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THE GENUS *ORNITHOGALUM* L. (HYACINTHACEAE). IX.
CHARACTERS AND TYPIFICATION OF *O. KOCHII* PARL.,
A MISINTERPRETED SPECIES (**)

Riassunto — *Il genere Ornithogalum L. (Hyacinthaceae). IX. Caratteri e tipificazione di O. kochii Parl., entità controversa.* — La sistematica e la tassonomia di *Ornithogalum kochii* — nell'ambito del «complesso» *O. collinum - O. gussonii* — sono interpretate in modo differente dai vari autori. Sulla base di considerazioni morfologiche e cariologiche ed a seguito della tipificazione dell'entità, in questa nota viene sostenuta la specificità del *taxon*. La difficoltà di riconoscere in erbario questo *Ornithogalum* da altri molto simili rende finora impossibile la determinazione della sua area distributiva e dei suoi rapporti con altri *taxa* del genere.

Abstract — Systematics and taxonomy of *Ornithogalum kochii* Parl. are variously considered within the «*O. collinum - O. gussonii*» complex. In the present authors' opinion this entity seems to be well characterized on caryological and morphological bases, in spite of the variations of some vegetative aspects which make it very similar to other species. *O. kochii* as a general rule is a diploid ($2n = 18$) with or without accessory chromosomes, with a pair of submetacentric satellited chromosomes not yet found in *O. gussonii* or *O. collinum*. The analysis of the type-specimen (FI) and of some living specimens from the *locus classicus* (Lipiça, Jugoslavia) could legitimate the specific rank of *O. kochii*, even if the geographic distribution is still to be revised and cleared.

Key words — *Ornithogalum* - Typification - Taxonomy.

1. INTRODUCTION

The uncertainty and discussion surrounding the systematic position and taxonomic rank of *Ornithogalum kochii* is widely known.

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Parlatore's description and diagnosis (1857) are synthetic and rather perplexing. For example the leaves are often considered ciliate but this character — within the complex of *O. umbellatum* and related species, as indicated according to GADELLA and RAAMSDONK (1981) and RAAMSDONK (1984) — is typical only of *O. collinum* by TORNADORE and GARBARI's (1979) analytical key and GARBARI and GIORDANI's (1984) considerations, and of *O. graecum* var. *ciliolatum* (ZAHARIADI, 1981; ZAHARIADI *et al.*, 1982). Already considered conspecific with *O. gussonii* Ten. [Syn.: *O. tenuifolium* Guss. non Delaroché, cfr. STEARN (1984) and STEDJE (1988)] by GARBARI and TORNADORE (1971), *O. kochii* Parl. is a good species for some authors (PIGNATTI, 1982) or a subspecies of *O. umbellatum* L. (MAIRE, 1958) or of *O. orthophyllum* Ten. (ZAHARIADI, 1980). Biosystematic studies by RAAMSDONK (1984, 1986) have not so far taken this entity into consideration.

This brief note contains some reflections on the typification of *O. kochii* and on the caryology and leaf anatomy of some plants (9 specimens) of *Ornithogalum* cf. *kochii* from near Lipiça (Istrian peninsula, Yugoslavia), *locus classicus* of this species.

2. TYPIFICATION

Ornithogalum kochii Parl. Fl. Ital. 2: 440 (1857).

Typus (holotypus): in herbis Lippizza, da Tommasini in Luglio 1856. FI!

PARLATORE (1857) makes specific mention of the specimen sent by Tommasini from the meadows of Istria near Lipiça — «nei prati e luoghi erbosi dell'Istria vicino a Lippizza» — and recalls that KOCH (1844) points out for Germany and Vienna (sub *O. collinum* Guss.) the same plant as that which Tommasini had sent him from the «Karstgebirge».

The type-specimen includes a complete plant with bulb, two leaves and flowers on one side and an inflorescence without bulb and with four separate leaves on the other side (Fig. 1).

It is interesting to note how Parlatore in his diagnosis of 1857 refers to ciliate leaves («*saepe ciliatis*») which are not to be found in the *typus*.

