

Integrative Environmental Physiology

# Temperature

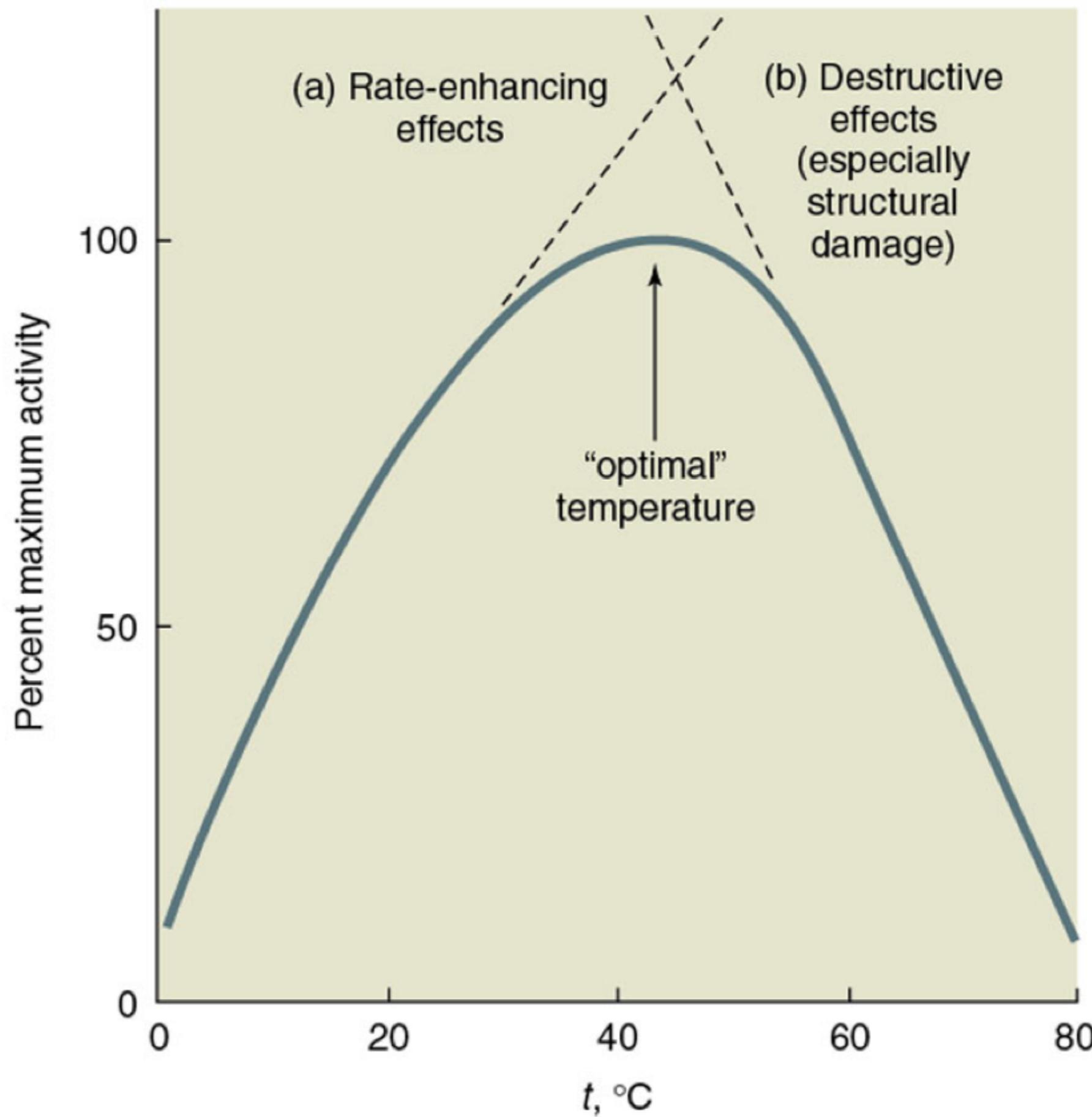
Steven Roberts

Lecture 5

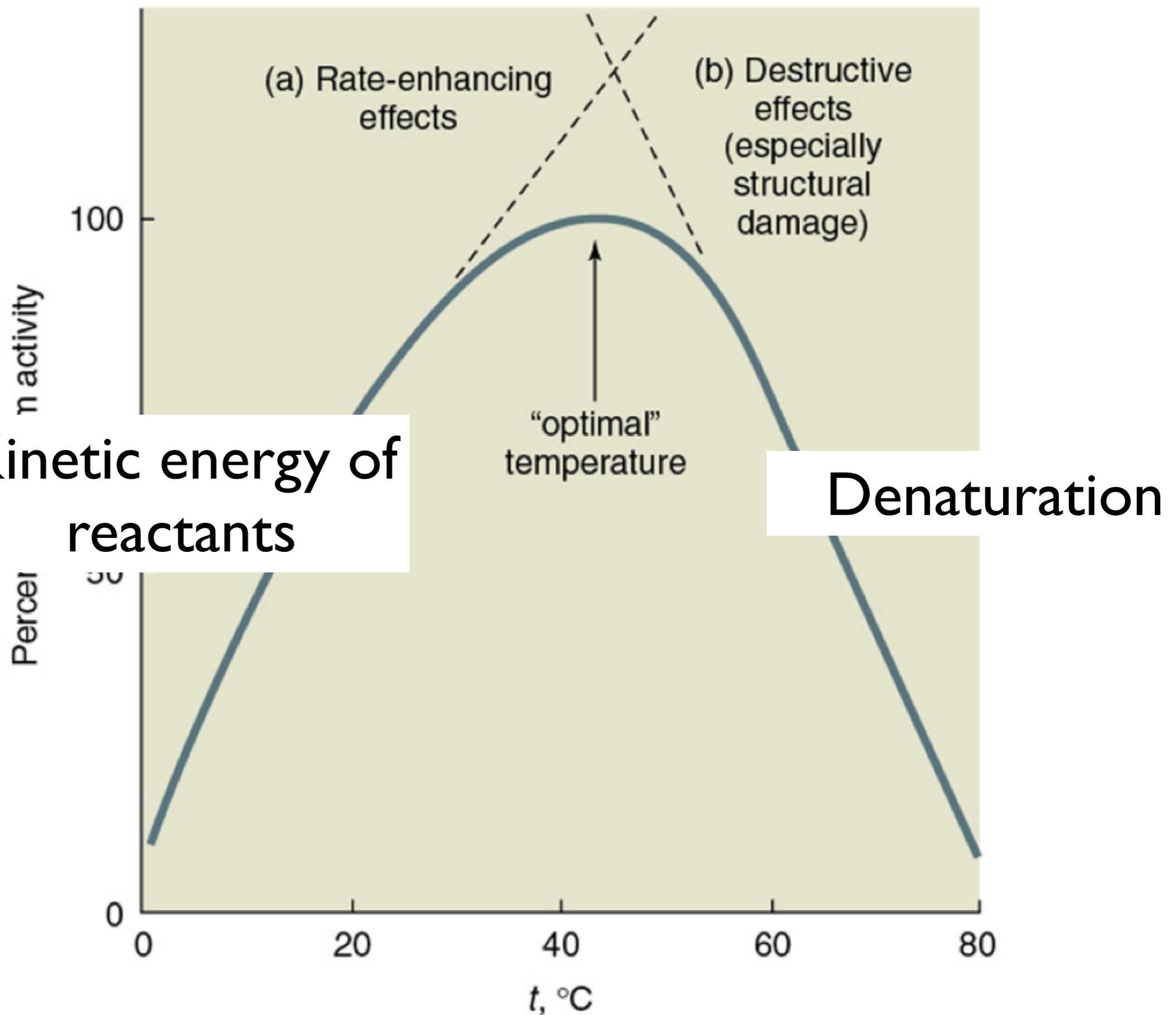
Chapter 15

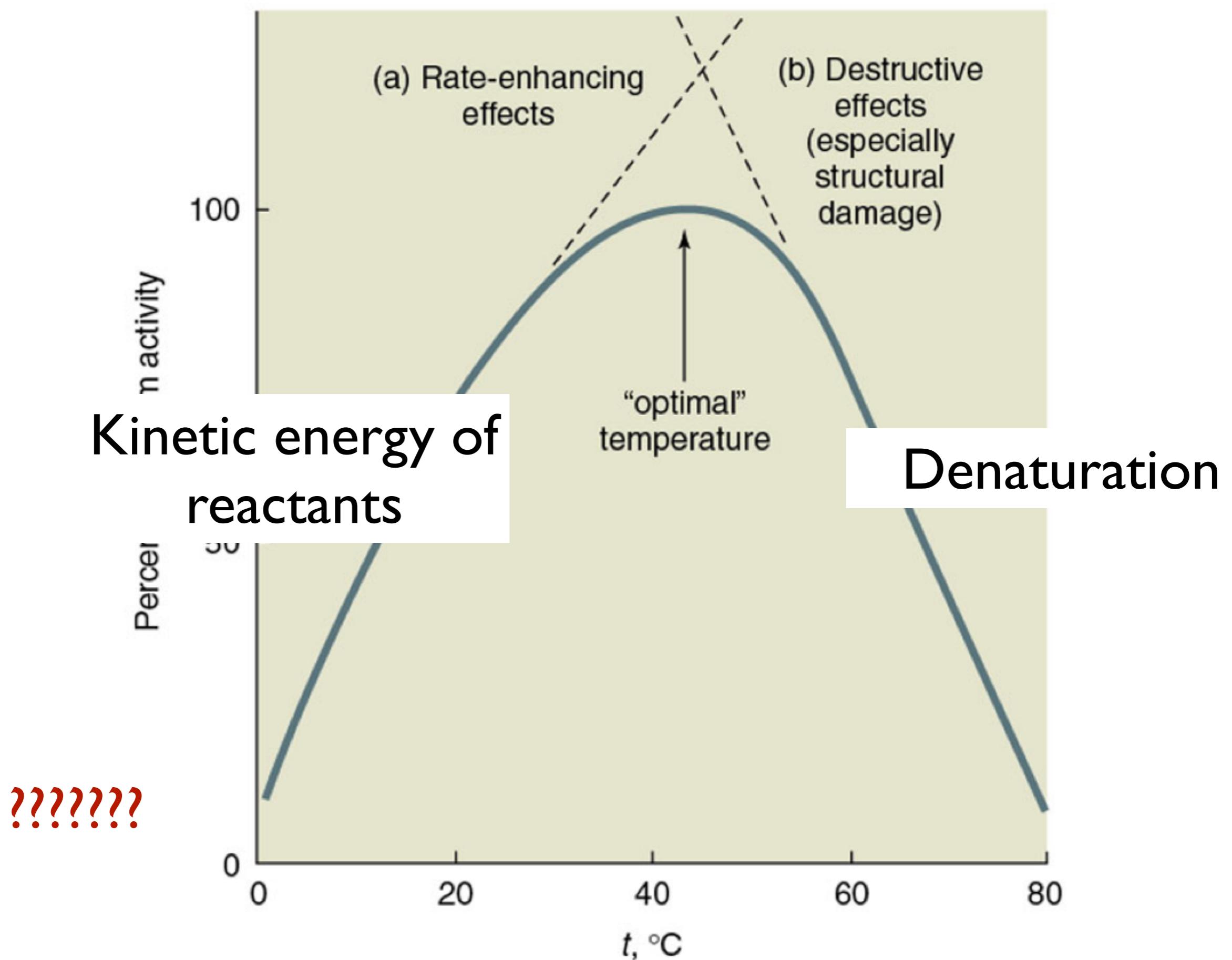
