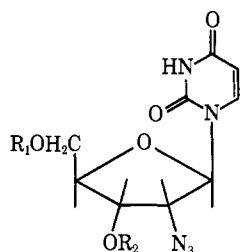


alkaline phosphatase, snake venom phosphodiesterase, and micrococcal nuclease.¹¹ As required by the absence of a 2'-OH function, poly U_z was completely resistant to degradation by pancreatic ribonuclease.¹²



- I, R₁ = R₂ = H
 II, R₁ = (C₆H₅)₃C-; R₂ = H
 III, R₁ = (C₆H₅)₃C-; R₂ = CH₃CO
 IV, R₁ = H; R₂ = CH₃CO
 V, R₁ = PO₃²⁻; R₂ = H
 VI, R₁ = P₂O₆³⁻; R₂ = H

The thermal stability of (presumably) single-stranded poly U_z is novel (Figure 1A), because with $T_m = 12^\circ$, it surpasses $T_m = 6^\circ$ for poly U under comparable conditions.¹³ The shape and midpoint of the phase transition did not depend on the solvent (1.0 M NaCl, pH 7.5, or 0.01 M MgCl₂, pH 7.4), but became less cooperative and markedly elevated ($\sim 10^\circ$) in the presence of 0.1 M MgCl₂. Poly U_z formed a 1:1 complex with poly A as evidenced by the eutectic point at 50 mol %. This complex underwent a smooth cooperative transition with $T_m = 59^\circ$ (Figure 1B), not markedly different from poly A · poly U.¹⁴ All transitions were completely reversible.

Poly U_z is the first example of a stable secondary structure in a single-stranded polynucleotide without a 2'-oxygen function.³ When the 2'-hydroxyl of poly U is replaced by chlorine, the single-stranded poly U_{C1} is destabilized,³ whereas substitution by the azido group has the opposite effect. Since both poly U_z and poly U_{C1} form equally stable double-stranded complexes with poly A, the predominant stabilizing influence must differ in the single-stranded forms.

The availability of a model as unique as poly U_z should prove helpful in further studying the nature of the forces operative in stabilization, transcription,¹⁵ and interferon stimulation¹⁶ now in progress.

After this paper was submitted for publication, the syntheses and physical properties of poly(2'-fluoro-2'-deoxyuridylic acid)¹⁷ (poly U_F) and poly(2'-amino-2'-deoxyuridylic acid)¹⁸ (poly U_A) appeared. Surprisingly, both poly U_F and poly U_A are devoid of significant secondary structure at temperatures $> 2^\circ$. The latter authors¹⁸ were also able to prepare poly U_z but did not characterize it further. Thus, while 2'-fluoro, 2'-chloro, 2'-amino, and 2'-deoxy substituents decrease

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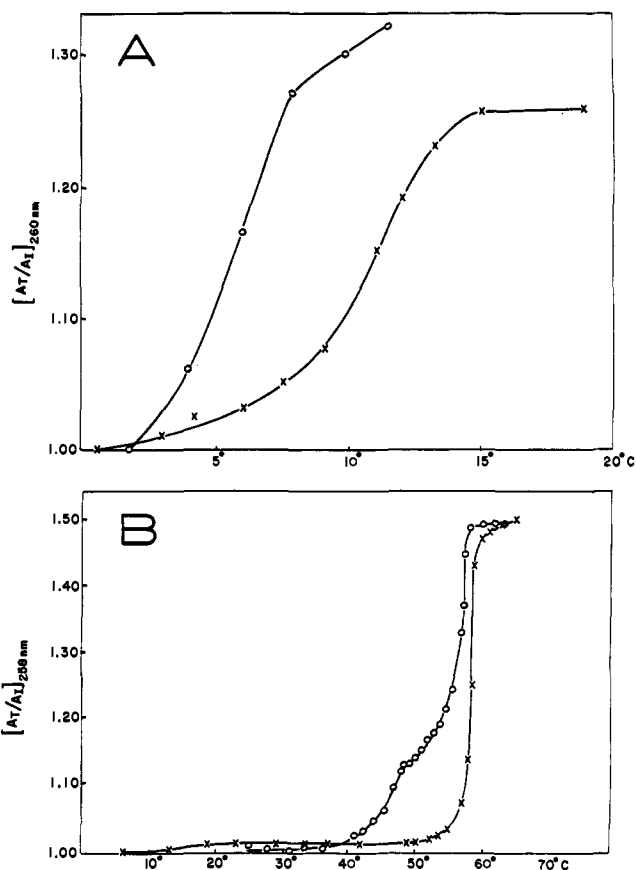


Figure 1. (A) Uv absorption-temperature profile of poly U (O) and poly U_z (X) in 0.01 M MgCl₂, pH 7.6. A_T/A_I is the ratio of absorbance at temperature T over the absorbance at the initial temperature. (B) Uv absorption-temperature profile of the complex poly A · 2 poly U (O) and poly A · poly U_z (X) in 0.1 M NaCl, 0.01 M NaH₂PO₄, pH 7.5. The inflection at 45° represents melting of the triple-stranded poly A · 2 poly U complex while the transition at 57° represents melting of the double-stranded poly A · poly U complex (also see ref 14).

the observed secondary structure of polyuridylic acid, the 2'-methoxy and 2'-azido substituents *alone* give rise to an increase in secondary structure.

(19) National Institutes of Health Staff Fellow, July 1969-present.

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Helix-Coil Transition of a Synthetic Polypeptide Monitored by Fourier Transform Carbon-13 Nuclear Magnetic Resonance

Sir:

We wish to report the preliminary results of the first¹ application of ¹³C nmr to the study of the helix-coil transition of a synthetic homopolypeptide. We

(1) (a) Dr. P. A. Temussi of the CNR laboratories in Naples, Italy, has obtained some ¹³C nmr spectra of poly(γ -benzyl-L-glutamate) with results which seem to be similar to our findings (communicated to the 6th Conference of the Italian Association of Physical Chemistry, Siena, Italy, Dec 1971). (b) NOTE ADDED IN PROOF. These results now appear in: L. Paolillo, T. Tancredi, P. A. Temussi, E. Trivellone, E. M. Bradbury, and C. Crane-Robinson, *J. Chem. Soc., Chem. Commun.*, 335 (1972).