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## Cytogeographic study of the genus *Leucojum* (Amaryllidaceae) in Greece

### Abstract

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A cytogeographic study of the genus *Leucojum* in Greece was undertaken. Two taxa of *Leucojum*, with significant morphological, cytological and ecological differences grow in Greece. *Leucojum aestivum*, with  $2n = 22$  chromosomes, occurs in shady places and wet meadows of the mainland southwards to N. Peloponnisos, and on some islands. *Leucojum valentinum* s.l., with  $2n = 16$  chromosomes, prefers dry, stony, or rocky places, often covered with phrygana, on the Ionian Islands and in W. Sterea Ellas. The Greek populations of *L. valentinum* s.l. are not morphologically identical with Spanish specimens seen and probably represent an undescribed taxon.

### Introduction

*Leucojum* L. (Amaryllidaceae) is an interesting genus from a taxonomic and cytological point of view. It consists of c. 12 taxa, many of which are cultivated for their ornamental value (Stearn 1956). Its distribution, almost all over Europe, includes a wide variety of habitats. The main concentration of species however, is found in the W. and C. Mediterranean region, which can be considered as the center of diversity for the genus.

The two taxa of *Leucojum* that occur in Greece present some significant morphological, cytological and ecological differences. These taxa have as follows:

1. *L. aestivum* L., a member of the subgenus *Aerosperma* Stearn, is widespread in Europe.
2. *L. valentinum* Pau s.l., which has been placed in subgenus *Ruminia* (Parl.) Baker, appears to have a peculiar and discontinuous distribution between Spain and the eastern coasts of the Ionian sea, while in the mid Mediterranean region (S. France, Corsica, Sardinia, and Sicily) other species of the genus are found.

### *Leucojum aestivum*

*L. aestivum* is characterized by broadly linear leaves appearing before anthesis, scape up to 65 cm high, and white perianth segments with a green marking below the apex. It flowers during spring and prefers shady places and wet meadows, developing the characteristic plant association of Leucojo-Fraxinetum Glavac 59 near the delta of Pinios river (Thessalia) according to Athanasiadis & Drosos (1992). In Greece, *L. aestivum* is distributed

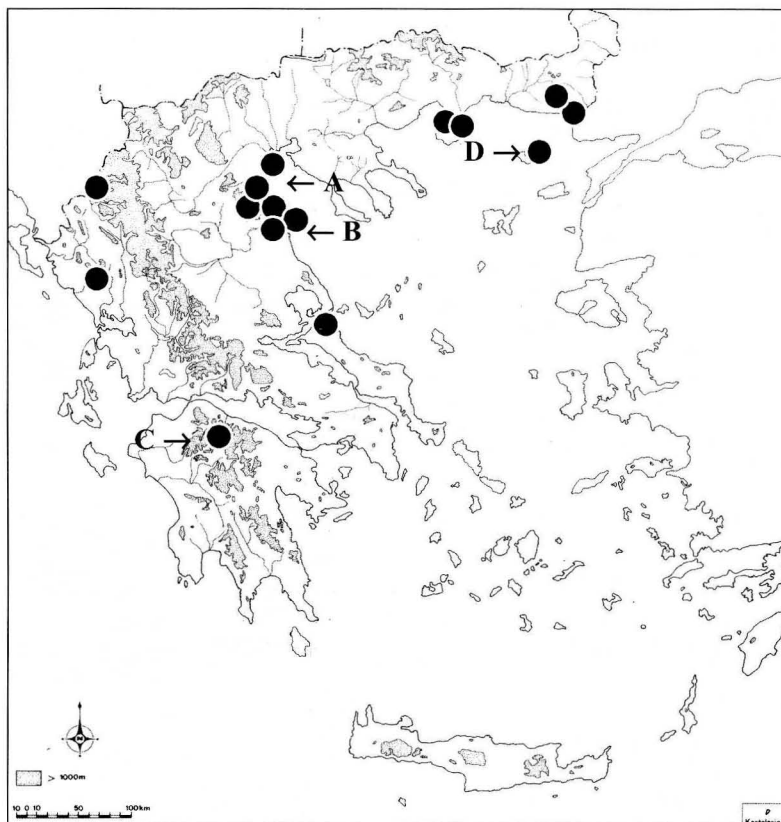


Fig. 1. Geographical distribution of *L. aestivum*. Letters indicate the populations studied cytologically.

mainly in the mainland, but also on Thasos, Evvia and Samothraki islands (Fig. 1). Its southernmost known distribution border lies in N. Peloponnisos (Kalavrita area).

