

Geological Time Handout

1. Geological Time Scale.

- a. **Presolar Era.** (18–4.6 billion years?)
 - i. Origin of the Universe— 16 billion years?
 - ii. Formation of Milky Way Galaxy— 12 billion years?
- b. **Formative Era.** (4.6–3.6 billion years)
 - i. Formation of sun and planets— 4.6–4.5 billion years.
 - ii. Heavy meteoritic cratering— 4 billion years.
 - iii. Oldest rocks; crystals?— 3.8 billion years.
 - iv. Condensation of atmospheric water into oceans— 3.8 billion years.
- c. **Archeozoic Era.** (3.6–1.5 billion years)
 - i. Earliest fossils (**algae**)— 3.6–3 billion years.
 - ii. Crustal and atmospheric evolution— 3–2.6 billion years.
 - iii. Oxygen increasing in atmosphere— 2 billion years.
 - iv. Oxygen producing microbes— 2 billion years.
- d. **Proterozoic Era.** (1.5 billion–540 million years)
 - i. First macroscopic life forms; sexually reproducing life forms; growth of protocontinents— 1 billion years.
 - ii. Small soft forms.
- e. **Paleozoic Era.** (540–245 million years)
 - i. **Cambrian Period.** (540–500 million years)
 1. Earliest abundant fossils (Trilobites)
 - ii. **Ordovician Period** (500–440 million years)
 1. Fishes— 500–450 million years.
 2. Waxy coated algae begin to live on land— 430 million years.
 - iii. **Silurian Period.** (440–410 million years)
 1. Early land plants.
 2. Millipedes evolve, the first land animal.
 - iv. **Devonian Period.** (410–360 million years)
 1. Appalachian mountains are formed via a plate tectonic.
 2. Appearance of primitive sharks.
 - v. **Mississippian Period.** (360–325 million years)
 1. Rise of amphibians— 350–300 million years.
 2. Primitive insects.
 - vi. **Pennsylvanian Period.** (325–290 million years)
 1. Primitive ferns.
 2. Rise of reptiles— 300–200 million years.
 3. Winged insects.
 - vii. **Permian Period.** (290–245 million years)
 1. Permian Period mass extinction.
 2. Conifers.

- f. **Mesozoic Era** (245-65 million years)
 - i. **Triassic Period** (245–190 million years)
 - 1. First dinosaurs.
 - 2. Bees
 - 3. Pangaea starts to break apart.
 - ii. **Jurassic Period** (190–136 million years)
 - 1. Dominance of dinosaurs.
 - 2. First mammals and birds.
 - 3. Insects abundant.
 - iii. **Cretaceous Period** (136–65 million years)
 - 1. Dinosaurs dominant to end.
 - 2. Both marsupial and placental mammals appear.
 - 3. First flowering plants appear.
 - 4. Continents take present shape.
 - 5. Large meteorite impact at end of period?
- g. **Cenozoic Era** (65 million years–Present)
 - i. **Tertiary Period (Paleogene/Neocene)** (65–1.8 million years)
 - 1. **Paleocene Epoch** (65–54 million years)
 - a. Great development of primitive mammals.
 - b. Earliest known primate from this period.
 - c. Building of Rocky Mountains.
 - 2. **Eocene Epoch** (54–38 million years)
 - a. Mammals consolidated their status as dominant land vertebrates.
 - 3. **Oligocene Epoch** (38–23 million years)
 - a. Many older types of mammals became extinct.
 - b. First appearance of apes.
 - 4. **Miocene Epoch** (23–5 million years)
 - a. Emergence of dogs, horses and human-like apes appeared.
 - 5. **Pliocene Epoch** (5–1.8 million years)
 - a. Modern mammals became dominant.
 - b. Ape-like humans appeared in Africa.
 - ii. **Quaternary Period** (1.8 million years–Present)
 - 1. **Pleistocene Epoch** (1.8 million years–10,000 years)
 - a. Advance of Ice sheets in Northern Europe and North America.
 - b. Many giant mammals became extinct.
 - c. Early humans appear.
 - 2. **Holocene Epoch** (10,000 years–Present)
 - a. Rising temperatures and retreat of ice sheets.