

Sequences of *trnR*-ACG and *petD* that contain a tRNA-like element within the chloroplast genome of *Chlamydomonas reinhardtii*

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As part of a study aimed at understanding mechanisms of chloroplast genetic suppression, the chloroplast *trnR*-ACG gene that encodes tRNA^{Arg} has been cloned and sequenced from the green alga *Chlamydomonas reinhardtii*. This gene was localized within a 1056-bp HindIII-HindIII subfragment of chloroplast EcoRI fragment 1 (1) by using a synthetic-oligonucleotide probe identical to the anticodon region of tobacco *trnR*-ACG (2). A secondary structure for the *trnR* DNA sequence is shown in the figure. With respect to the *trnR*-ACG chloroplast gene of *C. reinhardtii*, there is sequence identity of 85% with tobacco (2), 86% with *Euglena gracilis* (3), and 88% with *Chlorella ellipsoidea* (4). When the HindIII subfragment was sequenced in its entirety, the *petD* gene, which encodes subunit 4 of the cytochrome b/f complex (5), was found between nucleotides (nt) 41 and 523. With regard to the translation product of *petD*, there is protein-sequence identity of 81% with spinach (5) and 92% with *Chlamydomonas eugametos* (6).

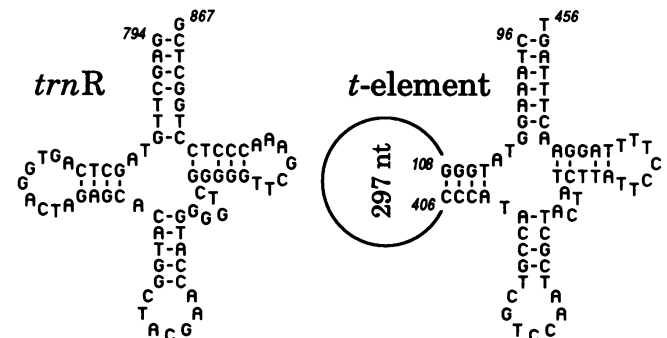
An unusual tRNA-like sequence was identified when the DNA sequence was searched for other tRNA genes. As shown in the figure, a tRNA secondary structure could be deduced, but the D arm would contain 297 nt. This structure is similar to repetitive 't-element' sequences that have been identified within spacer regions of wheat mitochondrial DNA (7). However, the chloroplast t-element is entirely within the coding region of the *petD* gene, and would be transcribed from the same strand as *petD* mRNA. These tRNA-like sequences may have a function in the regulation of gene expression (7), or they may simply be remnants of genome evolution.

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