

## Sea-Floor Spreading

I. **Mid-Ocean Ridges:** undersea mountain chains where new ocean floor is produced

A. In the mid 1900s, scientists mapped the mid-ocean ridges using sonar.

1 **sonar:** a device that determines the distance of an object underwater by recording echoes of sound waves

B. Mid-ocean ridges curve like the seam of a baseball along the sea floor; they extend into all of Earth's oceans.

C. Most of the mountains in the mid-ocean ridge system lie hidden underwater, but in a few places the ridge pokes above the surface. (Iceland)

D. The mapping of mid-ocean ridges made scientists curious about how they formed.

## II. What is Sea-Floor Spreading?

A. Harry Hess, an American geologist studied mid-ocean ridges by carefully examining maps & thinking about how the ocean floor could relate to continental drift.

1. In 1960, he proposed a radical idea called sea-floor spreading.

a. **sea-floor spreading:** the process by which molten material adds new oceanic crust to the ocean floor.

2. In sea-floor spreading, the sea floor spreads apart along both sides of a mid-ocean ridge as new crust is added.

3. As a result, the ocean floors move like conveyor belts, carrying the continents along with them.

#### 4. The process of sea-floor spreading:

- a. Begins at a mid-ocean ridge, which forms along a crack in the oceanic crust.
- b. Along the ridge, molten material beneath the surface rises & erupts as older rock moves outward on both sides of the ridge.
- c. As the molten material cools, it forms a strip of solid rock in the center of the ridge.

### III. Evidence From Sea-Floor Spreading

- A. Evidence from molten material: rocks shaped like pillows were found only where molten material hardens quickly after erupting under water.
- B. Evidence from magnetic stripes: Stripes of rock that formed when Earth's magnetic field pointed North alternate with stripes of rock that formed when the magnetic field pointed south.

- C. Evidence from drilling samples: the farther away from a ridge rock samples were taken, the older the rocks were; the youngest rocks were always in the center of the ridge.

### IV. Subduction at Trenches

- A. The ocean floor plunges into deep under-water canyons called deep ocean trenches: deep valleys along the ocean floor beneath which oceanic crust slowly sinks toward the mantle.
- B. Subduction: the process by which oceanic crust sinks beneath a deep-ocean trench and back into the mantle at a convergent plate boundary.
- C. Subduction and sea-floor spreading work together; they both change the size and shape of oceans.