

Clues to the Past-“Living Fossils”

D. Divya¹, G. Niharica Yadav², Sandras Spoorthy³, Praveena.V⁴

- 1.Lecture-St.Anns college for women-Hyderabad,
- 2.Student-BZC(III)st.anns college for women-Hyderabad,
- 3.Student-BZC(III)st.anns college for women-Hyderabad,
- 4.Student-BZC(III)St.anns college for women-Hyderabad

Abstract:

Living fossils are members of taxa that exhibit notable longevity in the sense that they have remained recognisable in the fossil record over unusually long periods. Living fossils commonly are species for lineages, but they need not be. The fossils exhibit stasis over geological long time scales. Ancient remains are generally fragmentary and can be studied only in a limited number of ways, but some discoveries are of sufficiently great antiquity to bridge the gaps separately between major kinds of mammalian anatomy and geometry of phylogeny.

Keywords:

Horseshoe crab, limulus , nautilus , coelacanth, living fossils ,lineages, geological time scale.

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INTRODUCTION:

A **fossil** (from Classical Latin *fossils*; literally, "obtained by digging") is any preserved remains, impression, or trace of any once-living thing from a past geological age. Examples include bones, shells, exoskeletons, stone imprints of animals or microbes, hair, petrified wood, oil, coal, and DNAREmnants.

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Here comes what exactly living fossils mean-A **living fossil** is an extant taxon that closely resembles organisms otherwise known only from the fossil record. As a rule, to be considered a living fossil, the fossil species must be old relative to the time of origin of the extant clade. Living fossils commonly are species-poor lineages, but they need not be. The term *living fossil* is not formally defined, but in scientific literature the term usually connotes a bradytelic group. "Bradytelic", however, is rarely used in modern scientific literature but the characteristic of a bradytelic group is that its changes fluctuate on a small scale and do not accumulate over time. In modern literature, the term most often used for that distinctive evolutionary tempo is "stasis". Living fossils exhibit stasis over geologically long time scales

Examples of living animal fossils-Monito del Monte, Horseshoe crab, Velvet worm, Nautilus, Coelacanth, Hoatzin.





How can we distinguish living fossils???*Are they any methods! Let's study the following statements.*

The first two are required for recognition as a living fossil stasis but some authors include the third.

1. They are members of taxa that exhibit notable longevity in the sense that they have remained recognisable in the fossil record over unusually long periods;
2. Show little morphological divergence, whether from early members of the lineage, or among extant species, and
3. Tend to have little taxonomic diversity.

History of living fossils:

The term was coined by Charles Darwin in his *On the Origin of Species* from 1859, when discussing *Ornithorhynchus* (the platypus) and *Lepidosiren* (the South American lungfish):

All fresh-water basins, taken together, make a small area compared with that of the sea or of the land; and, consequently, the competition between fresh-water productions will have been less severe than elsewhere; new forms will have been more slowly formed, and old forms more slowly exterminated. And it is in fresh water that we find seven genera of Ganoid fishes, remnants of a once preponderant order: and in fresh water we find some of the most anomalous forms now known in the world, as the *Ornithorhynchus* and *Lepidosiren*, which, like fossils, connect to a certain extent orders now widely separated in the natural scale. These anomalous forms may almost be called living fossils; they have endured to the present day, from having inhabited a confined area, and from having thus been exposed to less severe competition.

What do “living fossils” mean to EVOLUTION?

A new article in *American Scientist*, “The Evolutionary Truth About Living Fossils,” explores the subject, and notes that “The term living fossil has been used since Darwin coined it.” It then attacks the use of living fossils by “creationists”:

Unfortunately, creationists bent on denying the factual basis of evolution have increasingly misappropriated the term living fossil. In the Atlas of Creation, which pairs photographs of living fossils with similar ancient fossils, Turkish author and Islamic creationist Harun Yahya erroneously argues that “Darwinists are desperate when confronted by these fossils, for they prove that the evolution process has never existed.” Entry of “living fossil” into Internet search engines yields a preponderance of creationist websites, despite the fact that these species neither disprove nor provide any evidence counter to our understanding of evolution, which remains the cornerstone of biological science. There are no “unevolved” species, no reanimated fossils that have literally come back to life, and no living organisms that are truly identical to extinct species known in the fossil record.

Some of these counterpoints may be reasonable, and I certainly wouldn’t endorse Harun Yahya’s bizarre book. But the article in *American Scientist* misses the fact that whenever we see in the fossil record an organism that looks virtually identical to a living species, that’s also completely consistent with the hypothesis that “this species has not evolved.” So while it’s correct to for the authors say “we must not expect that all aspects of coelacanth or horseshoe crab biology have existed unchanged for hundreds of millions of years,” it’s equally if not more correct to respond that we must not assume that they have changed either (aside from, perhaps, neutral mutations). After all, the hard evidence which we have suggests they haven’t changed.

