

PALYNOLOGY AND ITS RELATION TO THE EXPLORATION FOR OIL

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ABSTRACT: Palynology is one of the branches of paleontology, and more particularly, paleobotany. It deals with the study of pollen, spores, and dissociated degradation detritus of higher plants; spores, fruiting structures and other fragments of algae and fungi; and often includes some entities of similar size belonging to the protozoans or to groups of uncertain affinity.

The principal common factor in these diverse organisms is their small size which requires study under magnifications of from 50 to 1500 diameters.

In a restricted sense we consider palynology to be the study of spores, pollen, algae and similar-sized entities and their significance in life, time, space and energy.

Pollen and spores were long recognized in sediments and rocks before clear application and significance of their presence was studied. The first major studies in various fields of geological sciences are:

- a. Pleistocene and Post-pleistocene studies -- analysis of peats, bogs, marshes, etc. for determination of glacial history and history of recent vegetation. Principally introduced by von Post in Northern Europe; later widely developed in U. S.
- b. Identification and correlation of coal seams and coal-bearing rocks. First introduced in Germany 1928-31 and almost immediately in U. S. Widely expanded in U. S. during 1930-1945.
- c. Application to various problems in exploration for oil commenced at almost the same time in three companies, 1945-47.

Fossil plants range from Precambrian (algae) onwards. First land plants developed probably from simple marine plants in very late Ordovician. Land plants were established by Early Devonian in low-lying, moist habitats. Higher plants were established in uplands away from coasts by late Devonian. Large trees and forests were present in Late Devonian, first seed plants gymnosperms (pine-like ancestors.) in Late Devonian. The first flowering plants in early Mesozoic became widespread in late Lower Cretaceous.

There are major gaps in our knowledge but paleobotanists have reconstructed relatively reasonable history and phylogeny. Information derived from the study of spores and pollen is not evenly distributed through geologic time.

Type of training desirable for most effective work is a reasonable background in both botany and geology. Especially desirable are courses in paleobotany, paleontology, sedimentation, stratigraphy, structure, oceanography, in the geological sciences and morphology, anatomy, taxonomy, ecology, plant geography and genetics in the botanical sciences. Additional courses in invertebrate zoology, marine organisms, statistics, chemistry, math and computer analysis are requisite.

The applications of palynology to exploration are as follows:

1. Determination of age or identification
2. Zonation of rock units
3. Correlation
4. Determination of ancient environments
5. Distribution of sediments (source and direction)