# Temperature is important



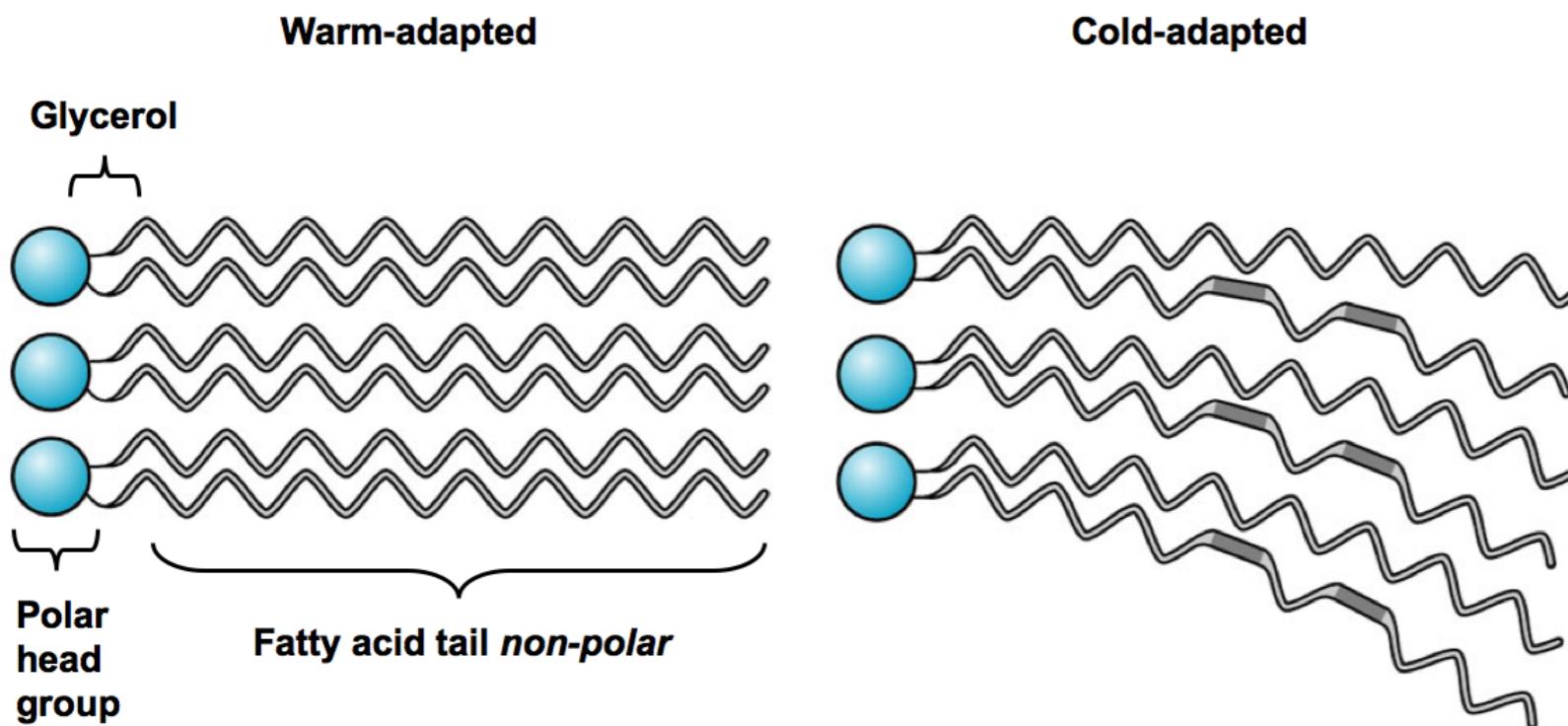


## Kinetic energy of reactants





# Membranes

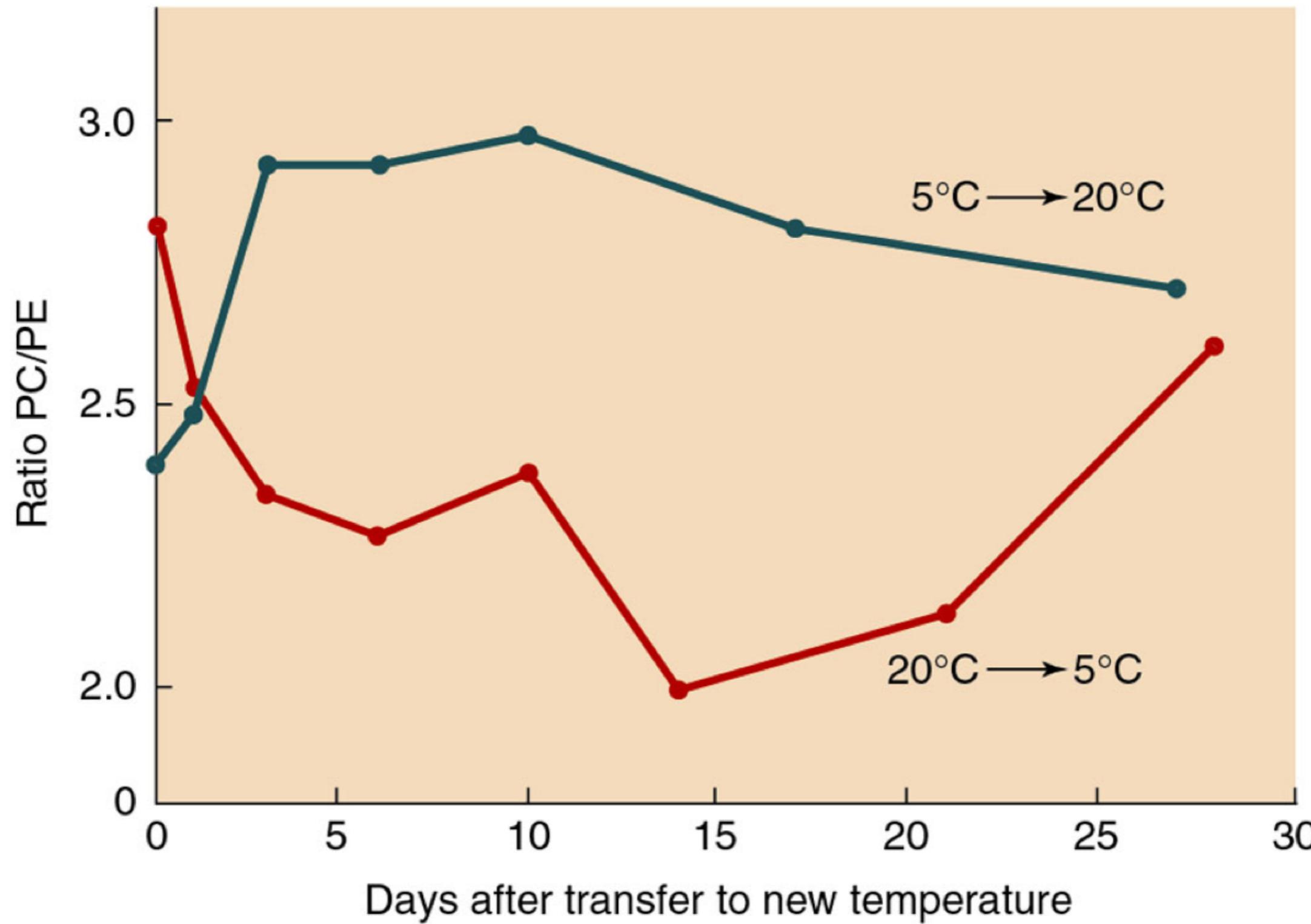


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cholesterol

how does this change?

