Use of Fossils

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(For Students of M.Sc Sem II Elective Geology)

Various types of fossils

Body fossils- Well preserved entire organism or part of its body , unaltered or altered, hard or soft parts, naturally formed molds and casts are classed as Body fossils.

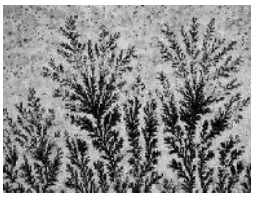
Trace Fossils- Foot prints, trails, burrows and tubes, coprolites (faecal matter) are termed as trace fossils or Ichno fossils.

Living Fossils- Fossils which range from ancient time upto the present day without any change in primitive characters are known as Living Fossils.

Derived Fossils - Fossils transported from their home in some older rocks to younger rocks are termed as Derived Fossils.

Facies Fossils- varied assemblages of fossils which are controlled by environment and restricted to certain sedimentary environment are known as Facies Fossils.

Pseudo Fossils- Certain structures of sedimentary or tectonic origin resemble fossilized organic remains are termed as Pseudo Fossils.



Dendritic pattern is result of MnO_2 precipitation

Chemical fossils - Well preserved palaeoproteins and amino acids are known as chemical fossils.

Trace Fossils

A **trace fossil,** also known as ichnofossil is a fossil record of biological activity but not the preserved remains of the plant or animal itself. These are impressions made on the substrate by an organism. Burrows, borings, footprints, feeding marks, and root cavities are few examples.

There are many types of trace fossils depicting different biological activities of organisms. They are classified according to ethology (inferred life history and behaviour of trace producing organisms), or preservational type.

The main types include :

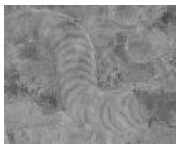
Cubichnia (**resting traces**)- - created by active organisms while at rest or hiding from prey.

Cubichnia

Repichnia or **locomotion traces** - A behavioural category of trace fossils that result from locomotion. Animals may leave distinct tracks through walking or crawling across soft sediment surfaces; repichnia are the fossilized traces of those tracks.

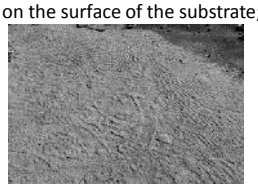
Repichnia

- **Domichnia** or dwelling traces are three dimensional dwelling structures created by burrowing.



Dwelling trace: Domichnia

Pascichnia or grazing traces - -These are horizontal feeding traces on the surface of the substrate;



Grazing traces: Pascichnia

Fodinichnia or **feeding traces** - - three dimensional networks characterized by the combined functions of deposit feeding and dwelling.

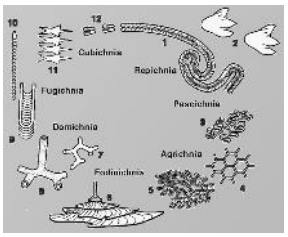
Fodichnia or feeding traces

Praedichnia or predation traces - - are common on hard substrates, as round drill holes in shells and shell damage by predators.

Praedichnia or predation traces

Fugichnia or escape traces - - occur as the animal flees to the new sea floor

Fugichnia or escape traces



Types of trace fossils

Significance of trace fossils

Trace fossils have great paleoecologic utility because they are (1) widespread in space and time, (2) found in place, and (3) largely the record of animal behavior and response, making them ideal indicators of environmental conditions. They provide rudimentary evidence for the morphology of the tracemakers, but the greatest contribution by traces is their demonstration of behavior patterns among extinct organisms. Trilobites and their traces are an excellent example, especially concerning modes of feeding, locomotio and protection. The contribution of ichnology to the general field of evolution is also important particularly during late Precambrian time.

Use of Fossils

Fossils are used to gather information about the lives and evolutionary relationships of organisms, for understanding geological changes and even for locating fossil fuel reserves.

Fossil remains can give us insight into how prehistoric plants and animals obtained food, reproduced and even how they behaved. At times fossils can also provide evidence for how or why the fossil organism died. Fossils can be used in many aspects, like:

Peeking into the Past: Fossil remains can give us insight into how prehistoric plants and animals obtained food, reproduced and even how they behaved. At times fossils can also provide evidence for how or why the fossil organism died.

Dating Layers of the Earth: Fossils aren't used only to understand individual organisms. Geologists also use fossils for what's called biostratigraphic correlation, which allows researchers to match layers of rock in different locations by age based on how similar the fossils in each rock layer are. This information can be used to help understand when different layers of rock were formed.

Documenting Changes: Environmental interpretation, or understanding how the Earth has changed over time, is another area where fossils supply invaluable evidence. The type of fossil found in a particular location tells us what kind of environment existed when the fossil was formed. For example, if you find fossil marine animals like brachiopods in the sandstone where you live, it means that, there must have once been an ocean where your house now stands.

Fossils and Oil: Fossils also have practical and commercial applications. The oil used in our energy and plastics industries tends to collect in specific types of rock layers. Because fossils can be used to understand the age of different rock layers as described above, studying the fossils that surface when digging oil wells can help workers locate oil and gas reserves. And of course, coal, oil and gas are themselves called "fossil fuels" because they're formed from the organic remains of prehistoric organisms.

Evolution: Perhaps one of the most important functions of fossils from a scientific perspective is that they constitute one line of evidence for understanding evolution. Using information pieced together from fossil evidence, scientists can reconstruct body types of animals that no longer exist and put together a "Tree of Life" to describe the evolutionary relationships between organisms.

Palaeogeophysics: Fossils play an important roleto determine the spatial relationship of the earth and the moon,the length of days and years, earth'sforce of gravity and palaeotides or ancient tidal forces during past.

Palaeogeoneurology: The study of endocranium of the fossil fauna reveals the degree of intelligence and the various receptive and motor facilities of the specimen.

Therefore, fossils play an important role in our day to day life.