

June 1997

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Heriberto D. Cerutti

University of Nebraska - Lincoln, hcerutti1@unl.edu

Anita M. Johnson

Duke University

Nicholas W. Gillham

Duke University

John E. Boynton

Duke University

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Cerutti, Heriberto D.; Johnson, Anita M.; Gillham, Nicholas W.; and Boynton, John E., "Epigenetic Silencing of a Foreign Gene in Nuclear Transformants of *Chlamydomonas*" (1997). *Faculty Publications from the Center for Plant Science Innovation*. 25.
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Epigenetic Silencing of a Foreign Gene in Nuclear Transformants of *Chlamydomonas*

Heriberto Cerutti, Anita M. Johnson, Nicholas W. Gillham, and John E. Boynton

Developmental, Cell, and Molecular Biology Group, Departments of Botany and Zoology, Duke University, Durham, North Carolina 27708-1000

Abstract

The unstable expression of introduced genes poses a serious problem for the application of transgenic technology in plants. In transformants of the unicellular green alga *Chlamydomonas reinhardtii*, expression of a eubacterial *aadA* gene, conferring spectinomycin resistance, is transcriptionally suppressed by a reversible epigenetic mechanism(s). Variations in the size and frequency of colonies surviving on different concentrations of spectinomycin as well as the levels of transcriptional activity of the introduced transgene(s) suggest the existence of intermediate expression states in genetically identical cells. Gene silencing does not correlate with methylation of the integrated DNA and does not involve large alterations in its chromatin structure, as revealed by digestion with restriction endonucleases and DNase I. Transgene repression is enhanced by lower temperatures, similar to position effect variegation in *Drosophila*. By analogy to epigenetic phenomena in several eukaryotes, our results suggest a possible role for (hetero)chromatic chromosomal domains in transcriptional inactivation.

This work was supported by National Institutes of Health Grant No. GM-19427 (to J.E.B. and N.W.G.) and a postdoctoral fellowship (project 61-906) from the Jane Coffin Childs Memorial Fund for Medical Research (to H.C.).

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