Fossils, Paleontology And Fossil Succession

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Abstract- *Paleobotanists examine the fossilized remains of dead plants. This will include remains of the the mineralized plants themselves, but it will also include any surviving microfossils such as pollen and spores, and phytoliths. These survive only under certain conditions. Likepaleontologists, they often work on excavation sites have a wide range of techniques and skills in common with archeologists. They will need profound knowledge of botany and geology, seemingly two very different and disparate disciplines. Some may need to understand more than a basic knowledge of soil science too.*

I. EXCAVATION PROCESS

Excavation is destructive and is often not the preferred method of investigation. The modern paleobotanist will increasingly need knowledge of technology too. New technologies mean that we can leave evidence in situ. We can acquire evidence from electronic equipment such as remote sensing, surveying and environmental sampling. In some cases they may be using the equipment, in others (for example, desk-based research roles) they will be required to interpret the data. These academic roles may require understanding of further methods such as scientific dating (absolute methods such as radiocarbon dating, or relative dating such as dendrochronology).

II. PALEONTOLOGY

Paleontology is the study of the history of life on Earth as based on fossils. Fossils are the remains of plants, animals, fungi, bacteria, and single-celled living things that have been replaced by rock material or impressions of organisms preserved in rock.

Micropaleontology is the study of fossils of microscopic organisms, such as protists, algae, tiny crustaceans, and pollen. Micropaleontologists use powerful electron microscopes to study microfossils that are generally smaller than four millimeters (0.16 inches). Microfossil species tend to be short-lived and abundant where they are found, which makes them helpful for identifying rock layers that are the same age, a process known as biostratigraphy. The chemical makeup of some microfossils can be used to learn about the environment when the organism was alive, making them important for paleoclimatology.

Micropaleontologists study shells from deep-sea microorganisms in order to understand how Earth's climate has changed. Shells accumulate on the ocean floor after the organisms die. Because the organisms draw the elements for their shells from the ocean water around them, the composition of the shells reflects the current composition of the ocean.By chemically analyzing the shells, paleontologists can determine the amount of oxygen, carbon, and other life-sustaining nutrients in the ocean when the shells developed. They can then compare shells from one period of time to another, or from one geographic area to another. Differences in the chemical composition of the ocean can be good indicators of differences in climate.

Micropaleontologists often study the oldest fossils on Earth. The oldest fossils are of cyanobacteria, sometimes called blue-green algae or pond scum. Cyanobacteria grew in shallow oceans when Earth was still cooling, billions of years ago. Fossils formed by cyanobacteria are called stromatolites. The oldest fossils on Earth are stromatolites discovered in western Australia that are 3.5 billion years old.

Concepts of study and use of fossils

Three concepts are important in the study and use of fossils:

(1) Fossils represent the remains of once-living organisms. (2) Most fossils are the remains of extinct organisms; that is, they belong to species that are no longer living anywhere on Earth. (3) The kinds of fossils found in rocks of different ages differ because life on Earth has changed through time. If we begin at the present and examine older and older layers of rock, we will come to a level where no fossils of humans are present. If we continue backwards in time, we will successively come to levels where no fossils of flowering plants are present, no birds, no mammals, no reptiles, no four-footed vertebrates, no land plants, no fishes, no shells, and no animals. The three concepts are summarized in the general principle called the *Law of Fossil Succession*: The kinds of animals and plants

found as fossils change through time. When we find the same kinds of fossils in rocks from different places, we know that the rocks are the same age.

III. THE LAW OF FOSSIL SUCCESSION

The *Law of Fossil Succession* is very important to geologists who need to know the ages of the rocks they are studying. The fossils present in a rock exposure or in a core hole can be used to determine the ages of rocks very precisely. Detailed studies of many rocks from many places reveal that some fossils have a short, well-known time of existence. These useful fossils are called *index fossils*.

Today the animals and plants that live in the ocean are very different from those that live on land, and the animals and plants that live in one part of the ocean or on one part of the land are very different from those in other parts. Similarly, fossil animals and plants from different environments are different. It becomes a challenge to recognize rocks of the same age when one rock was deposited on land and another was deposited in the deep ocean. Scientists must study the fossils from a variety of environments to build a complete picture of the animals and plants that were living at a particular time in the past.

The study of fossils and the rocks that contain them occurs both out of doors and in the laboratory. The field work can take place anywhere in the world. In the laboratory, rock saws, dental drills, pneumatic chisels, inorganic and organic acids, and other mechanical and chemical procedures may be used to prepare samples for study. Preparation may take days, weeks, or months--large dinosaurs may take years to prepare. Once the fossils are freed from the rock, they can be studied and interpreted. In addition, the rock itself provides much useful information about the environment in which it and the fossils were formed.

REFERENCES

[1] Andrews, Henry N., Jr., *Studies in Paleobotany* (New York: John Wiley and Sons, Inc., 1961). A good introductory textbook of paleobotany.Google Scholar
[2] Eicher, Don L., *Geologic Time* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1968). Contains methods of estimating the age of rock strata, correlation of rock strata, naming of rock sections, paleogeographic maps, continental drift, and correlations by fossil zones.Google Scholar
[3] Kummel, Bernhard, and David Raup, *Handbook of Paleontological Techniques* (San Francisco, Calif.: W. H. Freeman and Co., 1965). A compendium of techniques used in studying fossils.Google Scholar
[4] McAlester, A. Lee., *The History of Life* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1968). A concise, highly readable account of the origin and diversification of animal groups throughout geologic time.Google Scholar
[5] Schuchert, C. E., *Atlas of Paleogeographic Maps of North America* (New York: John Wiley and Sons, Inc., 1955). Contains maps showing the distribution of land and water in Northern America through geologic time.Google Scholar