

## **Are There Lost Alien Civilizations in Our Past?**

When we think about alien civilizations, we tend to look into the vastness of space to far away planets. But there is another incredibly vast dimension that we might be giving too little thought to: time. Could it be that over the last hundreds of millions of years, other civilizations existed on earth? Indigenous technological species that rose and died out? And that they or their artifacts are buried beneath our feet? What does science have to say about this and what are the implications for us?

Life on earth has existed for 4 billion years, mostly as single celled organisms until some 540 million years ago the Cambrian explosion heralded the age of animals. A huge time window for our indigenous aliens. Where would we look for them and what could we hope to find? Sadly, we have only one civilization to look at: Ourselves. Anatomically modern humans emerged around 300,000 years ago and probably lived in small groups of hunter gatherers, slowly spreading around the world. Progress was slow and our lifestyle did not change much, although there may have been local bursts of complexity. Until about 10,000 years ago, when the agricultural revolution changed our lifestyle forever, enabling massive population growth and technological progress. Rather than just animals with culture and tools that would have been invisible from space, we changed the face of the planet, cleared forests and constructed cities and temples for our gods at breathtaking speeds and scales. Until about 300 years ago, we became an industrial species and yet again our numbers grew exponentially as did our impact on the planet. We could say that our 300,000-year long history has three phases: We were hunter gatherers for 97%, farmers for 2.9% and industrialists for 0.1% of our history. And yet we are super new on earth.

On geological timescales, even the sturdiest things lose their durability. The oldest large-scale surface is in the Negev Desert, a meager 1.8 million years old. Everything older has been crushed to dust or turned over and it is either below the ground, or covered by ice or ocean. Our age, the Anthropocene will be a layer only a few centimeters thick in a few million years. If there were aliens before us and they too went through these three phases, what would remain of them? What can we learn about indigenous aliens by looking at ourselves?

### **Hunter & Gatherer Aliens**

We actually know that in the last few million years, there were hunter gatherers aliens. Our ancestors like Homo Erectus and cousins like the Neanderthals or Denisovans and probably many more that we haven't found yet or are lost to time forever. They left fragments of their bodies, of weapons and tools and even art. Considering how long they existed and how little remains of them, although they lived not that far from our present it is easy to think there have been others. Intelligent animals like us that could talk and use tools and fire, that had culture and art. For the last two million years, most hominins lived as hunter-gatherers – so if these aliens never moved up higher on the tech tree, hundreds of different species and cultures could have existed without leaving any traces. Their artifacts lost to biological and then geological processes. At worst they would leave absolutely nothing to be found after thousands of years. But what about fossils? We talked about how unlikely the process of fossilization is in more detail in our dinosaur video, but in a nutshell, per hundred thousand years of earth's history we only get a handful of good fossils. So, we might easily just miss fossils of such people – but even if we had any, we would not necessarily be able to identify them as hunter gatherers.

### **Agricultural and Empire Aliens**

Looking at humans again, agricultural societies left much more to be dug up and found, because they used more sophisticated tools made from sturdier materials and had to feed millions, leaving many more artifacts. Farming allowed them to specialize and develop tech from writing to navigation, architecture and government. Over thousands of years city states became kingdoms and empires, some existing for millennia before they fell. Many of the buildings or monuments they constructed are still around and traces of them will exist for a few thousand more years. Some only as outlines in the ground, but still recognizable to future archaeologists. The pyramids are piles of limestone so massive that they will probably be around for hundreds of thousands of years. And because of the greater numbers of humans that lived during our farm and empire period, we can expect way more fossils and artifacts to be detectable, maybe for a few million years before they vanish. So, we can say with confidence that no such indigenous alien civilization existed in the last few million years because otherwise we would have found something that they left. This still leaves a window of hundreds of millions of years, back to the emergence of complex life, where we would not be able to tell. If there were alien pre industrial societies and empires on the level of the ancient Romans or Chinese, they would have likely disappeared without a trace. Their tools, even advanced metals, would have rotted away. If they dug up canals, cleared forests and built cities, their traces would be very hard to distinguish from nature. Maybe there once was an empire of cephalopods occupying impressive cities in swamps and lakes, made from wood and stone. Their engineers flooding land to build wet cities, their poets reciting poems in a language of colors.

Maybe they never industrialized – maybe their society was too stable or not inventive enough or they never got a chance. A single event like an asteroid, an epidemic or an ice age could just have deleted their civilization, ground up their temples as their soft bodies rotted away. Sadly, we don't have the tiniest amount of evidence for any such civilization. After a few million years at best, their achievements would have dissolved into nothing.

### **Industrial Indigenous Aliens**

What about industrial civilizations, like humanity today? Imagine humans died out suddenly, through a pandemic or cosmic rays or something like that. What would remain? Our impact on the planet is orders of magnitude greater than that of our ancestors. The fossil record will show a great extinction of wildlife and an explosion of fossils from human associated animals, like rats, cows, pigs and chickens. Like the structures of our ancestors, skyscrapers and streets and hard drives will basically crumble into nothingness in a few millennia. But because there were so many humans everywhere, for a few million years after our sudden end, there would be clear hints of our existence.

The byproducts of our industrial lifestyle might actually give us away for some hundreds of millions of years. We use massive amounts of artificial fertilizer which redirects earth's flow of nitrogen that is being deposited in the soil. Mining metals and rare Earth elements leaves long term scars and depletes natural resources. We saturate our oceans with plastics that find their way to the ocean floor and may persist for hundreds of millions of years. There are radioactive elements and their decay, unnatural accumulations of elements that do not exist outside labs or weapons. And of course, in our short industrial history we have changed the proportion of CO<sub>2</sub> in the air by burning massive amounts of fossil fuels, increasing the acidity of the oceans and so on. We may already have left a mark in the geological record. So far, we have found no traces of an industrial alien civilization. No layers of weird chemicals or displaced elements. No radioactive layer to indicate that once great nations waged nuclear war. We do see mass extinctions and massive shifts in the fossil records but no evidence that they did

not occur naturally. And ironically, we've hit upon an interesting problem here: If industrial societies stress the ecosystem enough to cause their own extinction, they won't be around that long. But if they become sustainable their imprint on the geological record may be tiny. If past industrial civilizations were sustainable before they died out, we may have little to no chance of ever knowing about them. In any case, over hundreds of millions of years these signatures may become very subtle and get overlooked or interpreted as natural. Even if an industrialized alien society existed 200 million years ago and lasted for 100,000 years, 300 times longer than industrial humanity, it still might be easy to miss it in the geological record.

In any case, all of this is speculation. In the end we should not use our imagination to trick ourselves into thinking we know anything about our blind spots. Just assuming a thing happened because we don't have evidence against it is a trap we should avoid. So, for now, if we look at the vastness of time it seems as devoid of aliens as the vastness of space. Maybe we are alone in this universe and always were. Maybe we'll find traces of others eventually, we don't know. But there is one important takeaway: The continuation of our civilization is not guaranteed and if we are not careful, we may disappear forever. Let's hope that in a few million years, there won't be another civilization studying our layer in the fossil record.