

REACTION OF
TRIFLUOROMETHYLPHENYLDIMETHYLUREA
WITH DEOXYRIBONUCLEIC ACID

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The treatment of plants with trifluoromethylphenyldimethylurea (TFDM) increases the low-molecular-weight fraction of DNA [1]. The present paper gives the results of a study of the reaction between TFDM and DNA. Cotton-plant DNA was isolated by Kirby's method [2]. The thread-like precipitate was stored in 70% ethanol.

The figures in the table show that when DNA is treated with TFDM its hypochromic effect falls in comparison with the hypochromism of the starting materials.

TABLE 1. Change in the Hypochromism in Mixtures of DNA and TFDM

Time of incubation, h	DNA		TFDM		DNA † TFDM	
	E	$\frac{F_f - F_i}{E_i} \cdot 100\%$	E	$\frac{F_f - F_i}{E_i} \cdot 100\%$	E	$\frac{E_f - E_i}{E_i} \cdot 100\%$
0	0,300	0	1,040	0	1,340	0
15	0,306	2	1,043	0,5	1,350	0,5
72	0,316	5	1,131	8,8	1,417	5,8
120	0,408	36	1,253	20,5	1,433	7,0

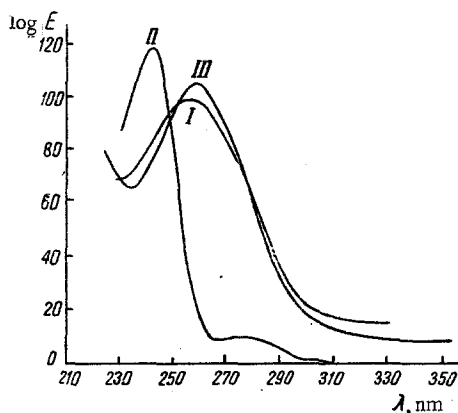


Fig. 1. UV spectra of a mixture of DNA and TFDM (I), TFDM (II), and DNA (III).

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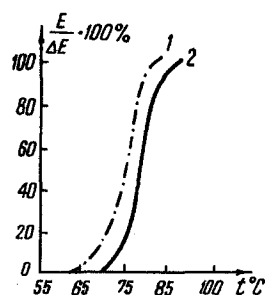


Fig. 2

Fig. 2. Influence of TFDM on the thermal denaturation of DNA under in vitro conditions (incubation at 30°C in 0.15 M NaCl and 0.015 M sodium citrate, pH 7, for 72 h): 1) experiment; 2) control.

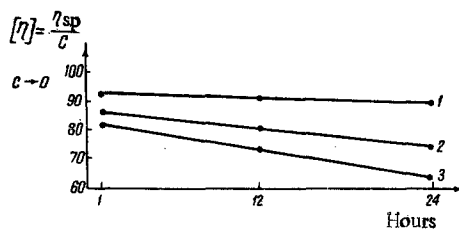


Fig. 3

Fig. 3. Influence of various doses of TFDM on the viscosity of DNA: 1) control; 2) 25 μg/ml; 3) 50 μg/ml.

The value of the hypochromism for DNA was 36%, and for TFDM 20.5%, while for the mixture of DNA and TFDM it was about 7% on incubation at 37°C for 120 h (the UV spectrum was recorded on a EPS-3S spectrophotometer, Fig. 1).

The reduction in the hypochromic effect can be explained by the formation of a complex between DNA and TFDM. Other facts indicating the correctness of this hypothesis are given below. After the elimination of TFDM from a solution of DNA, the DNA molecules begin to melt* at a lower temperature than untreated DNA (Fig. 2). Different doses of TFDM (25 and 50 μg) at 30°C decreased the viscosity of a DNA solution (after 12 h) by 10 and 18%, respectively. Twenty-four hours after the treatment of DNA with TFDM the decrease in viscosity amounted to 15 and 25 dl/g for the same doses (Fig. 3).

Thus, TFDM, like other alkylating agents, not only decreases the amounts of guanine and cytosine in DNA [3, 4] but also interacts with the macromolecular DNA, weakening its secondary structure.

LITERATURE CITED

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*The melting point of the DNA was determined in hermetically sealed quartz cells placed in a thermostated cell. The melting curves were recorded on a Unicam SP-700 spectrophotometer. The UV spectrum of the DNA solution with constant heating was taken at 260 nm, the temperature of the solutions being measured in the quartz cells by means of thermocouples.