**How to Grow a Planet**

**Episode 1: Life From Light**

1. Son Doong cave in Vietnam is the world’s largest cave passage, and has a portion where the roof has collapsed. What kind of ecosystem is found there, and why?

**The Great Oxidation Event**

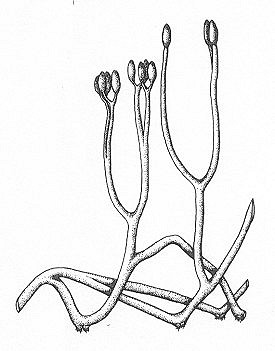
1. List two major ways the Earth’s atmosphere was different 3 billion years ago, before the advent of photosynthesis.
2. Iron is normally shiny and grey. What color was the iron taken from the deep rock layer at the mine? Why was it this color?
3. The documentary suggests that the oceans on Earth 3 billion years ago may have been purple. Why?
4. Cyanobacteria, the ancestors of plants, are green. Why?
   1. What do cyanobacteria produce as a waste product?

**The Joseph Priestly Experiment, Human-Sized**

1. What percent oxygen was the atmosphere in the sealed chamber when the experiment began?
2. What were two recorded symptoms of oxygen deprivation experienced by Dr. Ian Stewart?
3. As the lights were turned on, photosynthesis began in what organelle in the plant cells?
   1. How large are these organelles?
   2. Photons of light are captured by a \_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_.
   3. Water is split into what elements?
4. Describe how the oxygen concentration changed over the course of the experiment.
5. How did the addition of oxygen change the upper atmosphere of the Earth?

**The Move to Land**

1. The Scottish rocks shown are unique because of the dark splotches and lines throughout. What are these?



1. The earliest land plants are believed to have looked like this. What are they called?
2. What additional structure did plants have to evolve before they could move away from the shore?
   1. Describe how these structures help to produce soil. How long does this take?
3. Horseshoe crabs are studied as “living fossils” because they are similar to the first land animals. What do they have that allows them to go on land?
4. What is the main reason why plants photosynthesize – what are they producing?
   1. What are the three ingredients or reactants of photosynthesis?
   2. What happens to this product once it is made?
5. As plants populated the land, carbon dioxide levels plummeted. What special structures did ferns evolve to overcome this?
   1. What was the additional benefit of this adaptation?

**Carboniferous Period and the Dinosaurs**

1. How was the concentration of oxygen during this time period compared to today?
2. Insects are size-limited by oxygen in the atmosphere. How do they breathe?
   1. How long were carboniferous millipedes?
   2. What is the wingspan of a carboniferous dragonfly?
3. When the dinosaurs evolved, were most of them herbivores or carnivores?
4. The largest herbivores were the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
   1. How tall were they?
   2. How much do they eat, compared to modern elephants?
5. Cycads are plants that evolved defenses against large herbivores like dinosaurs. Give an example of a physical and chemical defense.
6. How and when do plants communicate with each other?
7. When plants evolved wood, they were able to grow \_\_\_\_\_\_\_\_\_\_\_\_\_.
8. Angiosperms are the last group of plants to evolve. What unique adaptation do they have?