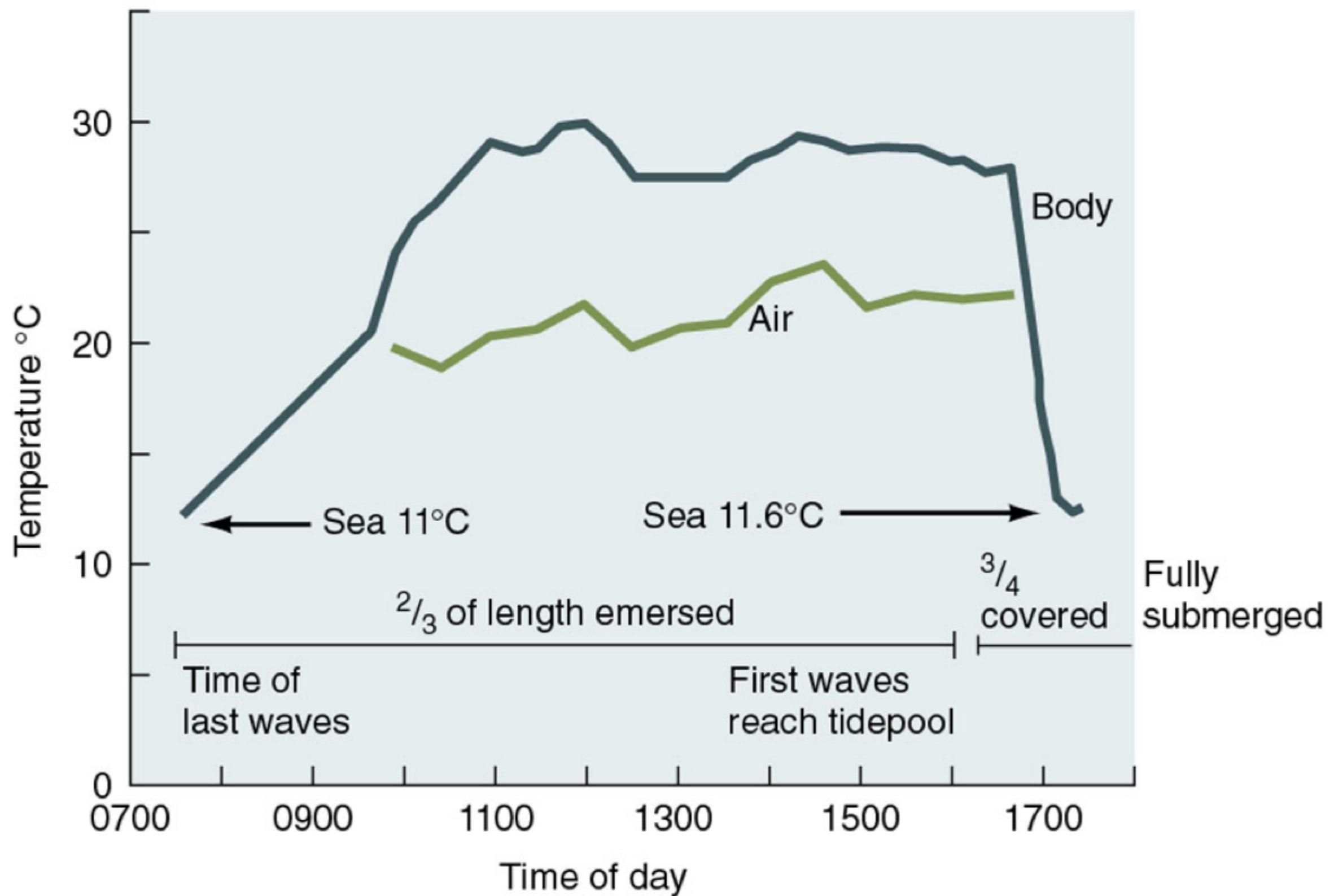
# Rainbow trout - ratio sat:unsats



# Ectotherms



# Ectotherms



# Ectothermic regulators



# Acclimatization

 Uploaded on January 12, 2008  
by [Bill Swindaman](#)

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Ectotherms can *metabolically compensate*

addition to Membranes -

ROTIENS also can change with temperature

# Acclimatization

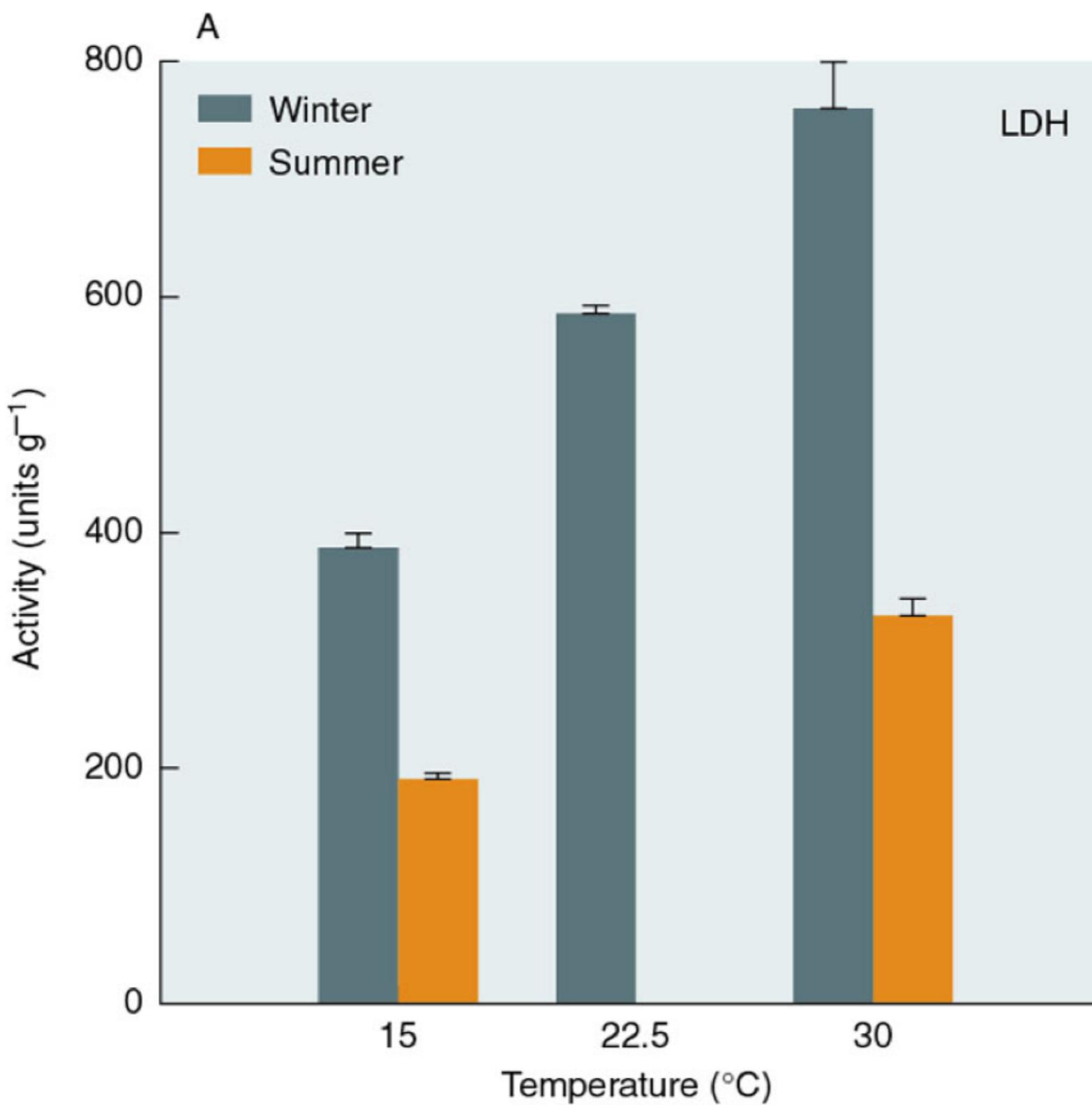


Fig. 15-15, p.690

# How is metabolic compensation achieved?

- Membrane adaptation
- pH (amino acid Histidine)
- Enzyme concentration
- Isoform regulation

