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PRO EXPERIMENTIS

Supercontraction of conifer chromosomes under the action of alkylating nitrosocompounds

T. Terasmaa

Estonian Institute of Forest Research, Tartu 202400 (USSR), 10 January 1978.

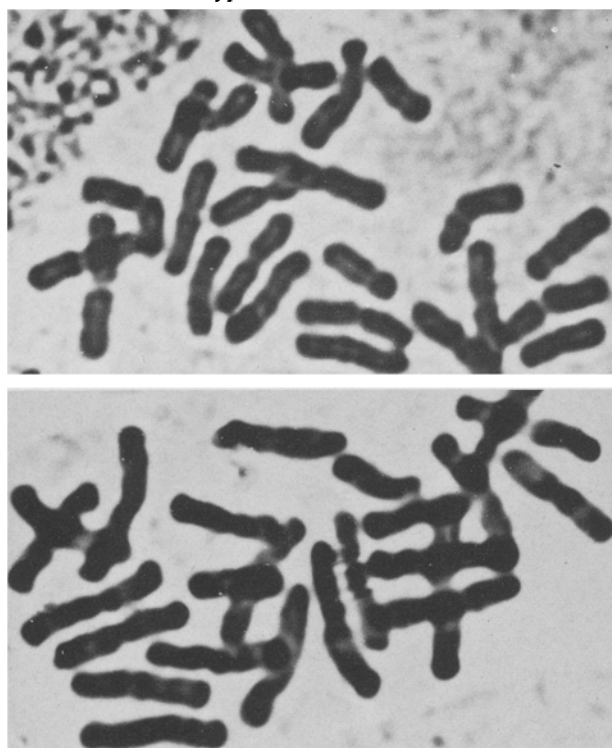
Summary. After treatment of seeds of the Norway spruce and of the Scotch pine with alkylating nitrosocompounds, an extremely strong contraction effect on mitotic metaphase chromosomes was observed in the first cell-cycles of the post-treatment period.

The cytogenetic action of chemical mutagens on conifer species has not been sufficiently investigated. However, it is known that the cytogenetic effect of some alkylating nitrosocompounds on the meristematic cells of the Norway spruce, *Picea abies* (L.) Karst.¹, is similar to their effect on the cells of other higher plants as well as on mammalian cells²⁻⁴. The main types of chromosome aberrations in-

duced in conifer cells under the action of nitrosocompounds are chromosome fragments of various sizes, lagging chromosomes and bridges (of chromatid and of chromosome type).

When studying the cytogenetic effect of N-methyl-N-nitrosourea and N-methyl-N-nitrosobiuret on the meristematic cells of the Scotch pine (*Pinus sylvestris* L.) and of the Norway spruce, we observed, besides the above-mentioned disturbances, an extremely strong contraction effect on mitotic chromosomes in dividing cells. After treating seeds with small doses (0.001-0.01% aqueous solution at an exposure of 18 h) of these chemicals, the chromosomes in some of the metaphase plates had a typical c-mitotic configuration (figure).

It is known that mitotic chromosomes (in most conifers $2n=24$) are quite long in Gymnosperms. In *Picea* and *Pinus* species the length of the longest chromosomes on mitotic metaphase plates is approximately $20\text{ }\mu\text{m}$ ⁵. It is therefore almost impossible to sort out the mitotic chromosomes on metaphase plates. But under the described experimental conditions, the contraction of chromosomes is such that individualization becomes easy. Contraction was even stronger than in the case of a prolonged colchicine pretreatment (figure). The supercontraction phenomenon of chromosomes is probably connected with a prolongation of cell-cycle phases brought about by the chemicals. At the same time we note a total decline of mitotic activity in the posttreatment period. Supercontraction may thus be a consequence of some general inhibition, rather than of a direct influence on the chromosomes. This response takes place only in the very first cell-cycles after treatment. Later mitoses proceed again normally. Since nuclear division is not synchronous in the embryo, it is possible to observe normal metaphase plates together with metaphase plates having supercontracted chromosomes.



Above: a metaphase chromosome complement of *Picea abies* after N-methyl-N-nitrosourea treatment. $\times 1900$.

Below: a metaphase chromosome complement of *Picea abies* after 30-h pretreatment with 0.1% colchicine (same magnification, aceto-orcein squash preparations).

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