

Index Fossils, one of the best

If we say index fossils, what is the first thing that pops into your mind? Have you thought about it? Most people think that fossils are the buried bones of an animal that someone found, well this isn't all wrong. In the first place, fossils aren't only of animals, we can find plants too. The study of fossils is called paleontology, however paleontologists don't study bones. This means that fossils are not bones, but rather rocks. This may sound weird but when animals or plants die, some of them have the "luck" to become a fossil. This only happens under specific conditions and depending on this there are different types of fossils. Index fossils are very important since they help us to establish a chronological order of the different species that are extinct or their common ancestors. In addition, it is possible to deduce the type of environmental circumstances by which species or organisms became extinct. Scientists with this information can predict periods of intense rain, tornadoes or hurricane, strong winds, periods of cooling or global warming. The fossils that tells us this information are called index fossils. But are all fossils index fossils? Could all fossils be an index fossil? The answer is no. Fossils must have very specific characteristics to be part of this tiny group.

As we previously indicated, not all fossils are index fossils because they must have a lot of specific characteristics that not all fossils have. According to experts all index fossils must include these 4 characteristics:

- 1- It is distinctive, which means that it must be in good conditions and a particular type of organism. Most of the time this organism had non-common aspects in its structure such as, reliefs in specific parts of its structure, so it can be easily identified by paleontologists.
- 2- The organism had to be abundant, this means that there were a lot of them.
- 3- The organism needed to have been widespread, meaning it lived over a large geographical area. We are able to find fossils of the same organism miles and miles away from each other, even on different continents. Most index fossils are marine organisms, because the ocean allowed them to populate over a large area and also because fossils can be easily formed in oceans.
- 4- The organism only lived for a short period of time. We can only find it in some rock layers.

These are the 4 most important characteristics that an index fossil must consist of. Obviously, there are some exceptions in the number 3 because all organisms need specific environmental circumstances to live.

Now that we know the characteristics of index fossils, let's see some of the most common examples of index fossils. But before that, it is necessary to clarify that index fossils are divided into different groups depending on the geological time they lived. There are distinct types of divisions that include subdivisions and the best way to explain this is with an image:

(The ones with a dark blue color are the names of the geological time and the light blue are the examples. As you can see most of them are shells.)

CENOZOIC ERA (Age of Recent Life)	Quaternary Period	<i>Pecten gibbus</i>		<i>Neptunea tabulata</i>	
	Tertiary Period	<i>Calyptrophorus velatus</i>		<i>Venericardia planicosta</i>	
MESOZOIC ERA (Age of Medieval Life)	Cretaceous Period	<i>Scaphites hippocrepis</i>		<i>Inoceramus labiatus</i>	
	Jurassic Period	<i>Periaphinctes tiziani</i>		<i>Nerinea trinodosa</i>	
	Triassic Period	<i>Trochites subbulatus</i>		<i>Monotis subcircularis</i>	
PALEOZOIC ERA (Age of Ancient Life)	Permian Period	<i>Leptodus americanus</i>		<i>Parafusulina bosei</i>	
	Pennsylvanian Period	<i>Dictyoclostus americanus</i>		<i>Lophophyllidium proliferum</i>	
	Mississippian Period	<i>Cactocrinus multibrachiatus</i>		<i>Prolecanites gurleyi</i>	
	Devonian Period	<i>Mucrospirifer mucronatus</i>		<i>Palmatolepus unicornis</i>	
PRECAMBRIAN	Silurian Period	<i>Cystiphyllum niagarensae</i>		<i>Hexamoceras hertzeri</i>	
	Ordovician Period	<i>Bathyrurus extans</i>		<i>Tetragraptus fruticosus</i>	
	Cambrian Period	<i>Paradoxides pinus</i>		<i>Billingella corrugata</i>	



Ammonites:

This animal used to live in shallow waters and over time it has experienced easily recognizable changes, making it useful as an indicator of age in marine habitats. That is why these are one of the best index fossils. They could be found in rocks dating from the Devonian Period (began 419 million years ago) to the Cretaceous Period (ended 66 million years ago).

There are different methods to know the age of the fossils that are found. One of them is to compare the fossil to another which age is already known, so that we can know the time of the fossils and the rock layer. A rock layer with an index fossil in it is close in age to another layer of rock with the same type of index fossil in it. Even though rock layers are of different regions, index fossils indicate that the layers are close in age. This might sound confusing but it's very easy. Imagine you are walking, and you find a fossil, but then you realize that it is in the group of index fossils and because of that you know a lot of information like the period, and the rock layer. If in the future, you find another fossil in the same place you will automatically know all this information because there was an index fossil next to it. But what happens if there isn't an index fossil next to it? There are other ways to recognize the age of a fossil and it is by using radiometric dating. This is a process that uses radioactive minerals that are on the fossil like a geological clock. In summary, there are 2 ways to know the age of a fossil, the first one is very easy and cheap because you just compare fossils. However, the other one is very expensive and takes some time.

To conclude in a very short sentence, we can describe index fossils as "commonly found, widely distributed fossils that are limited in time span". There are few index fossils because this characteristic is not that common in fossils, but even though, there are very few, they are very important for science. Scientists use index fossils to help them determine the age of several things. Since index fossils only lived for a short period of time, we can use them to narrow down the age of the rock we find them in, also it is possible to infer the age of unknown fossils and finally, they are used to help build the Geological Time Scale. Probably for scientist it is very difficult to determine a specie that is part of these fossils since it is very time consuming, but it is something that they do because it offers many benefits. That's why it is considered one of the best discoveries. In fact, have you ever imagined what the world would be like if no one had found and/ or studied a fossil?