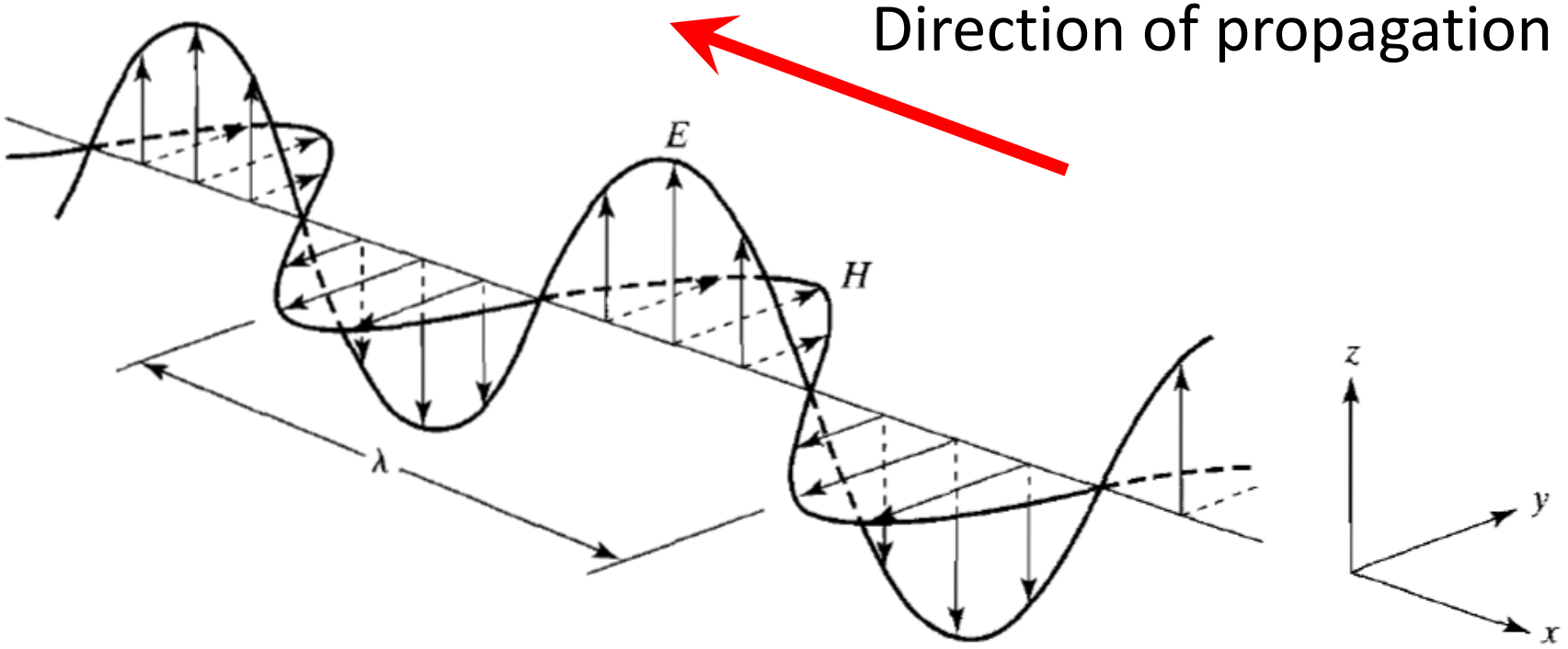
