

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

---

Faculty Publications from the Center for Plant  
Science Innovation

Plant Science Innovation, Center for

---

May 1993

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

Heriberto D. Cerutti

University of Nebraska - Lincoln, hcerutti1@unl.edu

A. T. Jagendorf

Cornell University

Follow this and additional works at: <https://digitalcommons.unl.edu/plantscifacpub>



Part of the [Plant Sciences Commons](#)

---

Cerutti, Heriberto D. and Jagendorf, A. T., "DNA Strand-Transfer Activity in Pea (*Pisum sativum* L.) Chloroplasts" (1993). *Faculty Publications from the Center for Plant Science Innovation*. 23.  
<https://digitalcommons.unl.edu/plantscifacpub/23>

This Article is brought to you for free and open access by the Plant Science Innovation, Center for at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Faculty Publications from the Center for Plant Science Innovation by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

*Plant Physiology*, Vol 102, Issue 1 (May 1993), pp. 145-153,

Copyright © 1993 by American Society of Plant Biologists

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

H. Cerutti and A. T. Jagendorf

Section of Plant Biology, Cornell University, Ithaca, New York 14853

### 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.

Partial support was provided by Hatch grant 0155928 and by grant 91-37301-6421 from the U.S. Department of Agriculture/National Research Initiative Competitive Grants Program. H.C. was supported by a predoctoral fellowship from the Cornell National Science Foundation Plant Science Center, a unit in the U.S. Department of Agriculture-Department of Energy-National Science Foundation Plant Science Centers Program and a unit of the Cornell Biotechnology Program, which is sponsored by the New York State Science and Technology Foundation, a consortium of industries, and the U.S. Army Research Office.

The American Society of Plant Biologists does not allow its publications to be archived in an institutional repository. It does, however, provide a free link to full-text content on its own site. Please use the link below to access this article:

LINK = <http://www.plantphysiol.org/cgi/reprint/102/1/145>