

XVI. Cenozoic Geology & Life (chapters 18-20)

A. Introduction

- 1. Traditional periods (Tertiary & Quaternary) versus modern periods (Paleogene & Neogene)**
- 2. Seven epochs**
- 3. Cenozoic starts at 65 Ma with K-T mass extinction**
- 4. “Age of Mammals”**

B. Highlights of Cenozoic geology

1. Paleogeography & plate tectonics

- a. Pangaea continues to break apart**
 - b. Continents move toward present spots**
 - c. Tethys Sea closes as India moves north**
 - d. Atlantic Ocean widens further**
 - e. North America & South America not connected in Paleogene (but connected at Panama by the Pliocene)**
 - f. Australia & Antarctica separate (rift apart)**
 - g. Africa collides into Europe & western Asia in the Neogene**
 - h. India collides with Asia in the Miocene**
- #### **2. Mountain building**
- a. Laramide Orogeny (late K-Paleogene)**
 - b. Alpine Orogeny (Paleogene-Neogene)**

c. Basin & Range tectonics (Paleogene-Neogene)

d. Himalayan Orogeny (Neogene)

e. Sierra Nevada uplifts (Miocene)

3. Sea levels & climates

a. Paleogene - sea level lower than in the K

b. Pleistocene - fluctuating sea level

c. Holocene - low sea level, but rising now

**d. If Greenland & Antarctic ice sheets melt? - sea level will rise
an estimated 120-240 meters**

e. Paleocene to mid-Eocene: greenhouse climate

f. Rapid warming at Paleocene-Eocene boundary

g. mid-Eocene to Holocene - icehouse climate

h. Ice Ages in Pliocene-Pleistocene

**i. Many major ice sheet advances (3.2 Ma to 11,500 years ago)
with warm intervals between (interglacials)**

**ii. Now - an interglacial; continued warming since Industrial
Revolution & post-World War II hyper-overpopulation**

4. Late Eocene impacts (comet/asteroid shower)

a. Two large impacts

i. Chesapeake Bay Impact

a) Between 33.1 & 35.3 Ma

b) Evidence: concentric fractures (85 km diameter hole & 2 km deep); breccia fill; tsunami deposits; shocked quartz; tektites

c) Deformed rocks continue downward ~7 miles

ii. Popigai Impact (35.7 Ma), ~90 km diameter

b. Two small impacts

i. Mistastin Impact (36.4 Ma), 28 km diameter

ii. Wanapitei Impact (37.8 Ma), 7.5 km diameter

5. Yellowstone Hotspot appeared

6. Columbia Plateau Flood Basalts (Miocene) (also known as: Columbia River Flood Basalt)