SEPM SESSION ON ANCIENT CARBONATES: SEDIMENTATION AND DIAGENESIS

Emerald Room

Presiding: C. H. MOORE, JR., L. C. PRAY

1. W. J. KOCH: Lower Triassic lithofacies of Cordilleran miogeosyncline, western United States 1:30
2. D. N. LUMSDEN, M. T. LEDBETTER: Pennsylvanian-Permian miogeosyncline to nearshore shelf carbonate facies transition, Clark County, Nevada 1:50
3. P. R. ROSE: Stratigraphic revision, Edwards Group (Lower Cretaceous) of Texas, and regional surface-subsurface synthesis 2:10
4. W. D. MARTIN: Petrography of composite vertical section of Cincinnatian Series limestones, southwestern Ohio and adjacent areas 2:25
5. J. C. HOPKINS: Production of reef-margin breccias by submarine cementation and slumping of carbonate sands, Miette reef complex 2:45
6. J. W. PARKER, L. D. TAYLOR: Sedimentary breccia in Bayport Limestone at Bellevue, Michigan 3:05
7. T. L. ROWLAND: Algal mudstone mounds in Morrowan Stage (Lower Pennsylvanian) in northeastern Oklahoma 3:25
8. L. C. PRAY: Submarine slope erosion along Permian bank margin, West Texas 3:40
9. D. C. THORSTENSON, F. T. MACKENZIE, BYRON RISTVET: Experimental cementation of carbonate sands 4:00
10. R. REZAK: Organic influences on carbonate cementation 4:15
11. T. FREEMAN: Magnesium-rich water from evaporite-bearing shales, and diagenesis of subjacent carbonates—Keuper-Muschelkalk, Iberian Range, Spain 4:35

SEPM SESSION ON RECENT CLASTICS

Embassy Room

Presiding: D. S. GORSLINE, S. ARONOW

1. M. E. FIELD, E. P. MEISBURGER, D. B. DUANE: Late Pleistocene-Holocene sedimentation history of Cape Kennedy inner continental shelf 1:30
2. J. C. KRAFT, G. K. ELLIOTT: Sediment facies patterns and geologic history of coastal marsh 1:45
3. R. A. DAVIS, JR., W. T. FOX: Beach and nearshore processes and morphology in nontidal environment 2:00
4. R. Q. OAKS, JR., E. C. OAKS: Stratification in Willow Creek alluvial fan, Eureka Valley, Inyo County, California 2:20
5. L. L. BRADY, H. E. JOBSON: Experimental study of heavy mineral segregation under alluvial flow conditions 2:35
6. R. M. FLORES: Variations in heavy mineral composition during transport of short-headed stream sands 2:55
7. D. J. STANLEY, T.-C. HUANG: Multiple origin of hemipelagic mud fill in Mediterranean basin 3:10
8. S. M. GAGLIANO: Building new marshes and estuaries in coastal Louisiana through controlled sedimentation 3:25
9. R. P. SELF: Cretaceous lithoclasts in modern beach and river sands, Veracruz, Mexico 3:45
10. A. S. NAIDU: Clay mineral composition of Beaufort Sea sediments, Arctic Ocean 4:00

THURSDAY MORNING, APRIL 1

SEPM COLLOQUIUM 9:00–12:00

Oceanic Plankton

Department of Geology, Rice University

Presiding: E. A. PESSAGNO, JR.

ADDITIONAL PAPERS

(BY TITLE)

M. D. PICARD, L. R. HIGH, JR.: Sedimentary structures and bedding along ephemeral streams

J. R. UNDERWOOD, JR., Y. Y. YOUASH, G. PHILIP: Uniquely rounded desiccation columns near Euphrates River, northwestern Iraq—produced by prolonged erosion in arid climate

ABSTRACTS OF PAPERS

AHR, WAYNE M., Dept. Geol., and RICHARD REZAK, Dept. Oceanog., Texas A&M Univ., College Station, TX 77843

LATE CAMBRIAN ALGAE FROM CENTRAL TEXAS

Late Cambrian algal reefs and bioherms in the Llano uplift of central Texas contain 4 genera of fossil algae. In decreasing abundance, they are *Girvanella, Renalcis, Nuia,* and *Epiphyton.* Detailed taxonomic investigations of the algae and studies of their host rocks show that changes in the ancient environment can be determined from (1) variations in relative abundance of *Nuia, Renalcis,* and *Girvanella;* (2) variations in growth patterns of *Girvanella;* (3) variations in the macrostructure texture and composition of the algal limestones; and (4) combinations of 1, 2, and 3. The occurrence of only 1 or 2 of these variables is sufficient to provide information about depositional environments. This can be accomplished by thin-section study of fossil algae in cuttings-size fragments.

