## 25.4 The rise and fall of groups of organisms reflect differences in speciation and extinction rates

- The rise and fall of groups depends on speciation and extinction rates within the group
- Plate Tectonics
  - According to this theory, Earth's crust is composed of plates floating on Earth's mantle
  - Continental plates gradually move over time, altering physical geography and climate
  - These changes lead to extinctions of some organisms and bursts of speciation in others
- Mass Extinctions
  - Evolutionary history has been punctuated by five mass extinctions that radically altered the history of life
  - Some of these extinctions may have been caused by changes in continent positions, volcanic activity, or comet/meteorite impacts
  - Mass extinction can alter ecological communities and the niches available to organisms
  - The percentage of marine organisms that were predators increased after the Permian and Cretaceous mass extinctions
- Adaptive Radiations

## 25.5 Major changes in body torme or result frem at a free of developmental acces esult from classes withe sequences and regulation

- the rate, timing, and spatial pattern of changes in an organism's form as it develops into an adult
- Heterochrony is an evolutionary change in the rate or timing of developmental events
- The Evolution of Development
  - The evolution of new morphological forms can be caused by changes in the nucleotide sequences or regulation of developmental genes
  - New morphological forms likely come from gene duplication events that produce new developmental genes
  - Changes in morphology likely result from changes in the regulation of developmental genes rather than changes in the sequence of developmental genes

## 25.6 Evolution is not goal oriented

## • Evolutionary Novelties

- Most novel biological structures evolve in many stages from previously existing structures
- Complex eyes have evolved from simple photosensitive cells independently many times
- Exaptations are structures that evolve in one context but become co-opted for a different function