# Tradeoffs

# Ectotherms - extreme cold



# Ectotherms - extreme cold

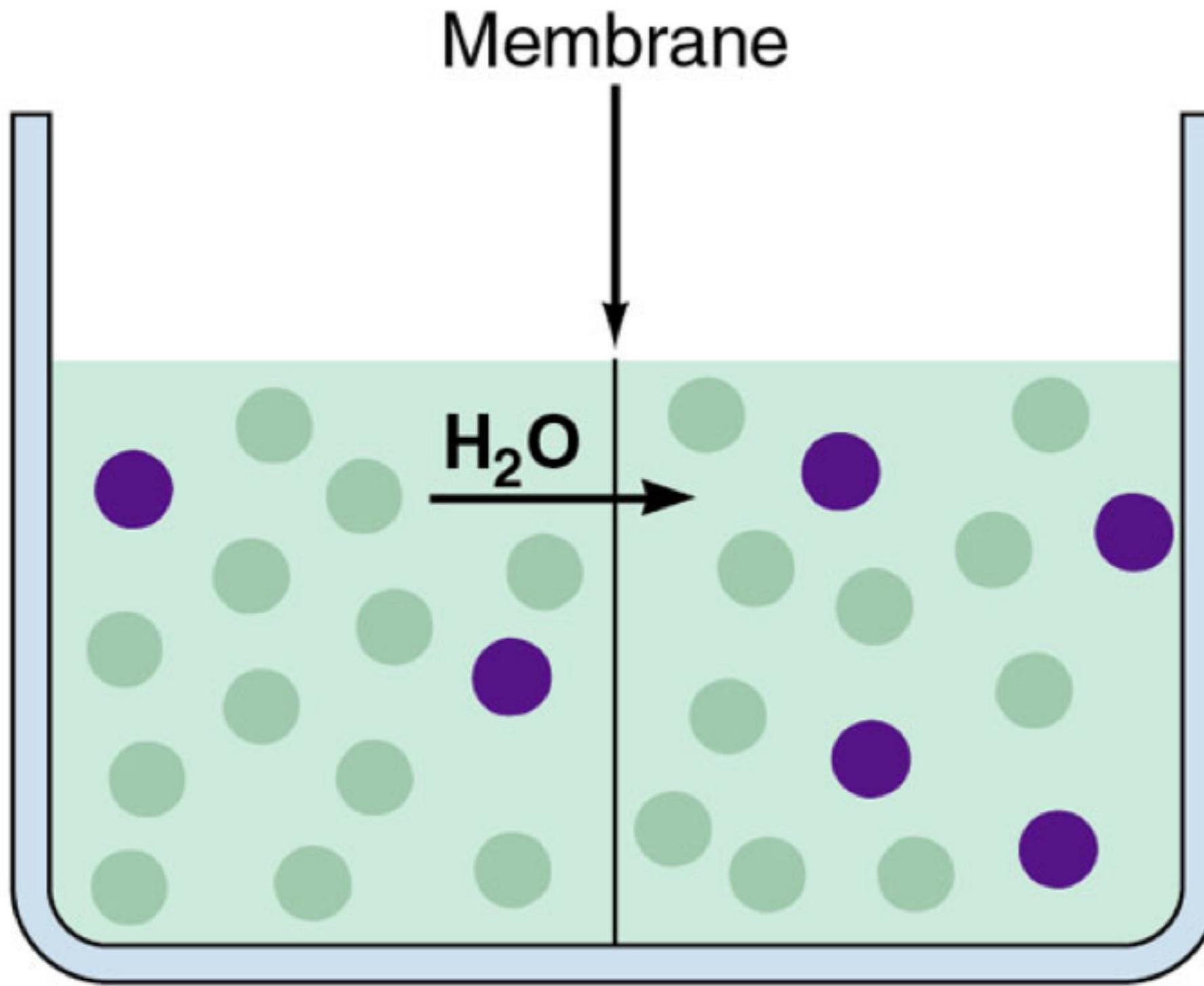
*DORMANCY*

Freeze Tolerance

Freeze Avoidance

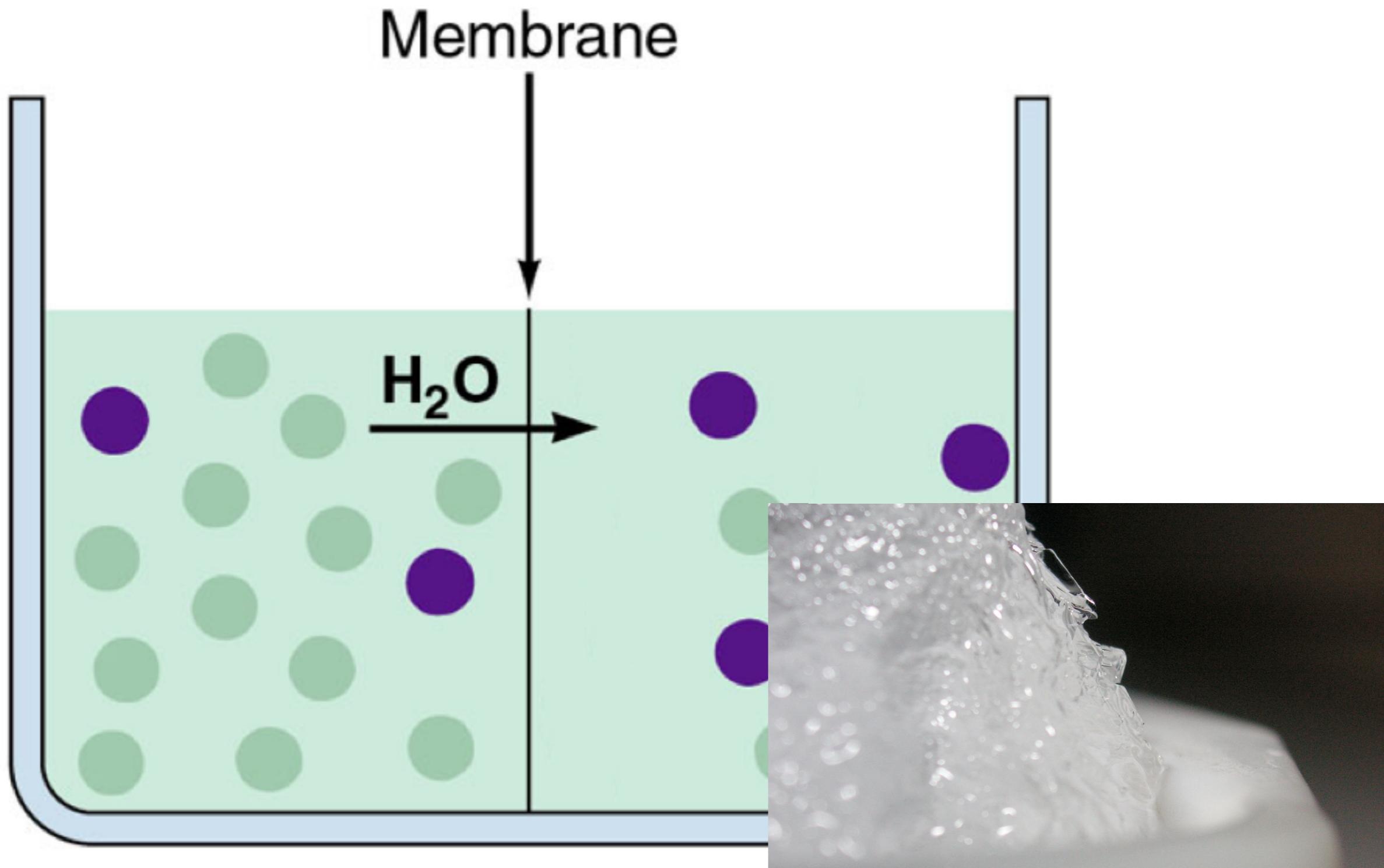
# Tolerance

*freeze*



# Tolerance

freeze



# Tolerance



# Tolerance

increase glucose

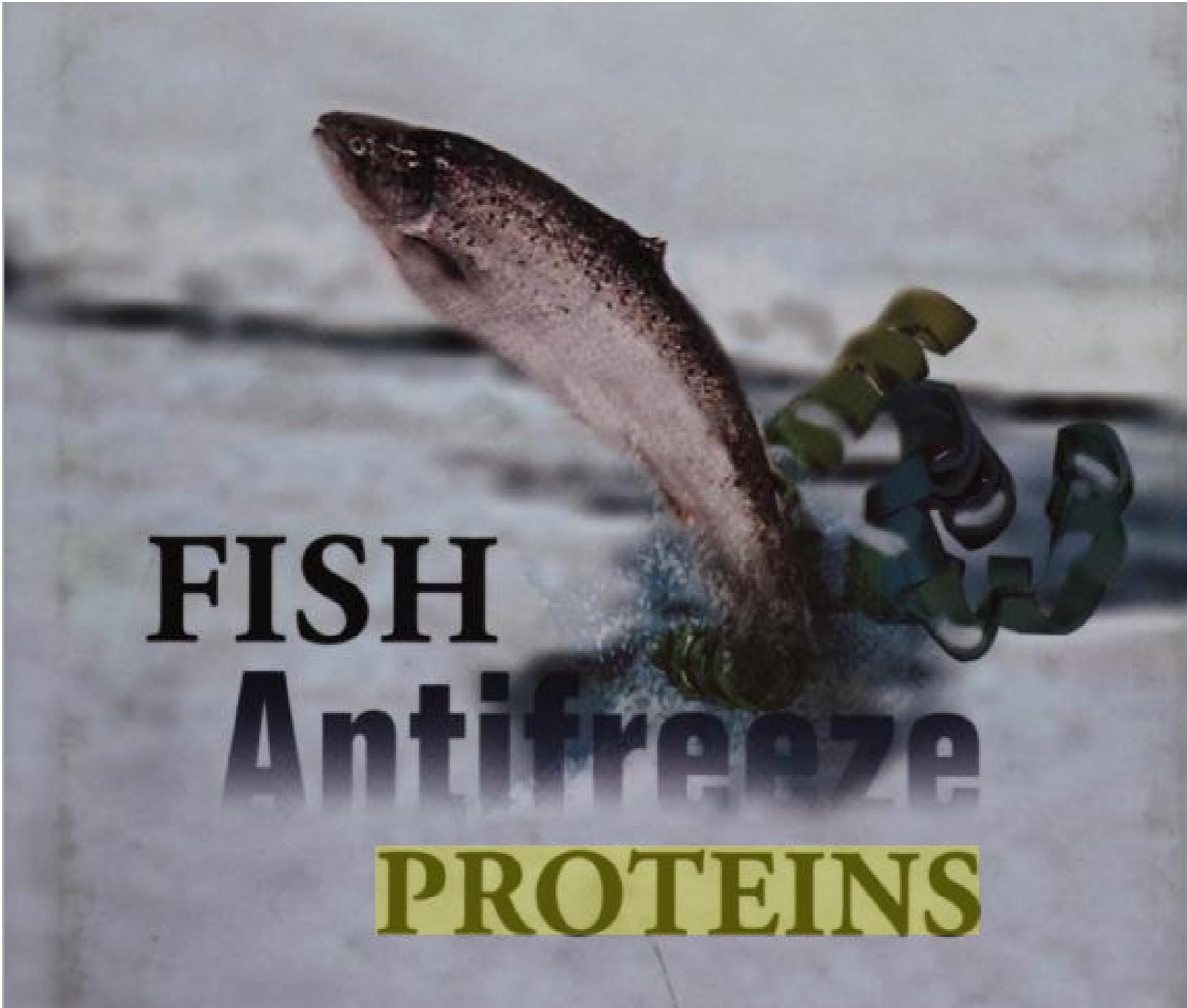


