DNA Interaction with Fluid Medium [pln88]

Main agents of influence:

- ion content (electrolyte),
- level of pH (acidity/alkalinity),
- temperature (heat bath, random forces),
- chemical additives (opportunistic bonds).

Force-induced melting (FIM) depends on ionic strength of fluid: mobile ions weaken electrostatic barriers.

Consequence: preponderance under tension of order-disorder transition (e.g. melting bubbles) or structural transition (e.g. from B-DNA to S-DNA) depends on salt concentration.

The chemical additive glyoxal forms a covalent adduct with guanine. FIM under tension allows adducts to form. These bonds stay intact when tension is released, making FIM irreversible [Bosaeus et al. 2014].

Experiment designed to characterize type of observed conformational change: order/disorder vs structural.





[images from Shokri et al. 2008]

Observed force-extension characteristics:

- 1 stretching without glyoxal,
- 2 relaxation without glyoxal,
- 3 stretching with glyoxal,
- 4 relaxation with glyoxal,
- 5 stretching again (after 4),
- 6 relaxation again (after 5).