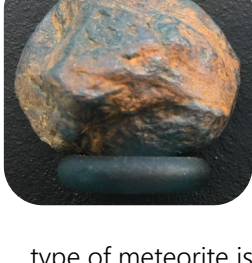


Welcome to the Utah State University™

Geology Museum



Meteorites - Meteorites are remnants of protoplanets that existed at the beginning of our solar system. They are the oldest objects found on our planet at around 4.6 billion years. No known Earth rocks are this old. There are two main types of meteorites - *stony meteorites*, which represent the outer layer or crust, and *iron meteorites*, which represent the inner core of the destroyed protoplanet. A very interesting intermediate type of meteorite is pallasite, which contains crystals of olivine (also known as the gem peridot) in a matrix of iron and nickel. These are thought to be remnants of the core-mantle boundary of a protoplanet. 94% of meteorites

Question - Why do you think there are no Earth rocks that are as old as meteorites?

Answer - The Earth is dynamic and rocks that old would likely be destroyed by

Local Rocks - The large figure on the wall above this case is a geologic cross-section of Logan Canyon. This shows that the rocks in the canyon are mainly from the Paleozoic Era (540-250 million years ago) and have been folded and thrust from west to east by the Sevier Orogeny from 120-80 million years ago. Examples of rocks from the various formations are displayed in the case below. The great majority of these rocks are sandstones, limestones, and dolostones which were deposited when Utah was covered by a shallow, tropical ocean. This ocean covered Utah long before



Question - Why do you think that rocks younger than 250 million years ago are

Answer - The rocks exposed in Logan Canyon were deeply buried and covered of the younger rocks. Uplift over the last 15 million years has resulted in the erosion by younger rocks. Exposure of the ones you now see in the canyon.



Fluorescent Minerals - These minerals fluoresce, or give off light, when struck by high-energy ultraviolet light. The display shows examples of these minerals when exposed to normal (fluorescent) light, long wavelength UV light (moderate energy), short wavelength UV light (high energy UVC), and a combination of both UV wavelengths. What is occurring during fluorescence is the excitation of electrons in the atomic structure of the minerals. These electrons temporarily "jump" to a higher level within the atomic structure; when they fall back to their original level, energy is given off in the form of light.

Question - Which minerals respond best to long wavelength UV light? Which minerals respond best to short wavelength UV light?

Tempskya (tree fern) - (on floor by Percy) This tree-like giant fern lived during the Cretaceous Period (~125 million years ago) and reached some 4.5m or 15' in height. *Tempskya* may have been a food resource for the large herbivorous



Percy, the *Utahraptor* - *Utahraptor* from the Cedar Mountain Formation of eastern Utah is the oldest (~125 million years ago) and largest (reaching 7m or 23' in length) of the dromaeosaurid (Raptors) dinosaurs. The famous *Velociraptors* in the movie, Jurassic Park, were actually small, turkey-sized dinosaurs, and *Utahraptor* would have been a more accurate choice for the

Dinosaur Bone - This limb bone likely belonged to a large Sauropod dinosaur that lived during the Cretaceous Period (~125 million years ago). Many dinosaur bones from Utah are



Question - What is the process of fossilization that preserved this bone?

Answer - Petrification or permineralization. The original pore space is infilled by calcite or silica.

Fossil Plants - Plants first colonized the land in the Middle Ordovician Period (~470 million years ago). By the Late Devonian Period (~370 million years ago), forests of tall trees were present. The Devonian forests consisted of scale trees, giant horsetails, ferns, seed ferns, and progymnosperms. Many of the coals that fueled the industrial revolution in Europe and North America were formed by these plants during the Carboniferous Period (359-299 million years ago). Woody plant material is often preserved through the infilling of pores by mineral deposits. Soft tissues like leaves may be preserved as carbon films or simple impressions in fine-grained soft sediment. There is a specimen of the fossil seed fern, *Glossopteris*, on display. The distribution of this fern on all the southern continents was one of the lines of evidence that Alfred Wegener used in the development of his theory of continental drift.



Question - Which plant specimens in the case are examples of petrification?

Answer - The opalized wood has been permineralized. Samples of *Glossopteris*, *Equisetum*, and the palm frond have undergone distillation. The specimens of

Green River Formation Rock - (located on the wall above the Green River Fossil Case) - This polished slab displays annual layers also

Question - How much time is represented by one foot of Green

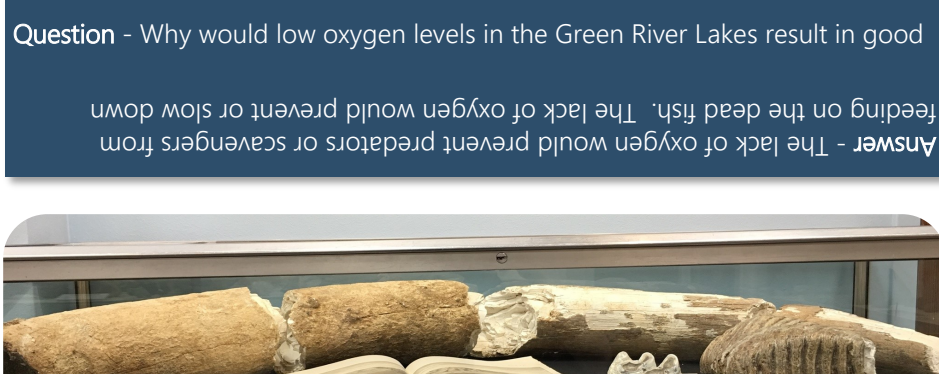
Answer - Approximately 2,000 years.

Question - There are two specimens of gars (fish); one large specimen is nearly perfect, the other, smaller one has broken down into many pieces. What do you think caused this difference in

Answer - The well preserved one was rapidly buried in deep water under low oxygen conditions. The poorly preserved specimen was

Question - Why would low oxygen levels in the Green River Lakes result in good

Answer - The lack of oxygen would prevent predators or scavengers from feeding on the dead fish. The lack of oxygen would prevent or slow down

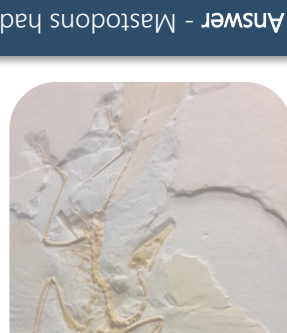


Pleistocene Fossils - During the Pleistocene Epoch (~2.6 million years - 12 thousand years ago), Utah may have resembled the plains of Africa in that there was a large megafauna consisting of mammoths, mastodons, woolly rhinoceros, camels, saber-toothed cats and cave bears. The large tusk in the display case is from a mammoth and was collected from a gravel pit in Hyrum, Utah. Examples

Question - Why do you think the related mastodons and mammoths had

Answer - Mastodons had teeth with prominent cusps on them, whereas mammoths had teeth with numerous ridges (like modern elephants). The differences are due to their differing diets. Mastodons fed upon twigs, leaves,

Archaeopteryx (plaster cast) - this Jurassic (~150 million years ago) age fossil shows an interesting mix of bird (feathers and keeled breastbone) and reptile (teeth, muscular tail) features. The creature's head is flexed strongly rearward, a common feature in dead birds. Reptiles and birds are now known to be closely related



Giant Clam, *Inoceramus* - This specimen was collected from the Late Cretaceous (~90 million years ago) Mancos Shale near Green River Utah. This clam lived in an arm of ocean that bisected North America during this time interval.