

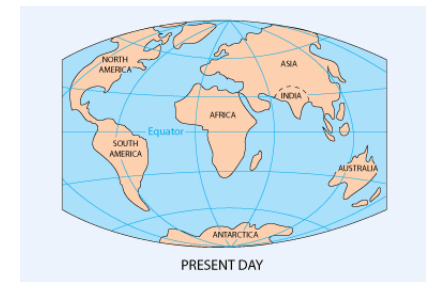
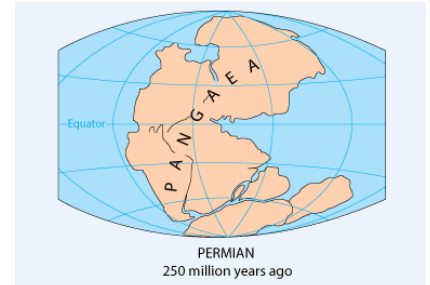


FACT SHEET: Geology of Konza Prairie

Based on PowerPoint presentation made by Dr. Keith Miller, KSU

GEOLOGIC TIME

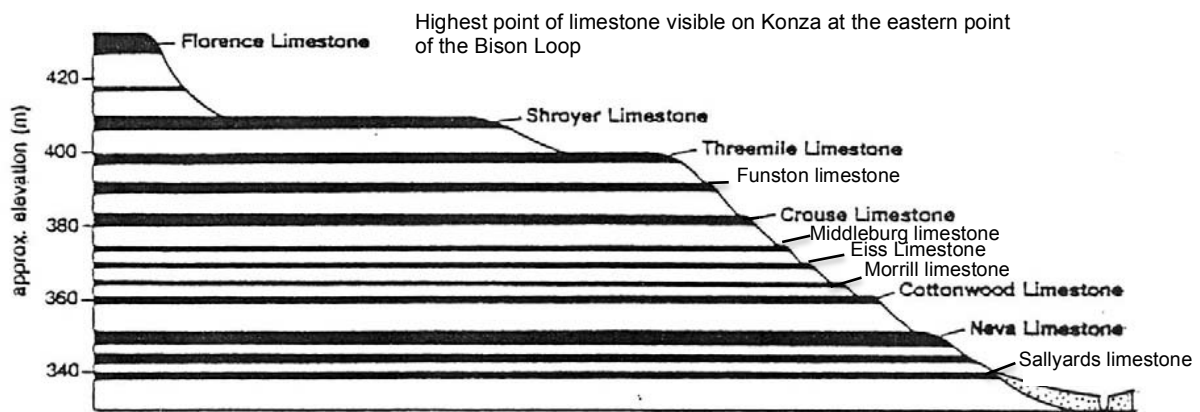
- The geology of Konza goes back approximately 290 million years. To understand it one would be aided by understanding geologic time and how it is parceled.
- Geologic time scale (from broadest to more specific):
 - Eon (broadest)
 - Era
 - Period
 - Epoch
- Konza's prominent limestone and shale layers were deposited:
 - ... in the **Phanerozoic eon** (Phanero = visible; zoic = animals) that began 540 million years ago (mya) and continues to today.
 - ... in the **Paleozoic era** (Paleo = early, ancient; zoic = animals) that lasted from 540 mya to 251 mya
 - ... in the **Permian period** that began 299 mya and lasted until 251 mya.
- The **Pleistocene epoch** lasted from 1.8 mya to 10,000 years ago (very recent) and brought glacial fill to cover some of the Permian limestone.



