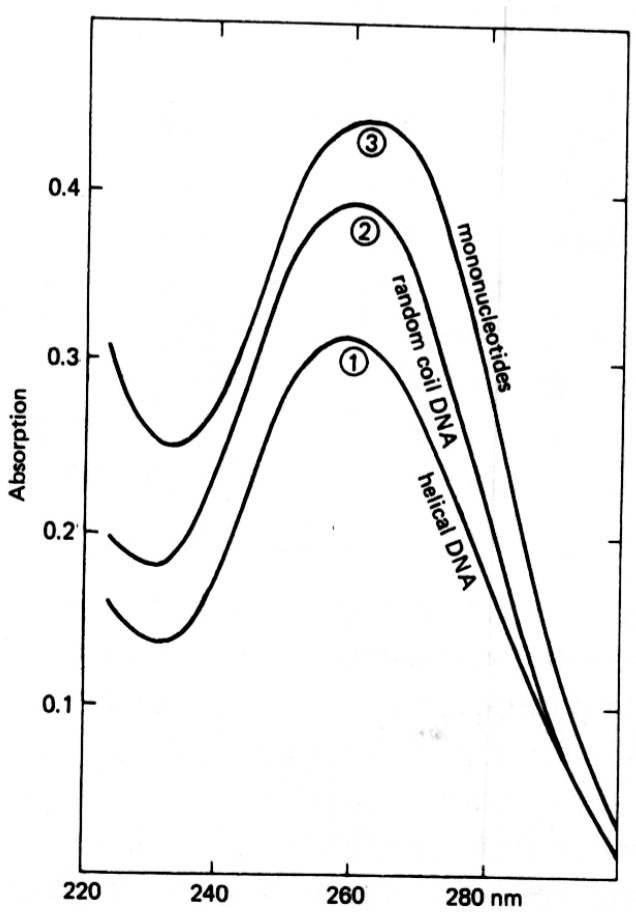
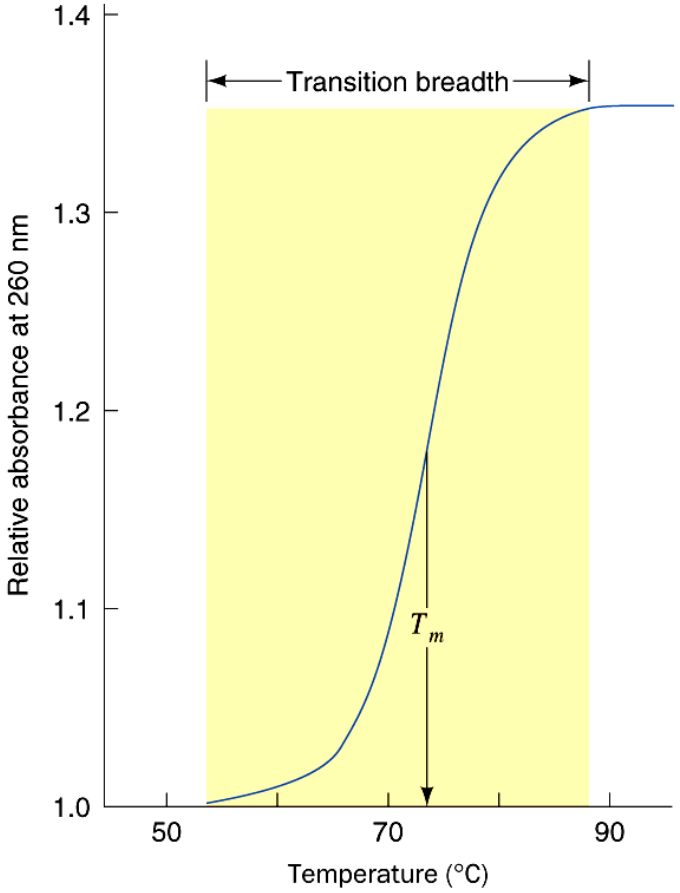




