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DNA Strand-Transfer Activity in Pea (*Pisum sativum* L.) Chloroplasts

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Abstract

The occurrence of DNA recombination in plastids of higher plants is well documented. However, little is known at the enzymic level. To begin dissecting the biochemical mechanism(s) involved we focused on a key step: strand transfer between homologous parental DNAs. We detected a RecA-like strand transfer activity in stromal extracts from pea (*Pisum sativum* L.) chloroplasts. Formation of joint molecules requires Mg^{2+}, ATP, and homologous substrates. This activity is inhibited by excess single-stranded DNA (ssDNA), suggesting a necessary stoichiometric relation between enzyme and ssDNA. In a novel assay with Triton X-100-permeabilized chloroplasts, we also detected strand invasion of the endogenous chloroplast DNA by ^{32}P-labeled ssDNA complementary to the 16S rRNA gene. Joint molecules, analyzed by electron microscopy, contained the expected displacement loops.

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