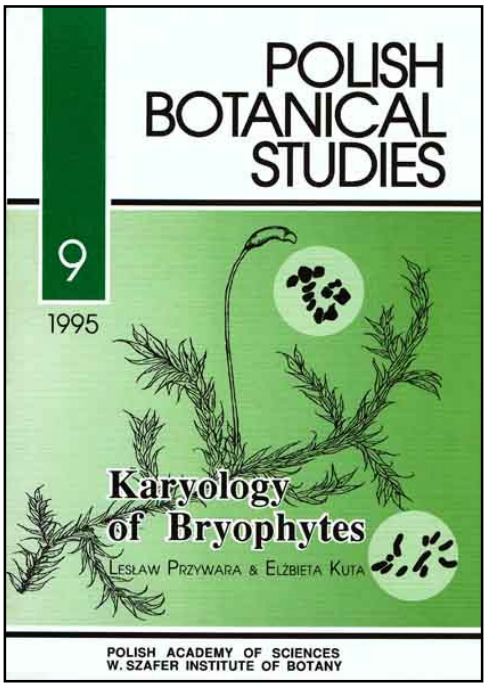

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KARYOLOGY OF BRYOPHYTES

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Abstract: In more than a hundred years of studies on bryophytes, chromosome counts have been determined in 2,242 species from all over the world (20 species of homworts, 771 hepatics and 1,451 mosses) which represent about 15% of the total number of species. Representatives of all orders have been made subjects of karyological studies, but the coverage of various orders differs significantly. There are still no chromosomal data for 14 families and 194 genera of hepatics and for 20 families and 442 genera of mosses.

The bryophyte flora of the northern hemisphere is much better covered than that of the southern hemisphere. Most of the chromosomal data come from Asia (Japan, India), Europe (Great Britain, Poland, Germany, Ukraine, Russia) and North America (USA, Canada).

The range of chromosome counts is from n = 4 to n=10 in Anthocerotae (n = 5 is most common among the species); in Hepaticae n = (3)4 to n = 48 (most species have n = 8 and n = 9); and in Musci n = 4 to n = 72(96) (most common are species with chromosome numbers n = 11 and n = 10).

On the basis of karyological data in the groups studied, the following chromosome numbers have been suggested as primary basic numbers: x = 5 in Anthocerotae, x = 9 in Hepaticae and x = 7 in Musci. The often occurring gametophytic chromosome number n = 8 in hepatics is probably of secondary origin, as are the low gametophytic chromosome numbers n = 4,5 and 6 found in mosses, which are secondary numbers appearing by way of descending aneuploidy.

On the basis of the primary basic numbers the issue of polyploidy is discussed. In contrast to most previous studies, the level of ploidy was related to the sporophyte and not to the gametophyte. The following are considered as polyploid numbers: n>10 in Anthocerotae and Hepaticae and n>9 in Musci. The calculated percentage of polyploid species is 0% in Anthocerotae, 8% in Hepaticae (in which an additional 6% of the species have both diploid and polyploid cytotypes), 76% in Musci (in which an additional 8% of species have both diploid and polyploid cytotypes).

The phenomenon of intraspecific karyological variability found in Anthocerotae, Hepaticae and Musci is discussed. Behind this intraspecific variability are such processes as aneuploidy (aneusomy, dysploidy, the presence of m-chromosomes, accessory chromosomes and sex chromosomes) and polyploidy (mainly autopolyploidy rarely allopolyploidy). The percentage of karyologically variable species has been calculated within groups. The issue of intraspecific variability is

also analyzed in the light of phytogeographical data. Widely distributed species and species from islands were taken into account; karyological data of species from lowlands is compared with those in mountains. The highest level of intraspecific variability occurs in the northern hemisphere and among European lowland populations, while the least diversified are populations from mountain regions and oceanic islands. Aneuploidy is of frequent occurrence in mosses and relatively rare in Anthocerotae and Hepaticae. The causes of the emergence of aneuploid cytotypes appearing at different levels of ploidy are discussed.

Cytogeography receives much attention in this study. An attempt has been made to determine the correlation between the frequency of polyploids and latitude, elevation above sea level and geographical isolation. In mosses it is difficult to find any correlation between the frequency of polyploids or polyploid cytotypes and climatic zones while the cytological data concerning hepatics indicates a certain correlation between polyploid cytotypes and climatic zones. It was found that the moss flora of oceanic islands is characterized by relatively low frequency of polyploid cytotypes. In mountain regions the proportion of polyploid species is generally very high. The frequency of polyploids in bryophytes is compared with that in all groups of vascular plants.

Key words: Bryophytes, karyology, aneuploidy, polyploidy, m-chromosomes, accessory chromosomes, sex chromosomes, sporophyte, cytogeography

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