

Emperor Penguin

Physical Adaptations:

- Large size retains heat - Emperors are twice the size of the next biggest penguin so are able to survive the extreme cold temperatures
- A Short stiff tail helps balance on land and forms a triangle of three points of contact which means the less contact with the ice to prevent heat loss.
- Chicks have soft feathers for **insulation**, this is effective on land but little use in the sea, they must grow thick oily feathers before they can swim.
- They can dive to a depth of 550 meters and hold their breath for up to 22 minutes, so are able to reach food that other birds can't reach
- Males can make "milk" in their throat which can be used to feed chicks in the winter before the female arrives back from fishing



Behavioural Adaptations:

- They huddle together in the winter to conserve heat to survive the winter
- They breed during the depths of the Antarctic winter, so the chicks are large enough to become independent during the summer when there is more food.

Adelie penguin

The second most southerly penguin species after the Emperor, breed in the far south, but leave it to head north with the onset of winter.

Physical Adaptations

- Short wings like flippers for swimming underwater
- Backward pointing spikes on tongue to stop slippery prey escaping
- Black above and white underneath makes it harder to see in the sea, and helps warming/cooling on land, back or front to the sun according to whether they are hot or cold.
- Muscle has large amounts of myoglobin to hold extra oxygen that is used up during a dive
- During a deep dive, the heart rate slows from 80-100 down to 20 beats per minute



Behavioural Adaptations

- Migrate north at the end of the brief summer looking for warmer temperatures
- Arrive in the south early in the summer season to take advantage of food supplies
- Tobogganing (sliding on their front while pushing with legs) saves a lot of energy in long journeys

Weddell Seal

The most southerly dwelling of all mammals. Live at the edge of pack ice wherever there is a breathing hole.

Physical Adaptations

- Fore and hind limbs developed into flippers for swimming
- Smooth, streamlined shape to pass easily through the water
- A substantial blubber layer lies under the skin acting as insulation, so allowing the seals to swim indefinitely in frigid Antarctic waters down to -2C
- Weddell seals can dive for over an hour, though 20 minute dives are more common. They can dive to 600m

Behavioural Adaptations

- Seals keep open breathing holes in the ice by rasping back and forth with their teeth, so allowing them to live further south than any other mammal
- They can swim large distances between breathing holes and cracks, finding the next hole using a form of sonar with high pitched sounds



Blue Whale

The largest animal ever to have lived, larger than any dinosaur, the huge bulk being supported by the sea. They can eat up to 4 tonnes of food a day in the Antarctic summer, they feed for about 8 months and then fast for 4 months living off their fat reserves.

Physical Adaptations

- 55 - 68 grooves that extend from the lower jaw to the navel. These allow a huge mouthful of water and food to be taken, expanding to about 6 times larger than normal size.
- Adult blue whales have a daily energy requirement supplied by up to 3.6 tonnes or 40 million individual krill eaten per day
- Blowholes (the two nostrils) located on top of the head.



Behavioural Adaptations

- Blue whales migrate to polar regions during the summer months of that region. There are distinct southern and northern populations which go to their respective pole, none go to both poles.
- Blue whales use sound to communicate with each other and also possibly as a means of finding krill swarms. They have been described as making the loudest noise made by any animal at 180 dB or more.