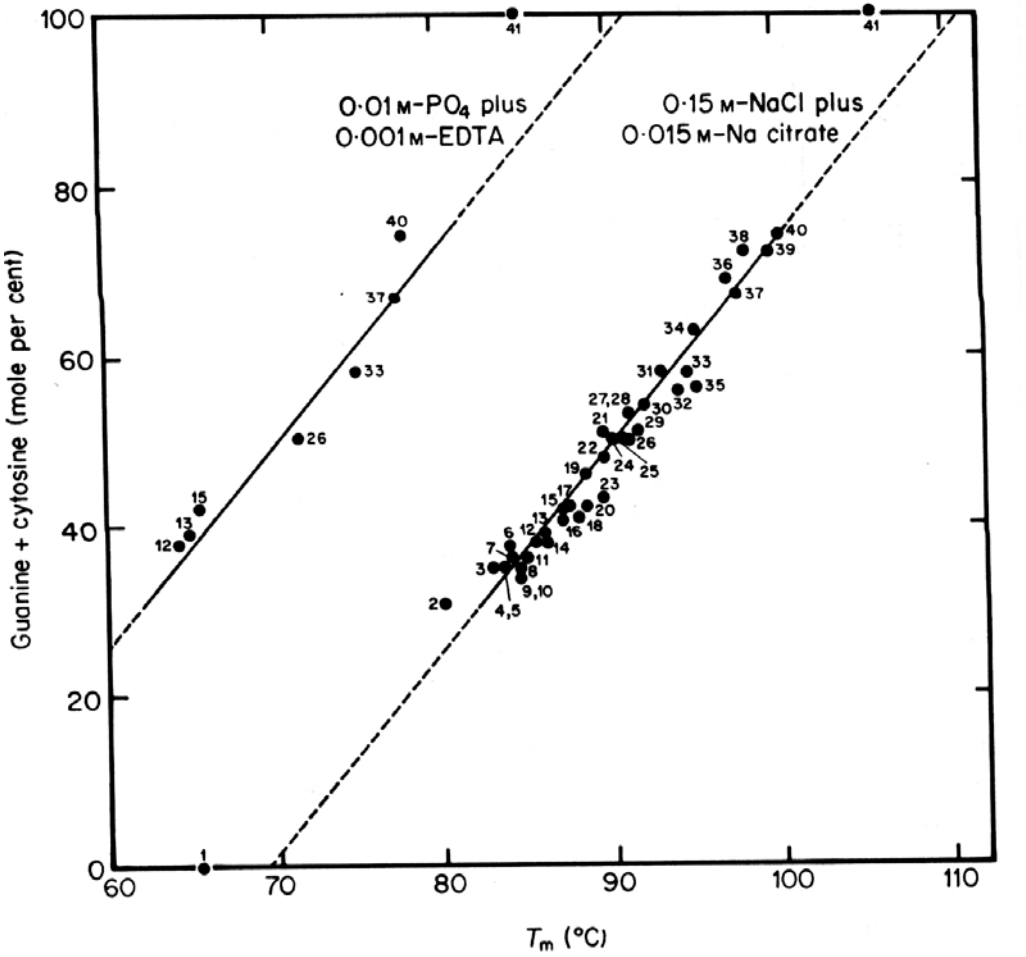
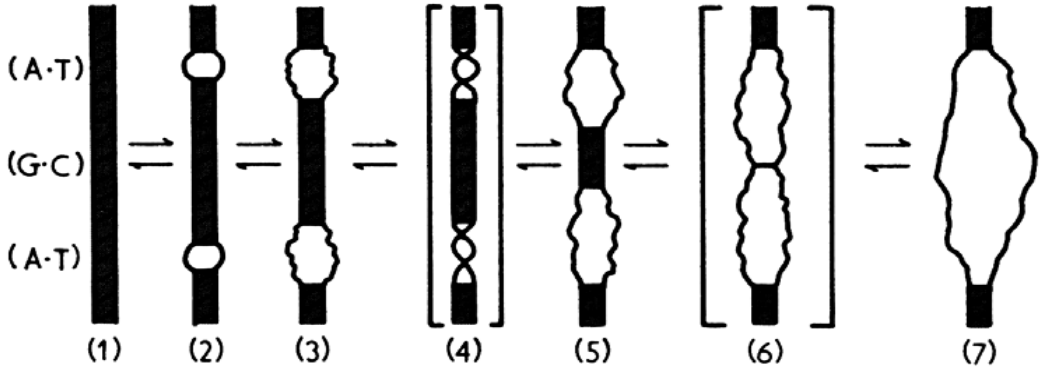
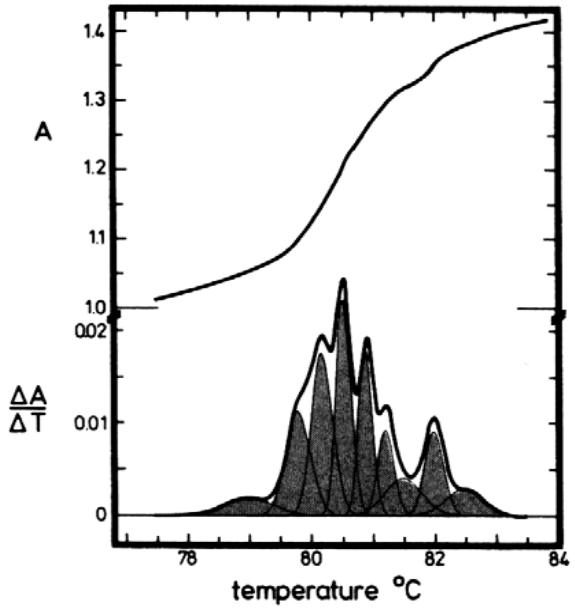


