Introduction

Stratigraphic Layers
Walk through a canyon and it is easy to observe the different layers of sediment and rock that form the surface of the Earth. By examining how layers of sediment are compacted and formed today, scientists noticed that the rock layers, or strata, were formed one on top of another with the oldest layers being located at the bottom. This can occur over long or short periods of time. The study of these rock layers is called stratigraphy.

While interpreting Earth’s history using rock strata layers sounds simple enough, the surface of the Earth has not always remained layered. Various geological processes such as earthquakes, volcanoes, and water run-off have changed Earth’s surface at varying times and spatial scales. Water has been one of the major factors impacting the Earth’s surface. Water’s movements – both on the land and underground – cause weathering and erosion, which changes the land’s surface features and creates underground formations.

The Fossil Record
While stratigraphy gives us some insight into how the Earth has changed over time, scientists also noticed that fossils embedded in these layers are important in interpreting the history of the Earth. The Earth is estimated to be approximately 4.6 billion years old, and the oldest known fossils are 3.8 billion years old. Prokaryotes, or simple single-celled organisms, were the first life on Earth. Multi-celled organisms appeared approximately 650 million years ago, and humans only in the last 200,000 years. The study of fossils is called paleontology and the history of animals that have lived on Earth is primarily based upon the fossil record. The fossil record shows changes in life through the sequence of rock strata that has been layered over time.

The Geologic Time Scale
Based on changes that occurred in the fossil record we can group the history of Earth into time periods and eras in a geologic time scale. The geologic time scale is interpreted from rock strata, and provides a way to organize Earth’s history. Analyses of rock strata and the fossil record provide relative dates based on changes in fossils. It is estimated that more than 99.9% of all species that have ever lived on Earth are extinct and only a small fraction of those have been preserved in the
fossil record. A short summary of the geologic time scale and the organisms that dominated during specific periods/eras can be observed in the following image.

A History of Human Health
How can stratigraphic layers and the fossil record possibly apply or contribute to human health? While humans have only been around a very short period of time, we can still find evidence of disease and health issues in human fossils. For example, cancer is a disease that many have assumed is a recent development in human health, but evidence of individuals with cancer, particularly osteosarcoma or bone cancer, are being identified throughout ancient human remains. We are also able to find evidence of disease-causing organisms, such as the bacteria that can cause tooth decay, in the fossil record. Studying these health issues in fossil remains can provide insight on the current status of human health.
Review Questions

1. What is stratigraphy?
2. How can stratigraphy be used to interpret Earth’s history?
3. How has water been instrumental in changing the Earth’s surface over time?
4. How can the fossil record help interpret Earth’s history?
5. Would a fossil found in the top layer of rock be older or younger than a fossil found in a bottom layer of rock? Explain your answer.
6. What is paleontology?
7. What is the geologic time scale? How was it created?
8. What types of organism were primarily found in the Mesozoic era? How was this determined?
9. Name one human disease that has been found within the fossil record?