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Karyological study of three species of *Paeonia (Paeoniaceae)* in Bulgaria

Abstract

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Chromosome numbers and karyotypes are given for the three *Paeonia* species occurring in Bulgaria and from a total of five wild populations, confirming earlier counts from other areas.

Introduction

The genus *Paeonia* comprises 35-40 species growing in the Mediterranean, in subtropical, temperate and boreal Asia, and in western N. America. Five of the eight species growing in Europe occur in the Balkan Peninsula (Jalas & Suominen 1989), and three of them in Bulgaria: *P. tenuifolia* L., *P. mascula* (L.) Mill., and *P. peregrina* Mill. The first two are included in the *Red data book of Bulgaria* (Velčev 1984) as threatened species, the third being more widely distributed.

A majority of species of *Paeonia* have been karyologically studied already. The basic chromosome number in the genus is $x = 5$. Diploid ($2n = 10$) and tetraploid ($2n = 20$) karyotypes, with a remarkably uniform chromosome morphology, were found by many authors (Stebbins 1938, Šopova 1971, Tzanoudakês 1977, Schwarzacher-Robinson 1986, Punina 1987, 1989).

Material and methods

Specimens were collected from their natural habitats in Bulgaria (vouchers at SO; Table 1). Mitotic metaphase plates from squashed root tips were studied. Chromosomes were shortened by pre-treatment with 8-hydroxyquinoline for 7 hours, after which cold maceration and staining with haematoxylin after Gomory were applied. The karyotypes are described in terms of the terminology proposed by Levan & al. (1965).

Table 1. A list of cytologically studied populations and voucher specimens.

Paeonia	Locality *(voucher No.)*
tenuifolia	W. Stara planina, village Ponor, 29 May 1992 *(2/92)*
	Black Sea coast, cape Kaliakra, 28 May 1992 *(10/92)*
	Danube plain, village Gorna Studena, 2 May 1993 *(6/93)*
mascula	Znepole region, Mt Konjavska, 2 May 1993 *(10/93)*
peregrina	N.E. Bulgaria, Mt Preslavska, 12 May 1991 *(3/91)*

Results

Paeonia tenuifolia – $2n = 2x = 10 = 4m + 2m\text{-SAT} + 2Sm\text{-SAT} + 2St\text{-SAT}$ (Fig. 1).

The diploid number established for specimens from three Bulgarian localities is the same as had been reported by many other authors (see Fedorov 1969, Goldblatt 1981-1988). The karyotype consists of 3 metacentric, 1 submetacentric and 1 subtelocentric chromosome pairs. The satellites on the short arm of the fifth pair are visible in all plates, but on the third and fourth pairs the satellites are not always discernible. They were revealed by C-banding as described by Schwarzacher-Robinson (1986) and Punina (1989).

Paeonia mascula – $2n = 2x = 10 = 2M + 2m + 2m\text{-SAT} + 2Sm\text{-SAT} + 2St\text{-SAT}$ (Fig. 2).

The karyotype consists of 3 metacentric, 1 submetacentric and 1 subtelocentric chromosome pairs. Satellites are seen on the third, fourth and fifth pairs. The same diploid number and karyotype were described for *Paeonia mascula* from the F.Y.R. Makedonija (Šopova 1971), but Tzanoudakês (1977) counted $2n = 20$ on Greek material.

Paeonia peregrina – $2n = 4x = 20 = 10m + 2m\text{-SAT} + 2Sm + 2Sm\text{-SAT} + 4St\text{-SAT}$ (Fig. 3).

The tetraploid chromosome number had been found by many authors (see Fedorov 1969). From the Balkan Peninsula, mainly tetraploid populations are known (Šopova 1971, Sušnik & Lovka 1973, Tzanoudakês 1977, Popova & Češmedžiev 1978), but Šopova (1971) found both diploids and tetraploids in one and the same locality. The karyotype studied consists of 6 metacentric, 2 submetacentric and 2 subtelocentric chromosome pairs, all of different sizes. Satellites were observed on both subtelocentric pairs as well as on one of the submetacentric and one of the metacentric pairs. It is evident from Fig. 3′ that length differentiation of homologous chromosome pairs must have occurred, since no four identical sets can be seen.