Figure 6-17. Dependence of melting temperature T_m on guanine + cytosine (G + C) content of various samples of DNA obtained from different sources. DNA was dissolved in 0.15 *M* NaCl + 0.015 *M* Na-citrate, pH 7.0. Points 1 and 41, for poly(dA-dT) and poly(dG-dC), fall off the least-squares line which is described analytically by $T_m = 69.3 + 0.41$ (%C). From (549).



Scheme describing processes involved in DNA or RNA double-helix de- and renaturation. A–T-rich regions melt first, giving rise to states (2) and (3). In (4), additional base-pairs are opened and the twist is taken up in coil regions. From (550).



Melting profile of DNA (top) and its first derivative dA/dT (bottom). The latter curve is deconvoluted into nine individual peaks characterized by temperature, amplitude, and breadth. *A* indicates UV absorption at 260 nm; dA/dT or $\Delta A/\Delta T$ are first derivatives with respect to temperature *T*. These curves are simulated; for some realistic data see Ref. (557).

Prediction of DNA Double Helix Stability from Base Sequence m (555)]

Stability Matrix for Nearest-Neighbor Stacking in Base–Paired Dinucleotides in B-DNA Geometry[a]:

	3′			
5′	A	T	G	C
T	36.73	54.50	54.71	86.44
A	54.50	57.02	58.42	97.73
C	54.71	58.42	72.55	85.97
G	86.44	97.73	85.97	136.12

[a] Numbers give T_m values in °C at 19.5 m*M* Na^+.

