

SPECIAL NOON MEETING

PRACTICAL CLASSIFICATION OF REEFS AND BANKS BIOHERMS AND BIOSTROMES

by Karl W. Klement

Reefs and banks form stratigraphic traps which account for more than 40 percent of the total petroleum production in the world. Yet there is much confusion concerning the classification and terminology of these skeletal deposits. Following LOWENSTAM and NELSON et al, I apply the terms "reef" and "banks" to denote the origin of the structures, whereas I use the terms "bioherm" and "biostrome" to designate the shape of the structures and their relations with the associated layered facies.

A reef is a structure built by the in-situ growth of organisms which have the ecological potential to act as frame-builders. It is a wave-resistant, prominent structure on the sea floor and will, therefore, influence and modify the sedimentation in its vicinity.

A bank, on the contrary, is made up of organisms which did not have the ability to act as frame-builders. Banks may be formed in place or by mechanical accumulation following transport of the skeletal remains. Banks are also wave-resistant. They may or may not be prominent structures on the sea floor. Correspondingly, they may or may not influence the sedimentation in their surroundings.

According to the mode of their formation, banks may be further subdivided into (1) mechanical aggregational banks; and (2) biogenic banks resulting from

- (a) biogenic baffling of sediment;
- (b) biogenic sediment binding;
- (c) biogenic accretions of cementing organisms; and
- (d) local gregarious growth of organisms which did not cement themselves to one another or to the substratum.

Thus, reef and banks represent distinct different biogenic structures. A reef is a structure in which the in-situ growth of organisms is more important than sediment-trapping and binding. In banks the sediment-baffling and binding functions of the organisms are the predominant source of sediment accumulations. In a reef, the organic productivity of the frame-building organisms is by itself sufficient to elevate the structure above the surrounding sea floor. Frame-builders in general are organisms which cement themselves to the substratum and form a rigid reef mass.

According to their shape and geological settings, biogenic buildups may be subdivided into bioherms and biostromes.

A bioherm is a massive, mound-shaped structure which is in discordant relationship to the surrounding layered facies of different lithology. A biostrome is coarsely layered and grades concordantly into the associated layered sediments.

According to the foregoing definitions, a reef represents a bioherm on the basis of its shape and geological setting. A bank, however, may appear in the form of a bioherm or a biostrome. Mechanically accumulated banks and biogenic banks resulting from the sediment-baffling activity of organisms usually are found in the form of bioherms. Banks resulting from biogenic binding of sediment may represent bioherms or biostromes. Local gigantic growth of organisms usually lead to accumulations of biostrome type.

Examples of various types of recent and ancient reefs and banks will be illustrated and discussed. The lecture will emphasize the fact that structures which superficially appear to be similar may be quite different in their genetic and environmental interpretation.

BIOGRAPHICAL DATA - Karl W. Klement

Born: - Czechoslovakia

Education: - 1959 - Ph. D., University of Tuebingen, Germany
1960 - Post-doctoral Fellow, Scripps Institution of Oceanography, La Jolla, California

Experience: - 1959 - Research Assistant, University of Tuebingen, Germany
1961-64 - Senior Research Scientist, Pan American Petroleum Corp., (now Amoco Prod. Co.), Tulsa, Oklahoma
1964-69 - Associate Professor of Geosciences, Texas Tech University, Lubbock, Texas
1969 - Professor of Geology, University of Texas at El Paso, El Paso, Tex.

Membership: - American Association of Petroleum Geologists
Society of Economic Paleontologists and Mineralogists,
Society of Economic Paleontologists and Mineralogists,
Permian Basin Section
Paleontological Society (US)
Paleontological Association (England)
Paleontological Society (Germany)
Sigma XI
West Texas Geological Society, Midland
Lubbock Geological Society
El Paso Geological Society

Other: - 1969 - Recipient A. I. Levorsen Memorial Award, Southwest Section, AAPG.