Arch. Biol. Sci., Belgrade, 59 (4), 73P-74P, 2007 DOI:10.2298/ABS070473PB

B CHROMOSOMES IN KEELED GARLIC, *ALLIUM CARINATUM* L. (LILIACEAE), FROM TARA MOUNTAIN (SERBIA).

Jelena Blagojević[1], V. Stevanović[2] and **M. Vujošević[1].** [1]*Department of Genetic Research, Siniša Stanković Institute for Biological Research,* 11060 Belgrade, Serbia; [2]*Institute of Botany,, Faculty of Biology, University of Belgrade*, 11000 Belgrade, Serbia

Keywords: B chromosomes, *Allium carinatum*, Mt. Tara, Serbia

UDC 582.573.16(497.11 Tara):575.1

The genus *Allium* is the largest in the family Liliaceae and is mainly distributed in subtropical and temperate regions of the Northern Hemisphere, particularly in the Mediterranean region and Central Asia. Thus, about 700 species are recognized (Klass, 1998). However, chromosome numbers are known for only about one-third of them and detailed cytological data are very limited. The genus *Allium* is karyologically interesting in many respects, the most salient of which are polyploidy and the appearance of B chromosomes. B chromosomes (Bs) chromosomes that are supernumerary to the standard complement, and characterize some individuals within populations of certain species. By definition they are not necessary for normal development, and this permits them to have their own evolutionary pathway (Camacho et al., 2000). These chromosomes must be regarded as a significant component of the eukaryote genetic system, since more than 1300 plant species and about 500 animal species (as well as several species of fungi) possess them (Jones and Rees, 1982). Among plants Bs are mostly distributed in monocots and plants characterized by large genomes but a small number of chromosomes (Palestis et al., 2004). The family Liliaceae is prominent for having a large number of species with Bs. In the given family, the genus *Allium* is especially interesting not only because up to now Bs have been found in 34 species, but also because the Bs in some *Allium* species have been studied in detail and one species, *A. schoenoprasum*, is frequently mentioned as a rare example of proven adaptive advantageousness of the presence of Bs (Bougourd and Parker, 1979).

Information about the geographical distribution of B chromosomes is available for a limited number of species, but it is clear that Bs are restricted to a few populations in some species, whereas in others their distribution is wide. In *Allium carinatum*, up to three B chromosomes have been found in populations from Croatia (Šopova, 1966) and one in *Allium carinatum* from Austria (Loidl, 1982).

Specimens of *Allium carinatum* were collected from natural populations at the Kaludjerske Bare locality on Mount Tara (Serbia). Root tips were processed for chromosome counts and analyses according to standard procedures. They were treated with 0.01% colchicine for 5 hours, fixed in Carnoy's fixative overnight, hydrolyzed in 1 N HCl at 60°C for 12 minutes, stained with aceto-orcein, and squashed. Chromosome counts were made from several root tips of each plant.