3. MORPHOLOGICAL AND LEAF ANATOMICAL CHARACTERS

Thanks to Prof. L. Poldini (Trieste) it has been possible to ob-



Fig. 1 - The drawing of the type specimens of *Ornithogalum kochii* Parl. (FI).

tain several specimens of *O. cf. kochii* from the *locus classicus*⁽¹⁾, which are now cultivated in the Pisa Botanical Garden. They are plants, with ovate pyriform bulb, 13×22 mm without bulblets or offsets, with light brown coats. The leaves are erect, up to 16 cm in length and up to 3 mm in breadth, canaliculate with a white stripe down the centre and glabrous. The scape is erect and 2,5 mm in diameter. The inflorescence is corymbiform, 6,5-7 cm long with on an average 7 flowers with erect pedicels (1) 1,7 (3) cm in length. The bracts are scarious with longitudinal green venations; they are more than half as long as the pedicels of which they completely sheathe the base.

Flowers are 2,3-2,5 cm in diameter; the external tepals (14×5,5

(1) The exact location is at the lead-off road from the Trieste-Diaccia road to the turning for Lipiça, ca 410 m above s.l. Leg. L. Poldini (sub *O. tenuifolium* agrgr.). [cult. Hort. Bot. Pis., n. 128/1985].

mm) are larger than the inner ($12 \times 4,5$ mm). Stamens are 6,5 mm long. The ovary is six-ribbed with ribs in pairs.

Flowering is in early May.

Aspects of leaf anatomy are reported in Fig. 2 (transversal section of lamina); some details of the mesophyll and of the epidermis at the level of the central white stripe are illustrated in Fig. 3.

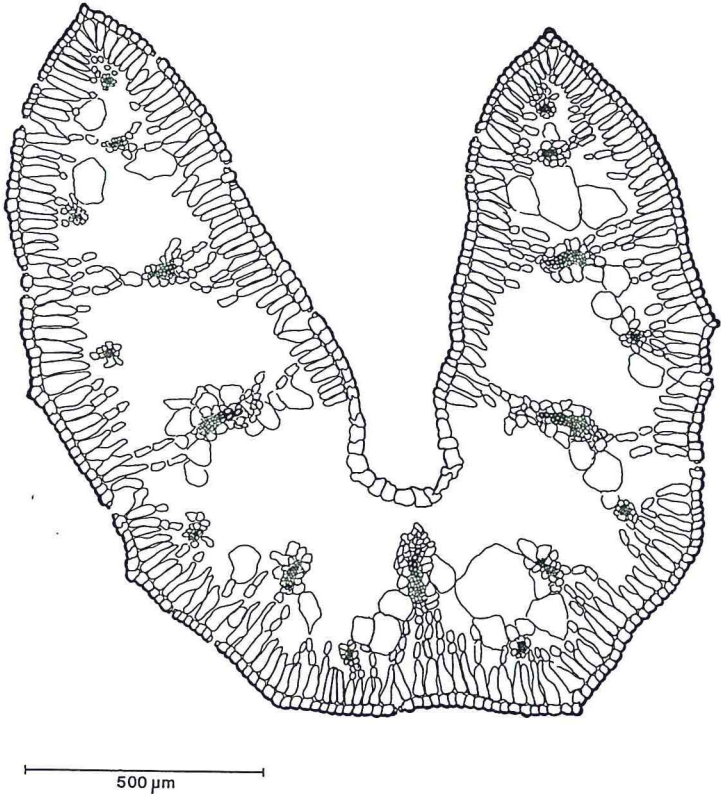


Fig. 2 - *Ornithogalum* cf. *kochii* Parl. (28/1985, cult. H.B.P.). Cross section of the leaf, anatomical general view.