The somatic number of  $2n = 22$  has previously been reported for this species by several authors (Sato 1937; Neves 1939; Garbari & Tornadore 1970; Chiappini & Scrugli 1970; Suznik & Lovka 1973; Sveshnikova 1975; Uhricova 1976; Sveshnikova & Krichfalnshij 1985; Sveshnikova & Zemskova 1988; Druskovic & Lovka 1995; Bareka & al. 1998; Amato & Bianchi 1999; Marcucci & Tornadore 1999). Additionally, Magulaev (1986) reported the chromosome number of  $2n = 24$ , while the chromosome numbers  $2n = 20, 21, 22, 23, 24$  have been counted by Dobeš & al. (1997).

The cytological study of Greek material reveals an asymmetrical karyotype with  $2n = 22$  chromosomes, ranging in size from 16,6 to 3,1  $\mu\text{m}$  (Fig. 2). The largest chromosome pair is metacentric (m), one medium sized chromosome pair is subtelocentric (t) and the rest are acrocentric (st). Within the populations studied karyologically (Fig. 1), the shortest chromosome pair varies from submetacentric (sm) to acrocentric (st) and the number of SAT-chromosome pairs from 2 to 4 (Fig. 3). Additionally, in population A (Fig. 1) the subtelocentric (sixth in size) and the shortest (sm/st) chromosome pairs present structural

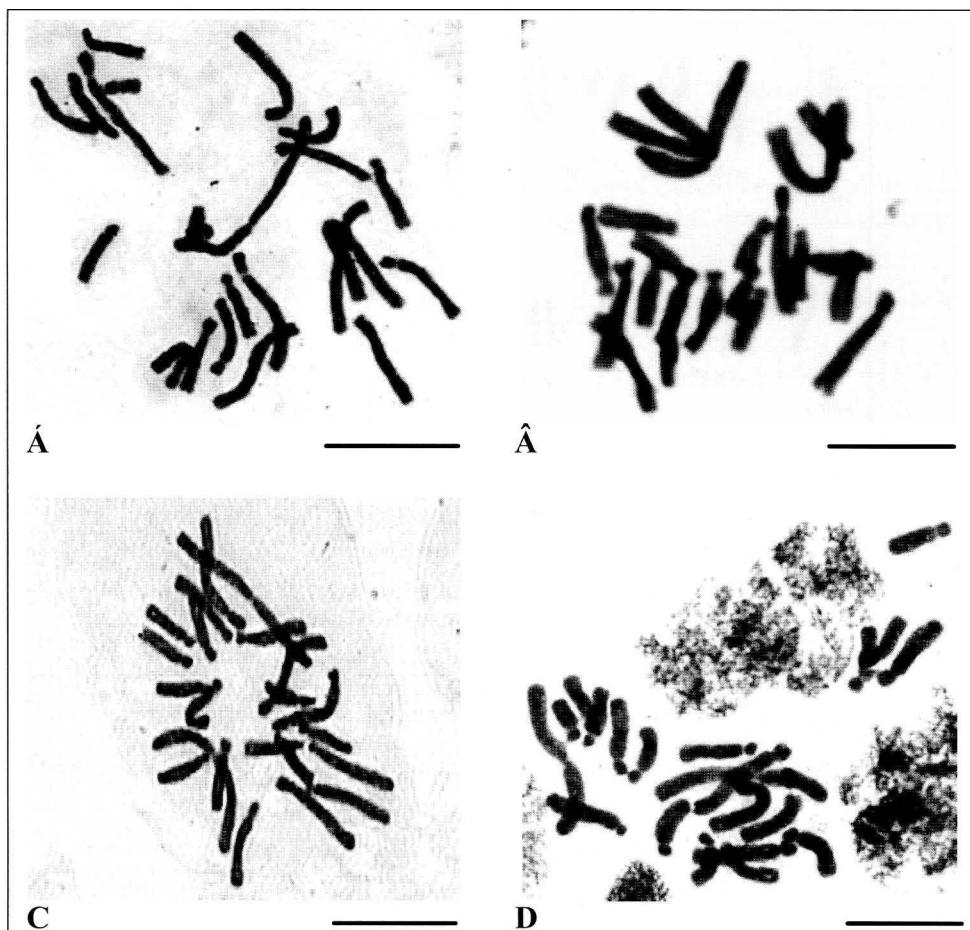


Fig. 2. Microphotographs of mitotic metaphase plates of *L. aestivum*,  $2n = 22$ . Letters correspond to the populations indicated in Fig. 1. - Scale bars = 10  $\mu$ m.

heterozygosity with respect to relative size of the long chromosome arms (Fig. 3 A).