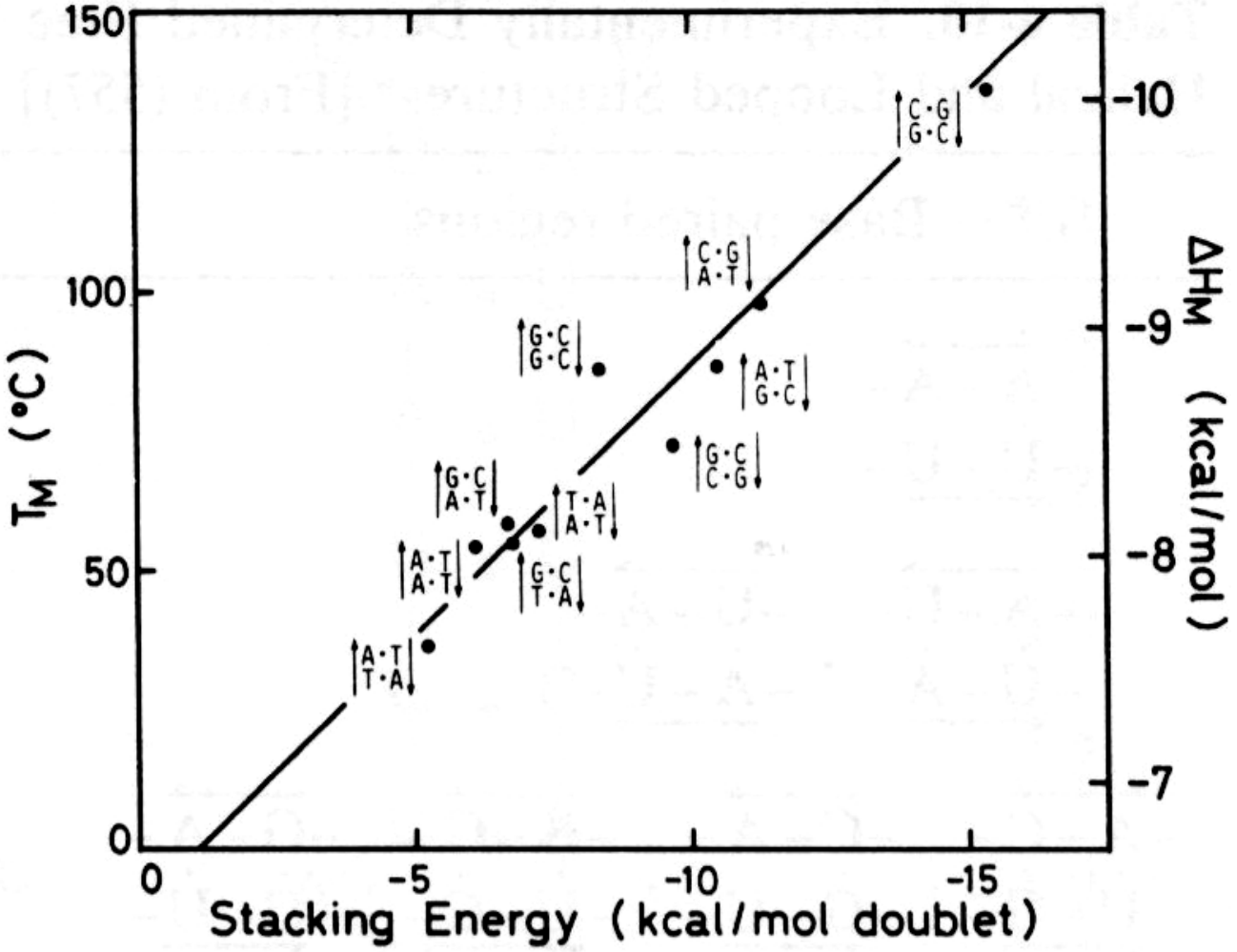
T_m Values Predicted with This Matrix for a Collection of Synthetic DNA Polymers with Defined Sequence:

