S2 plasmid from cms-S-maize mitochondria potentially encodes a specific RNA polymerase

Evgeny V.Kuzmin, Igor V.Levchenko* and Galina N.Zaitseva

Molecular Biology Division, Biology Department, Moscow State University, Moscow 119899, USSR
Submitted February 2, 1988

Mitochondria of cms-S-maize contain linear plasmids S1 and S2 of 6.4 and 5.4 kbp (1). 4 unidentified ORFs were found in the nucleotide sequences of S1 and S2 plasmids (2,3). We reported earlier that ORF3 of S1 can code for a viral type DNA-polymerase (4). Extensive published data concerning the transcriptional rates of S-homologous sequences in different maize cytoplasms (e.g.5) and the phenomenon of free plasmid disappearance from mitochondria of certain cytoplasmic fertile revertants (e.g.6) allowed us to suppose that ORF1 of S2 might code for the S-plasmid-specific RNA-polymerase. Recently the comparison of primary structures of RNA-polymerases from T7 phage and yeast mitochondria has shown the existence of eight conservative aminoacid blocks (7). We report here, that all of these blocks are also present in the aminoacid sequence of ORF1 of S2 (fig., blocks 3-10). Yeast mitochondrial RNA-polymerase displays some dispersed homology in its amino-terminal part (7) with ORF1 protein (fig., blocks 1-2) but not with T7 RNA-polymerase (7). It can be suggested that S-plasmids are autonomous not only in their replication mode but also in mode of their transcription and can be regarded as proviruses.

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RPO41   ANDNVLEMEPTENDD(-95-)SEELSDEE-SLNEVDTNR(-45-)GEAIEMEFE(-130-)VEPEPWVNWESGGY(-137-)
ORF1S2  AED-YLLDELEEPDD(-90-)SE-L-DEEESISE-QTNR(-23-)EELIEVEEP(- 62-)LTPLSSY--R-GGY(-123-)

RPO41   LEIAEAFLGEE-LYFPHNLDFEGRAYPLSP-HFNHLGNDMSEGLLIF(-55-)WWTTADEPWQALATCFE(-22-)
ORF1S2  MEIAEAYLDYE-IYFPIFLDFEGRNYEEHGPFHF-H-EEDLVESFIIF(-43-)IYNEIED-MQSEPTFFE(-42-)

RPO41   DGTCNGLQHYAALGGDVEGATQVNLV-PSDE----VQDVY(-28-)TEEVVEQTVMTNVYG(-85-)VIWTTPLGLPIVQPYE(-27-)
ORF2S1  DASASAYQIMSYFLLDIDYGIHTNLLKETNTDGEYIEDIY(-38-)DENVVKEMFMPHMYG(-61-)VVYSTPYWVT-LQTYK(-36-)

RPO41   AEEQKAGLPPNFIHSLDA-SH(-182-)COOH  N-----------C
ORF1S2  IEESSTSTFANFIHQEDAFTA(-205-)COOH  N-----------C
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Fig. legend. RPO41: presumptive aminoacid sequence of yeast mitochondrial RNA-polymerase (7); ORF1 S2: nucleotide sequence (2) was translated from the first ATG. The rightmost part of fig. represents the alignment of two sequences.

*To whom requests for reprints should be sent

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