# Tolerance

# Avoidance

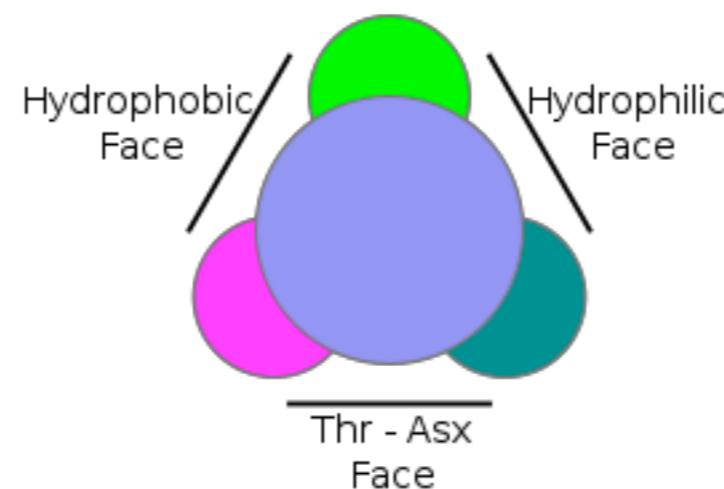


# Avoidance



# Avoidance

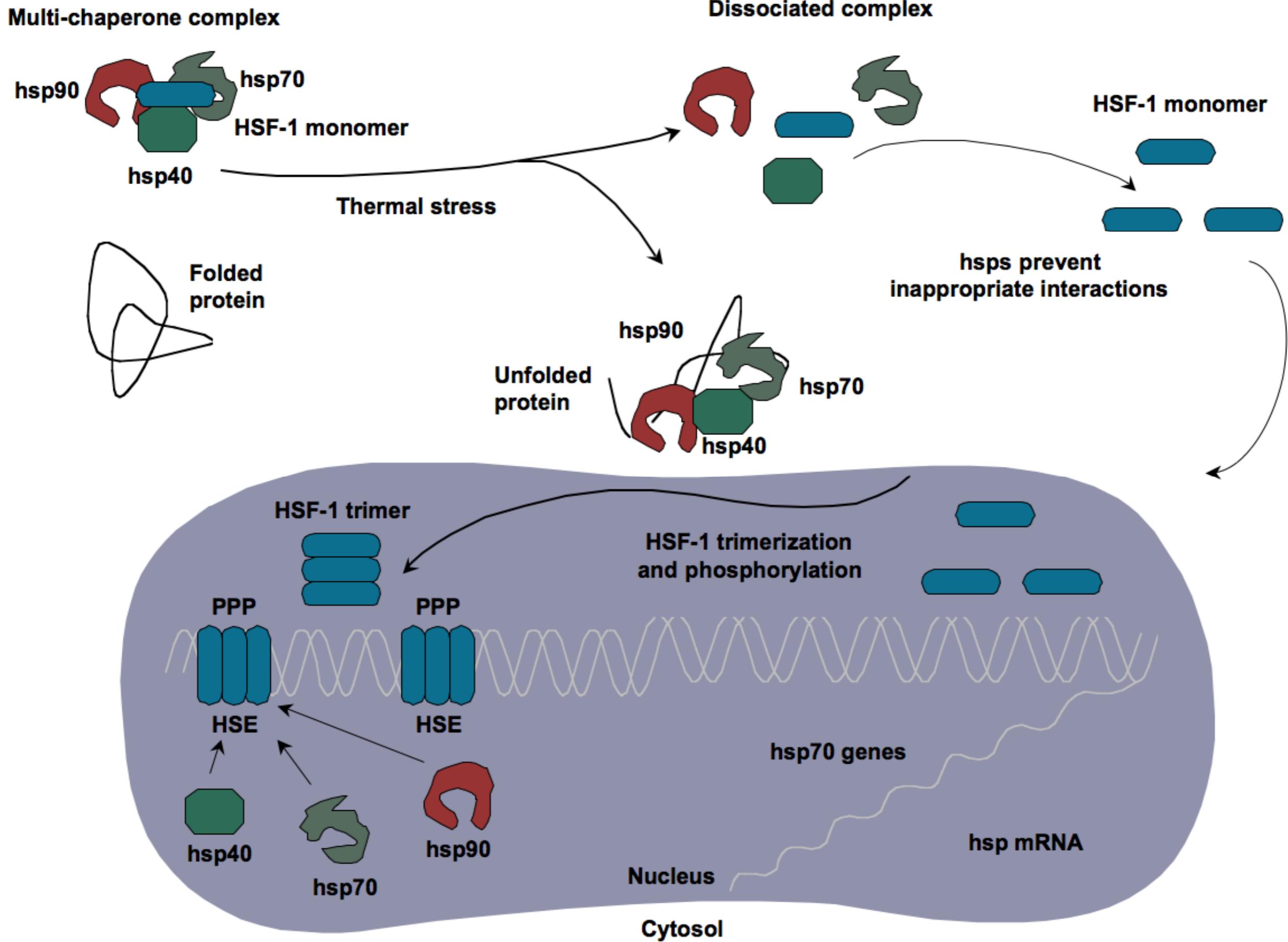
**J. Duman** and A.L. DeVries. (1976). Isolation, characterization and physical properties of protein antifreezes from the Winter Flounder *Pseudopleuronectes Americanus*. *Comp. Biochem. Physiol.* B54, 375–380.