#### *Leucojum valentinum* s.l.

*L. valentinum* s.l. has filiform leaves appearing after anthesis, scape up to 25 cm high, and white perianth segments. It flowers in the beginning of autumn and grows in stony and rocky places, which are often covered with phrygana.

The typical *L. valentinum* is distributed in E. Spain (Valencia), while the Greek plants, which probably belong to a different, undescribed taxon, are distributed on the Ionian Islands and in W. Sterea Ellas (Fig. 4). Plants from Albania (Vlore) have been considered as morphologically different from the Spanish and the Greek populations and were given the illegitimate name *L. valentinum* subsp. *vlorense* Paparisto & Qosja (Paparisto & Qosja 1983).

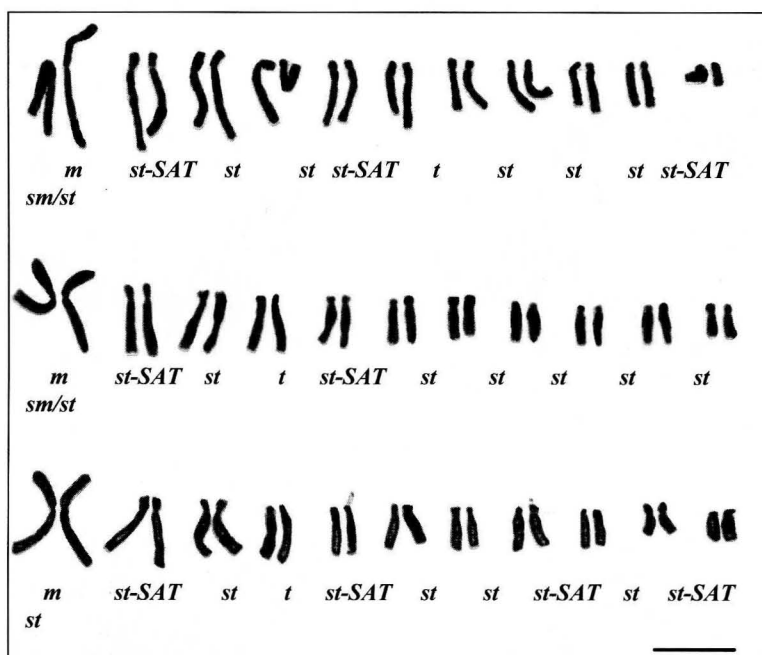


Fig. 3. Karyograms of *L. aestivum*,  $2n = 22$ . Letters correspond to the populations indicated in Fig. 1. - Scale bar = 10  $\mu$ m.

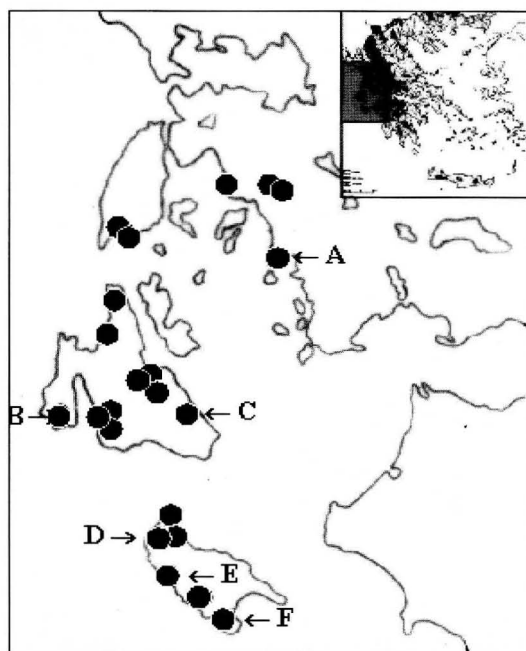


Fig. 4. Geographical distribution of *L. valentinum*. Letters indicate the populations studied cytologically.

