6 Summary

In *Arabidopsis thaliana* three nucleus-encoded phagetype RNA polymerases (RpoT;1, RpoT;2 and RpoT;3) were cloned. They show a conserved gene structure and have up to 55% aminoacid homology. By means of *in organello*-import approaches and by using GFP-fusion-proteins, the localization of these three enzymes in different organelles was possible. Therefore RpoT;1 is only needed in mitochondria, RpoT;3 is targeted to plastids. In contrast to this, RNA polymerase 2 (RpoT;2) is imported in both plastids and mitochondria.

Transcript reduction of each distinct RNA polymerase by means of *antisense*-approaches led to reduction of the expression. Transgenic *antisense*-plants displayed in part severe phenotype changes, e.g. root- and shoot-reduction, leave- and shoot-deformation including bleached and anthocyan-discoulored leaves. Thus genomic 5'-parts of the RNA polymerase sequences caused much stronger effects than 3'-ends. However, usage of cDNA constructs led to an overexpression of all three RNA polymerases. Comparison of knock-out-lines for each RNA polymerase revealed that replacing RpoT;1 by one of the other two RNA polymerases (RpoT;2 or RpoT;3) seems to be impossible. Loss of RpoT;1 causes lethal effects to the embryo in early plant developmental stages. Knock-out-lines for RpoT;3 showed an at least partial replacement by RNA polymerase 2 (RpoT;2).

Examinations of RpoT;2-*antisense* plants, which showed trancript reduction for RNA polymerase 2, revealed an effect on RNA editing of specific sites (*rpoB*). All these facts seem to suggest that each of the three RNA polymerases is capable of exercising a specific function at certain stages of plant development. Therefore the possibility of a replacement by another RpoT is possible only to a limited degree.