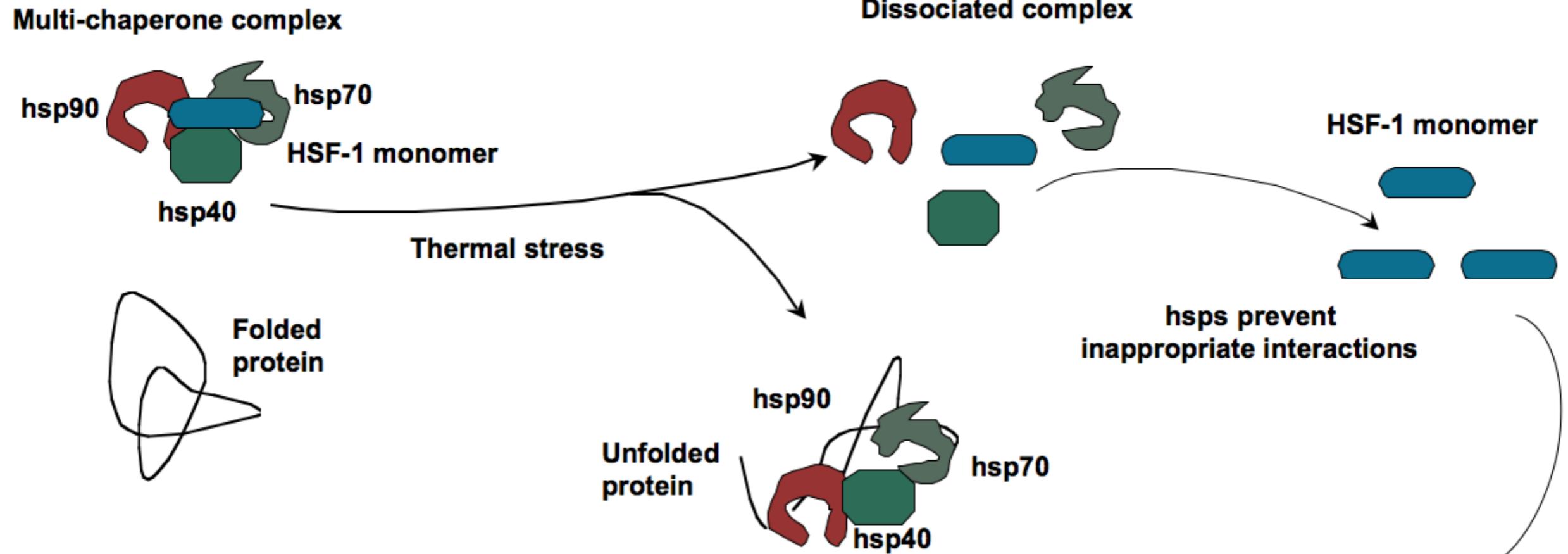
# Elevated temperature

# Elevated temperature

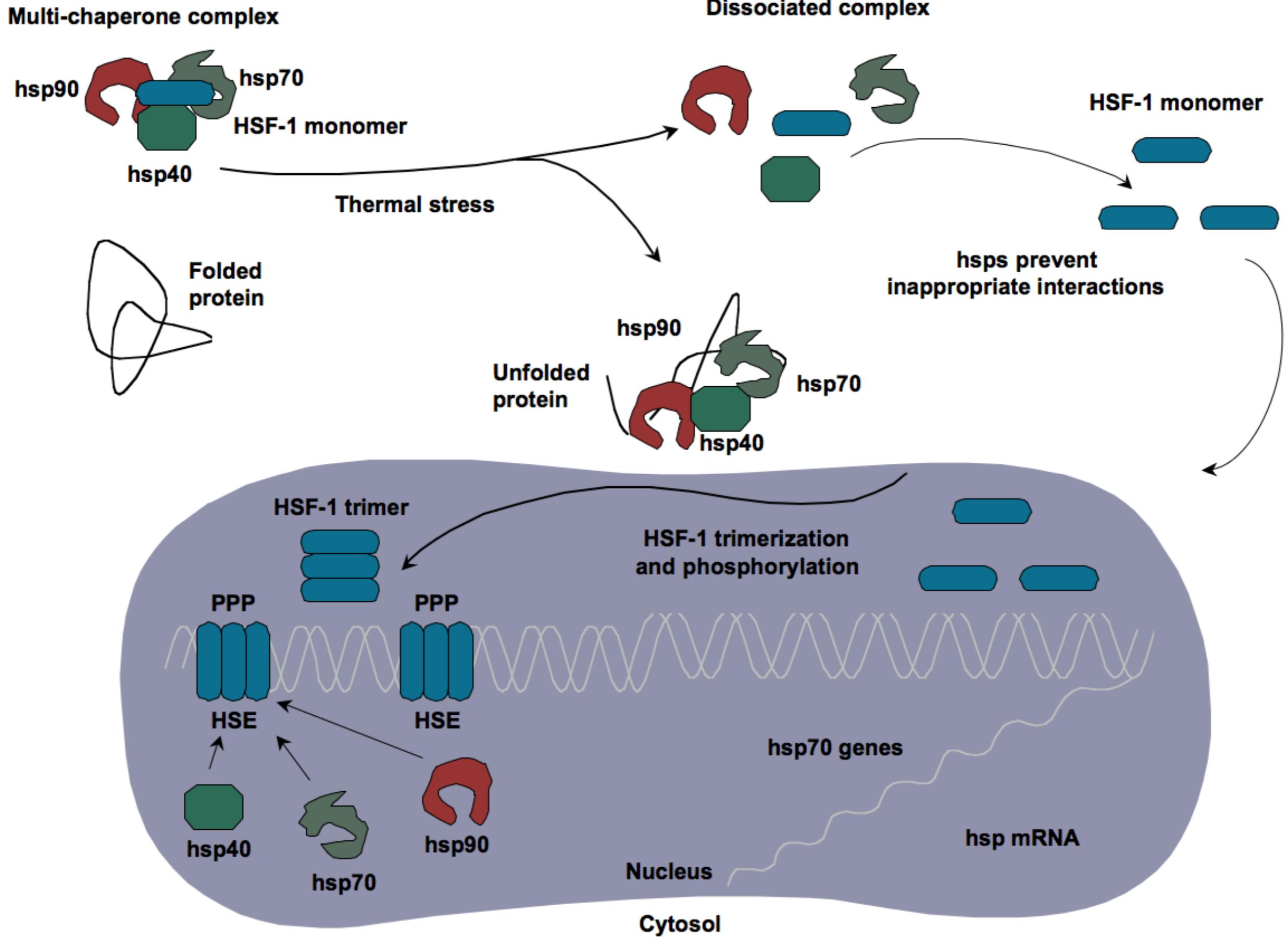
acute



# Heat Shock



# Heat Shock



# Transcription