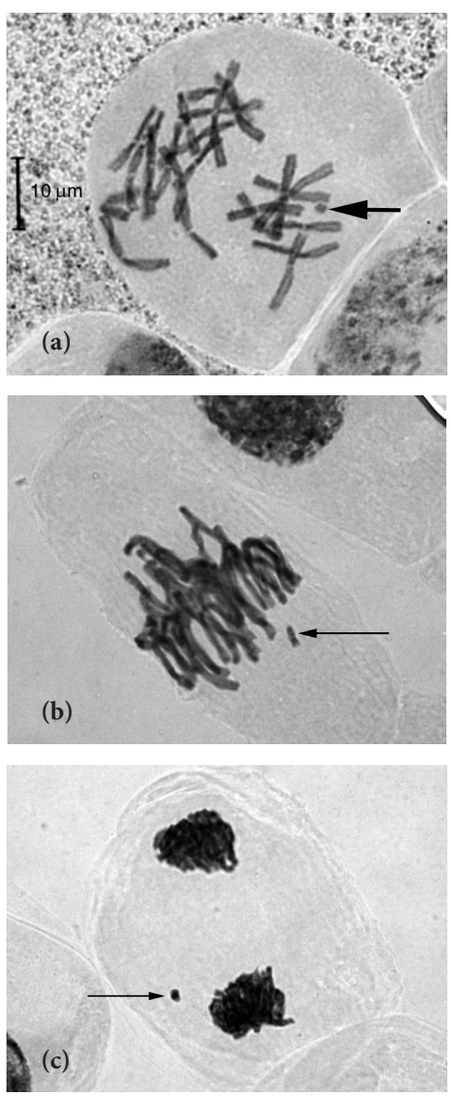

Fig. 1. B chromosomes in *Allium carrinatum* L. (a) metaphase with metacentric B; (b) side view of metaphase with acrocentric B; (c) B chromosome lagging in late telophase.

All studied plants were triploids with 24 chromosomes. However, among European populations of *A. carinatum,* dif-

ferent chromosome numbers (2n=16, 24, 26) were recorded (Stearn, 1980; Kuzmanov, 1993). We therefore expected to find three metacentric chromosomes with satellites or secondary constrictions in each karyotype. However, only two were present in all specimens. In some plants, in addition to the normal complement, one or two additional (or B) chromosomes were observed (Fig. 1). They were much smaller than the smallest chromosomes of the standard complement and can be designated micro Bs. Two types of such Bs were found. In most cases the larger one was metacentric and less than 2 μm in length (Fig. 1a), while the smaller one was acrocentric (Figure 1b). Their appearance was mosaical, as they were not present in all cells of the studied root tissue. This is well illustrated by the B chromosome left lagging in the telophase spindle (Fig. 1c). Somatic elimination is frequently higher in triploids than in diploids or tetraploids. The Bs found by Šopova (1966) in specimens from the Dalmatian Coast were approximately half the length of standard chromosomes, and all were acrocentrics. In the population from Mount Tara, B chromosomes of this type were not seen. The single B chromosome detected in specimens from Austria (Loidl, 1982) was a small submetacentric and more like those found preferentially in Serbia. A similar type of B was recorded by Tschermak-Woess and Schiman (1960) in *A. pulchellum*, which was later classified by Stearn (1978, 1980) as a subspecies of *A. carinatum*. It is possible that different types of Bs belong to different subspecies.

Since B chromosomes, by definition, are not under the same selection pressures as chromosomes of the standard complement, they can more frequently undergo changes. Further studies are needed to show how many types of Bs characterize *A. carinatum* throughout its range of distribution and ascertain if there is any correlation with habitat differences.

Acknowledgment - This work was supported by the Serbian Ministry of Science (Grant No. 143011).

References: Bougourd, S. M. and J. S. Parker (1979). *Chromosoma* **75**, 369-383. - Camacho, J. P. M., Sharbel, T. F., and L. W. Beukeboom (2000). *Phil. Trans. Roy. Soc.* **355**, 163-178. - Jones, R. N., and H. Rees (1982). *B Chromosomes*. Academic Press, New York. - Klass, M. (1998). *Plant Breeding* **117**, 297–308. – Kuzmanov, B. (1993). *Flora Mediterranea* **3,** 19-163. - Levan, A. (1932). *Hereditas* **16**, 257-294. - Loidl, J. (1982). *Plant Syst. Evol.*, **139**, 197-207. - Plestis, G. B., Trivers, R., Burt, A., and R. N. Jones (2004). *Cytogenet. Genome Res.* **106**, 151-158. - Šopova, M. (1966). *Chromosoma* **19**, 149-158. - Šopova, M. (1971). *Genetika* **3**, 249-259. - Stearn, W. T. (1978). *Ann. Mus. Goulandris* **4**, 83-198. – Stearn, W.T. (1980). *Flora Europaea* **5,** 49-69. - Tschermak-Woess, E., and H. Schiman (1960). *Österr. Bot. Z.* **107**, 212-227.