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FOSSIL

INTRODUCTION:- In justifying the doctrine of evolution that complex animals are evolved from the simple ones we try to collect evidence from the field of palaeontology.

The palaeontological evidences are justified with the help of fossils. The term fossil is derived from a Latin word fossilium - something dug up. In general fossils are the preserved remains of animals and plants under the earth.

According to Lamarck the term fossil include the remains of plants & animals preserved in any natural formation whether hard rock or superficial deposits.

METHOD OF FOSSIL FORMATION:-

The ways of fossils formation is known as the method of fossilization. There are different methods of fossil formation as follows:-

① Preservation of harder parts of the body:-

In several cases the bony part of skeleton of vertebrates or hard ex-skeleton of invertebrates have frozen in ice or preserved in the oil impregnated soil without any morphological change.

In continuous dry or cold region all organic remains of body are found embedded in the ice for example - mammoth & woolly rhinoceros of Siberia (Alaska), were preserved as fossils they are found embedded in the ice & frozen.

② Preservation of smaller forms in Amber:-

Amber is fossil resin found exuded from pine trees. In the process of exudation the resin are sufficiently soft to engulf a fragile insect.

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latter on due to evaporation the volatile portion become hardened and finally changes to Amber without causing even the slightest change to the structure of the creatures for example:- many tertiary insects have been preserved have been fossils by the Method.

(3) Petrification:- In this process the animal undergoes the process of mineralization the degree of mineralization is greater in case of older fossils all the cavity of the animals are filled up with the mineral and the water and the actual tissues are gradually replaced by the minerals the minerals involved in petrification are - Silica Iron Pyrites and oxides sulphur, Tinsom, plauside dolomite Calcium Carbonate etc. Such fossils retain both morphological as well as histological details.

(4) Preservation of foot prints (Tracks & trails):-

Tracks are recorded in muddy environment where wet sand and mud receive impression of the feet of vertebrates and invertebrates. These impressions are covered by sediments before they are eroded or washed out.

Trails are the irregular markings of the animals recorded on the soft sediment beneath the surface of water. These are formed due to crawling of a worm or a snail dragging tentacles of Coleopterates or the fins of fish.

(5) Natural moulds or casts:-

Mould is imprint fossils formed by the hardening of the surrounding material in which the organism are buried.

The organic matter decomposes and gradually removed by percolating water finally activities formed which retains the exact form of the organism. Sometimes the moulds are filled in with mineral matter so that a natural casts of objective forms.

⑥ Caprolites:- The preserved remains of amoeboid intestines contents are called Caprolites.

Condition for fossilization:-

It is the first prerequisite for fossilization and it should be such that not oxidation the organic material should takes place. Air should be completely excluded.

It can be done by nature in two ways:-

① Immediate burial:- It is usually effected by water borne sediment, which turned derived as the degradation of older rocks. Burial is also done by the loess or volcanic ash which has yielded fossils of terrestrial organism.

② Miring (plunging into Mud):- Great swamps work as death traps. Death and immediate burial take place by miring in swamps (boggy soil) or quick sand. Example - The remains of Ireland and remains of elephants and mastodons from "the great death traps" in hot Angles. (California)

③ Subsequent vicissitudes:- (Changes) - After the initial preservation the resultant fossil is subjected to various vicissitudes with lapse of time, the changes concerned with fossilization gradually take place. The important factors responsible for these changes are pressure elevation, folding and subsequent erosion of the strata together with the slow circulation of acidulated and other waters through the rocks.

#### 4. Defining of fossil - (Age determination of fossil) -

Fossils are mostly contained in stratified or rudimentary rocks. These rocks contain various radio-active elements help us to calculate the age of rocks in which they are created. Some important methods of dating of fossils are -

##### ① The lead uranium ratio method:- (Boltwood-1907)

Radioactive elements radium uranium and thorium are found in radio-active quantities in earth's crust. These radioactive elements gradually and spontaneously disintegrated into simpler and stable elements. Uranium-238 slowly disintegrates to produce lead 206 and helium the rate of disintegration is constant and is not influenced by ~~change~~ changes in temperature pressure and chemical conditions. If the ratio of the radio active lead to the uranium is known the age of rock can be calculated by the formula.

$$T = \frac{L}{u} \times 7,600,000,000 \text{ (After Sabni 1952)}$$

T = Time in year.

L = Quantity of lead in gram.

u = Quantity of uranium in grams.

##### ② Radio-Carbon method:- (W.F. Libby)

In all living beings a constant amount of  $C^{14}$  (isotope of carbon) is present. After the death of the organism, the  $C^{14}$  gradually disintegrates into  $C^{12}$  (Normal Carbon) at a constant rate the half life period of  $C^{14}$  is about 5,568 years. For dating of a fossil. The amount of  $C^{14}$  present in the sample is measured and compared with the same present in most-living specimens.

Potassium Argon method:- It has recently been developed and by this method the accurate age of the fossil can be determined. Ordinary potassium contains 0.01% of radioactive isotope which gradually disintegrates to form calcium and argon. The half life period of radioactive potassium is 1,300,000,000 years.