

What underlies the incredible diversity of life on Earth? How have complex life forms evolved? The journey from water to land, the return of land mammals to the sea, and the emergence of humans all suggest that creatures past and present are members of a single tree of life.

1. Whales are aquatic mammals that evolved from a terrestrial ancestor.
  - a. Comparative anatomy of skull, pelvic girdle
    - 1) Ear of whale on the skull of the animal that looked like a wolf
  - b. Intermediate fossils between two living animals are called transitional forms
    - 1) Paleontologists are geologists interesting in the history of life
  - c. Now, we know of many whale transitional species
    - 1) *Basilosaurus*, *Ambulocetus*, *Pachycetus*, *Rodhocetus*, and more
  - d. Living species share other similarities besides bones
    - 1) DNA, soft tissues, reproductive strategies, and locomotion
2. Some fish evolved into tetrapods.
  - a. Comparative anatomy of fish and tetrapods reveal common origins
    - 1) Devonian period has transitional forms from 370 million years ago
    - 2) Bones from one of life's four-legged creatures found in a streambed
  - b. Limbs had already evolved in lobe-finned fish
    - 1) *Acanthostega* had aquatic features but also had arms and legs
3. Burgess Shale.
  - a. Animals evolved in the Cambrian explosion, 600 million years ago
  - b. First bodies appear, some recognizable, others bizarre
    - 1) But similar to living animals with heads, tails, and appendages
  - c. Precursor to our own ancestors, variations of the same theme
4. DNA and Genes; the recipe that build bodies.
  - a. Bodies had repeating structures
    - 1) Some had deformities, the underlying blueprint was being disrupted
  - b. Fruit Fly genes
    - 1) Geneticists were able to cause similar deformities by altering genes
    - 2) Mouse genes in fruit flies to produce compound eyes
  - c. Evolution is simpler than scientists thought
    - 1) Commonality of form due to the same set of genes
5. Human Evolution.
  - a. Transition to two-legged walking
  - b. Lemurs used as living analogs to compare with fossils
  - c. Human history has occurred over a short period of time, compared to evolutionary history and the age of the earth

