

HOSKINS, C. W., Jersey Production Research Company, Tulsa, Okla.

MOLLUSCAN BIOFACIES IN CALCAREOUS SEDIMENTS OF GULF OF BATABANO, CUBA

The Gulf of Batabano is a shallow embayment approximately 16,000 square miles in area on the south side of Cuba. It is covered with a veneer of carbonate sediments, and the water is generally no more than 25 or 30 feet deep. Reefs rim the Gulf on the southeast margin.

Calcareous sediments range in composition from clean oölitic sand, composite grain sand, and skeletal sand to a sediment consisting almost entirely of carbonate mud and skeletal debris. Some of these sediment types can be characterized by specific associations of mollusks.

The invertebrate fauna of the Gulf is principally molluscan, and comprises 194 named species and sub-species of gastropods, pelecypods, and scaphopods. Molluscan faunules were used from 119 gravity core and grab samples, which are more or less evenly spaced over the Gulf. Semi-quantitative methods were employed in analyzing the faunal data.

Mollusks are most abundant on areas of carbonate mud along the north margin of the Gulf, particularly in the northeastern part of the Gulf where brackish-water influences are greatest. They are least abundant in high-energy areas along the seaward Gulf margin.

The energy of the water mass and salinity appear to be the two most important environmental factors affecting the distribution of the mollusks. Accordingly, two major ecological molluscan assemblages may be recognized: (1) the Northern Gulf assemblage and (2) the Southeastern Gulf and Gulf Margin assemblage. The Northern Gulf assemblage is best developed in low-energy areas on grassy sediments that contain more than 50 per cent carbonate mud. The Southeastern Gulf and Gulf Margin assemblage is found on relatively clean sandy sediments along the seaward margin of the Gulf, and in the waters of higher energy found in the eastern part of the Gulf. Subordinate faunal associations are recognizable within each assemblage, but these reflect local variations in sediment type, salinity, and abundance of marine grasses.

Characteristic species of each of these major assemblages are: (1) Northern Gulf assemblage: *Anomalocardia brasilina*, *Corbula swiftiana*, *Brachidontes exustus*, *Alabina* sp., *Batillaria minima*, *Tegula fasciata*; (2) Southeastern Gulf and Gulf Margin assemblage: *Ercilia nitens*, *Divaricella quadrisulcata*, *Tellina candeana*, *Lucina pennsylvanica*, *Cerithium litteratum*, *Olivella nivea*.

HUEY, ARTHUR S., Signal Oil and Gas Company, Los Angeles, Calif.

COMPARISON OF CONDITIONS AFFECTING EXPLORATION IN SOUTH AMERICA

South America is a land of contrasts. Within this variety of relief, climate, and cover are some countries blessed with oil resources and other countries denied this wealth. Exploration for oil and gas in three countries, namely, Brazil, Chile, and Uruguay is carried on by government oil monopolies and financed through State funds. In all other countries of South America exploration is either performed through the participation of private companies or through cooperation between State enterprise and private companies.

Venezuela is the most important oil-producing country of South America. Its daily rate of almost 3 million barrels of oil constitutes more than 80 per cent of

all South America's production. For several decades Venezuela served as a world model for a 50/50 sharing of profits between the government and private enterprise. Late in 1958 an increase in income-tax rates was instituted which resulted in a marked increase in the government's share of oil-company profits. One effect of this change, coupled with the government's announced policy of granting no more concessions, has been a reduction of exploration activities.

In Argentina a program called the "Battle for Petroleum" was invoked in July, 1958, by President Frondizi whereby private companies were invited to bid for contracts to help the government oil agency, Yacimientos Petrolíferos Fiscales, develop known fields and to assist in the exploration for the finding of new reserves. This program in less than 4 years has brought Argentina self-sufficiency in oil production, greatly reduced the import requirements, and saved valuable foreign exchange.

The future of exploration in South America is intricately involved in the destiny of these peoples and could be affected seriously if communism or its Cuban variety, "Castroism," should make inroads into their political and economic life. Our government, through the "Alliance for Progress," a cooperative program, hopes to help the people of Latin America advance their economy and public welfare. Private enterprise also must challenge and defeat the charge of "imperialism" through accelerated public-relation programs and positive demonstrations of a working partnership or *sociedad* in the exploration for oil and gas.

IMBRIE, JOHN, Columbia University, New York, N.Y.

FACTOR ANALYSIS IN GEOLOGY

In geology, as in physical science in general, it is sometimes possible to approach complex problems by arranging observations or experiments so that selected variables are held constant. In many cases, however, such a simplification is either difficult to achieve, or unrewarding by reason of uncertainties and artificialities entailed in attempts to duplicate natural conditions in the laboratory. Advent of high-speed digital computers has made it possible to treat such problems by various multivariate statistical techniques. One of these techniques, factor analysis, can be applied to problems involving as many as 200 variables recorded quantitatively or qualitatively on any number of samples. By treating such a data array simultaneously, relationships that might otherwise be missed can be identified and objectively evaluated. One of the most useful features of this system is its ability to specify the number of independent casual influences at work in a given problem and to assess the relative importance of each variable at each locality. Applications to modern sediment data and ancient sedimentary rocks indicate that the scheme is a useful supplement to usual rational procedures of data analysis.

JEKHOWSKY, B. DE, AND GOUBIN, N. Institut Français du Pétrole, Rueil-Malmaison, France

SUBSURFACE PALYNOLOGY IN MADAGASCAR: PERMIAN, TRIASSIC, AND JURASSIC OF MORONDAVA BASIN

Palynological investigations are summarized for several hundred cores and cuttings samples from the Permian, Triassic, and Jurassic found in about 30 wells drilled by the Société des Pétroles de Madagascar in the Morondava Basin (southwest of Madagascar). The nature of the microflora, which includes about 300 forms of organic microfossils (numerous spores and