

S1 plasmid from cms-S-maize mitochondria encodes a viral type DNA-polymerase

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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). Overall S-plasmid organization is reminiscent of the structure of Bacillar phages (such as ø29 and ø15) and adenoviruses whose replication is dependent on virus-encoded DNA-polymerase and terminal protein. Comparison of primary structures of some viral DNA-polymerases has revealed the existence of two conserved aminoacid blocks (block I,II; fig.), one of which is also present in some viral RNA-replicases (4,5). We have also noticed third aminoacid block (block I) of homology between ø29 and herpesvirus DNA-polymerases. It can be seen from figure that all three above mentioned homologous blocks are present in the aminoacid sequence of ORF3 of S1. In total, sequences in all three blocks of ORF3 have more homology to ø29 DNA-polymerase. It is quite possible that plasmid-specific DNA-polymerase is indeed synthesized in mitochondria of cms-S-maize. The similarity of primary structure of this protein with that of viral DNA-polymerases is in accordance with the suggestion about viral origin of S-plasmids (3).

TMV-			VYVGD TQQIPYINR	(5)
			*** ** *	
BMV-			LAFGDTEGISFKSR	(5)
	I	II	III + *** + + *	
CMV-			VIVGD TSVFVFRFR	(5)
			*****+* *	
HSV-VVVFDFASLYPSIIQAHNLCFS-	68aa	-LDKQQAAT-KVVCNSVY6-FT-	45aa-PEAADHRAP6PYSHR IYGD TDSIFVLCRGLTAAGL	(6)
*** *****	*	**** ** * ** ** *	*** * *****+* ** +	
EBV-VLVVDFASLYPSIIQAHNLCYS-	71aa	-LDKQQLAI-KCTCNAVY6-FT-	45aa-PDAMAPLNP-EGQLRV IYGD TDSLFI ECRGFSESET	(6)
+ * * * *	*	* * * **** *	* ** + ** *****+ ** **	
Ad2-LVYD ICGMY-ASAL THPMPNG-	116aa	-KERARD-KNQTLSIAKLLSNALY6SFA-	147aa-EDRG TPLE--DRPLKSVYGD TDSL FVTERGHR LNET	(4)
* * * * * + * * *	*	* + ** **** * ** *	+ * *****+ *	
ø29-GMVFDVNSLYPAGMYSRLPY6-	95aa	-KWTYIKTTSEGH I KQAKLMLNSLY6KFA-	43aa-RYTTITAA-QACFR IYCD TDSIHLTGTEIPDVIK	(4,5)
***** * ** *	*	* * * + ** *****+*	* * * **** + ****	
RF3-LYYDVNSLYPSSMLDDM-P16-	93aa	-KRLDAKAKBEKALDF IYKITMNSLY6RFG-	70aa-YAR-IRMHPFISRDDCYITD TDSVVV-ERELPEEV	

Fig. legend. RF3: ORF3 S1, nucleotide sequence (3) was translated from the first ATG; HSV: herpes simplex virus (HSV-1); EBV: Epstein-Barr virus; CMV: cytomegalovirus; TMV: tobacco mosaic virus; BMV: brome mosaic virus. The source of protein sequence is given in parentheses.

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