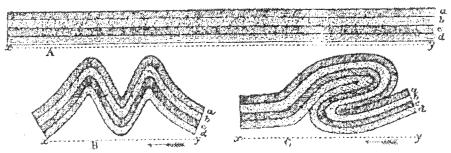
INTRO TO PLATE TECTONICS AND CONTINENTAL DRIFT

Name: Key Block: _____

Part I.

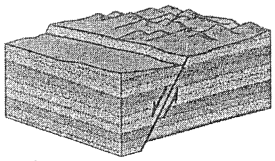
1. There are several observations that can be made to prove that the earth's lithosphere does move



Direct observations:

a. Volcanism b. Earthquakes

Indirect observations (past movement):



c. Folding d. Faulting

e. Uplift - ex: Catskills containing marine fossils (oceanic organisms)

2. The Study of Plate Tectonics: States that the earth's lithosphere is subdivided into plates which move slowly over the plastic/ductile asthenosphere over long periods of time.

Rate of movement: 2-10 cm/year page 5 of the ESRT shows the earth's tectonic plates

There are 3 different types of boundaries:

a. Divergent: ← → b. Convergent: → ← c. Transform ↑/↓

Where plates move apart Where plates move together Where plates Slide past one another

The world's major active volcanoes and the occurrences of earthquakes usually occur along plate boundaries. (when plates move together, move apart, or slide past one another)

3. Continental Drift

Alfred Wegner first proposed the idea of Continental Drift which suggested that the continents today seemed to fit together and form a super continent called Pangea.

According to the ESRT pg. 8-9 (Geologic Timeline): Pangea began to breakup during the Triassic time period about 200 million years ago (up to 230 ma).

There was a multitude of scientific data that was collected over Alfred Wegner's life to attempt to prove the continental drift hypothesis.

a.) Fossil Evidence: The same fossils were found on multiple continents today ex: Glossopteris (Fern) found in Australia, Antarctica, India, Africa * Reptiles found in Antarctica!

b.) Paleo climatic Evidence: Coal deposits found in N. America + Europe (coal can only form in tropical Climates!)

c.) Glacial Striations: - rocks had the same direction of scratches (striations) from a glacier once covering S. America Africa, Antarctica, Australia

d.) Matching Rock Types and Sequences: The same age and order of rock layers occured on adjoining continents

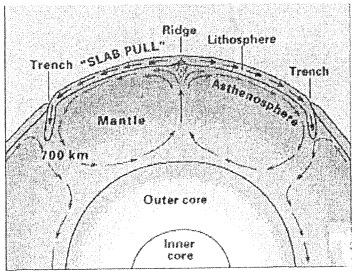
e.) Matching Mountain Belts from different continents:

ex: The appalachian mountain have the same rocks, age and features as the mountain belt in Africa + Europe

After Pangea broke apart, North America, India, Eurasia and Africa all drifted North. While Australia, Antarctica, and South America remained but drifted south.

Alfred Wegner was thought to be a joke because he couldn't prove how or why the continents moved!

PART II:



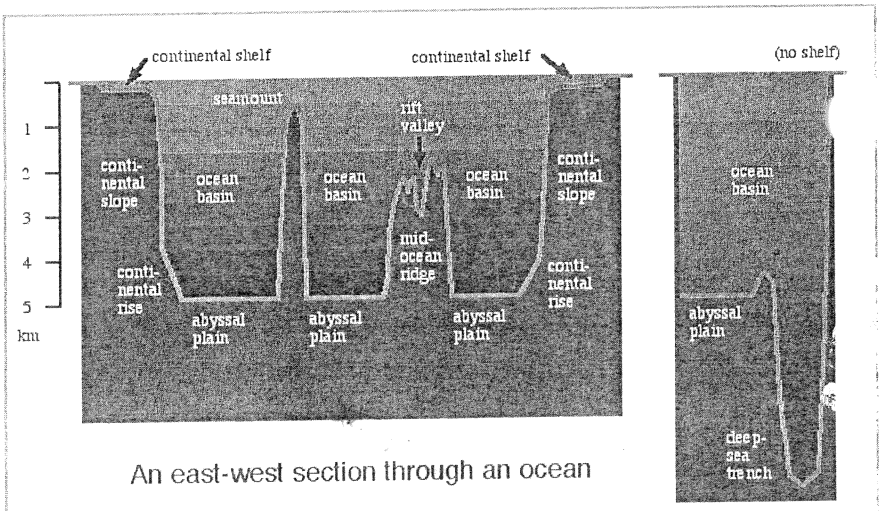
What drives the motion of the plates?

Convection Currents within the mantle is the driving force behind plate movement!

Thermal convection cells are due to differences in density within the earth

Alfred Wegner had thought that the continents "plowed" through the oceanic crust...

Seafloor Spreading was a major discovery in the 1900's. With Sonar Mapping and Manometers, we were able to make maps of the ocean floor topography. Through use of this technology we discovered that oceanic crust is more mountainous and younger compared to continental crust.



An east-west section through an ocean

At mid ocean ridges the oceanic crust: Splits apart, forming an underwater volcanic mountain chain and a rift valley at the center.

Basaltic Rocks dated at or near ocean ridges are younger compared to rocks dated at deep see trenches which are older. In summary, New crust is created at ocean ridges, and old crust is destroyed at ocean trenches.

↑ see pg 10 of ESRT (TDB)

USING PATTERNS OF MAGNETISM TO PROVE SEAFLOOR SPREADING

Every few or so thousand years the earth reverses Polarity.

This means that magnetic north switches to magnetic south. Because basalt has iron it, the grains align themselves to the magnetic field of the earth at that time. The parallel striping illustrating past changes in earth's magnetic field on both sides of mid ocean ridges contributed evidence that the seafloor was spreading.