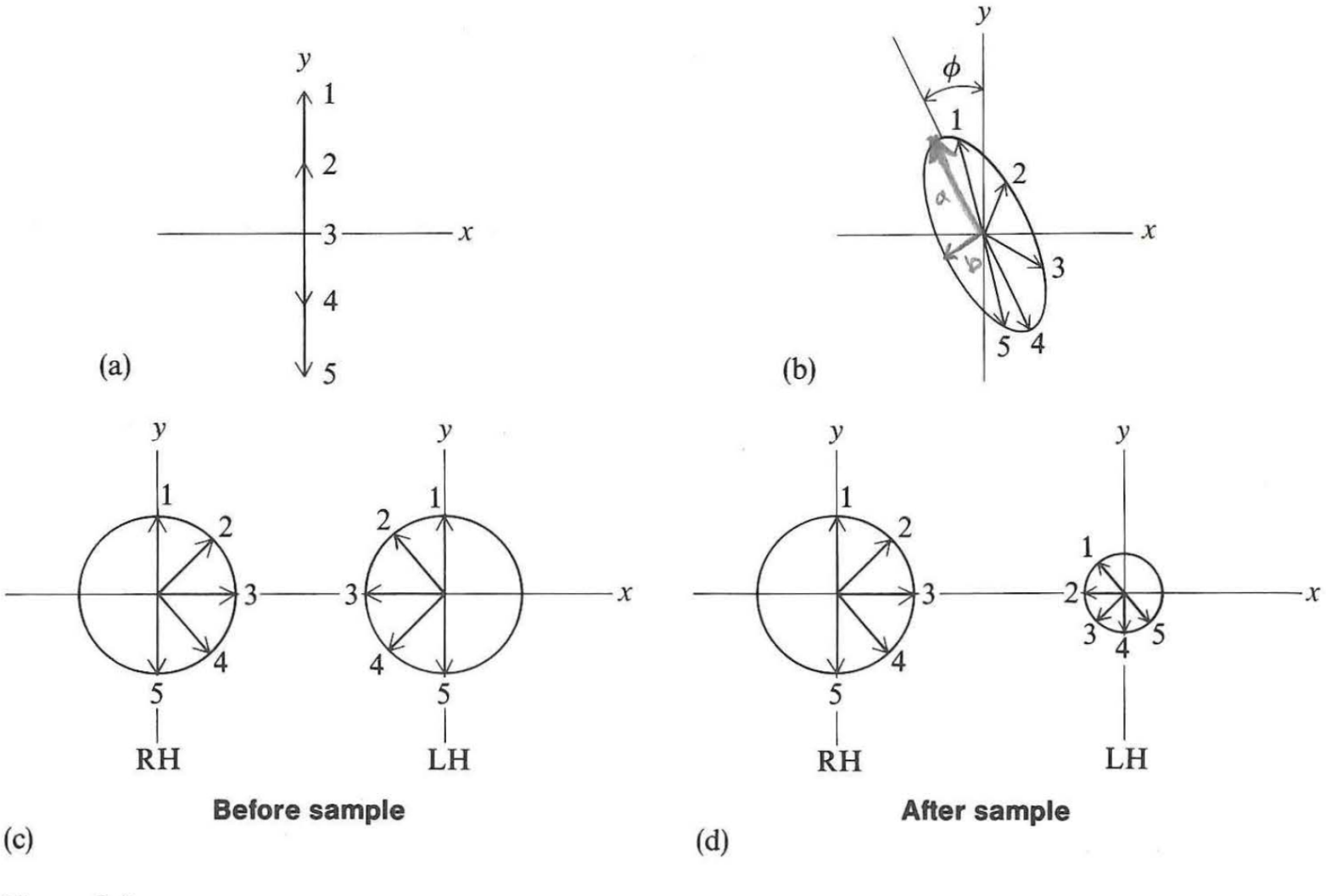
Polarized Light



