At 10 C^o the rate of a reaction was 6 and at 16 C^o that same reaction rate increased to 20, what is the Q_{10} for this reaction? (6/20) ^ (10/16-10) = $3.33^{1.67}$ = 7.46

A cell going through homeoviscous adaptation will change its ratio of _saturated____ to _unsaturated lipids__ in an attempt to regulate _membrane fuidity.

Water ice formation requires sufficiently low temperatures, water and nucleating agent.

True/False – most radiative heat exchange occurs in the visible spectrum.

Animals that are freeze tolerant do not produce antifreeze proteins (generally) that are typically produced by freeze intolerant animals that supercool tissues.

A psychrometer measures humidity by contrasting the temperature of a wet and dry bulb moving through the air.

Evaporative cooling is only effective when the atmosphere is relatively dry, and the skin is wet.

Describe the short term (seconds), medium term (acclimation), and long term (evolutionary) responses to increased temperature observed on a cellular scale.
Some examples: short term = activation of heat shock factor or change effective concentrations. medium term = production of different sets of allozymes or modify membrane composition. Long term = genetic change in enzymes to perform optimally at different temperatures or frequency of occurrence of allozymes (ldh example).

How do ectothermic organisms run a fever? Behavioral – selecting warmer habitats or modifying body position to increase radiative absorption.

How might one determine the thermal optima of an organism? Measure performance across a range of temperatures, where is it maximized? Understand why thermal preference is not always a good measure of optima.

For each of the following, list one organism that matches the described strategy. Which of the strategies is the most rare and why?

Homeothermic endotherm - humans

Homeothermic ectotherm - icefish

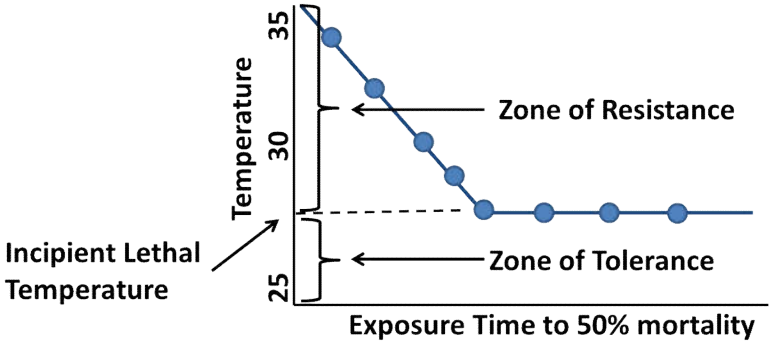
Poikilothermic endotherm – hummingbird (most rare strategy – think about energetics and tradeoffs, why bother producing heat if you are not going to be homeotherm?)

Poikilothermic ectotherm – fence lizard

What is a tolerance polygon? Draw a tolerance polygon for a steno and eurythermal organism and explain the ecological significance of the difference.

Plot of acclimation on the x vs tolerance on the y. Upper and lower lines for heat and cold tolerance form a polygon that describes a species thermal niche. Think about how polygons change for steno vs. eurytherms.

What is the difference between the zone of thermal resistance and zone of thermal tolerance? Similarly, what is the difference between critical thermal maxima and upper incipient temperature? Figure from notes:



Zone of resistance – range of temperatures over which there is thermal stress and prolonged exposure reduces fitness and eventually can be fatal.
Zone of tolerance (below incipient lethal temperature) – range of temperatures that are tolerable and do not cause stress or reduce fitness.

Compare and contrast the advantages and disadvantages of endothermy and ectothermy. How did endothermy evolve? See notes the last day of lecture on the costs of endothermy and how those costs are offset (fundamentals of the tradeoff).