4. CARYOLOGY

The nine individuals from the *locus classicus* of *O. kochii* were tested caryologically by the usual Feulgen technique, which however allows only preliminary evaluation. Our analysis showed a diploid with a LEVAN *et al.* (1964) caryotype formula of $z = 2n = 18:4m + 6sm + 2sm^s + 2m + 2sm + 2m$. Figure 4 shows an idiogram and a so-

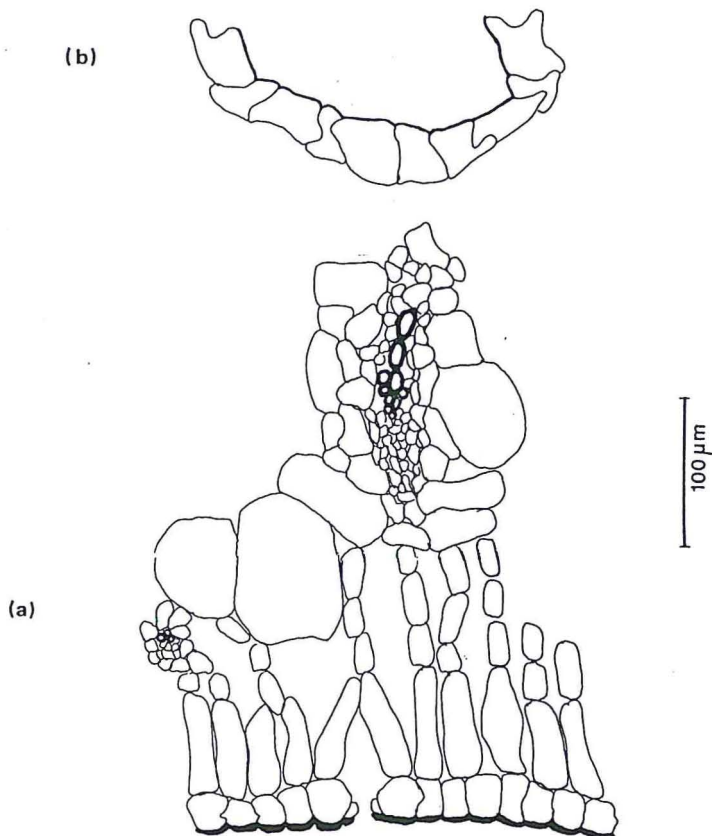


Fig. 3 - *Ornithogalum* cf. *kochii* Parl. a) Detail of the adaxial part; b) hyaline epidermal cells of the white strip on the leaf (central abaxial part).

matic metaphase. To be exact it is a diploid with or without accessory chromosomes ($2n=18+0-4B$)⁽²⁾; the caryotype pattern includes metacentric (m) and submetacentric (sm) and a pair with satellite on the short arm (sm^s). The B chromosomes are of the euchromatic type, metacentric and small in size. The chromosome number ($2n=18$) and caryotype found by us for this species proved to be similar to that found by MORET (1987), MORET and COUDERC (1986) and MORET *et al.* (1987) for plants identified as *O. kochii* Parl. from Morocco and Spain.

⁽²⁾ TORNADORE and MARCUCCI (1988) point out aneuploids with $2n=19, 20, 21$ in some populations of northern Italy.

