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Evolution in Elephants through Geological Times

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ABSTRACT

About 180 million years ago, mammals arose from a reptile-like lineage about the same time as true dinosaurs. About 80 Million years ago, the genetic linage of elephants split from primates. The tree shrew is considered our nearest common ancestor. It is believed that 50-60 million years ago, Moeritheriums, approximately the size of current day pigs, were the roots from which the proboscideans evolved. Based on both morphological and biochemical evidence, it is generally agreed that the manatees, dugongs, and hyraxes are the closest living relatives of today's elephants. This is incredible given the vast difference in sizes, external appearance and the fact that these animals occupy completely different habitats.

Keywords : Moeritheriums, Elephants

I. INTRODUCTION

Early elephants

They were very different in their size and their appearance back then compared to what we see of them today. During the Ice Age the elephants likely had very thick hair like the mammoth. However, as the temperatures got warmer they didn't have a need for it. This is why they got thicker skin and very little hair on it at all. This allowed the to live in regions where the temperatures were extremely hot. They have to be able to reduce their body temperatures and to regulate them. This can also account for the larger size of the ears; they use them as fans to cool down.
The length of the trunk as well as the ability to use it for so many different things is also something that happened for elephants through evolution. Their needs to be able to grasp things are one of the main reasons why this likely. While early elephants did have trunks they weren't as versatile as what these animals have today.

It is believed that the ability adapt to a variety of different environments allowed elephants to evolve about 50 to 60 million years ago. Some of them lived in the rainforests while others resided in the desert. They are still considered to be on of the most adaptable animals in the world. However, with humans taking these areas away from them at an alarming rate there is a limit to what they are able to do and where they are able to survive today.

Proboscidae (Order)

The order under which Elephants are classified is the Proboscidea. This means animals with trunks/proboscis.

Over the course of evolutionary history, it has been estimated that there have been about 352 species of Probscideans. The creatures of this order have inhabited every continent except Australia and Antarctica. All but two (the African and Asian elephants) have died out.

It has been hypothesised that Proboscideans were able to exist in so many environments because they were capable of specialising to particular habitats. This enabled them to disperse across the continents. However, this very advantage became a disadvantage in the face of radical changes in their habitats. Because

of their specialisation, they were unable to adapt to change in order to survive. Their large size proved to be a hinderance to their adaptive abilities.

The trend in the evolution of Proboscidea has generally been longer limb bones and larger skulls and teeth. As Proboscideans have grown taller, their trunks have grown longer.

Because their heads are far from the ground, nature has compensated for this height by developing the trunk as a necessary tool. For such large animals, the trunk has provided a fast and convenient way of reaching food and water on the ground. This has meant that they do not have to bend down to drink or feed, which would put them in a vulnerable position. A long trunk has enabled Proboscideans to investigate the ground for food and water while still watching and listening for approaching danger. As a result, nature has selected in favour of longer trunks. This is one of the elephant's most interesting and unique physical features.

Elephantidae (Family)

The family Elephantidae developed from the order Proboscidea. The Asian elephant, both species of African elephant and the Mammoth sit within this family. Previous to these species however were other closely related ancestors:

1) Trilophodon

This species lived about 26 million years ago, characterised by having four tusks. Two tusks curved upward out of the upper jaw and two tusks curved downward out of the lower jaw.

2) Deinotherium

This creature had two downward curving tusks that were probably used in a shovel-like manner to scoop vegetation out of the watery swamps where it lived. It existed approximately 25 million years ago. They had no tusks in their upper jaw, making them somewhat unusual.

3) Platybelodon

This creature also had two lower flattened tusks, again probably used for digging and scooping vegetation.

4) Mastadons

More correctly classified as part of the family Mammutidae, the remains of the first Mammutidae (descended from the paleomastodon) were found in the 25 million-year-old Oligocene strata in Africa and Eurasia. These animals were about the size of today's elephants, but more solidly built with a hairy body.

Elephas Maximus / Asian Elephant (Genus)

At about the same time that the mammoth was coming into existence, so was the Asian elephant, Elephas. It also originated in Africa and it is believed to have a stronger evolutionary tie to mammoths than it has with African elephants.

Asian elephants spread throughout Eurasia and they now exist in India, Sri Lanka, China, Bangladesh and Southeast Asia. Elephas maximus indicus is the Indian subspecies. Elephas maximus sumatranus is the subspecies of Sumatra. On the island of Sri Lanka, there is also a subspecies called Elephas maximus maximus. The isolation that the island has provided has allowed a divergent evolution to occur. Most of the bulls there are tuskless, though they are not a separate species. This may be the result of a selection process in which, over a period of centuries, bulls with particularly large tusks were shot by ivory hunters and had fewer offspring as a result. This is a sad, but interesting example of the role that humans can play in the evolution of other species.

Loxodonta / African Elephant

The African elephant, Loxodonta, appeared about 1.5 million years ago. It is the "newest" elephant species in evolutionary terms and differs from the Asian

elephant in its larger size and the fact that both males and females have tusks.

The largest of all elephants is the the savanna or bush elephant, Loxodonta africana. There is also a much smaller forest elephant called Loxodonta cyclotis, which inhabits the equatorial rain forests of West and Central Africa. They tend to have small, rounded ears and darker skin. Interbreeding occurs between the savanna and forest elephants in areas where the two habitats meet.

At one time, African elephants inhabited the whole of the African continent. Now they are found only south of the Sahara, due to shrinking habitat and the effects of man's presence (namely the ivory trade). Another interesting evolutionary feature of elephants, particularly relevant to African elephants, is their infrasonic hearing and moaning. This ability to hear sound waves below our own hearing level is a crucial means of communication for elephants out on the wide-open plains. It allows them to "talk" to each other without alerting predators to their position (the predators can't hear their communication)

II. REFERENCES

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