

Onion chromosome nomenclature and homoeology relationships – workshop report

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Received 8 January 1990; accepted 8 January 1990

Key words: *Allium cepa*, onion, cross compatible species, chromosome nomenclature

Summary

Participants in a workshop on onion chromosome nomenclature held during the Eucarpia 4th *Allium* Symposium, agreed to consider the nomenclature for the chromosomes of *Allium cepa* L. proposed by E.R. Kalkman (1984) as the standard. Recommendations were formulated for the chromosome nomenclature of species which are cross compatible with onion.

Introduction

The number and intensity of efforts to gather fundamental knowledge about the genomes of *Allium cepa* L. and related species are increasing rapidly. Investigators working with onion chromosomes recognize the danger of increasing confusion. Without an agreement on the standardization of chromosome nomenclature, an efficient synthesis of the knowledge acquired by different groups will be severely hampered. Moreover, such an agreement is essential for any communication concerning homoeology relationships between the genomes of onion and its relatives.

Workshop

An international workshop about onion chromosome nomenclature and homoeology relationships was held at the University of Warwick, Coventry, U.K. on 8 September 1988 on the occasion of the Eucarpia 4th *Allium* Symposium. Representatives

of most of the groups working with onion chromosomes were invited to participate.

Participants were: S. Armstrong (East Birmingham Hospital, Birmingham, U.K.), J.N. Corgan (New Mexico State University, Las Cruces, USA), C.M. Cryder (Shamrock Seed Company, Inc., Las Cruces, USA), L. Currah (Institute of Horticultural Research, Wellesbourne, U.K.), B.V. Ford-Lloyd (University of Birmingham, U.K.), U.S. Gupta (Michigan State University, East Lansing, USA), R.N. Jones (University College of Wales, Aberystwyth, U.K.), E.B. Peffley (Texas Tech University, Lubbock, USA), H.D. Rabinowitch (Hebrew University of Jerusalem, Rehovot, Israel) and J.N. de Vries (Centre for Plant Breeding Research, Wageningen, the Netherlands).

The comments of I. Schubert (Zentralinstitut für Genetik und Kulturpflanzenforschung, Gatersleben, G.D.R.) and R.K.J. Narayan (University College of Wales, Aberystwyth, U.K.) were communicated to the workshop by J.N. de Vries, who visited them on 22 July and 5 September 1988, respectively.

Chromosome nomenclature of A. cepa

With the support of I. Schubert and R.K.J. Narayan, the workshop agreed that the chromosome nomenclature proposed by E.R. Kalkman (1984) should be considered the standard system of nomenclature for the chromosomes of *A. cepa*. Kalkman's paper was the first to give a detailed and accurate account of the onion karyotype with respect to relative chromosome length, centromeric position, and intercalary C-band pattern. Members of the workshop and others who have also studied the karyotype of *A. cepa* in a variety of genotypes, including long day and short day onions, multiplier onions and shallots, found that their results largely agree with those of Kalkman (Peffley & Currah, 1988; de Putter & van de Vooren, 1988; de Vries & Jongerius, 1988).

Idiograms of species cross compatible with A. cepa

Based on Kalkman's classification, the workshop participants suggested that the following general rules might be used as guide-lines for construction of idiograms for those *Allium* species which cross-fertilize with *A. cepa* to yield F₁ interspecific hybrids.

To construct idiograms of this group of species, the chromosomes will be arranged in order of de-

creasing average relative length. In the idiogram each chromosome drawn represents a pair of homologues, the longest being numbered '1' etc. The longest chromosome will be at the left side in the idiogram and the centromeres of all chromosomes will be positioned at the same level, with the short arm uppermost. A capital letter, the same as the first letter of the species under investigation, is written after the chromosome rank number.

When relative length does not separate two chromosome pairs, it is suggested that the most nearly metacentric chromosome pair will be given the lower rank order number, based on international protocol. Because the satellites (the chromosome segments distal from the secondary constriction of the satellite chromosomes) may vary considerably in size, often being extremely small, their size should not be included in relative length measurements but should be represented graphically in the idiograms.

As an example, in Fig. 1 the idiogram of *A. cepa* based on these recommendations is presented.

Homoeology relationships

The workshop participants were well aware that chromosomes assigned the same rank order number in different species are not necessarily homoeologues. The only chromosomes known to be homoeologous to date are the nucleolar organizing ones in *A. cepa* and *A. fistulosum* (Jones & Rees, 1968).

Acknowledgements

Thanks are due to Dr. T.J. Riggs for his help with inviting the participants to the workshop, to Dr. L. Currah and Dr. C.M. Cryder for their help with editing the initial manuscript, and to the Department of Plant Taxonomy of the Agricultural University, Wageningen for their kind permission to use the original illustrations from E.R. Kalkman's paper.

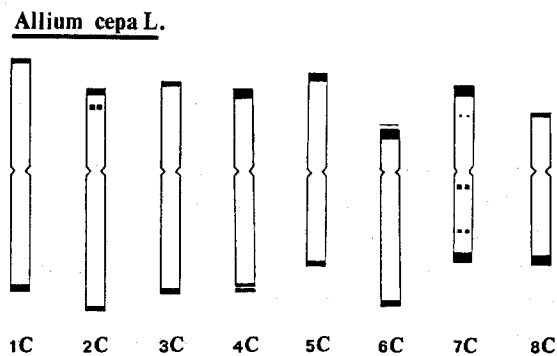


Fig. 1. Idiogram of *A. cepa*, modified from Kalkman (1984).

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