4.3

INTRODUCTION TO THE GEOLOGIC TIME CHART

0:13–0:37

PERIODIZATION

If you really want to understand history deeply, you have to break it down into manageable chunks. This is called periodization, breaking history down into periods.

So, we're familiar with that in human history, where historians talk about the Renaissance or they talk about the Ming Dynasty or they talk about the Old Kingdom of Egypt.

0:37–1:46

DEFINED PERIODS

Well, these human history periods tend to be pretty vaguely defined because different people would put the start of the Renaissance at different dates and it probably started at a different time in Italy than it did in England. And so these are informal periods.

Now in geology, where we're reading the record of Earth history that's written in rocks, we've found it's necessary to have very much more formal, concrete, well-defined periods. And so geologists break Earth history up into very long intervals that are called eons, and then shorter periods which are called periods, and then still shorter intervals that are called epochs and even stages, and all of those periods had been defined very precisely and agreed upon at international level by all the geologists. And that's the basis on which we reconstruct Earth history.

1:46–2:30

EONS OF TIME

Let's start with the broadest divisions of geological time, the eons. There are four of these and their names are Hadean, Archean, Proterozoic, and Phanerozoic. What do those names mean? Well, Hadean starts at the beginning of the Earth four and a half billion years ago and it lasts for the first half billion years. And that was the time when Earth was being assembled, accreted as big comets and asteroids fell out of the sky and heated the Earth up so that some parts of it were even melted at times. So it must have been a really awful place, kind of like hell, which is why the geologists call it the Hadean.

2:30–3:08

LIFE EMERGES

Then, once the accretion of the Earth was over, things quieted down and in fact, it became very slow and tranquil. The Earth was very quiet and there are two long eons that cover that period, first the Archean and then the Proterozoic.

And then, about a half billion years ago, life gets going in complicated life, like animals and plants, and that's called the Phanerozoic because—well, that means

visible life and it's because fossils are around. And so here's a really good piece of understanding about the Earth.

3:08–3:52

ERAS OF TIME

The Earth had rapid change at the beginning in the Hadean because it was hot. It had slow change in the Archean and the Proterozoic because it had cooled down, but in the Phanerozoic, because of having complicated life around, the rate of change increased again and of course now it's very fast with our human technological civilization.

At a finer level, each of those eons is divided up into intervals that we call eras. So the Phanerozoic eon is divided up into the Paleozoic, meaning old life; Mesozoic, meaning middle life; and the Cenozoic, meaning young life.

3:52–5:22

PERIODS OF TIME

And each of those eras in turn is divided up into periods with names like Cretaceous and Ordovician and Cambrian. Now, each of those periods has its own personality, its own character which is as familiar and distinctive to a geologist as, say, Classical Mayan or the Industrial Revolution would be to a human historian. For example, the Cretaceous is the last of the periods when the dinosaurs were alive.

Now, maybe you have a favorite period of human history, maybe the High Middle Ages, for example, or the Renaissance. Well, you might think about whether there might be a geological period that you find particularly interesting.

One of my favorite periods is the Ordovician. Let me tell you about a couple of really cool things that happened during the Ordovician. So first of all, at that time, Gondwanaland, which was the supercontinent that includes Africa, was drifting across the South Pole. So there were glaciers in what is now the heart of the Sahara, where it's blazing hot and as dry as you can imagine. Boy, were the first geologists to find those glacial deposits ever surprised.

5:22–6:27

ORDOVICIAN LEGACY

And another thing that happened in the Ordovician had to do with our bodies because before that time, fish had a single big fixed mouth up at the front end and it was during the Ordovician that jaws first evolved. And we today, hundreds of millions of years later, are still using the jaws that we inherited from those creatures of so long ago. So every time you talk or eat or share a kiss, you are using a souvenir of the Ordovician.

Now, if you find the Ordovician interesting, it's easy to remember its dates because it ended 444 million years ago. And the beginning is almost as interesting to remember. It started 488 million years ago. So this is how geologists have periodized Earth's history and made it possible to understand what happened in the past.