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

By

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With 3 Figures on 1 Plate

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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 comparison 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.

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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-hydroxyquinoline for 3—4 hours, and stained with alcoholic hydrochloric acid-carmin (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 RUIZ REJÓN & al. 1976: 226 is known (material from Granada, Spain, but mistakenly identified as *A. flavum* L., a species whose distribution area does not reach 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 $12M + 20m$ (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: Córdoba. Rute, Pico de Las Cruces, 17. VII. 1982, PASTOR & VALDÉS (SEV 90001).

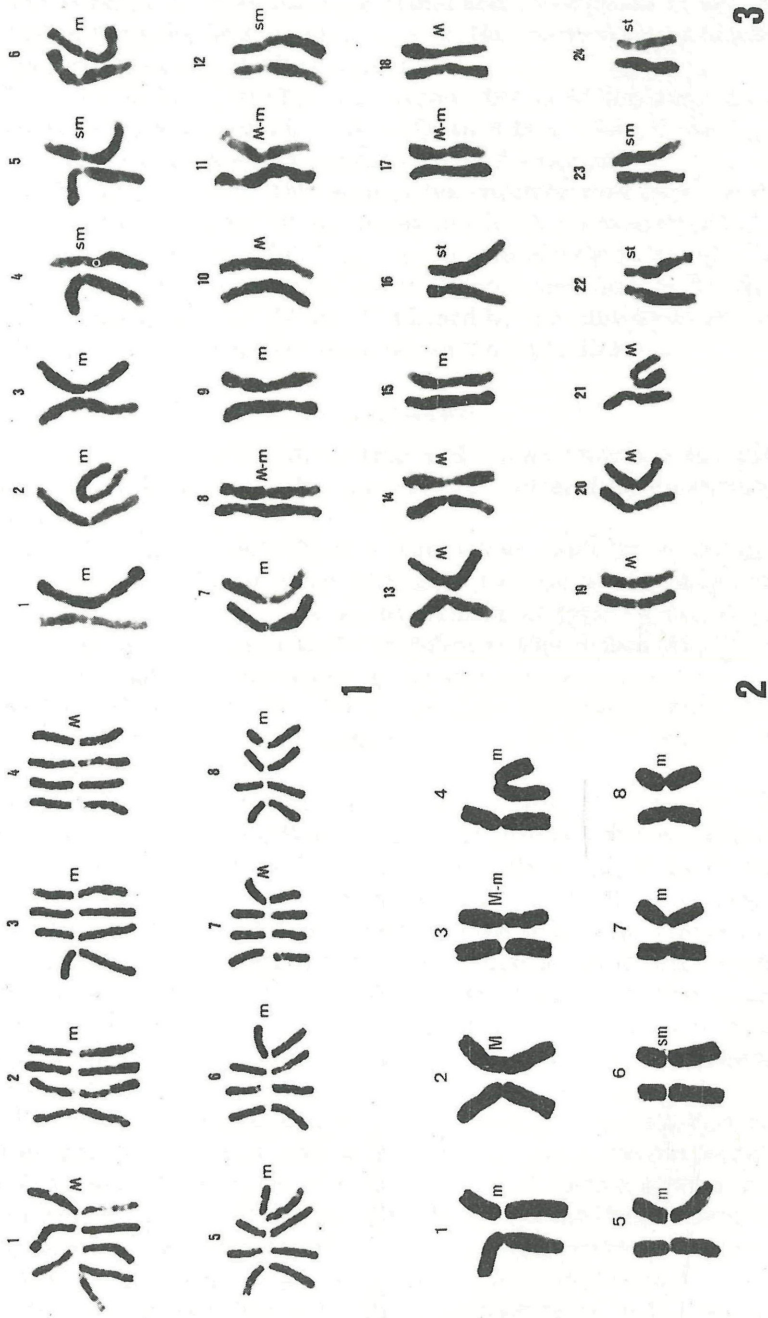


Fig. 1. *A. stearnii* (4x). Córdoba Et Tejar (SEV 90880), × 1000. — Fig. 2. *A. pallens* (2x) Cáceres, Sierra de las Villuercas (SEV 42252), × 1000. — Fig. 3. *A. reconditum* (6x). Córdoba. Rute. Pico de las Cruces (SEV 90001), × 1000

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 $8,2-15,8 \mu\text{m}$.

In the karyogram of this species the chromosomes have been assembled in pairs, in spite of the hexaploid level, because they are not to homologize 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 subtolocentrics (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 $8,8-14,1 \mu\text{m}$. 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 $10,5-17,1 \mu\text{m}$. 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 REYÓN & 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. pardoii*, 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 geographic 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.

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