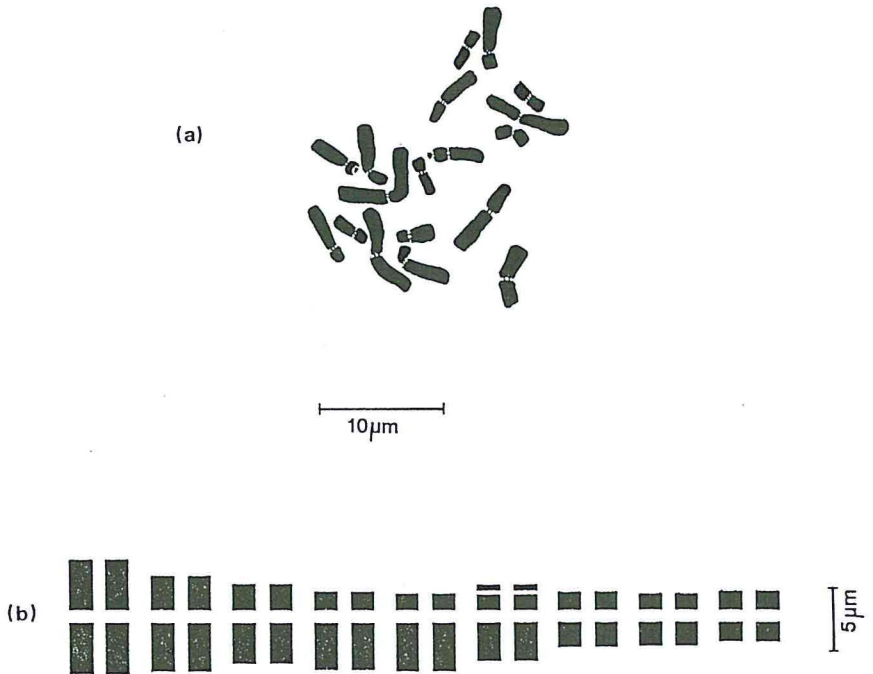


Fig. 4 - *Ornithogalum* cf. *kochii* Parl. $2n=18$. a) Somatic metaphase; b) idiogram of the chromosome complement.

CONCLUSIONS

After identifying the *typus* of *O. kochii* Parl. in the Florence Herbarium (FI) we proceeded to the morphological, caryological and anatomical examinations of samples of *O. cf. kochii* from the *locus classicus*. The vegetative parts and chromosomal pattern suggest that the plants studied are not to be assigned to *O. gussonii* Ten. (= *O. tenuifolium* Guss.) (GARBARI and TORNADORE, 1971) or to *O. umbellatum* L. (RAAMSDONK, 1986) but instead to *O. kochii* Parl., although the leaves longer than the scape and other minor characters do not allow a precise attribution. The caryotype of the plants analysed, independently of accessory chromosomes, was found to be similar to that shown by TORNADORE and GARBARI (1979) in a population (249/1972, Karst region, Trieste; *leg.* D. Lausi as *O. kochii*) already provisionally assigned to *Ornithogalum* cf. *gussonii* (where a case of trisomy in the longer metacentric chromosomes of the caryotype is probably present). It is also similar to that proposed by CZAPIK (1965) for Polish plants identified as *O. gussonii* but re-interpreted

by RAAMSDONK (1986) as *O. angustifolium* Boreau and to that analysed by MORET *et al.* (1987) for northern African plants, as previously mentioned.

According to ZAHARIADI (1977, 1981) *O. kochii* differs from *O. gussonii* for the germination of seeds on the soil surface (epigenous seeds; in *O. gussonii* the seeds are hypogaeus)⁽³⁾, the presence of a pseudotuber bulb with concrescent scales (in *O. gussonii* bulb-scales are free), the flowers not smelling and the anthers without a red point at the insertion of the filament (in *O. gussonii* flowers faintly smell and show a small reddish dot on the connective, just at the end of the filament at the base of the anther).

From the above it emerges that even if at present it is impossible to have an exhaustive picture of this species as regards the distribution and the correlation — if any — between *O. kochii* and other taxa of the group (in MORET's opinion (1987), for example, *O. kochii* is probably one of the parents of *O. umbellatum*) the specific rank seems taxonomically the most appropriate for this Parlature's plant. Further observations are in progress.

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REFERENCES

- CZAPIK R., (1965) - Karyotype analysis of *Ornithogalum umbellatum* L. and *O. gussonii* Ten. *Acta Biol. Cracov., Bot. Ser.* 8, 21-36.
- GADELLA Th. W.J., RAAMSDONK L.W.D. Van, (1981) - Biosystematic studies on *Ornithogalum umbellatum* L. s.l. *Bol. Soc. Brot., Ser. 2*, 53, 745-791.
- GARBARI F., GIORDANI A. (1984) - *Ornithogalum collinum* Guss. (Liliaceae): typification, caryology and leaf anatomical characters. *Atti. Soc. Tosc. Sc. Nat. Mem.*, B, 91, 63-70.
- GARBARI F., TORNADORE N. (1971) - The genus *Ornithogalum* L. (Liliaceae). I. *Ornithogalum kochii* Parl.: morphological and caryotypical analysis. *Atti Soc. Tosc. Sc. Nat. Mem.*, B, 77, 101-111.
- GIORDANI A., GARBARI F. (1986) - Characters and typification of a misinterpreted entity: *O. kochii* Parl. (Liliaceae). Fifth OPTIMA Meeting, Abstract Comun. Posters, 53. Istanbul.