MONITO DEL MONTE.



-) *Oligocene(23)*
-) *Mammal*
-) *Central Chile*
-) *Insects, invertebrates, fruits*
-) *Nests made with bamboo sticks*
-) *Hibernate*
-) *Reproduce in spring.*

Regarded by scientists as a living fossil, the Monito del Monte (*Dromiciops gliroides*) or “mountain monkey”, a small marsupial is the only surviving representative of the superorder Australidelphia. A nocturnal and arboreal mammal, it is widespread across Argentina and Chile inhabiting dense, cool, humid forests. Slightly larger than a mouse, it measures between 83-130mm (head to body) length, around 90-132 mm tall and weighs between 16-42 g.

It has dense, silky brown-colored fur, short and furry ears, round eyes mark by black rings and a hairy prehensile tail. An amazing and excellent tree climber, it feeds mainly on insects and other small invertebrates. The Monito del Monte has a life span of about 2 years. Its population decreasing due to habitat loss, this marsupial is Listed as Vulnerable on the 2006 IUCN Red List of Threatened Species.

HORSESHOE CRAB.



-) *Ordovician (488-433)*
-) *Arthropod*
-) *Asia to America*
-) *Omnivorous*
-) *Tail to flip*
-) *Shores for mating.*

American horseshoe crab is a common sight on Florida's beaches. Many people have seen horseshoe crabs but do not realize they are looking at one of the oldest animals on the planet. Often called "living

fossils," horseshoe crab ancestors can traced back through the geologic record to around 445 million years ago, 200 million years before dinosaurs existed. Horseshoe crabs are actually not true crabs at all, being more closely related to arachnids (a group that includes spiders and scorpions) than to crustaceans (a group that includes true crabs, lobsters, and shrimp). Four species of horseshoe crabs exist today. Only one species, *Limulus Polyphemus*, is found in North America along the Atlantic and Gulf coasts from Maine to Mexico. The other three species are found in Southeast Asia.

HOATZIN.

-) *No date. First feather birds.*
-) *Birds*
-) *Amazon and orinoco*
-) *Leaves and fruits*
-) *Stinkbird*
-) *Claws*
-) *Guyana.*

This unique family history makes for one hell of a unique bird. The South American, rainforest-dwelling Hoatzin is roughly the size and shape of a chicken, and it looks like the mascot for your sixteen-year-old's death metal garage band. Its long, dark wing and tail feathers give it a cloaked appearance, and make its body look massive in contrast to its relatively tiny head. Its face is featherless and the skin is brilliant blue, punctuated by dark red eyes. Sitting atop its cranium is an orange, spiky crest that would be the envy of any '90s goth or punk rocker.



The Hoatzin's weirdness doesn't stop with its looks though, and there's plenty more unique hiding under the surface. The Hoatzin doesn't eat seeds, or fruit, or insects, or meat like a normal bird. Instead it is intent on eating leaves, a diet that very few birds in the world can subsist on. Leaves are difficult to digest, especially when you can't chew them, so the Hoatzin employs a solution straight from the barnyard: it incubates the leaves in its enlarged crop and ferments them with the help of the microorganisms that live there. The Hoatzin is basically a cow, and it is reputed to smell like one too.

COELACANTH.

-) *Devonian (416-360)*
-) *Fish*
-) *Indian ocean*
-) *Swallow water fish*
-) *Caves at 100-150 metres*
-) *Ovoviviparous.*

One of the few species to have hardly changed in tens of millions of years..



A deep-sea fish which became known as a “living fossil” has not changed in appearance since before the time of the dinosaurs with the help of an extraordinary genome that is barely evolving, a study has found. The coelacanth, which lives in deep-sea caves off the coast of Africa, was once known only from its fossils and so was thought to have gone extinct at least 70 million years ago until a recently-dead specimen was discovered by South African fishermen in 1938. It is one of the few species to have hardly changed in tens of millions of years and now scientists believe this physical stability is mirrored in the coelacanth’s genome – the 3 billion “letters” of its DNA code. “We found that the genes overall are evolving significantly slower than in every other fish and land vertebrate that we looked at. This is the first time that we’ve had a big enough gene set to really see that,” said Jessica Alfold, a research scientist at the Broad Institute of MIT and Harvard in Massachusetts.

NAUTILUS.

