

Popular Article

PECULIARITIES OF WARM BLOODED ANIMALS TO STAY WARM IN EXTREME COLD

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Introduction

Adaptation is the process by which an animal adapts itself into new changed environmental conditions. Adapted animals have equilibrium between lipogenesis and lipolysis of the adipose tissue. Defence against cold is accomplished by conserving heat, more heat production or by a combination of both. Therefore, animals survive in the harsh cold climatic conditions by reducing the percentage of body heat that is lost to the environment. This can be by physical means (generally evolved over many generations) or patterns of behaviour. Generating heat that is sufficient to maintain a steady body temperature requires that the animal is able to generate enough heat in the first place and then hang onto it, by taking enough energy as food to generate the heat and by anatomical, physiological and behavioural adaptations to retain the heat generated.

Peculiarities of warm blooded animals of extreme cooler regions

1. **Large body size** to reduce the loss of heat from your skin, even small Antarctic animals are still pretty big when compared to their more temperate climate relatives. There needs to be a low surface area to volume ratio, lots of volume, little surface area.
2. **Extremities tend to be small** to prevent undue heat loss (the surface area volume ratio thing again).
3. **Well insulated**, internally immediately under the skin with stored fat (blubber) and externally with fur (the best insulation of all, though not so good when wet) or feathers.
4. **Eat lots of high energy easy to digest food** to generate warmth from within. All large animals (from the smallest birds upwards) in Antarctica are carnivores. Meat is a more concentrated energy rich source of food than is vegetable matter that doesn't grow very well or very widely in Antarctica except

as tiny plankton in the seas which requires extreme specialization to gather. Food supply is the main problem, small animals cannot eat enough to keep warm in extreme cold, they lose heat faster than they can replace it by releasing energy from food. Antarctic herbivores are the zooplankton, especially krill, these are cold blooded and so convert the energy in phytoplankton into meat more effectively than if they were warm blooded.

5. **Huddle** together in large or small groups is a good way of getting protection from the wind and retaining warmth. The effect is similar to many huddled animals having the reduced surface area of a larger animal. E.g. penguins.

6. **Some animals as whales and dolphins - never leave the sea**, so little exposure to extremes of air temperature, then migrating north when the air temperature drops enough to freeze the sea, while seals - **entering the sea at times of extremely cold air temperatures and high winds**, then migrating north when the air temperature drops enough to start to make the sea freeze.

7. **Counter-current heat exchangers in flippers and feet** means that these parts are kept at a lower temperature than the rest of the body to reduce heat loss, blood is cooled when it enters and warmed up when it leaves the flipper or foot. e.g. seals and whales flippers, penguins flippers and feet.



Fig 1: Animals of cold climatic regions

Conclusion

The different species of warm blooded animals live in cold environments and have adapted in many ways to survive the harsh climate and conditions. They can survive in the harsh cold climate because of their thick fur, short extremities, adipose tissue and many other adaptive features.