

TETRAPODS

1. SUPERCLASS TETRAPODA

mostly terrestrial - originally evolved on land
(more O₂, less competition)

3 groups with marine representatives
- reptiles, birds, mammals, (no amphibians)

2. MARINE REPTILES

Class Reptilia - most species tropical (ectothermic)
- lungs (no gills), scales impermeable to water
- salt glands to excrete excess salt
- eggs protected by leathery shell

sea turtles - all endangered (habitat, poaching)
- herbivorous, flippers (front propel, rear steer)
- shell with carapace & plastron
(but head & legs don't retract)

sea snakes - Indian & western Pacific
- flattened tail for slow swimming
- forked tongue for olfaction, O₂ also absorbed by skin
- neurotoxic saliva (venom like cobra's) but no fangs

Galápagos Iguana - large herbivorous lizard near Ecuador

crocodiles - s.e. Asia & Australia mangroves
- largest reptile (7 m/1 ton), aggressive
- stout body, long narrow snout, protruding teeth

3. PELAGIC BIRDS

Class Aves - feathers (endothermic)
- entire body adapted for flight (body shape, wings, light weight, reduced bones & gonads, uric acid)
- marine species feed entirely in ocean but nest on land

penguins - southern hemisphere only
- flippers for flying through water

albatrosses - tubenose excretes salt
- most oceanic bird (months at sea)

pelicans, cormorants, boobies

- throat pouch for scooping fish

gulls, terns, puffins - also freshwater

4. MARINE MAMMALS

Class Mammalia - dominant vertebrates on land

- umbilical cord, placenta, mammary glands

3 groups returned to oceans - whales, carnivora, manatees

- streamlined (front flippers steer, rear flippers & tail flukes propel)
- lungs more efficient than on land
- fur & blubber insulate (endothermic)
- no salt gland (need to conserve H₂O)

5. WHALES

Order Cetacea - huge (blubber to counter gravity)

- little hair, large brain, no hind legs (bones vestigial)
- horizontal tail flukes propel vertically
- blowhole evolved from nostrils

toothed whales - smaller & deeper

- narrow jaw with conical teeth
- vocal cords click for echolocation focused by melon
- Sperm Whale - size 18 m/60 ft, Moby Dick
- Killer Whale - largest dolphin
- Narwhal - single upper right tusk
- dolphins - large, slim beak, perform at shows
- porpoises - small, blunt/no beak

baleen whales - larger & shallower

- huge jaw & baleen plates to filter plankton, no teeth
- complex low-frequency songs resonate from larynx (no vocal cords)
- Blue Whale - largest animal, size 33 m/110 ft, 209 tons
- Humpback Whale - traps prey with bubble net
- Grey Whale - migrates along Calif coast

6. CARNIVORA

Order Carnivora - mostly terrestrial (cats, dogs, foxes, etc.)

- marine species only forage in ocean (return to land to rest & breed)

true seals - no external ears

- no underfur (lots of blubber, plump)
- hind flippers pointed back for swim (clumsy on land)
- Elephant Seal - trunk in males

fur seals - small external earflaps

- soft underfur (less blubber, sleek)
- hind flippers turn forward to walk
- front flippers for swimming
- Sea Lion - barks, at shows & Pier 39

Walrus - largest seal (2 ton), Arctic

- pair of long tusks to probe clams

Sea Otter - smallest marine mammal

- densest of all fur (very warm, little blubber)
- huge appetite (20% weight/day, shelled inverts)
- hammers open shell while floating on back

7. MANATEES

Order Sirenia - dugong or sea cow

- tropical/subtropical coasts & rivers
- herbivorous (algae & sea grass)
- large stocky body (lots blubber)
- slow swim (front flippers, no hind legs, broad fluke)
- all endangered (habitat loss, pollution, propellers)