Phyton (Austria)	Vol. 25	Fasc. 1	73—76	28. 2. 1985

Karyology of *Allium stearnii* and *A. reconditum*, two new species from the Iberian Peninsula

By

Julio PASTOR *)

With 3 Figures on 1 Plate

Received October 24, 1983

Key words: *Alliaceae, Allium, Liliaceae.* — Karyology, Chromosome morphology, polyploidy. — Flora of Spain

Summary

PASTOR J. 1985. Karyology of *Allium stearnii* and *A. reconditum,* two new species from the Iberian Peninsula. — Phyton (Austria) 25 (1): 73—76. English with German summary.

A karyological study of two recently described species of *Allium* from the Iberian Peninsula has been made. *A. stearnii* PASTOR & VALDÉS, belonging to the sectio *A.* sect. *Codonoprasum,* has 2n = 32. *A. reconditum* PASTOR, VALDÉS & MUÑOZ, belonging to *A.* sect. *Scorodon,* shows 2n = 48. A comparation of the karyograms of the closely related spec. *A. stearnii, A. pallens* and *A. paniculatum* has been made. Diploidization is regarded as an evolutionary mechanism in some tetraploids.

Zusammenfassung

PASTOR J. 1985. Karyologie von *Allium stearnii* und *A. reconditum,* zwei neuen Arten von der Iberischen Halbinsel. — Phyton (Austria) 25 (1): 73—76. — Englisch mit deutscher Zusammenfassung.

Die Metaphasechromosomen zweier kürzlich von der Iberischen Halbinsel beschriebenen *Allium*-Arten wurden untersucht. *A. stearnii* PASTOR & VALDÉS aus der Sektion *A.* sect. *Codonoprasum* hat 2n = 32 Chromosomen, *A. reconditum* PASTOR, VALDÉS & MUÑOZ aus *A.* sect. *Scorodon* besitzt die Chromosomenzahl 2n = 48. Die Chromosomenmorphologie der drei nah verwandten Arten *A. stearnii, A. pallens* und *A. paniculatum* wird verglichen. Diploidisierung wird bei manchen Tetraploiden als ein Evolutionsmechanismus angesehen.

*) Dr. J. PASTOR, Departamento de Botánica, Facultad de Biología, Universidad de Sevilla, Sevilla, Spain.

Introduction

The karyological study of these two species (described in Pastor & Valdés 1983) brings new data to a previous paper on the karyology of *Allium* species from the Iberian Peninsula (Pastor 1982).

Material and Methods

Root tips of bulbs have been used for the study of chromosomes in mitosis. The roots were treated with 8-hydroxiquinoline for 3—4 hours, and stained with alcoholic hydrochloric acid-carmine (Snow 1963).

The samples investigated are listed individually by the sheet number of the vouchers kept in the herbarium of the Botanical Department, Faculty of Biology, Sevilla (SEV).

The terminology for chromosome morphology follows the classification of Levan & al. 1964. The asymmetry degree of the karyotypes is indicated following Stebbins 1971: 88. Chromosome size is given as in Pastor 1982: 173.

Subgenus *Allium*

Allium sect. *Codonoprasum* Reichenb.

A. stearnii Pastor & Valdés

Material: Córdoba. Rute, Sierra Horconera, 17. VI. 1982, Pastor & Valdés (SEV 80275). — El Tejar, 7. VII. 1982, Pastor & Valdés (SEV 90880).

In the populations studied the number found has been 2n = 32, which correspond to the tetraploid level with the basic number x = 8. Previously only a count of Ruíz Rejón & al. 1976: 226 is known (material from Granada, Spain, but mistakenly identified as *A. flavum* L., a species whose distribution area does not reaches the Iberian Peninsula).

It also is possible that many counts indicated for *A. paniculatum* L. or *A. pallens* L. belong to *A. stearnii*, because these species are related.

