he attributed the authority of the basionym ('*Iris foetida*') to Linnaeus and also cited explicitly the same synonym, '*Spatha foetida* Dodon. p. 245' (DODONAEUS, 1583), as LINNAEUS (1753) did. Therefore it is here regarded as an orthographic error without nomenclatural consequences, and the combination is attributed to Medikus.

Tentative key for species of *Chamaeiris*

1. Stem with a longitudinal ridge; seeds with scarlet or white fleshy testa, long persistent after dehiscence (sect. *Spathula*) .... **Ch. foetidissima**

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– Stem terete or evidently 2-winged; seeds with brownish to reddish-brown papiraceous testa, released soon after dehiscence (sect. *Chamaeiris*) 2
2. Haft of falls covered with short unicellular hairs; rhizome slender, wide creeping (ser. *Ludwigia*) ..... **Ch. ludwigii**
– Haft of falls glabrous; rhizome stouter, short creeping 3
3. Leaves with prominent nerves, not fetid, usually long overtopping stems (ser. *Chamaeiris*) 4
– Leaves weakly nerved, usually fetid, shorter to longer than stems (ser. *Spuriae*) 7
4. Stem strongly flattened, with 2-winged edges; outer spathe usually much longer than inner ..... **Ch. graminea**
– Stem terete o somewhat compressed, not winged; outer spathe equalling or shorter than inner 5
5. Stem up to 4 cm long, almost clasped by two reduced leaves just below spathes; capsule at ground level ..... **Ch. pontica**
– Stem longer, produced: capsule situated clearly above ground level 6
6. Leaves scabrous, rough, herbaceous, 1-3 mm wide; spathes strongly inflated, with conspicuous nerves ..... **Ch. urumovii**
– Leaves smooth, coriaceous, 2-5 mm wide; spathes not strongly inflated, inconspicuously veined ..... **Ch. sintenisii**
7. Haft of fall ending in a distinct tubular-canaliculated strip at the junction with blade; crests strongly incurved ..... **Ch. violacea**
– Haft of fall plane or somewhat canaliculated, never tubular at the junction with blade; crests erect to incurved 8
8. Flowers golden yellow, yellowish, whitish or white 9
– Flowers violet, blue, lilac or purplish ... 16
9. Stems 10-40 cm long, shorter than to equalling basal leaves 10
– Stems 40-125 cm long, usually longer than to equalling basal leaves 11
10. Spathes 7-9 cm long, completely greenish; standards narrowly oblanceolate; leaves 3-7(10) mm wide ..... **Ch. haussknechtii**
– Spathes 10-15 cm long, purplish on margins when dry; standards broadly obovate-cuneate; leaves 9-15 mm wide .... **Ch. longepedicellata**
11. Leaves 25-50 mm wide; blade of falls broadly orbicular 12
– Leaves 10-20(25) mm wide; blade of falls oblong, elliptic, oblanceolate or ovate (rarely orbicular) 13
12. Falls uniformly lemon-yellow; styles 2-4 cm long, parallel-sided; crests 5-8 mm, deltoid ..... **Ch. monnieri**
– Falls white, flushed with yellow in the centre; styles 4-5 cm long, wider towards apex; crests 10-13 mm, narrowly triangular ..... **Ch. orientalis**
13. Flowers white; leaves usually 110-140 cm long ..... **Ch. carthaliniae**
– Flowers yellow; leaves usually 50-100 cm long 14
14. Crests erect or slightly incurved; blade of falls 4.5-5 cm long, oblong, with crimped margins, longer than haft ..... **Ch. aurea**
– Crests strongly incurved; blade of falls up to 3-4 cm long, orbicular, broadly elliptical or ovate, with smooth margins, about equalling to shorter than haft 15
15. Leaves 5-10(12) mm wide; falls 4-5.5 cm long, with horizontal or slightly recurved blade ..... **Ch. halophila**
– Leaves (10)12-20 mm wide; falls 6-8 cm long, with strongly recurved blade .... **Ch. xanthospuria**
16. Blade of falls about equalling to slightly shorter than haft 17
– Blade about twice shorter than haft 18
17. Spathes not inflated; blade of falls strongly recurved; standards oblong-lanceolate crests incurved ..... **Ch. notha**
– Spathes somewhat inflated; blade of falls horizontal or slightly recurved; standards obovate-cuneate; crests erect or slightly incurved ..... **Ch. prilipkoana**
18. Flowers violet to bluish-violet; outer spathe slightly keeled in the upper part 19
– Flowers pale-blue to greyish-lilac; outer spathe usually conspicuously keeled ... 21
19. Leaves 2.5-5 cm wide, deep dull-green; standards 6-8 cm long ..... **Ch. lilacina**
– Leaves 0.5-2 cm wide, somewhat glaucous; standards 4-6 cm long 20
20. Spathes membranous at the apical part; blade of hafts broadly oblong to ovate, strongly recurved; haft of falls less than twice the length of blade ..... **Ch. spuria**
– Spathes herbaceous, with narrow membranous margin; blade of hafts orbicular to obovate, horizontal to slightly recurved; haft about twice the length of blade .....

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..... **Ch. reichenbachiana**

21. Flowers up to 15 cm in diameter; falls 6-8 cm long ..... **Ch. carthaliniae**
– Flowers 6-8(10) cm in diameter; falls 3-6 cm long 22
22. Standards grey-purple; style equalling haft in length ..... **Ch. halophila**
– Standards pale-blue to greyish-lilac; style shorter than haft 23
23. Leaves glaucous; spathes inflated; blade of falls broadly ovate, with a narrow yellow band at the base; standards with yellowish claw ..... **Ch. pseudonotha**
– Leaves dull green; spathes not or slightly inflated; blade of falls ovate-lanceolate, fluxed with yellow at the base; standards with brown claw ..... **Ch. sogdiana**

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