

I Plate Tectonic Theory

A Continental Drift

- 1 Proposed by Alfred Wegner in 1915
- 2 Continents are a giant jigsaw puzzle
- 3 Put together get Pangea (“all land”) a supercontinent
- 4 Evidence for Continental Drift
 - a Jigsaw Pattern Fit
 - i Using the Continental Shelves continents fit nicely
 - ii Continents began breakup \approx 200 million years ago
 - b Fossils
 - i Mesosaurus
 - (i) **Fresh water** reptile
 - (ii) Could swim, but not an ocean
 - (iii) Found in South America and Africa
 - ii Lystrosaurus
 - (i) **Land dwelling** reptile
 - (ii) Could not swim
 - (iii) Found in Africa, India, and Antarctica
 - iii Cynognathus
 - (i) **Land dwelling** reptile
 - (ii) Could not swim
 - (iii) Found in Africa, South America.
 - iv Glossopteris
 - (i) **Fern**
 - (ii) Seeds too big to be transported by wind.
 - (iii) Habitation area dictated by ability of plant to spread.
 - (iv) Found in Africa, India, South America, Australia, and Antarctica.
 - c Rocks
 - i Similar composition, age, and geologic structures on both sides of the Atlantic
 - ii When continents are together have continuous pattern
 - d Mountains
 - i See continuation of mountains on both sides of Atlantic Ocean
 - ii North America and Europe together have a continuous mountain chain, rock is similar composition and age
 - e Paleoclimatic Data
 - i Evidence of Tropical Climates in non tropical areas.
 - ii Evidence of Low-latitude deserts in non desert areas.
 - iii Evidence of Glaciers in areas of tropical climates today.
- 5 Question for Wegner
 - a What is the mechanism of the movement?
 - b Wegner proposed that the tidal influence of the moon was strong enough to move continents.
 - c Continents plowed through ocean crust.

B Refining a Hypothesis

- 1 Paleomagnetism

- a Earth has a magnetic field creating a north and south pole – similar to a small magnet.
 - b Magnetic Field has reversed over Earth's history.
 - c Magnetic Signature
 - d Iron-rich (ferromagnesium) minerals become weakly magnetized in the direction parallel to the existing magnetic field as they cool below 580 °C.
 - e The rock retains the signature unless heated up past 580 °C.
 - f If the rock moves or if the magnetic pole changes, the rock retains the original magnetic signature.
- 2 Polar Wandering
- a Study of lava flows showed that magnetic signature of lava flows of different ages varied widely.
 - b Magnetic signatures indicate that the magnetic poles have moved.
 - c Taken separately with no continental movement, the data indicate different pathways for the pole movement.
- 3 Magnetic Reversals and Ocean Floor Data
- a Earth's Magnetic field has reversed
 - b In addition to magnetic signature, polarity is recorded in rocks [either normal (present day) or reversed].
 - c At mid-ocean ridges, new oceanic crust (*basalt* – mafic composition) is generated and records the magnetic signature and polarity.
 - d Magnetism Patterns at Mid-Ocean Ridges
 - e World-wide Seafloor Distribution