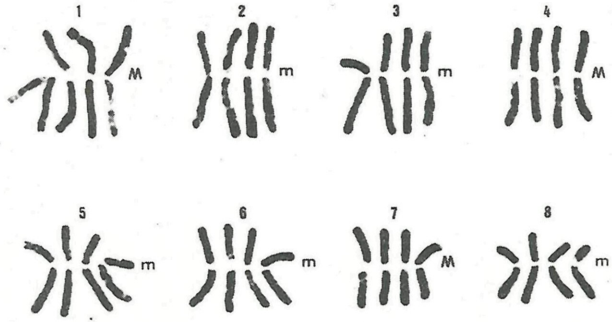
The karyogram has an asymmetry of the 1A type, and the idiogrammatic formula is 12M + 20 m (Fig. 1). The size of the chromosomes ranges from 8,6 to 15.2 μm.

Diploids are not known in this species. But because the chromosomes can be assembled in groups of four (see karyogram Fig. 1), this species is clearly tetraploid.

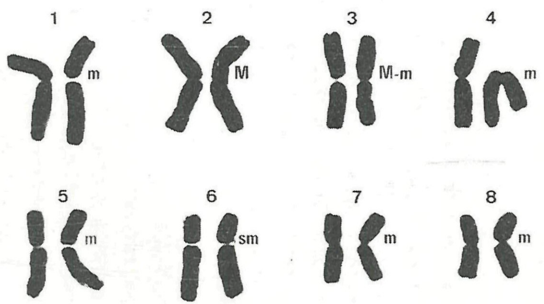
Allium sect. *Scorodon* Koch

A. reconditum Pastor, Valdés & Muñoz

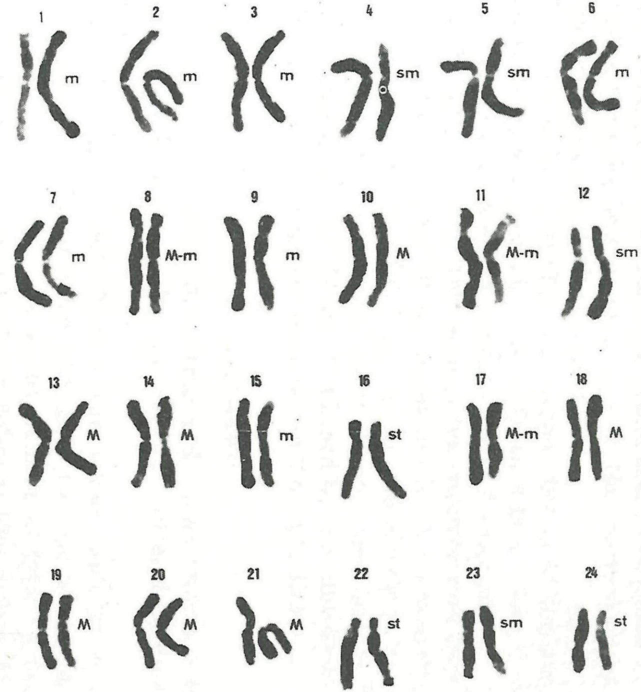
Material: Cordoba. Rute, Pico de Las Cruces, 17. VII. 1982, Pastor & Valdés (SEV 90001).



1



2



3

Fig. 1. A *stearnii* (4x). Córdoba Et Tejar (SEV 90880), × 1000. — Fig. 2. *A pallens* (2x) Cáceres, Sierra de las Villuercas (SEV 42252), × 1000. — Fig. 3. *A. reconditum* (6x). Córdoba. Rute. Pico de las Cruces (SEV 90001), × 1000

The number 2n = 48 has been found and corresponds to the hexaploid level with the basic number x = 8. No previous count exists for this species endemic of the Sierra de Rute.

In the population studied the asymmetry is of the type 2A and the idiogrammatic formula is 14M + 6M-m +14m +8sm + 6st (fig. 3). The length of the chromosomes ranges from 8,2—15,8 µm.

In the karyogram of this species the chromosomes have been assembled in pairs, in spite of the hexaploid level, because they are not to homoligize as groups of 6. This can be seen clearly in the groups 4, 5 and 12 formed by the submetacentric chromosomes (sm) of the largest size and in the groups 16, 22 and 24 formed by the subtelocentrics (st).

