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Homologous Association in Somatic Cells of *Ornithogalum virens*

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Association of homologous chromosomes in somatic cells of *Ornithogalum virens* has been reported by Chauhan (1973). Similar results were published by Brown and Stack (1968) in *Haplopappus gracilis* and in *Rhoeo discolor*. These reports have prompted to an analysis of this phenomenon and the present note deals with the preliminary results of such an analysis.

Materials and methods

Since the behaviour of chromosomes can be influenced by many external factors especially the conditions in the soil it became necessary to grow plants under conditions that give minimum error. Fertilizers, decaying organic matter, cow-dung etc. are known to influence chromosome behaviour (Thomas 1960). Hence in the present study bulbs of *Ornithogalum virens* were grown in the following media: saw dust—previously washed and dried, sand—washed and dried, sand—cow dung mixture (1 : 1) and ordinary garden soil. Root tips were collected from various samples, fixed in acetic-alcohol mixture (1 : 3) and stained with Feulgen reagent and analysed for homologous association. The chromosomes were very much random in their arrangement and a cell was scored for homologous association if there is a detectably close association between homologues during late prophase and metaphase.

Results and discussion

The observations have shown that the arrangements of chromosomes are at random in the cell. But with respect to homologous association there was distinguishable difference between root tips collected from different media. While the root tips collected from washed saw dust and sand showed no case of homologous association, a certain number of such associations were recorded in root tips collected from sand-cow dung mixture and garden soil (Table 1).

The data indicates that the rate of homologous association as observed in the present study is very low, 3.8% and 3.6% respectively in the two treatments and zero and 0.18% in the other two treatments. The interesting thing was that such association was not recorded in the case of root tips grown in washed sand. In saw dust only a single cell was noticed having close association between chromosomes. No pseudochiasmata and chromosome number changes were observed in the present study.

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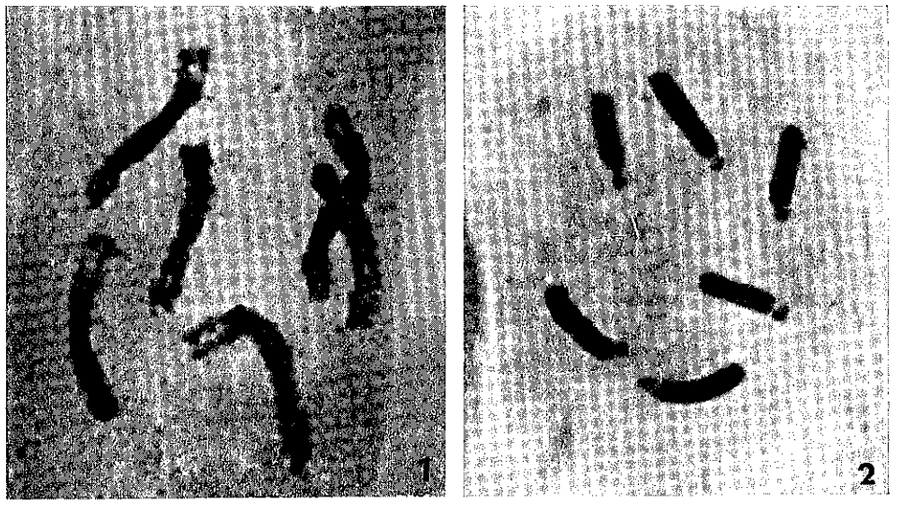
Statistical analysis of the data revealed that the association observed in two of the treatments were not significant. Even in the case of such associations it was observed that only a part of the chromosomes were associated closely. It



Figs. 1–4. 1, late prophase chromosomes of *Ornithogalum virens*. 2, metaphse chromosomes showing sub-terminal centromeres. 3, metaphse with divided chromosomes (C-mitosis) from plant grown in cow dung—sand mixture. 4, a cell showing tetraploid chromosome number, from a plant grown in cow dung—sand mixture. All figures ×1250.

was also noticed that this type of 'stickiness' of chromosome parts was not always restricted to homologous chromosomes but in one or two cases even non homologous chromosomes too were found be involved in this.

The present study does not support the earlier observation of Chauhan (1973).

The association was probably the after-effect of some soil factors, such as increase or decrease in soil pH, presence of certain organic compounds or metal ions etc.

Table 1. Homologous association in *Ornithogalum virens*

Treatment no.	Growing medium	No. of cells analysed	Late prophase	Metaphase	% of associations
1.	Washed saw dust	560	1	0	0.18
2.	Washed sand	495	0	0	0
3.	Sand: cowdung	520	17	3	3.8
4.	Garden soil	420	14	2	3.7

rather than due to any inherent ability of the plant. It has been reported that presence of organic matter induces abnormalities in chromosome behaviour including somatic reduction (Thomas 1960, Abraham and Smith 1966). Similarly the variations in pH was found to influence the chromosome behaviour very much, probably by causing ionic changes in the nucleoproteins, which may some times lead to a week attractive force resulting in a closer association of some of the chromosomes. Presence of some metal ions were reported to give similar results (Ravindran 1971). Under natural growth conditions similar association may be taking place because the roots are directly in contact with the conditions in the soil. The absence of any somatic associations in root tips collected from washed saw dust and sand indicates that this phenomenon is an enviornmental effect.

Hence it is highly doubtful whether homologous somatic association is a mechanism employed by plants to enhance variability. It seems that the so-called somatic association and somatic segregation etc. are not in any way related to organism's inherent genetic capacity but results from the impact of various outside factors. How far such variations are useful especially in vegetatively propagated plants such as *Ornithogalum virens* is doubtfull. Such variations could be meaningless unless they lead to mutated sectors from which bulbs or bulbils could eventually arise.

Ornithogalum virens has got interesting meiotic behaviour and how far the so-called somatic association is influential in producing such variations in meiosis is also doubtful.

From the present study it seems that somatic association is not a natural phenomenon in *Ornithogalum virens,* but is induced under some growth conditions.

Summary

An analysis of the presence of homologous association in *Ornithogalum virens* indicates that the homologous association reported by earlier workers may be due to the influence of some environmental factors rather than due to any inherent ability of the plant.

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