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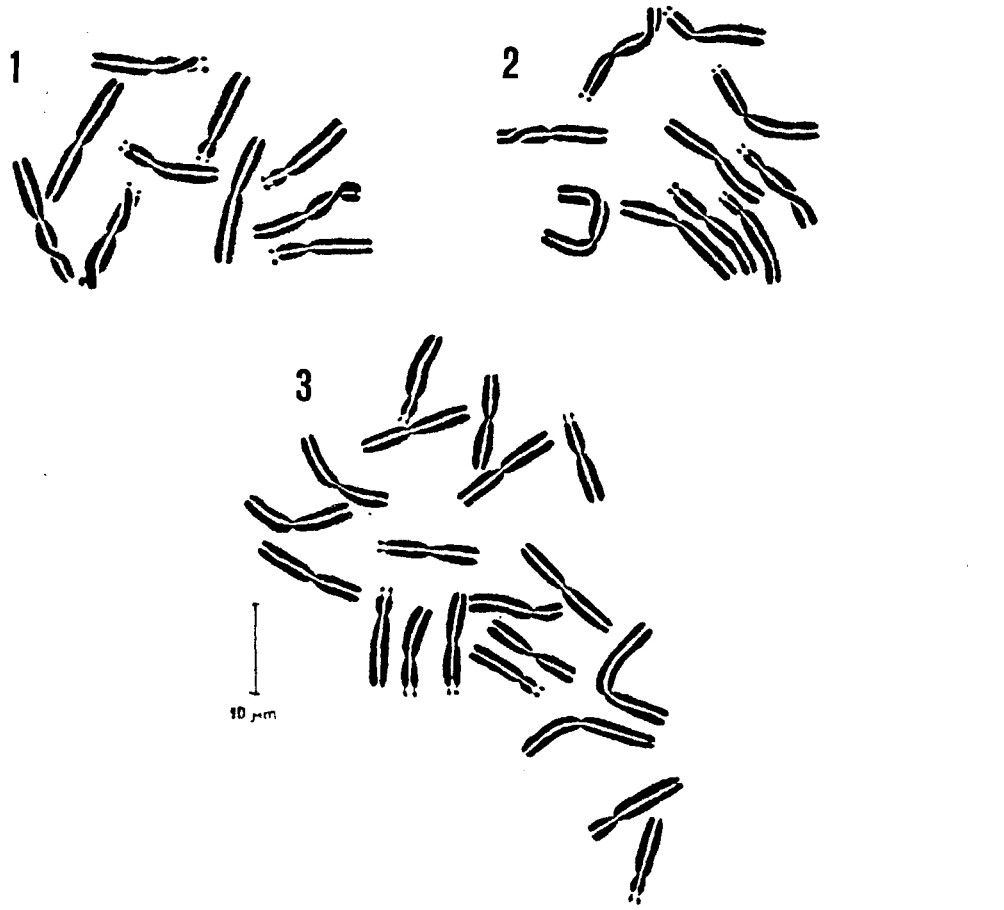
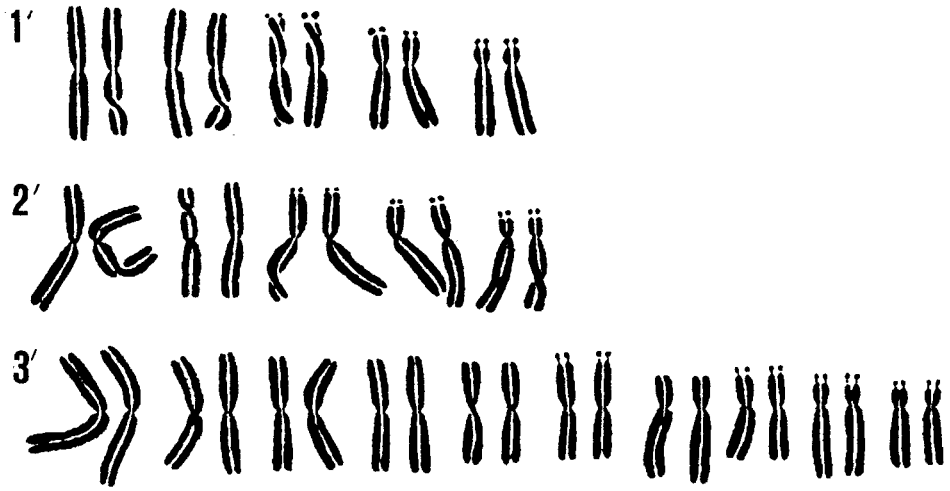
Fig. 1-3. Drawings of metaphase plates (1, 2, 3) and karyograms (1′, 2′, 3′) of Bulgarian *Paeonia* species. – 1, *P. tenuifolia;* 2, *P. mascula;* 3, *P. peregrina.*


1
2
3
10 µm


1'
2'
3'

Discussion

Our results confirm, for Bulgarian material, those of other authors. The karyotypes are stable and uniform with respect to centromere index and relative length of the chromosome arms, but vary between species in absolute length. The basic diploid karyotype of *Paeonia* consists of 1 long and 2 somewhat shorter pairs with median centromeres, 1 pair with submedian and 1 pair with subtelocentric centromeres. At the tetraploid level this karyotype is doubled and can be considered to result from allopolyploidy.

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