



Mammals



Mammal- Any of various warm-blooded vertebrate animals of the class Mammalia, characterized by a covering of hair on the skin and, in the female, milk-producing mammary glands for nourishing the young.


Marine Mammal Adaptations

Being a mammal in the water is tough! What adaptations help marine mammals succeed?



Keeping Warm



- Larger size
 - Surface area/ volume
 - Size is an advantage when retaining heat against the cold water.
 - Evident especially whales



Fun little facts about size of some whales;
To equate the size of a 100-foot blue whale, imagine being in a theater with multi-levels and high ceilings. If a blue whale was suspended head downwards, looking at you, the tip of its snout would be touching the floor and its large, grapefruit sized eyes would be staring at you from the top of the stages arch (approximately 30 feet). Its head would end at the ceiling and the rest of the body (about twice the size you are seeing) would be above the roof of the theater (3 or 4 theater heights total)!

Keeping Warm


- Hair/ fur and thick skin
- Lower blood flow to the extremities, to keep the core temperature warmer.

Oh my gosh Mr. Myka! Why do you make us take so many notes?!

Keeping Warm-blubber

- Is a fat laced with connective tissue and blood vessels
- 50cm thick and varies seasonally
- Can be up to 50% of body weight
- Smooths the body, protects, gives buoyancy and is a food reserve for times of migration.



CALL IT BLUBBER
Whale fat, or muktuk, in foreground, behind it, dried seal (at left) and caribou.


Live Birth and Breast Feeding

- Many migrate to warmer waters or actually do it out of water.
 - 6,000 mile journey, is the longest of any mammal. They leave Alaska in Oct and arrive in Mexico mid December to mate and give birth. Most have a 12 month gestation period to match the migration pattern.



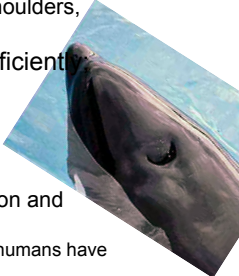

Live Birth and Breastfeeding

- The babies are born quickly, flukes first.
- Precocious at birth, develop quickly. (gray; 15ft long at birth, 30ft after one year.)
- The milk is 50% fat with high protein. Instead of suckling, the milk is injected into the baby's mouth.
- There is a long period of maternal care, the family aunts help too.
- They only have one baby at a time.




Conserving O₂

- Exceptionally streamlined;
 - Blubber smoothes out the body (fusiform)
 - No parts 'sticking out' ex; shoulders, ears...
- They breath quickly and efficiently
 - Horizontal flukes
 - Dorsally located nostrils;
 - 2 blowholes (baleen)
 - 1 blowhole (toothed)
 - Strong and forceful exhalation and complete inhalation.
 - 90% lung volume turn over. (humans have 5-15% turn over)



Diving


- This ability is necessary for many to get food yet difficult because of dependency on air.
- Fun Fact; sperm whales can go two miles down for over 2 hours!



Diving cont.

- Do they have extra large lungs? **NO!**
- They do have;
 - More blood (30% more)
 - More rbc
 - More hemoglobin
 - More myoglobin
 - Tolerant of CO₂
 - Bradycardia "diving response"
 - Blood only to essential organs

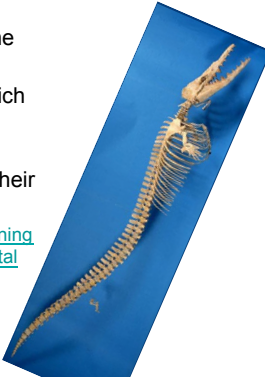
• Slows heart rate up to 50%



Proof of Terrestrial Origin

1. Need to breathe air from the surface;
2. The bones of their fins, which resemble the limbs of land mammals
3. The vertical movement of their spines:
 - Characteristic more of a running mammal than of the horizontal movement of fish.

- Whale vestigial hindlimb is evidence of basilosaurids' terrestrial heritage.



Marine Mammals

- **Have similar adaptations for the marine environment**
 - **Body Size**
 - **Streamlined Shape**
 - **Insulation**
 - Dense fur or blubber
 - **Modified skeleton**
 - Shortening of appendages
 - Loss of hind limbs
 - **Similar Physiological Adaptations**
 - For diving, thermoregulation, osmoregulation, communication and orientation
 - **Senses** - vision is poor, uses echolocation to compensate

Marine Mammals

- **Have similar habitat requirements**
 - **Require the aquatic habitat for survival**
 - They can therefore be used as indicators of habitat degradation.
- **Many have been exploited by humans to the point of near extinction**

Types of Marine Mammals

- **Three Orders**
 - **Carnivora**- The mammalian carnivores, includes cats and dogs
 - **Suborder Pinnipedia** ('fin'-footed')
 - **Other Marine Carnivora**
 - » **Family Ursidae:** Polar Bears
 - » **Family Mustelidae:** Otters
 - **Cetacea**- Whales, dolphins and porpoises
 - **Sirenians**- Manatees and Dugongs

- Seals, Sea lions & Walruses
- Sea otters
- Polar bears
- Whales and Dolphins
- Manatees

Family Balaenopteridae (baleen whales)

Odontoceti (toothed whales)

- **Odontoceti** (toothed whales)
 - Possess teeth in one or both jaws.

Family Monodontidae

- 3 Species: Beluga, Narwal,
- Generally no dorsal fin or small dorsal fin
- Head blunt, no beak

Narwhal 'horns' are actually erupted left teeth. They're capable of sensing temperature, salinity, particle density and touch.

Sirenians- Manatees and Dugongs

- Evolved from elephants and other subungulates
- Skin lacks hair
- Well developed vibrissae (whiskers)
- Well developed layer of fat
- Pectoral limbs modified as flippers
- Hind limbs absent
- Tail modified into flukes
- Ears absent