This species shows a clear tendency to the diploidization.

Discussion

Although *A. stearnii, A. pallens* and *A. paniculatum* are rather closely related morphologically, there are very clear differences in their karyograms.

A. pallens L. has only diploid populations, with 2n = 16, in the Iberian Peninsula (Pastor 1982: 181). Its chromosome size ranges from 8,8—14,1 µm. Its karyotype has an asymmetry of type 1A and the following idiogrammatic formula: 2M + 2M-m + 10m + 2sm (Fig. 2).

A. paniculatum L. has also only diploid populations in the Iberian Peninsula (Pastor 1982: 181). Its chromosome size ranges from 10,5—17,1 µm. Its karyotype has an asymmetry of type 1A and the following idiogrammatic formula: 2M + 12m + 2sm.

In *A. stearnii* only tetraploid populations with 2n = 32 have been found, and although Ruíz Rejón & al. 1976 grouped the chromosomes by pairs, it can be confirmed that they are better grouped by four (see Fig. 1). The chromosomes are similar in size to these of *A. pallens,* but smaller than in *A. paniculatum.* The karyotype, also with an asymmetry of type 1A, is somewhat more symmetric, because idiogrammatic formula of *A. stearnii* is 12M + 20m (Fig. 1), with a higher proportion of metacentric chromosomes with three groups of 4M chromosomes against 1—2 pairs in *A. pallens* and 1 pair in *A. paniculatum,* and moreover *A. stearnii* do not have submetacentric (sm) chromosomes.

A. reconditum shows an advanced process of diploidization, since most of this chromosomes must be grouped by pairs, and not in groups of 6. A similar situation has been observed in *A. pardoi,* another hexaploid taxon with 2n = 48 (Pastor 1982: 175). It seems that an increasing ploidy level, with its consequent increasing of chromosomal irregularities in meiosis, will be favoured by a process of diploidization in this two species; they lack bulbils in the inflorescence or in the leaf axils as a compensatory mechanism against high sexual sterility and they show rather restricted geographics areas. This tendency of diploidization has been detected in other species by several authors. So, LEVAN 1940, observed the formation of bivalents in tetraploid plants of *A. porrum.* FERNANDES 1969: 32, indicated for several polyploid Narcissi the preferential formation of bivalents, and affirmed that in *N.* × *poetaz* (*N. poeticus* × *N. tazetta*) there must be some genes controlling the increasing of bivalents formed in the meiosis. WET & HARLAN 1970: 270 have found that in a polyploid series of *Dichanthium* (2x, 4x & 6x) only bivalents are formed.

Bibliography

FERNANDES A. 1969. Contribution to the knowledge of the biosystematic of some species of genus *Narcissus* L. — In: V. Simposio de Flora Europaea, p. 245—284. — Sevilla.

LEVAN A. 1940. Meiosis of *Allium porrum.* A tetraploid species with chiasma localization. Hereditas 26: 454—462.

—, FREDGA K. & SANDBERG A. A. 1964. Nomenclature for centromeric position on chromosomes. — Hereditas 52: 201—220.

PASTOR J. 1982. Karyology of *Allium* species from the Iberian Peninsula. — Phyton (Austria) 22 (2): 171—200.

— & VALDES B. 1983. Revisión del Género *Allium* (*Liliaceae*) en la Península Ibérica e Islas Baleares. — Publicaciones de la Universidad de Sevilla.

RUÍZ REJÓN M. & SAÑUDO A. 1976. Estudios cariológicos en especies españolas del Orden *Liliales. I. Allium, Lapiedra, Narcissus.* — Lagascalia 6 (2): 225—238.

SNOW R. 1963. Alcoholic hydrochloric acid-carmine as a stain for chromosomes in squash preparations. — Stain Technol. 38: 9—13.

STEBBINS G. L. 1971. Chromosomal evolution in higher plants. — London.

WET J. M. J. de & HARLAN J. R. 1970. Apomixis, polyploidy and speciation in *Dichanthium.* — Evolution 24: 270—277.