PATERNAL INHERITANCE OF ORGANELLE DNA IN CONIFERS

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We have been investigating the modes of inheritance of chloroplast DNA (cpDNA) and mitochondrial DNA (mtDNA) in conifers using RFLP markers in controlled crosses. Four species were chosen: Pinus taeda (Pinaceae), Psuedotsuga menziesii (Pinaceae), Sequoia sempervirens (Taxodiaceae) and Calocedrus decurrens (Cupressaceae). Controlled crosses of the four conifers tested showed strict paternal inheritance of cpDNA. MtDNA is maternally inherited in Pinus taeda, just as it is in angiosperms. In Sequoia sempervirens and Calocedrus decurrens, however, mtDNA is paternally inherited.

The inheritance of organelle DNA is clearly very different in conifers than in angiosperms. Ultrastructural observations of conifer fertilization show transmission of paternal plastids and mitochondria and exclusion of maternal organelles. We can not explain why paternal inheritance of organelle DNA has evolved in this group of plants. Paternal inheritance of cpDNA is common to all conifers studied, whereas only the closely related Taxodiaceae and Cupressaceae show paternal inheritance of mtDNA. Data from other families is needed to trace the evolution of mtDNA inheritance in conifers.