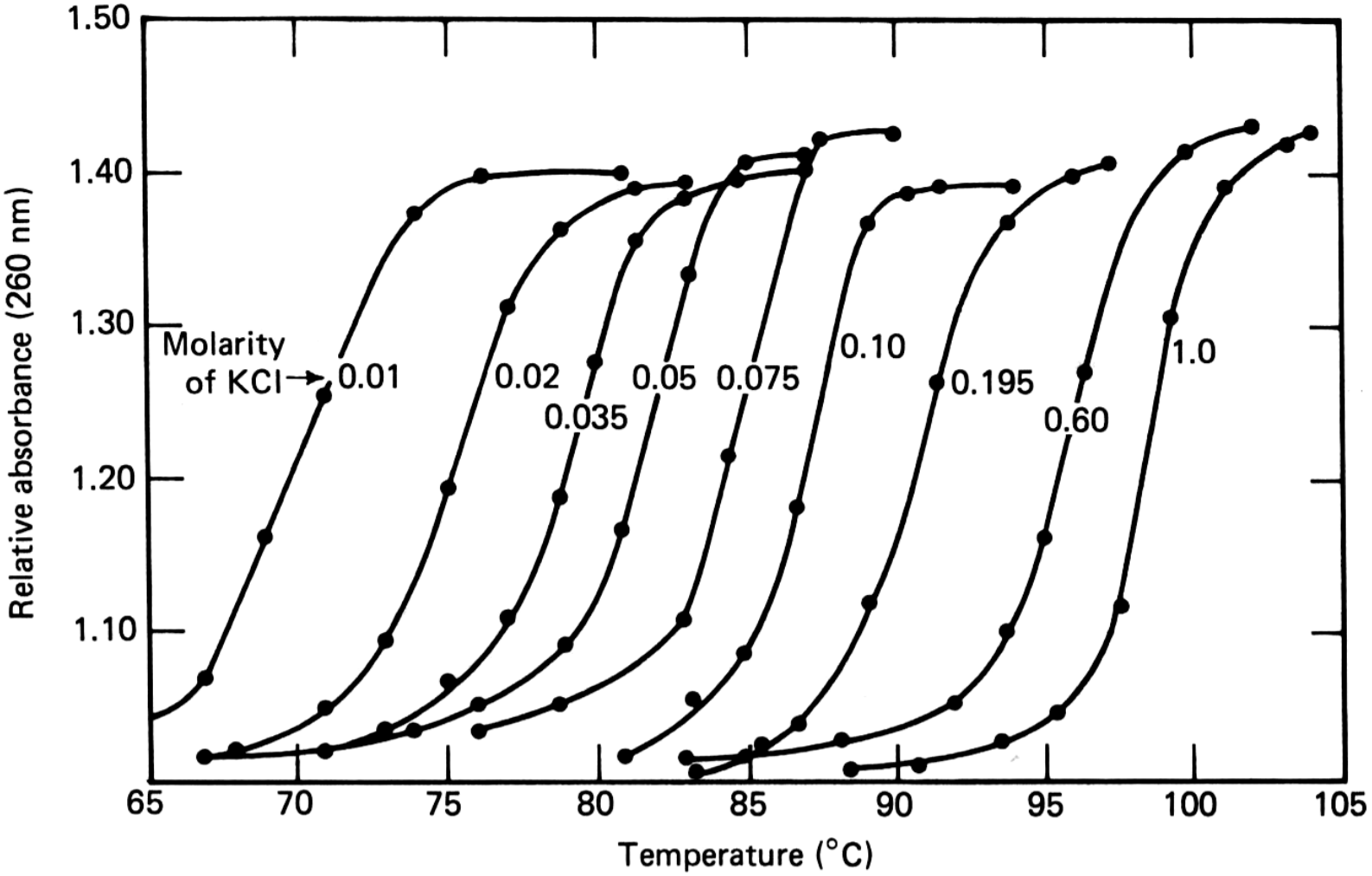
	T_m(°C)		
Polynucleotide	Experimental[a]	Calculated[b]	Difference[c]
Poly(dA-dT)·poly(dA-dT)	45.0	46.9	−1.9
Poly(dA-dA-dT)·poly(dA-dT-dT)	49.2	49.4	−0.2
Poly(dA)·poly(dT)	53.0	54.5	−1.5
Poly(dG-dA-dA)·poly(dT-dT-dC)	64.5	66.5	−2.0
Poly(dG-dT-dA)·poly(dT-dA-dC)	66.8	64.3	2.5
Poly(dA-dA-dC)·poly(dG-dT-dT)	70.2	69.0	1.2
Poly(dG-dA)·poly(dT-dC)	71.3	72.4	−1.1
Poly(dG-dA-dT)·poly(dA-dT-dC)	72.0	66.1	5.9
Poly(dG-dG-dA)·poly(dT-dC-dC)	76.3	76.9	−0.6
Poly(dG-dT)·poly(dA-dC)	77.4	76.2	1.2
Poly(dG)·poly(dC)	87.8	86.0	1.8
Poly(dG-dC)·poly(dG-dC)	99.2	104.3	−5.1

[a] Experimental melting temperatures at various ionic strengths are interpolated to 19.5 m*M* Na^+.

[b] Calculated from values in Table 6-9(A) and nearest-neighbor frequencies in each polymer.

[c] T_m (experimental) − T_m (calculated).


150
100
50
0
T_M (°C)
-10
-9
-8
-7
ΔH_M (kcal/mol)
0
-5
-10
-15
Stacking Energy (kcal/mol doublet)
C·G / G·C
C·G / A·T
A·T / G·C
G·C / G·C
G·C / C·G
G·C / A·T
T·A / A·T
A·T / A·T
G·C / T·A
A·T / T·A


1.50
1.40
1.30
1.20
1.10
Relative absorbance (260 nm)
Molarity
of KCl
0.01
0.02
0.035
0.05
0.075
0.10
0.195
0.60
1.0
65
70
75
80
85
90
95
100
105
Temperature (°C)