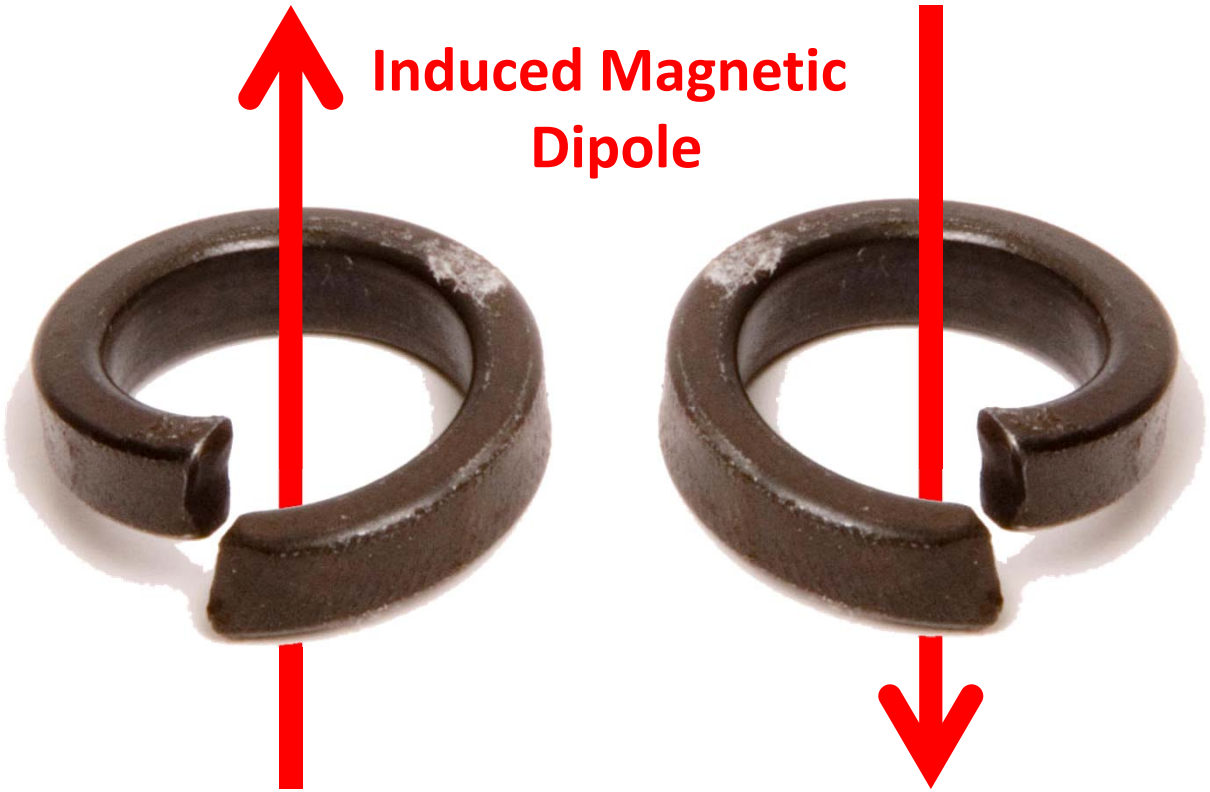
From *Principles of Physical Biochemistry*
van Holde, et al., Chapt. 8, p. 381

