

Temperature and animals

Poikilotherms

- Cold-blooded animals
- Ectotherms
- Fish, reptiles, amphibians, insects
- Body temperature = ambient temperature of environment

Homeotherms

- Warm-blooded animals
- Endotherms
- Birds, mammals
- Metabolic generation of level
- Above ambient temperature of environment

Temperature range

When active, body temperature must be in a narrow range

Endotherms there is a lethal few degrees above/below 37°C core temperature. Ectotherms have wider range of tolerance. Most cannot survive close to freezing or near 40°C

- Antarctic icefish active at -1.9°C, lethal above 6°C
- Ants in Namib desert can survive 52-55°C for short periods
- African rock hyrax survives at 41°C

Polar bear strategies to reduce the below critical temperature

- 11cm thick blubber
- Black skin
- Hollow hairs
- Ambient air temp -50°C
- Core temperature 37°C

Daphnia – water flea

- Metabolic rate declines rapidly above 40°C
- Enzyme activity slows
- Proteins break down
- Cell membranes destroyed
- Rates of oxygen intake no longer match respiratory needs

Allen's Rule: the shorter an animal's extremities are relative to body mass, the lower the rate of heat loss. Surface area: volume ratio

Smaller animals have higher SA:V ratios, therefore have problems with cold. Many birds have winter range limits dictated by low temperature.