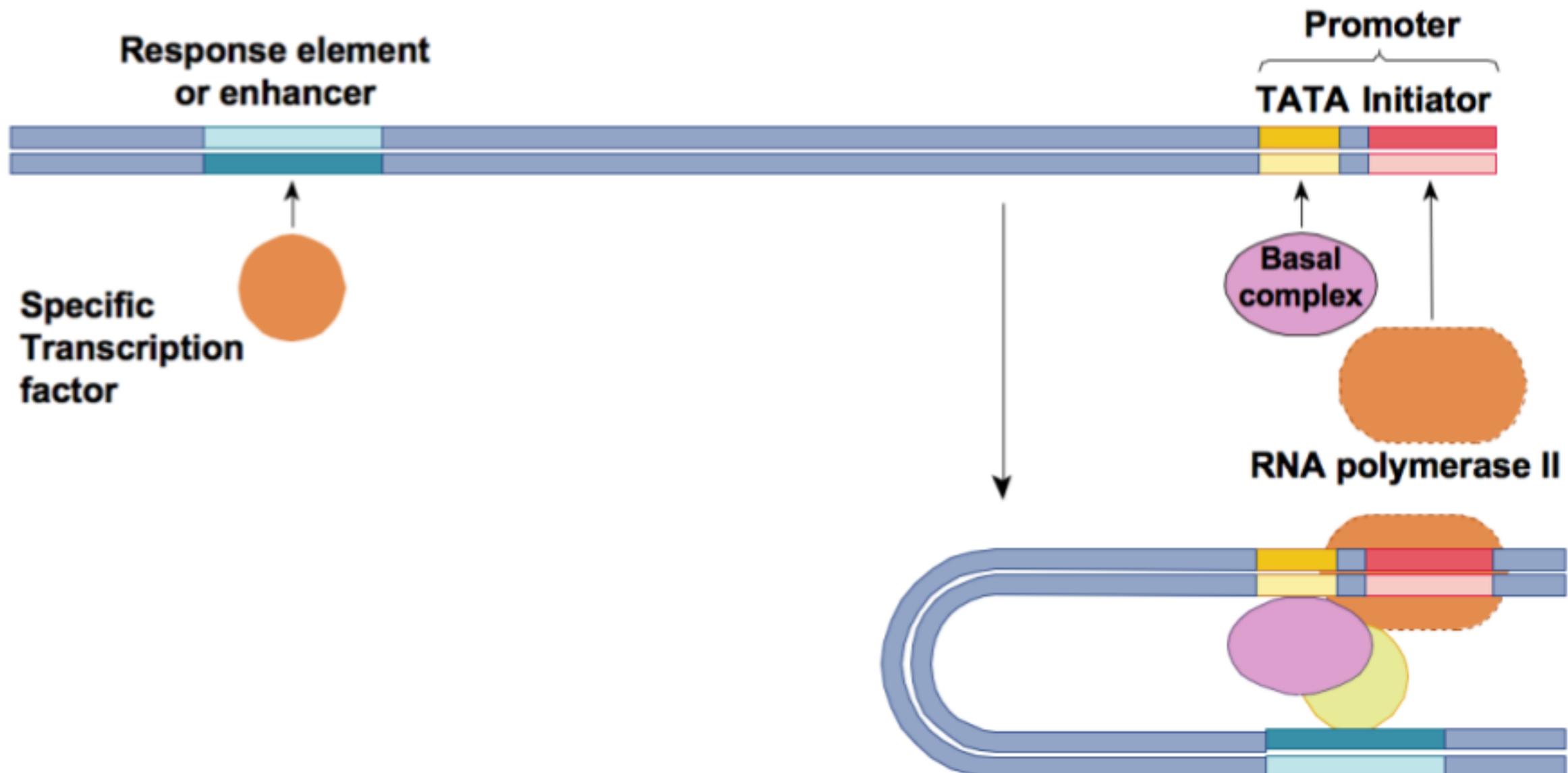


Fig. 2-4b, p.30

# Transcription

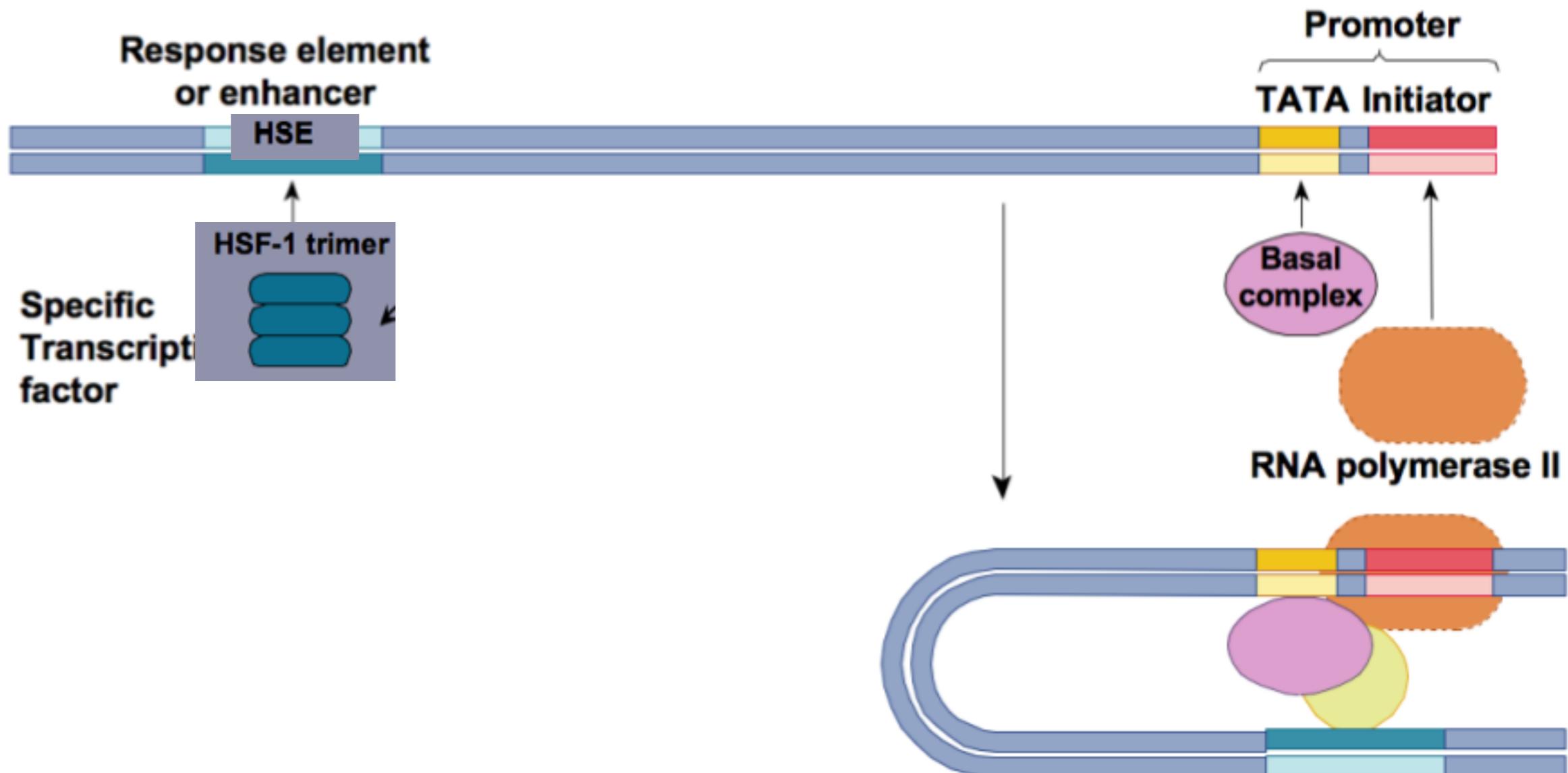
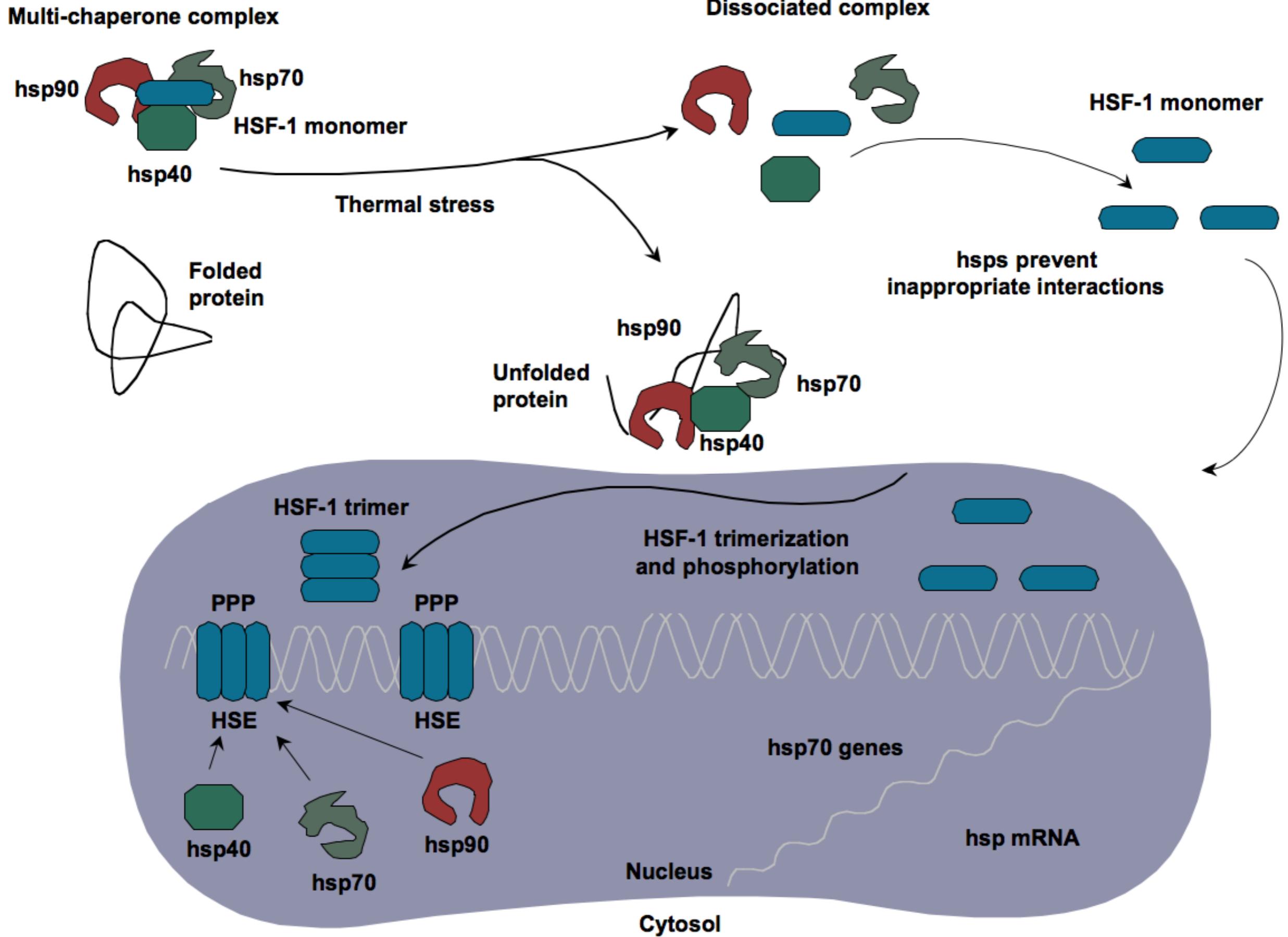
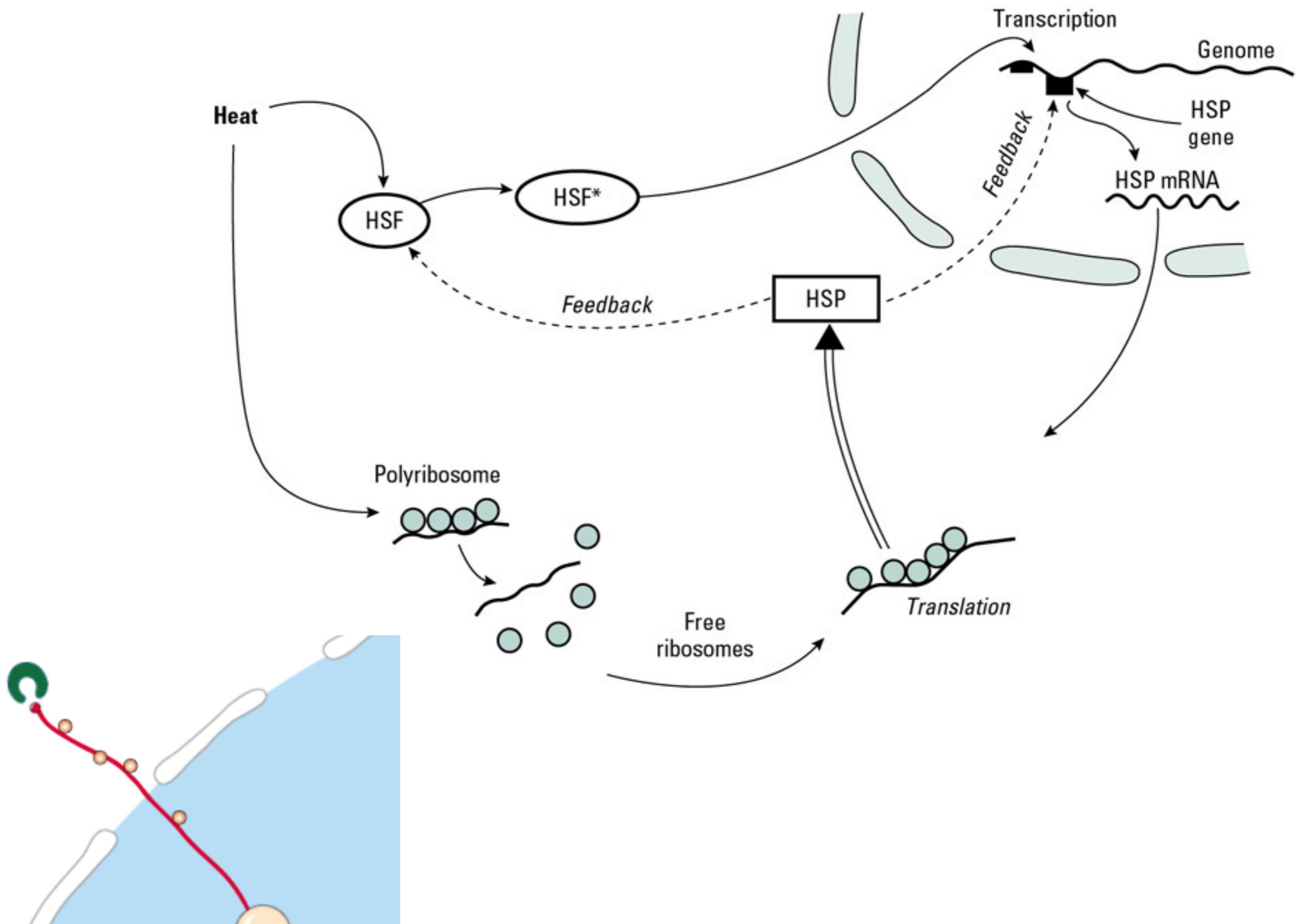


Fig. 2-4b, p.30

# Heat Shock



# Heat Shock



# Heat shock proteins

hsp 70

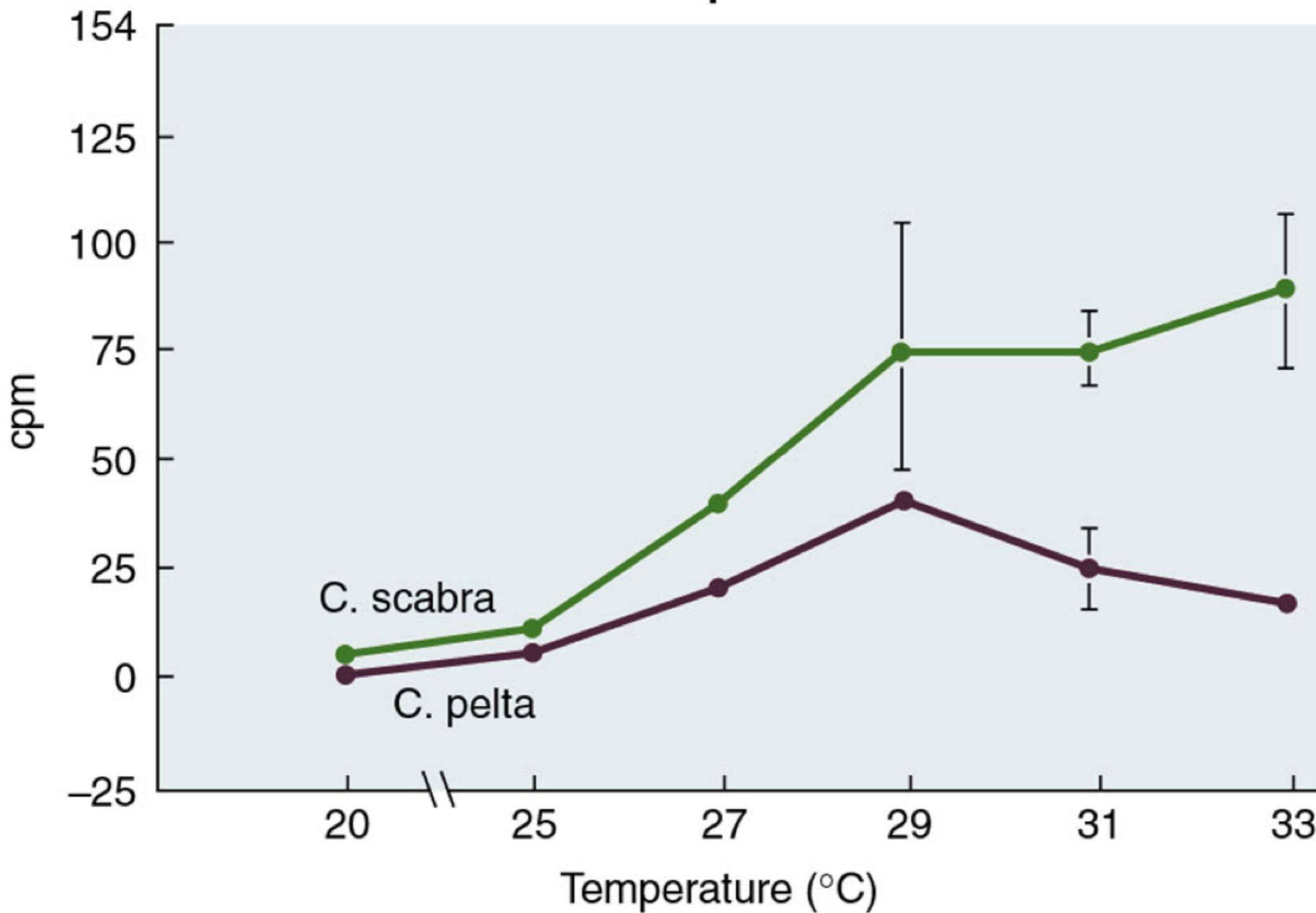
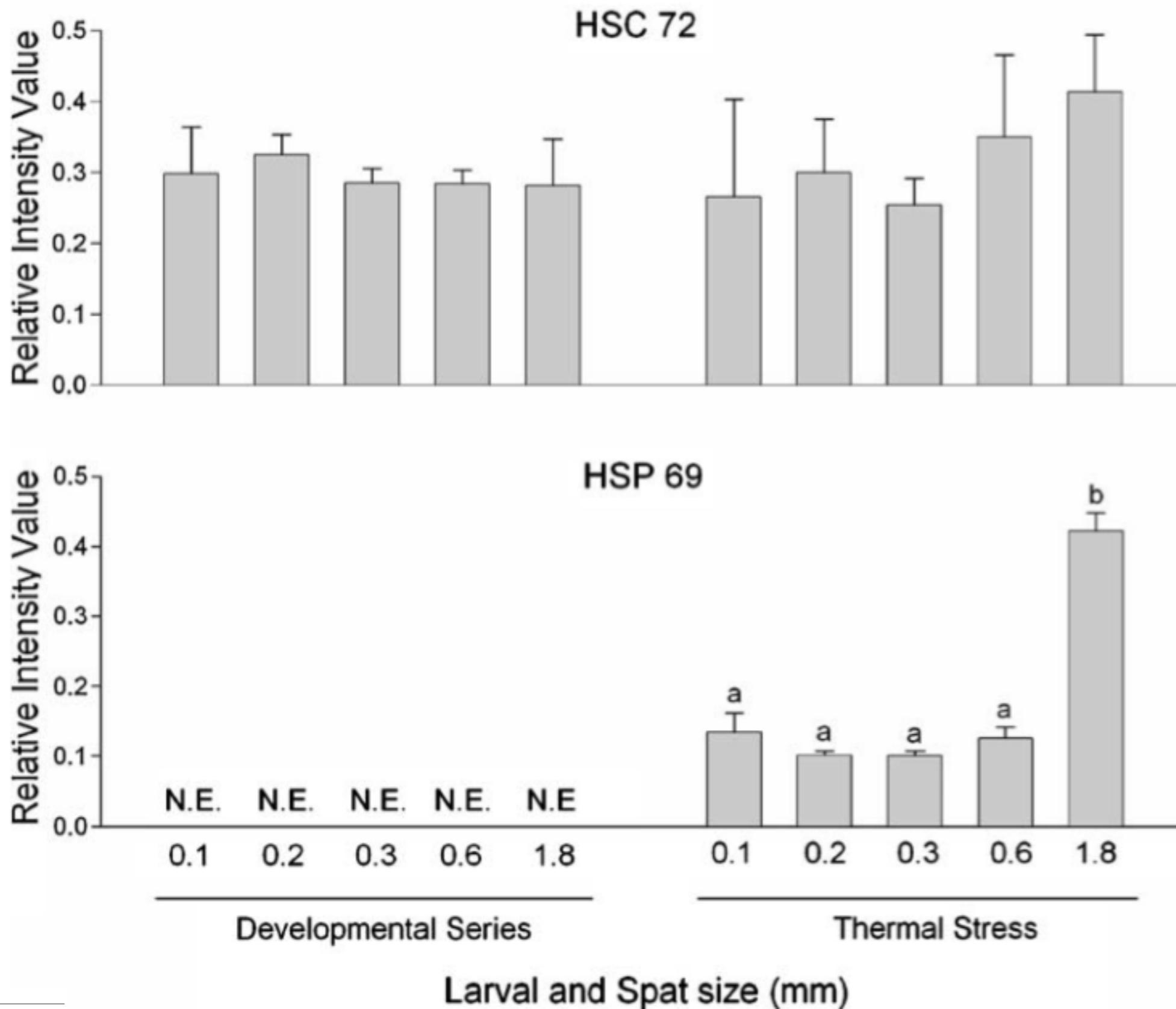


Fig. 15-16b, p.693



# REVIEW