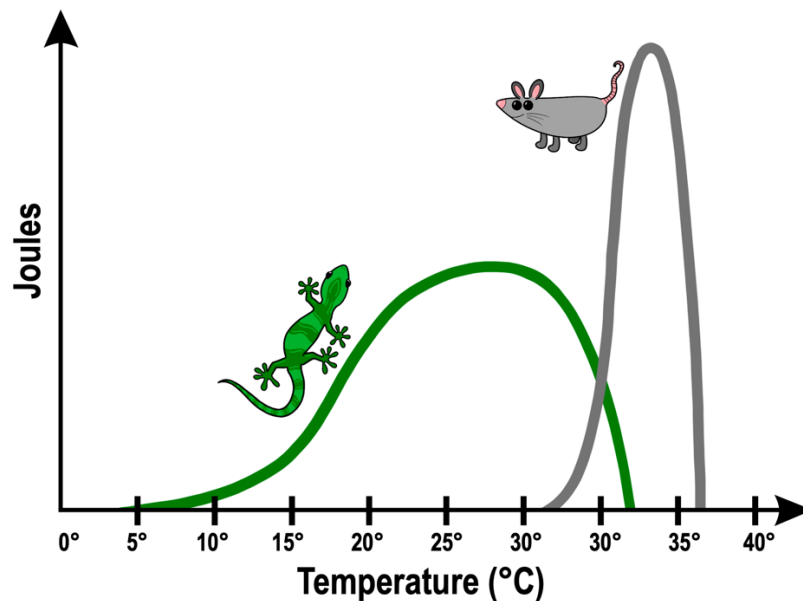


## CONCEPT: THERMOREGULATION

- **Thermoregulation** – regulation of body temperature within a certain range, sensors found in hypothalamus
  - **Endothermic** – main source of body heat is internal, and generated by the organism's metabolism
  - **Ectothermic** – main source of body heat is external to the organism, and absorbed by it
    - Each strategy has energetic and metabolic trade-offs
  - **Homeotherms** – maintain a constant body temperature regardless of environmental conditions
  - Poikilotherms – body temperature varies considerably based on environmental conditions
  - Heterotherms – use strategies that are both homeothermic and poikilothermic

### EXAMPLE:



- Integumentary system – organ system that surrounds the body, composed of skin, hair, and nails in mammals
- Insulation like hair, feathers, and fat can reduce heat loss to the environment
- Brown adipose tissue contains high concentrations of mitochondria which are used for heat generation
- Behaviors can affect thermoregulation, shivering produces heat as a byproduct of muscle movement
- Evaporation requires water absorb a lot of energy, and is an effective cooling mechanism

### EXAMPLE:



## CONCEPT: THERMOREGULATION

- **Vasoconstriction** helps reduce heat loss, and **vasodilation** increases heat loss
- **Countercurrent exchange** – antiparallel flow that includes the exchange between the two currents
  - Arteries bring warm blood away from the body core, veins move cold blood back to the core
  - Countercurrent exchange of heat helps conserve heat loss in extremities

### EXAMPLE:

