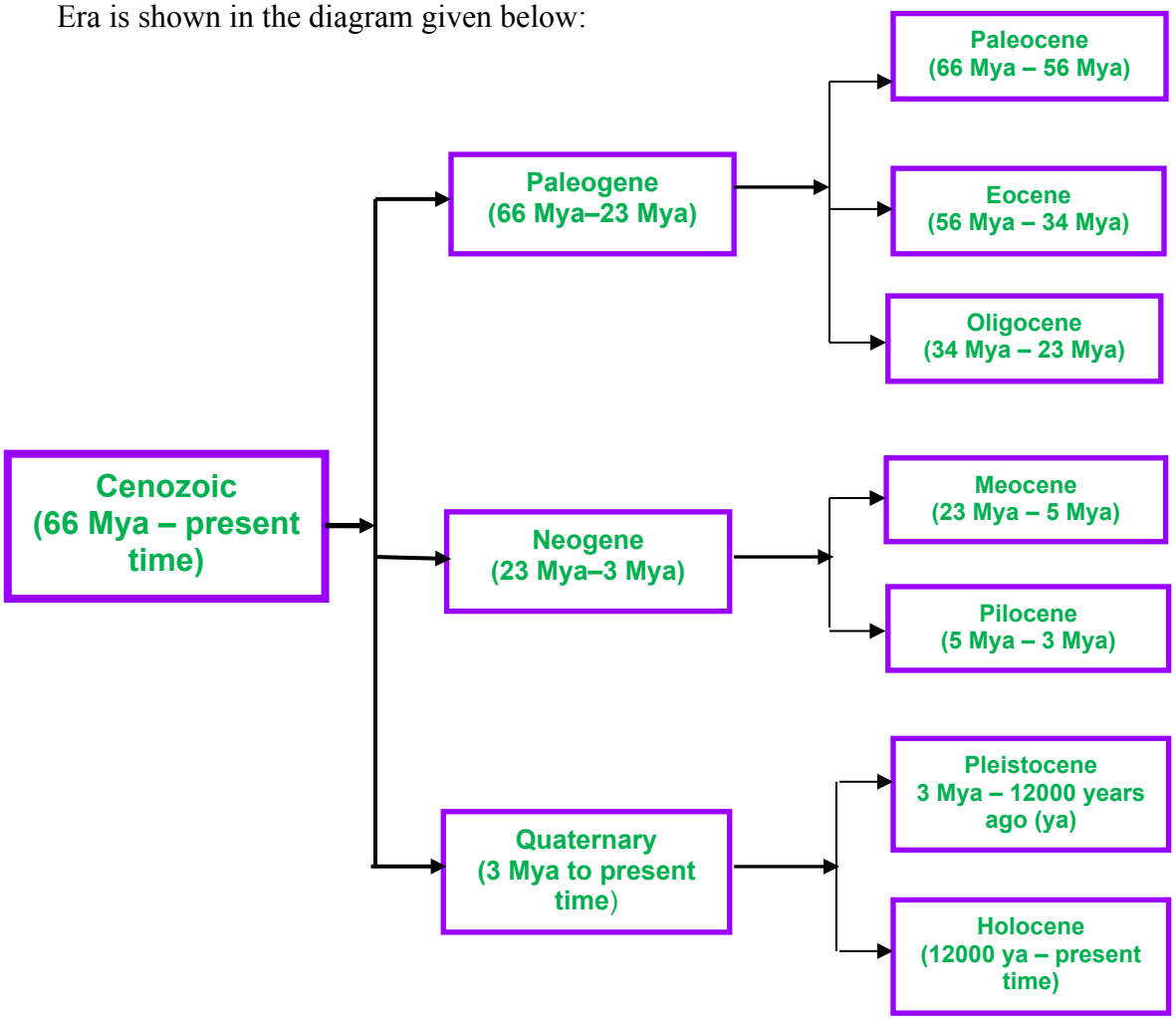
The Cenozoic – the Age of Mammals and Emergence of the First True Humans

1.0 Introduction

1.1 The last Era of the Phanerozoic Eon is Cenozoic covering a period of about 66 million years. The present age of ours is within this Era. Three periods and seven epochs of this Era is shown in the diagram given below:



1.2 The **Cenozoic** Era is the current and most recent of the three Phanerozoic eras. The Cenozoic is known as the ***Age of Mammals*** because of the domination of large mammals. Extinction of many large dinosaurs allowed the mammals, reptiles, amphibians and birds, to greatly diversify and become the world's predominant fauna.

Some flightless birds, known as terror birds, grew very large and were formidable predators. Mammals came to occupy almost every available niche – both marine and terrestrial, attaining large sizes. Recent fossil discoveries have revealed a succession of organisms that, during the early period of this Era, moved from life on land first to hunt and then to live continuously in marine environments. This fossil evidence accords with recent genetics findings that whales, dolphins, and porpoises are descended from a group of terrestrial mammals that existed during the Neogene period of this Era, known as artiodactyls, which today includes such animals as sheep, goats and giraffes. The oceans were dominated by sharks as the large reptiles that had once ruled became extinct. Archaic mammals, such as, ***Creodonts***, the ancestral to modern carnivores of various sizes had grown in the Paleocene epoch. In the same Era, during Neogene period, the primates – the ancestors of the monkeys, the apes and the humans arose. In the late Meocene epoch, the first creatures who closely resembled human beings evolved, accompanied by a spectacular increase in brain size. And then in the Quaternary period, the first true humans emerged.

2.0 Climate

2.1 During the Paleogene period, Earth's climate was tropical. The Paleocene epoch was characterized by a general warming trend with increase in the forest area. Average temperature was near 45^{o}C. Atmospheric concentrations of CO_2 were at higher level. It was probably caused due to massive injection of carbon dioxide in the atmosphere due to volcanic eruptions. During the Eocene epoch, the planet was almost ice-free. The Neogene Period, however, saw a drastic cooling, which continued upto the Pleistocene epoch of the Quaternary period.

2.2 During the Neogene period, melting of methane hydrates produced by microbial degradation of organic matter under low temperature and high pressure on the seafloor led to reversal of ocean circulation and ocean acidification. These environmental impacts caused extinction of calcifying creatures such as foraminifera, mollusks,

and corals. White plankton shells disappeared from the seafloor mud, shifting its color from white to red.

2.3 A major evolution in mammalian life occurred during the Pleistocene epoch during which the mammals started migrating for one place to other to find more sustainable environment for their livings.

3.0 Tectonic Shift and Position of Continents

3.1 During the Paleocene epoch, shapes of the continents were similar to those of today, but they were in different positions on the globe due to the movements of tectonic plates. During the early part of this Era, North America, Greenland and Eurasia had together formed a northern super-continent called Laurasia, but at the end of the Paleocene, North America and Greenland began to separate from Eurasia; this opened the northeast Atlantic. This separation was initiated by massive periodic volcanic activities, deep under the earth's crust, causing rifting, thinning and spreading of the sea floor that moved the two continental plates apart. Due to tectonic shift during the Oligocene epoch, Australia was separated from Antarctica; India crashed into Asia creating the Himalayan Mountains; Antarctica was covered by glaciers causing lower sea levels. During Eocene, North America and Europe separated. During Paleocene, Europe and North America joined together; Australia joined with Antarctica. India was connected with Asia during Oligocene epoch. The Atlantic Ocean was small because South America and Africa had just separated.

4.0 Growth of Mammals, Reptiles, Birds and Marine Species

4.1 During this Era, mammals had grown, diversified and flourished. There were various types of mammals, namely, ***Monotremes*** (egg laying mammals); ***Marsupials*** (almost like modern kangaroos), rodent-like mammals, ***Placental*** mammals primates and hoofed mammals. In these days, mammals were timid, weak and small. The early primates looked like lemurs, lorises, bush-babies and tarsiers.

4.2 Because of the climatic conditions, reptiles were more widely distributed. Among the sub-tropical reptiles found during Pleistocene epoch are champsosaurs (aquatic reptiles that resemble modern gharials or fish-eating crocodiles), crocodiles, soft-shelled turtles, Palaeophis (largest known marine snakes), varanid lizards (a group of carnivorous lizards having long necks, powerful tails, claws and well developed limbs) and Protochelydra zangerli (similar to modern snapping turtles).

4.3 Birds also began to re-diversify during the Pleistocene epoch occupying new niches. ***Neornithes***, the last common ancestor of all birds and its descendants had undergone rapid evolution in the early Palaeocene. Large flightless birds with huge beaks and massive skulls such as ***Gastornis*** and carnivorous terror birds were the top predators in the late Paleocene epoch. Early owl type birds also appeared in this epoch.

4.4 Tropical conditions gave rise to abundant marine life including coral reefs. With the extinction of marine reptiles at the end of the Cretaceous epoch, sharks became the top predators.

5.0 CLIMATE CHANGE

During the Oligocene epoch, splitting off of the Australasian landmass from Antarctica caused cooling of water as the oceans encircled the growing polar ice cap. This cooling effect spread around the globe by circulating currents that produced a dramatic drop in temperature. Many animals living in warm climate during the Eocene epoch became extinct. This cooling period continued upto Pleistocene period. By the end of the Pliocene epoch, the Earth was locked in an ice age. The major effects of ice age were erosion and deposition of material over large parts of the continents, change in sea level, modification of river system, creation of lakes, isostatic adjustment of the crust, creation of huge deserts and abnormal winds. It affected the nature of oceans and biological communities changing the flora and fauna and habitat system.

6.0 CONCLUSIONS

Significance and importance of this Era lies on the emergence of mammals who are our ancestors. Our Mother Earth in her own way changed the climate which favoured evolution of human life. On one hand, dramatic climate change accompanied by sudden disastrous events reduced the overall diversity of animal life, while on the other hand, it had nourished growth and flourishing of our ancestors – the last one being the bipedal hominid. With change in environment due to climate change, stresses worked on the prosimians. They developed into the anthropoids with more brainpower, and finally hominoids, the apelike family that spread throughout Africa, Europe and Asia 25-10 million years ago. Around 4 million years ago, driven by need or lured by opportunity, certain primates took up a new behavior, walking on their hind legs. Bone fossils show that their originally upright posture alternated with four-legged running and climbing. But gradually, the hominid became more and more bipedal, freeing its hands for carrying and manipulating its environment. Upright walking required dramatic changes in anatomy and these changes further widened the anatomical gap between this proto-human and its closest relative, the quadripedal ape. Pelvic changes limited the size of the young at birth, creating a longer period of infant dependency. This, in turn, encouraged the development of a social organization to protect and rear the young. Other benefits of this cooperation fostered more complex arrangements such as foraging together, using of communal shelters, tool making, the specialization of labor, and sharing resources. Thus began the long journey from tropical treetops into the remotest region of the globe, by the mammal which possesses the power to affect all life on Earth.