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MARINE ECOLOGY AS AN AID IN TEACHING INVERTEBRATE PALEONTOLOGY

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With the growth of paleoecology as an acessory exploratory technique of the petroleum geologist, the writer has attempted to introduce to his invertebrate paleontology classes some of the basic concepts of marine ecology. The encouraging results and the enthusiasm of the students prompted the writing of this paper.

Many excellent references are available for reading assignments and current textbooks have sections dealing with the ecology of all major taxonomic groups. The study of members of the various phyla from a zoological viewpoint and in their natural habitats emphasizes the importance of a biological background for the working paleontologist.

Colleges and universities in coastal areas are favorably situated for investigations of this nature; however, institutions located a reasonable distance inland should find a longer trip well worth the time involved. Trips could be made in conjunction with invertebrate zoology or field ecology classes.

A marine-ecology trip is conducted at Lamar Tech in one day because of proximity to the Gulf of Mexico. Several days prior to the trip an outline covering the following points is issued to the students:

1) *General area of investigation.* The area in which the trip is to be conducted is briefly described. Geographical coordinates, type of coast line, range of tides, prevailing winds, type of bottom, depth, salinity and temperature of the water are some of the items covered.

2) *Specific stations to be studied.* Stations are designated on the map and a brief description of each locality and the type of fauna to be encountered are noted. A typical description follows:

Station I—Sydnors Bayou (See Map No. I), a partially closed body of water with a brackish water fauna. The bayou is surrounded by a small salt marsh, and pilings extend out into the water affording attachment for many sessile organisms. The salt marsh and mud flat exposed during low tide will be studied in some detail.

Several methods of study are used to obtain representative samples of the population at each station:

Population sample counts. Approximately one square foot of substratum is outlined by means of a wooden frame and the surface is counted. The area may be spaded up, screened and washed and the remaining animals counted.

Collection of specimens. May be accomplished in several ways:

1) *Screening.* Burrowing clams, annelids, etc. may be taken by washing bottom material through a 36×24 inch screening frame.
2) *Spading.* Certain mollusks and arthropods may be taken by digging near the opening of their burrows.
3) *Dip-net.* Two nets are used, a large net with a one-half inch mesh of heavy netting is used for crabs and larger forms. A butterfly net is used to catch smaller organisms.
4) *Plankton catch.* A plankton net is used to collect a representative sample of plankton and these forms are studied later under the microscope.
5) *Beach collecting.* Certain animals may be left stranded by the tides and others are blown in from the Gulf and deposited on the beach.
6) *Near-shore dredging.* A small dredge towed offshore will recover many neritic benthonic forms.

Salinity determination. Hydrometers and Knudsen's tables are used to obtain salinity readings at each station.

Temperature readings. Both air and water temperatures should be taken at each station.

On Galveston Island, Texas, the following habitats may be conveniently studied:

Rocky shore. At Galveston the rocky shore is a man-made environment resulting from the construction of a pair of stone jetties. Wave action, scour, and salinity variations are important in this environment.

Sandy beach. The beaches support relatively few organisms, but burrowing pelecypods, and gastropods are found along the strand. Many dead shells of animals inhabiting the near-shore bottom may also be collected on the beaches. These specimens are useful as comparative material in the laboratory.

Mud flat and brackish water. Forms typical of this hibitat may be studied with respect to environmental adaptation.

Near-shore bottom. Inhabitants of this environment are best collected by means of a small dredge. The plankton net may also be towed during this operation.

The above habitats support interesting faunas representing different sedimentary and biological environments.

Studies of this type acquaint the student with the paleoecological approach in the solution of paleontological and stratigraphic problems. The student is introduced to:

1) A variety of ecological situations.
2) Types of organisms inhabiting the environments and their relationship to each other. Predators, scavengers, commensals, parasites, and others are pointed out.
3) Effect of these organisms on the sedimentary environment.
4) Structural variations of organisms as a result of adaptation to such modes of life as burrowing, swimming, and attachment.
5) Examples of faunal zonation and factors controlling zonation.
6) The use of recent material in illustrating similarity among taxonomic groups and a comparison between recent and fossil forms.
7) Methods by which fossil assemblages might be classified as biocoenoses or thanatocoenoses.
8) A systematic method of investigating the ecology of a given area.
9) A correlation between neontological and paleontological techniques.

REFERENCES

ALLEE, W. C., EMERSON, A. E., PARK, T., & SCHMIDT, K. P., 1950, Principles of Animal Ecology: W. B. Saunders Company, p. 1.

ALLAN, R. S., 1948, Geological correlation and paleoecology: Geol. Soc. Amer. Bull., v. 59, p. 1–10.

ELLISON, S. P., 1951, Microfossils as environment indicators in marine shales: Jour. Sed. Petrology, v. 21, p. 214–225.

——, 1955, Economic applications of paleoecology: Econ. Geol., Fiftieth Anniversary Volume, Pt. 1, p. 867–884.

FENTON, C. L., 1935, Viewpoints and objects of paleoecology: Jour. Paleont., v. 9, p. 63–78.

NEWELL, N. D., RIGBY, J. K., FISCHER, A. G., WHITEMAN, A. J., HICKOX, J. E., & BRADLEY, J. S., 1953, The Permian Reef Complex of the Guadalupe Mountains Region, Texas and New Mexico; A Study in Paleoecology: San Francisco, Freeman, 233 p.

PAYNE, T. G., 1942, Stratigraphical analysis and environmental reconstruction: Amer. Assoc. Petrol. Geol. Bull., v. 26, p. 1697–1770.

SCHENCK, H. G., 1940, Applied paleontology: Amer. Assoc. Petrol. Geol. Bull., v. 24, p. 1752–1778.

SCOTT, G., 1940, Paleoecological factors controlling the distribution and mode of life of Cretaceous ammonoids in the Texas area: Jour. Paleont., v. 14, p. 299–323; A.A.P.G. Bull., v. 24, p. 1164–1203.

TWENHOFEL, W. H., 1931, Environment in sedimentation and stratigraphy: Geol. Soc. Amer. Bull., v. 42, p. 407–424.

VAUGHAN, T. W., 1940, Ecology of modern marine organisms with reference to paleogeography: Geol. Soc. Amer. Bull., v. 51, p. 433–468.

WILSON, J. L., 1951, Paleoecology: Texas Jour. Sci., v. 3, no. 1, p. 58–65.