-) *Triassic (225)*
-) *Cephalopod*
-) *Indo- pacific*
-) *Fish, shrimps and crustaceans*
-) *300 metres*
-) *Withdraw*

Amongst all underwater creatures, the curious-looking nautilus is the one creature that fascinates me the most. The Nautilus is known as the living fossil due to the fact that it has remained largely unchanged for almost 400 million years. Found in abundance in prehistoric times, the nautilus' numbers have dwindled and only a handful of its species remains today.



The nautilus which gets its name from the Greek word meaning 'sailor', is a mollusc and a member of the cephalopod family. It is closely related to other cephalopods such as the squid, cuttlefish, and octopus. And just like the other members of its family, the Nautilus too uses water jet expulsion to propel in quick bursts across the ocean. Part of the mystery shrouding the life and habits of this prehistoric creature is the fact that it usually inhabits depths of about 300 m, rising to around 100 m at night only for feeding, mating or laying eggs. It is known that the average lifespan of a nautilus is around 20 years, and it lays its eggs on rocks in shallower waters.

VELVET WORM.



-) *Eocene(40)*
-) *Panarthropod(ecdysozoa)*
-) *Central America*
-) *Invertebrates*
-) *Sense of perception*
-) *Secrete sticky substance.*

There is a phylum of living lobopods called *velvet worms*, caterpillar-like creatures that live in moist environments like soil and rotting tree trunks. They bear a striking resemblance to some of their oldest fossil

ancestors, suggesting that these early adaptations remain ecologically relevant. Velvet worms are thought to be a well-preserved descendant of a prototypical animal from which arthropods (including insects, spiders, and crustaceans) were derived, as they share many important body-plan characteristics. Velvet worms don't look like our ancestors, however. The difference between the lineage leading to humans and that leading to velvet worms diverged very early on in the Cambrian: humans have one kind of embryonic development shared with starfish and sea urchins, while velvet worms share their embryonic development with squid and 'bugs'.

DISCUSSION?

Why to study the importance of living fossils?

Fossils are the remains or impression of a prehistoric plant or animal embedded in rock and preserved in petrified form. In simple words, Fossils are basically degraded living things which responsible for reformation of earth's productive natural things. Fossils develop when dead animals and plants degrade and mix in soil and helps humus layer of soil (Top most layer of Soil formation) to be more fertile.

Now a days, Due to continuously developing human made technology leads to degradation of renewable or natural resources which increase the importance of study of fossils. In this way, study of fossils become important in this modern world.

Because humans become so obsessive about their comforts unknowingly he cut down our natural resources so this things increase the need of this kind of studies which help humans to understand how we can restore or prevent our natural resources so that it does not become curse for us.

SIGNIFICANCE OF EVOLUTION :

Darwin first drew attention to the idea of living fossils. At this time he was thinking of the Ginkgo tree. From his evolutionist point of view, he was at a loss to imagine how creatures which appeared long ago and therefore presumably have simple characteristics, could do well in communities where the other organisms enjoy the latest developments. It was a wonder to Darwin that archaic or old fashioned forms were not eliminated although they were apparently untouched during the passage of time. From an evolutionary perspective then, living fossils are viewed as organisms with a very long history. Creationists point out that this idea of long time intervals is open to question. Nevertheless, it is the idea that organisms are "very old" which arouses the interest of the public.

Darwin realized that living fossils are not what evolutionists expect to find in nature. Indeed to supporters of the evolution paradigm, the idea of living fossils, so ancient and unchanged, is definitely a problem. As Niles Eldredge remarked: "In the context of Darwin's own founding conceptions, and certainly from the perspective of the modern synthesis, living fossils are something of an enigma, if not an embarrassment." (Eldredge and Stanley op cit p. 272) And Peter Ward, in his 1992 bookrms living fossils "evolutionary curiosities, more embarrassments to the theory of evolution than anything else."

REFERENCES:

1. Butler, M; King, A (2004). "Phylogenetic comparative analysis: A modeling approach for adaptive evolution". *The American Naturalist*. **164**: 683–695. doi:10.1086/426002.
2. https://evolutionnews.org/2014/10/what_do_living_/to
3. Mathers, Thomas C.; Hammond, Robert L.; Jenner, Ronald A.; Hänfling, Bernd; Gómez, Africa (2013). "Multiple global radiations in tadpole shrimps challenge the concept of 'living fossils'". *PeerJ*. **1**: e62. doi:10.7717/peerj.62. PMC 3628881  PMID 23638400.
4. Simpson, George (1944). *Tempo and Mode in Evolution*. NY: Columbia University Press.
5. , Volff J-N; Chalopin; Casane; Laurenti; Volffn (July–August 2015). "The coelacanth: Can a "living fossil" have active transposable elements in its genome?". *Mobile Genetic Elements*. **5** (4): 55–9. doi:10.1080/2159256X.2015.1052184. PMC 4588170  PMID 26442185.