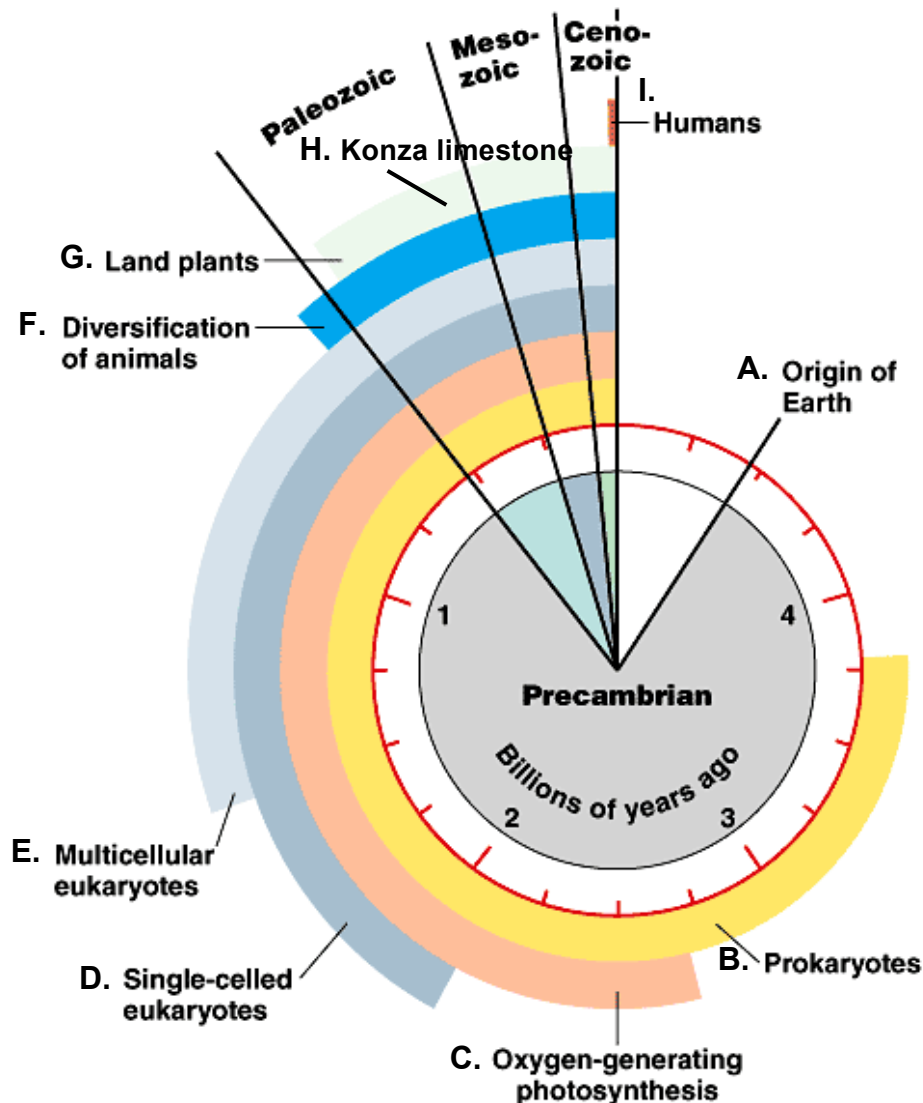
KONZA'S LIMESTONE

- 290 mya that land that is now Konza Prairie was 10° north of the equator in a landmass consisting of all of the continents together = "Pangea" supercontinent. To put that into perspective, we are currently 39° north of the equator.
- Pangea formed 300 million years ago (mya) and began to break apart 100 mya.
- The limestone on Konza formed 270-290 mya during the Permian era.
- **Calcium carbonate (CaCO₃)** - found in the shells of bivalves (clams), brachiopods, fusulinids (foraminiferans), and secreted by algae and bacteria – makes up "**limestone**".
- Limestone will also contain **calcite** – a crystalline form of calcium carbonate that may be transparent and reflective.

- Any mineral that contains CO_3 is termed a “carbonate” mineral. All carbonate minerals dissolve in acid – a trick you can use with HCl – limestone will bubble when HCl is dropped on it (to form water and salt, if you’re brave enough to taste it when the bubbling is done).
- Limestone layers were formed when there was water present in the shallow inland sea. Marine organisms secreted CaCO_3 that was deposited on the ocean floor to build up as rock layers.
- Polar glaciers periodically built up and retreated in a cycle known as a “**Cyclothem**”. When the glaciers were building up (snow would land on the glacier and stay, adding to the ice pack), the water levels of the inland sea (that evaporated to help form snow) would decline.
- When the glaciers were building, parts of the sea would become exposed and terrestrial. Soils (ancient soils = “paleosols”) building in the terrestrial parts of the dry sea bed left clay and silt clumpy layers that became became **mudstones**. Mudstones that were compacted to form thin, flat sheets of clay-based rock are **shales**.
- Mudstones are much softer than the limestones and erode much faster than the limestone. The differential rate of erosion accounts for the terracing pattern seen on the hillsides of the Flint Hills.
- When glaciers melted the inland sea levels would rise and new layers of limestone (from marine organisms) would be deposited.
- 13 different cycles (cyclothem) of limestone and shale/mudstone occurred to form the hills seen at Konza Prairie.
- In the illustration below the limestone layers are black and the shale layers are white



- Threemile limestone = top of Butterfly Hill and top of the Nature Trail
- Morrill limestone = base of Butterfly Hill
- The Neva limestone layer is visible just above the brome field on the Nature Trail.
- The Sallyards limestone is visible in the bed of Kings Creek at the suspension bridge.



This 24-hour clock model shows where major landmarks in the evolution occurred on Earth relative to the formation of the planet 4.6 billion years ago.

- A. **Origin of Earth** = 4.6 billion years ago
- B. **Prokaryotes** = Bacteria and Archaea – 3.8 billions years ago
- C. **Oxygen-generating photosynthesis** = by pigmented bacteria (cyanobacteria) 2.7 billion years ago
- D. **Single-celled eukaryotes** = Amoeba and Paramecium – protists that have advanced cells (eukaryotic cells) but are still very simple – 2.1 billion years ago
- E. **Multicellular eukaryotes** = Algae, protists that have many cells but still have a simple structure – 1.5 billion years ago
- F. **Diversification of animals** = “Cambrian explosion” – sudden increase in the diversity of many animals – 540 million years ago
- G. **Land plants** = Mosses and other early plants first able to live on land – 500 million years ago
- H. **Konza limestone** = From an inland sea and marine creatures – 290 – 270 million years ago
- I. **Humans** = 200,000 years ago