

ity of oil or gas fields contain significant quantities of saturated hydrocarbons ranging from methane through the pentanes.

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#### EXAMINATION OF GEORGIA COASTAL SEDIMENTS WITH N.E.L. SPADE CORER

For 2 years samples have been obtained with an N.E.L. spade corer from the nearshore waters of the Georgia coast. During the past year, work has been concentrated on sampling in the coastal rivers, sounds, and estuaries of the Sea Island section of Georgia. Approximately 300 spade cores have been collected at 150 stations in 12 rivers and estuaries.

A tremendous variety of sediments and substrates are indicated by the sampling results. Sediment textures in the estuaries and rivers range from clay to gravel. Rivers such as the Satilla, Altamaha, and Ogeechee, which have their sources far inland, are characterized by clean, well-sorted sand, whereas closed sounds such as Doboy and Sapelo Sounds appear to be the sites of silt and mud accumulation. Exposures of Miocene bedrock, indicating the absence of any Holocene sediment accumulation, are found at several locations in the St. Marys and Turtle Rivers. All the samples reflect the mixing, to some extent, of Pleistocene and Holocene sediments. Mixed assemblages of Miocene, Pleistocene, and Holocene macroinvertebrate fossils have been found.

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#### OCCURRENCE AND SIGNIFICANCE OF RIBBING VARIATIONS IN LATE ORDOVICIAN BRACHIOPODS

Brachiopods are among the most common elements of marine Paleozoic faunas. Many species are suitable for study of widely separated basins.

Costate specimens representing 11 species were obtained from Upper Ordovician (Richmondian) strata in the Ohio Valley, Illinois, Iowa, Minnesota, Missouri, Oklahoma, Tennessee, and Texas in order to examine geographic patterns in costation and to determine whether observed variations were uniform within each sedimentary province. Regardless of wide variations in costae between different species, most species showed some tendency toward geographic variation in costation. In the Ohio Valley, the variations generally followed a trend toward lower costation. Specimens of *Lepidocyclus capax* (Conrad), *Austinella sooyellei* (Miller), *Plaesiomys subquadrata* Hall, *Zygospira kentuckyensis* James, and *Z. modesta* (Hall) are typically less costate than related members in adjacent basins. These relations support earlier observations of provincialism in the type Richmond fauna. Exceptions to this general pattern were noted in *Glyptorthis insculpta* (Hall) and *Rhynchotrema dentatum* (Hall), both of which exhibited little geographic variation in their costation. Observations for the widespread species, *Lepidocyclus capax*, are somewhat contradictory. Representatives from the Ohio Valley generally are less costate than those observed in Tennessee, Iowa, and Minnesota, but are somewhat more costate than the "Fernvale" variant in Oklahoma. The latter may be an older form.

Preliminary results suggest that ecologic factors, operating within a sedimentary basin, did affect costation but not uniformly for all species. Studies are con-

tinuing to determine more precisely the degree of uniformity of costation patterns and whether such patterns are related to variations in lithology.

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#### SOLITARY CORAL GROWTH FORMS AND DISTRIBUTION PATTERNS AS INDEX OF SEDIMENT-ACCUMULATION RATES

The characteristic feature of a 300-m-thick shelf sequence of alternating limestone and shale (lower Carboniferous, Northwest Ireland) is the presence of extensive solitary coral-strewn bedding planes. These shale-overlain, prone, coral death assemblages from particle-supported beds 5–15 cm thick alternating with 6–75-cm beds of skeletal carbonaceous silt, sand, or mud. The death assemblages consist of randomly oriented adult corals averaging 50–100 cm in length in concentrations of 4–11/sq m; they are laterally extensive (>30 m) with rare discontinuities. Locally upward-facing surfaces of prone individuals are breached and infested with boring bryozoans and sponges, or encrusted with aulopodid corals. Coral growth forms and internal structures in the death assemblage commonly are aberrant; the cylindrical form is irregularly coiled and constricted; the intertabular space is highly variable (0.50–4.0 mm); the tabulae are thin in places and accompanied by a suppressed dissepimentarium. In the malformed parts of the corals the intertabular space commonly is infilled completely with silty biomicrite, whereas normally developed axial structures are spar filled. A few free-living upward-growing corals are present in life position in intervening units.

The coincidence of silty biomicrite axial infill and aberration in growth form and internal structures suggests that rapid local accumulation of fine sediment about the calyx forced upward growth and concomitant skeletal reduction. The coral death assemblages are lag deposits probably produced by unusually intense storm wave action which alternated with prolonged periods of quiet-water accumulation. The thickness of the quiet-water deposits (>75 cm) implies a long duration between storms, e.g., "once-in-a-hundred-years."

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#### GEOCHEMICAL PROSPECTING AT SEA

An underwater seep-detector system was placed in operation in November 1967 as one of the research and development programs on the M/V *Gulfrex*. From thousands of miles of traverse, the results of the hydrocarbon analyses of seawater have shown the tremendous potential of this system for locating petroleum and natural gas seepages in offshore areas. The seepages, in turn, indicate prospective areas of buried hydrocarbon deposits.

The *Gulfrex* seep detector is capable of analyzing seawater for saturated and unsaturated hydrocarbons up to butane. The analyses have yielded surprisingly consistent data on the background hydrocarbon assemblage in the seas. From this knowledge, we now can recognize true petroleum and natural gas seepages, even in areas where prolific life activity may give abnormally high hydrocarbon backgrounds. The specific signature of hydrocarbon distributions in the sea also has the potential of distinguishing the types of hydro-