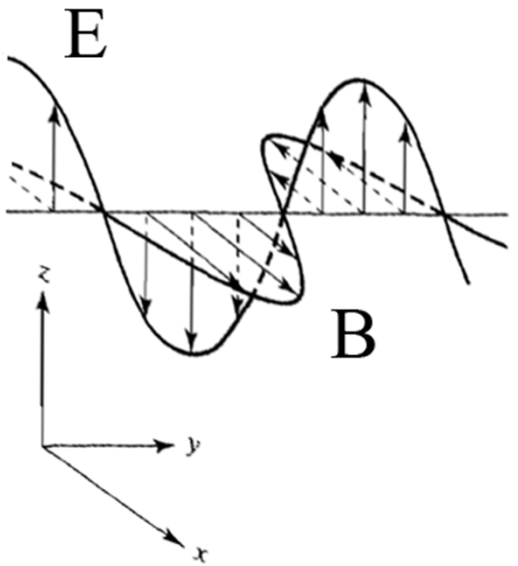
Optical Activity



From *Biophysical Chemistry, Part II*
Cantor & Schimmel, Chapt. 8, p. 469

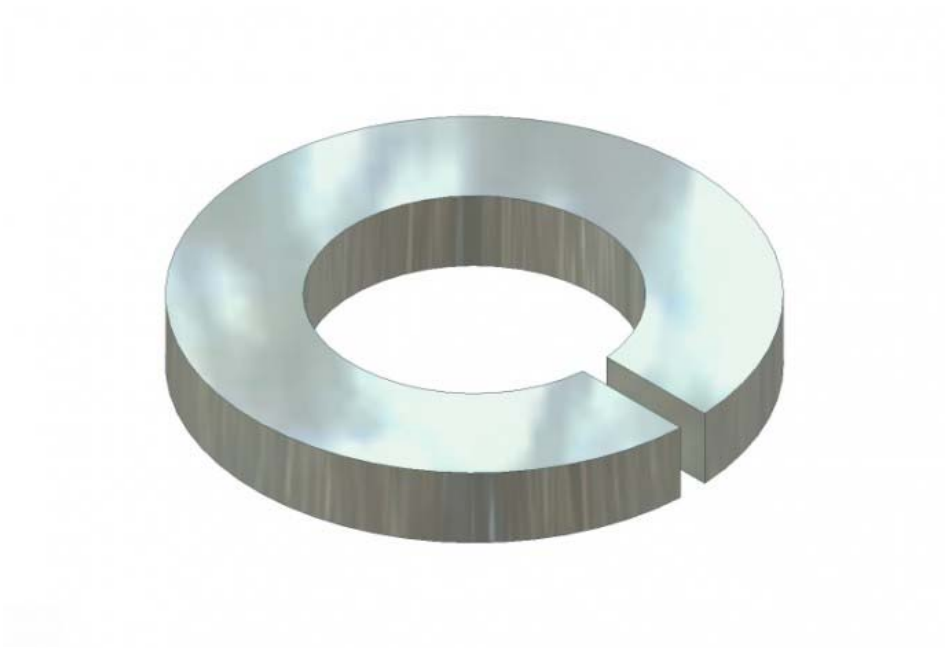
Basis of CD Spectroscopy

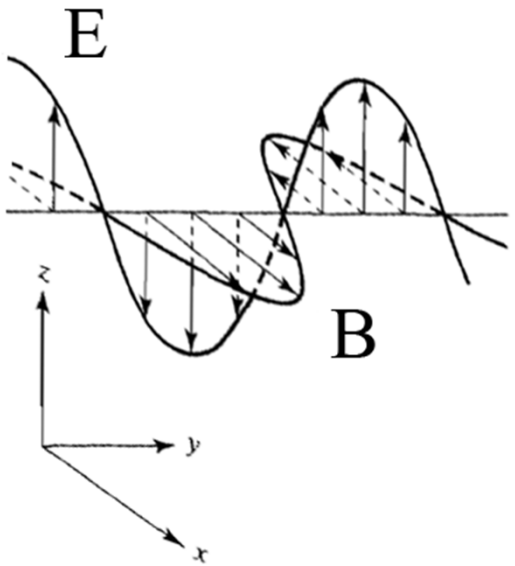




- Electric field dipole drives a current in the lock washer, which induces a magnetic dipole.
- Magnetic dipole must align with electric dipole ($\vec{\mu} \cdot \vec{m} \neq 0$)
- **This is a significant oversimplification!**

Basis of CD Spectroscopy





- If there's no mirror symmetry, E field doesn't induce a magnetic dipole.
- **Main point:** In chiral systems, electric fields can induce magnetic dipoles, which can interact with incident light itself

Secondary Structure

- Basis spectra based on model peptides (e.g. under helix-forming conditions)
- Molar extinction coefficient *per residue*