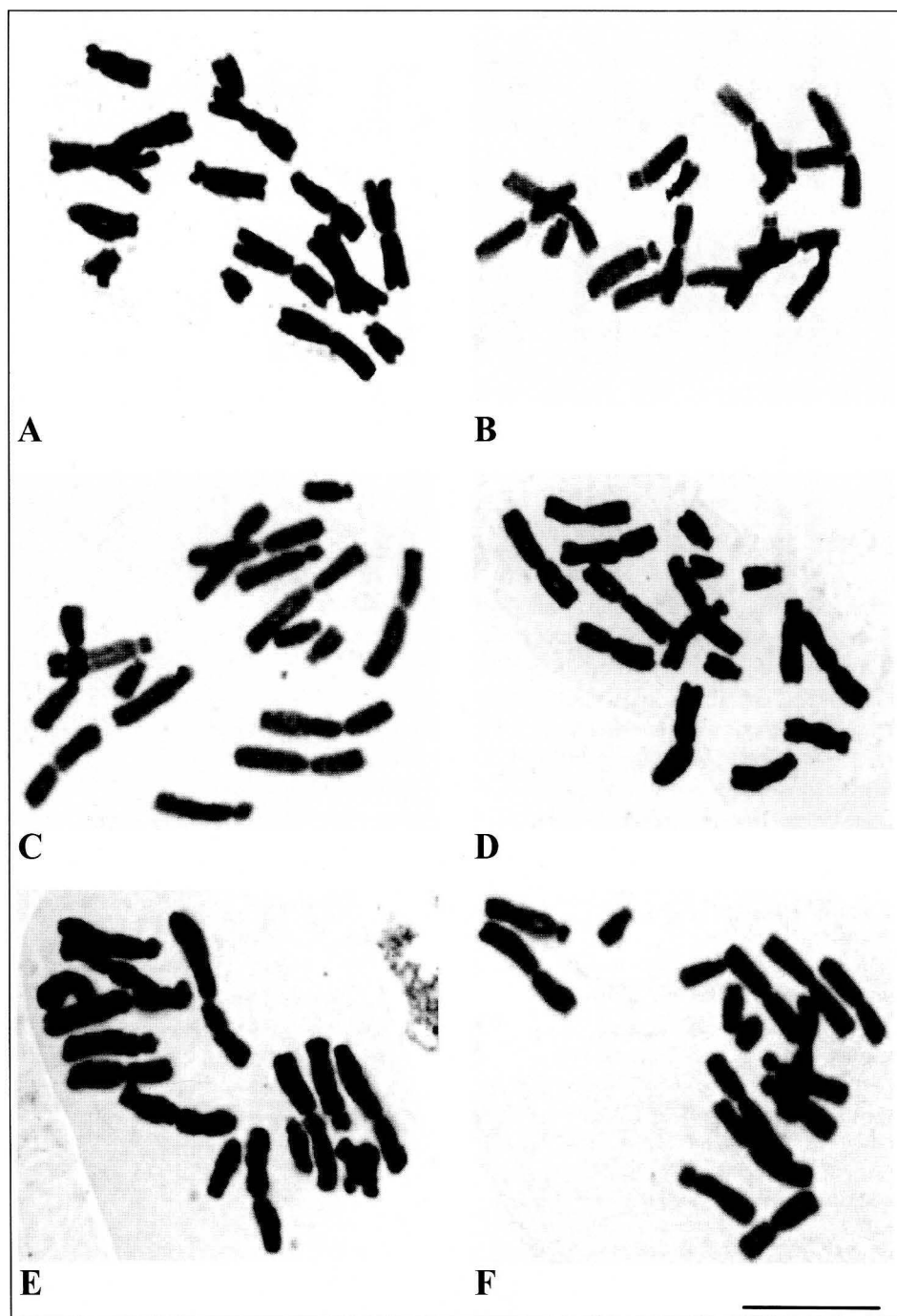


Fig. 5. Microphotographs of mitotic metaphase plates of *L. valentinum*,  $2n = 16$ . Letters correspond to the populations indicated in Fig. 4. - Scale bar = 10  $\mu\text{m}$ .