⁽³⁾ In the infrageneric ZAHARIADI's (1965, 1970) classification, *O. kochii* is referred to subgen. *Ornithogalum* and *O. gussonii* to subgen. *Hypogaeum* Zahar. sect. *Tenuifolia* Zahar.

- KOCH W.D.J. (1844) - Synopsis fl. germ. helv., ed. 2, 821-822. Lipsiae.
- LEVAN A., FREDGA K., SANDBERG A.A. (1964) - Nomenclature for centromeric position on chromosomes. *Hereditas*, **52**, 201-220.
- MAIRE R. (1958) - Flore de l'Afrique du Nord, **5**, 180. Lechevalier, Paris.
- MORET J. (1987) - Apport de la taxonomie numerique a la connaissance du genre *Ornithogalum* L. au Maroc: relations entre les sous-espèces d'*Ornithogalum umbellatum* L.. *Bull. Soc. Bot. Fr.* **134**, *Lettres bot.* **1987** (2), 155-163.
- MORET J., AZZIOUI O., COUDERC H., GORENFLOT R. (1987) - La différenciation de populations d'*Ornithogalum kochii* Parl. (Liliaceae) au Maroc et en Espagne: essai biosystématique. *Bull. Mus. natn. Hist. Nat.*, Paris IV ser., **9** (2), 177-194.
- MORET J., COUDERC H. (1986) - Contribution of caryology to the systematic knowledge of the *Ornithogalum* L. Genus in North Africa: the *Heliocharmos* Baker subgenus. *Caryologia* **39** (3), 259-272.
- PARLATORE F. (1857) - *Flora italiana*, **2**, 440. Firenze.
- PIGNATTI S. (1982) - *Flora d'Italia*, **3**, 368-373, Bologna.
- RAAMSDONK L.W.D. VAN (1984) - Biosystematic studies on the *umbellatum-angustifolium* complex in the genus *Ornithogalum* L. Thesis, 143 pp., Utrecht.
- RAAMSDONK L.W.D. VAN (1986) - Biosystematic studies on the *umbellatum-angustifolium* complex of the genus *Ornithogalum* (Liliaceae). II. Genome characterization and evolution. *Nord. J. Bot.*, **6** (5), 525-544.
- STEARNS W.T. (1984) - Homonyms in the genus *Ornithogalum* L. (Liliaceae). *Bot. Helvetica*, **94** (1), 189-197.
- STEDJE B. (1988) - A new low chromosome number for *Ornithogalum tenuifolium* (Hyacinthaceae). *Pl. Syst. Evol.*, **161**, 65-69.
- TORNADORE N., GARBARI F. (1979) - Il genere *Ornithogalum* L. (Liliaceae) in Italia. 3. Contributo alla revisione citotassonomica. *Webbia*, **33** (2), 379-423 (1978).
- TORNADORE N., MARCUCCI R. (1988) - Notes on the caryology of some critical taxa of the genus *Ornithogalum* L. (Liliaceae). *Giorn. Bot. Ital.* **122**, suppl. **1**, 53.
- ZAHARIADI C. (1965) - Sous-genres et sections mésogéens du genre *Ornithogalum* et la valeur de leurs caractères différentiels. *Rev. Roum. Biol.*, ser. bot., **10** (4), 271-291.
- ZAHARIADI C. (1970) - Validation of names of Liliaceae. *Taxon*, **12** (4), 650-651.
- ZAHARIADI C. (1977) - Notes on the intrageneric classification of the genus *Ornithogalum* L. (Liliaceae). *Bot. Zhur.*, **62** (11), 1624-1639.
- ZAHARIADI C. (1980) - *Ornithogalum* L. *Flora Europaea*, **5**, 35-40.
- ZAHARIADI C. (1981) - Nouvelles especes du genre *Ornithogalum* du Proche-Orient et de la Grèce. *Bull. Soc. Bot. Fr.* **128**, *Lettres bot.* (4), 303-314.
- ZAHARIADI C., STAMATIADOU E., DIMA A., ZAMBELLI V. (1982) - Geographical distribution of species of *Ornithogalum* (Liliaceae) in Greece, including two new taxa. *Ann. Mus. Goulandris*, **5**, 131-162.

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