Nuclear DNA and Heterochromatin Contents in the *Scilla hohenackeri* Group, *S. persica*, and *Puschkinia scilloides* (Liliaceae)*

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**Key Words:** Liliaceae, Scilleae; *Scilla bisotunensis, S. jurseorum, S. hohenackeri, S. greilhuberi, S. gorganica, S. puschkinioioides, S. vvedenskyi; S. persica; Puschkinia scilloides.*---DNA content, heterochromatin, C-banding patterns; karyotype evolution.

**Abstract:** DNA contents (presented as 1C-values) have been determined cytophotometrically in 7 species of the *Scilla hohenackeri* group (10.18 to 22.71 pg), and in the systematically more isolated taxa *S. persica* (21.02 pg) and *Puschkinia scilloides* (6.80 pg). The heterochromatin amount is not correlated with the nuclear DNA content. Euchromatin, therefore, is not a particularly "conservative" part of the genome. However, high C-values and large but few terminal heterochromatin bands, and lower C-values and numerous but smaller heterochromatin bands are found to be linked in the *S. hohenackeri* group. Obviously, numerous chromosomal changes have accompanied speciation in this group. DNA contents, and C-banded karyotypes are consistent with systematic affinities based on morphological similarities.

Recent investigations have established anew that in higher plants nuclear DNA contents (C-values) are of considerable infraspecific stability, provided that no differences in the level of polyploidy or major chromosome mutations are involved. Reports on major infraspecific variation in DNA contents up to the 2.2-fold, which has been claimed especially for N-American conifers (MIKSCHE 1967, 1968, 1971, DHIR & MIKSCHE 1974, EL LAKANY & SZIKLAI 1970, etc.), are now understood as being due rather to methodical shortcomings than to genuine differences (TEOH & REES 1976, BENNETT & SMITH 1976). However, it is evident that inconspicuous true DNA differences, e.g. due to dele-
tions of small dispensable chromosome segments, or duplications, must be of regular occurrence even within populations.

A similar infraspecific stability can be claimed for C-banding patterns, however on the basis of less ample evidence. While it is well known that banding patterns can show distinct differences in detail, it is also known that a typical basic banding pattern is discernible for each species (e.g. Vosa 1973, Bentzer & Landström 1975, Marks 1976, Greilhuber & Speta 1977). Whenever extraordinary differences in banding patterns occur within a presumed species, it is rather the taxonomical basis which will have to be reexamined. This conclusion may be illustrated by a recent C-banding investigation in Scilla bifolia s. l., where the doubtfully accepted taxonomic separation of S. vindobonensis Speta from the habitually very similar S. bifolia L. (Speta 1974) was strikingly confirmed (Greilhuber & Speta 1977, but compare McNeill 1977). At the same time it could be shown that the well differentiated Giemsa banding pattern of S. vindobonensis is largely constant over a 500 km range of the area from east to west.

Both karyological traits, DNA content as well as heterochromatin amount, have gained considerable interest in evolutionary cytogenetics (Rees & Jones 1972, Nagl 1974a, b, Nagl & Ehrendorfer 1974, Narajan & Rees 1976, Price 1976). An important and often somewhat neglected prerequisite for the interpretation of such DNA and heterochromatin data is a thorough morphological and systematical understanding of the group involved. On the other hand, our knowledge of the natural relationships can be greatly improved through the often high resolution of modern cytological and biochemical methods. Under these aspects an investigation of the genomes in Scilla L. and related taxa has been initiated. The present study directly continues an investigation on C-band karyotypes in 3 systematic groups, viz. the S. hohenackeri group, S. persica, and Puschkinia scilloides (Greilhuber & Speta 1976). In this paper the C-values of the respective species are presented, and a quantitative comparison of the chromosome complements and their components is performed.

Materials and Methods

The species, provenances, data of collection and documentation are listed in Greilhuber & Speta (1976). See also Table 1. Additionally to Puschkinia scilloides collected 1974 in Seyah Chaman, Iran, by F. Speta, also a commercial cultivar has been investigated (origin: Tubergen Ltd., Haarlem, The Netherlands, 1976).

Giemsa Karyotypes and Diagrams. Since the absolute chromosome length as measured from cytological preparations are not very meaningful for a quantitative comparison of karyotypes, the C-band karyograms presented in Greilhuber & Speta (1976) have been brought to length