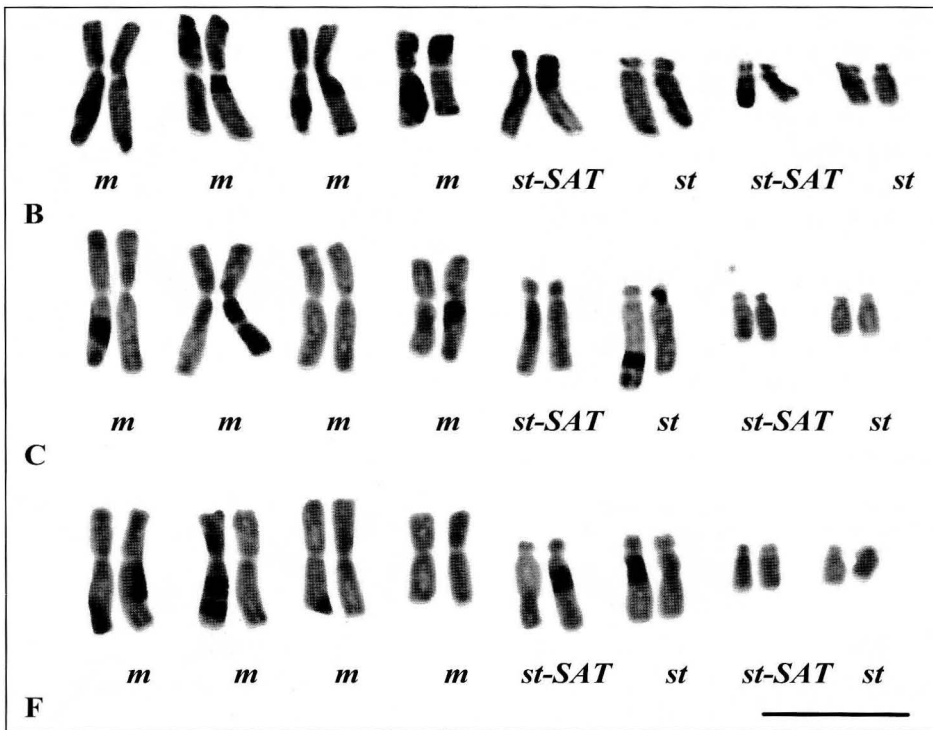


Fig. 6. Karyograms of *L. valentinum*,  $2n = 16$ . Letters correspond to the populations indicated in Fig. 4. - Scale bar = 10  $\mu$ m.

The chromosome number of  $2n = 16$  counted in all Greek populations examined, has already been reported by Damboldt & Phitos (1975), Müller-Doblies & Müller-Doblies (1975) and Bareka & Kamari (1999). The same chromosome number of  $2n = 16$  has also counted by Boscaiu et al. (1997) in material from Spain.

The karyotype of *L. valentinum* s.l. is rather symmetrical, and its 16 chromosomes vary in size between 10,8 and 3,2  $\mu$ m (Figs 5 and 6). Half of the chromosomes are metacentric (m), while the rest are acrocentric (st). Four of the acrocentric chromosomes bear small satellites, not always visible (Fig. 6). In two of the populations studied (Fig. 4 C and D), one of the acrocentric st-SAT chromosome pairs appear to be heteromorphic with respect to size of the long arms (Fig. 6 C).

### Discussion and conclusions

The sharply discontinuous distribution of the known *L. valentinum* s.l. populations (E. and W. Mediterranean), the morphological differences among Greek and Spanish specimens and the incomplete cytological study of the Spanish populations raise some doubts on the true identity of the Greek taxon. According to recent publications, the distribution of *L. valentinum* itself in the E. Mediterranean region is questioned (Aguilella & al. 1990;

Lledó & Crespo 1996). The typical *L. valentinum* is restricted to Spain. More precisely, it is localized to a limited coastal calcareous area of E. Spain (Valencia).

From the Spanish taxon only the chromosome number is known, and is attributed to a single population (Boscaiu & al. 1997). No karyotype details are published. Based on the fact that karyotype morphology is a significant taxonomic character among species of *L.* subgenera *Acis* and *Ruminia*, we consider the karyological study of the Spanish populations as essential before any final taxonomic conclusions of the Greek populations are made.

In cooperation with Spanish colleagues, a comparative karyosystematic study of Greek and Spanish populations of *L. valentinum* is in progress. Such a study will contribute substantially towards a taxonomic clarification of the taxa covered by the same name of *L. valentinum* in the W. and E. Mediterranean area.

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