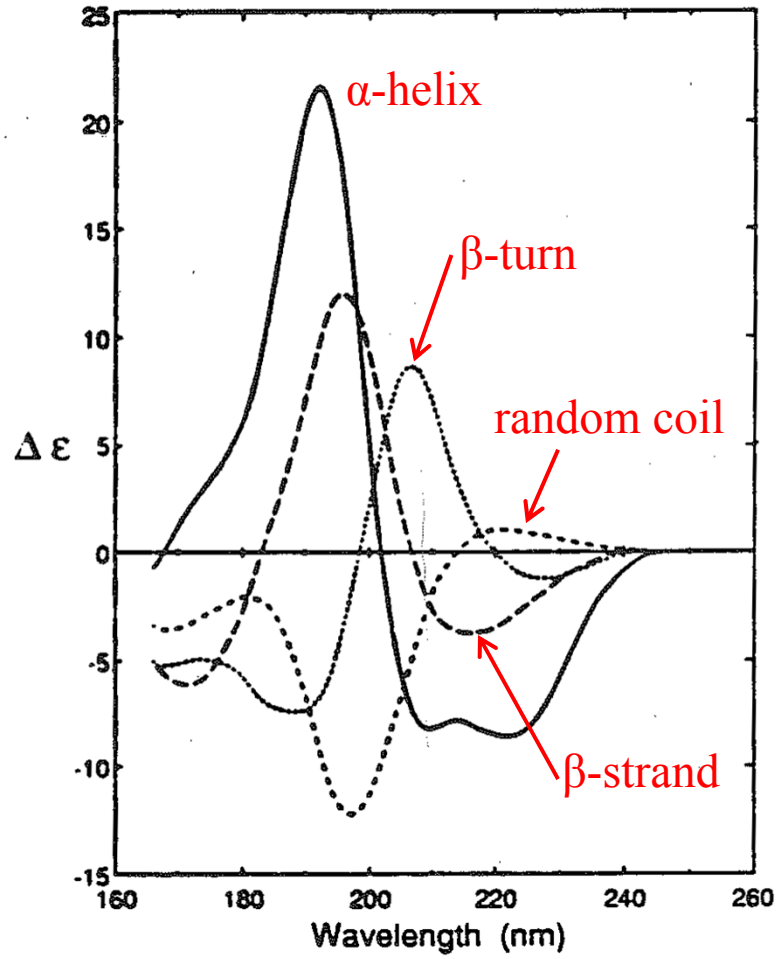


Fig. 2. The CD for various secondary structures: α-helix (——), antiparallel β-sheet (——), β-turn (····), and random coil (—), redrawn from Ref. 7.

Taken From:
Johnson, W. C., Jr. (1990) *Proteins*. **7** (3): 205-14

DNA Structure

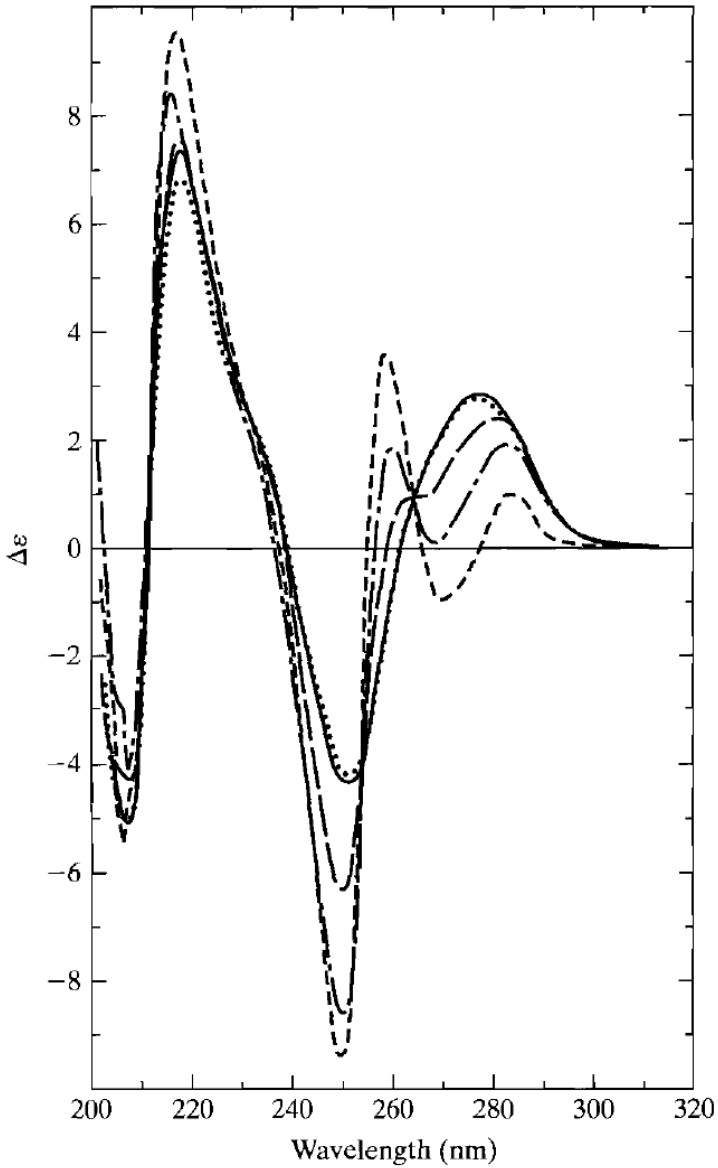


Figure 10.12 The CD of poly (dA) · poly (dT) as a function of temperature: 1.0°C (- - -); 38.8°C (–·–·); 44.7°C (– –); 48.2°C (···); 58.3°C (—). [Adapted from data in J. Greve, M. F. Maestre, and A. Levin (1977), *Biopolymers* **16**, 1489–1504. Reprinted from W. C. Johnson, "Circular Dichroism and Its Empirical Application to Biopolymers," in *Methods of Biochemical Analysis*, vol. 31, ed. D. Glick, copyright 1985 by John Wiley & Sons.]