

STANDARD NOMENCLATURE FOR COMMON BEAN CHROMOSOMES AND LINKAGE GROUPS

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Several DNA-based linkage maps have been developed for common bean since 1992 (reviewed by Gepts *et al.* 2008). From these initial maps, a core common bean linkage map was developed in the BAT93 x Jalo EEP558 recombinant inbred line (RIL) population (Freyre *et al.* 1998). Subsequent studies have continued to map additional markers in this population, making the core map a reference map for the species (e.g., Blair *et al.* 2003; Papa *et al.* 2005).

The first common bean mitotic chromosome nomenclature was proposed by Moscone *et al.* (1999). Chromosomes were characterized with respect to size, morphology, heterochromatin content and distribution of rDNA genes by fluorescent *in situ* hybridization (FISH) and assigned numbers from 1 to 11, based on size from largest to smallest, using the European cultivar ‘Wax’ as a reference. But correlation to genetic linkage groups came only in 2003, when RFLP markers from the Florida map (Vallejos *et al.* 1992) were used to assign each linkage group to a chromosome pair by FISH (Pedrosa *et al.* 2003). Chromosomes were named following the nomenclature proposed by Moscone *et al.* (1999).

Due to the large variation in number and size of the 45S rDNA loci, however, chromosome size is highly variable within *Phaseolus vulgaris* (Pedrosa-Harand *et al.* 2006). Chromosome number, therefore, does not reflect chromosome size. The largest chromosome of Wax, named chromosome 1 by Moscone *et al.* (1999), for example, is the smallest chromosome in BAT93 and in many other accessions. The commonly used cytological criterion for naming chromosomes, namely size, is therefore not applicable for common bean as a whole.

Because the numbering of linkage groups according to Freyre *et al.* (1998), B1 to B11, has been widely used by the bean community, it was agreed during the Phaseomics III meeting in 2004 that chromosomes should be reassigned numbers based on the linkage group nomenclature. This new chromosome numbering scheme was applied in a recent publication (Pedrosa-Harand *et al.* 2006). We therefore present a modified version of Figure 4 from Pedrosa *et al.* (2003), in which chromosomes are re-named according to Freyre *et al.* (1998). Because chromosomes are always represented with the short arm on top and the long arm on the bottom, linkage groups B1, B2, B3, B4, B6, B9 and B10 were rotated top to bottom. Linkage groups B5, B7, B8 and B11 were kept in their original orientation (Figure 1). A new version of the core map, with the new orientation for some linkage groups, is now available on the BIC website (<http://www.css.msu.edu/bic/PDF/Bean%20Core%20map%202007.pdf>). The correspondence between the actual and previous chromosome nomenclature, as well as with linkage groups in the core and Florida maps is presented in Table 1. Henceforth, the chromosome/linkage group numbers will consist of arabic numerals only (dropping the B prefix). When the situation warrants it (e.g., comparative linkage mapping), a prefix Pv can be added (e.g., Pv1) to facilitate comparisons of linkage groups across species.

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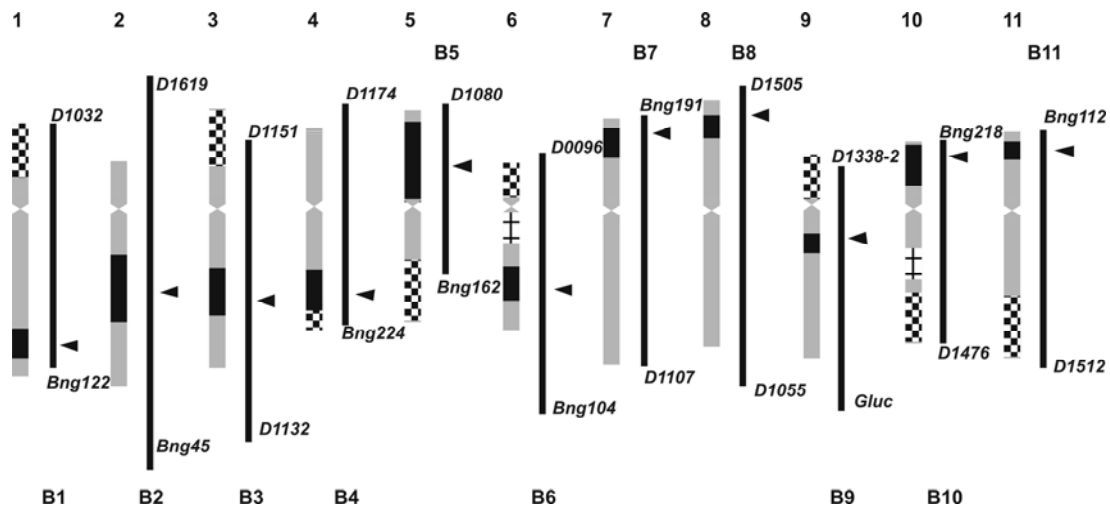


Fig. 1. Idiogram of *Phaseolus vulgaris* Calima chromosomes (modified from Pedrosa *et al.* 2003 and A. Pedrosa, unpubl. results) numbered according to the corresponding linkage groups of the core map (Freyre *et al.* 1998). Linkage group names are written on the bottom when linkage groups have been rotated to reorient them according to chromosome arm length. Position of RFLP clones used for the correlation of linkage groups (■), 45S rDNA (▣) and 5S rDNA (⊠) and chromosomes are indicated. Approximate location on the core map of Bng clone pools used in *in situ* hybridization by Pedrosa *et al.* (2003) is indicated by arrowheads. Labels at the extremities of linkage groups represent distal RFLP markers according to Freyre *et al.* (1998).

Table 1. Correspondence between the new common bean chromosome nomenclature and previous linkage group and chromosome designations

New chromosome/linkage group nomenclature	New										
	1	2	3	4	5	6	7	8	9	10	11
Freyre <i>et al.</i> 1998	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11
Pedrosa <i>et al.</i> 2003	2	9	5	10	7	1	4	3	11	8	6
Vallejos <i>et al.</i> 1992	H	D	C	B	E	G	A	F	K	I	J

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