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TEXTURE AND GRAIN SURFACE CHARACTER OF ST. PETER SANDSTONE

The St. Peter Sandstone in Wisconsin, Minnesota, and Illinois was investigated, and size, shape, and grain surface characteristics were determined by modern analytic techniques.

Texturally the St. Peter Sandstone is a fine to medium-fine (av $M_z = 2.09\ \phi$), moderately to moderately well sorted (av $\sigma_I = 0.59\ \phi$), finely skewed, mesokurtic sandstone. Textural parameters exhibit little vertical or horizontal variability. The average grain roundness is a ρ value of 4.76 (rounded) with a significant percentage of angular grains in the very fine sand and silt fractions. The average grain Elongation Index is 0.67 (intermediate) with an average 23% of the grains in the very elongate class. High magnification studies show grain surfaces to be devoid of the classic abrasion features of frosting. The "frosting" is chiefly minute, crystallographically oriented, rhombohedral and prism overgrowths of authigenic quartz,

with superimposed overgrowths of authigenic clay minerals and etch pits.

Textural data were utilized in a variety of bivariant techniques and linear discriminant functions attempting to determine depositional environments for the St. Peter Sandstone. The results were inconsistent and nondefinitive. More consistent results were obtained by inspecting cumulative probability curves, following the techniques of Douglas, Sindowski, and Visher, which indicate a shallow-marine origin for the St. Peter Sandstone.

The classic textbook description of the St. Peter Sandstone as a very well-sorted sandstone with very well-rounded nearly spherical, and eolian frosted grains, is in error.

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SMACKOVER TREND FROM MEXICO TO FLORIDA

The Smackover trend within the United States extends approximately 1,000 mi from south Texas to western Florida. Prolific production has been obtained in east Texas, southern Arkansas, northern Louisiana, and eastern Mississippi. Continuing exploration is extending the productive areas eastward into Alabama and western Florida and promises to extend production into south Texas.

Most of the production has come from oolitic, pelletal, and skeletal carbonates of the upper Smackover. The 3 most important types of reservoir rocks are oomoldic dolomite, saccharoidal dolomite, and oolitic limestone with interoolite porosity. Reservoir porosity and permeability vary widely depending on the quality of the primary porosity, amount of secondary porosity development, and the magnitude of porosity destruction.

Low-relief anticlines, with up to about 400 ft of closure, are the most important structural traps in terms of present production. These closures are usually associated with Louann Salt swells which underlie the Smackover section. Fault traps, traps associated with high relief structures and salt piercements, and stratigraphic traps are of lesser importance at present, but it is anticipated that they will provide major reserves as exploration continues.

The search for low-relief anticlines will continue throughout the trend, but the importance of these features will be greatest in the sparsely drilled areas. Within well-developed areas, exploration will focus on the other trap types in order to find big new reserves.

ASSEEZ, L. O., Dept. Geol., Univ. Ife, Ife, Nigeria, and E. A. FAYOSE, Dept. Geol., Univ. Ibadan, Ibadan, Nigeria

MICROPALEONTOLOGIC INVESTIGATION OF EWEKORO AREA, SOUTHWESTERN NIGERIA

About 80 surface and subsurface samples from the Ewekoro limestone quarry and the Akinsinde borehole, approximately 10 mi south of the quarry, were examined for foraminiferal evidence bearing on the nature and vertical extent of the Ewekoro Limestone and the ages of the suprajacent and subjacent beds. A detailed bed-by-bed sampling of the section exposed at Ewekoro was carried out. Altogether, about 78 species of benthonic and planktonic Foraminifera were identified. Although some ostracods and Foraminifera have been studied previously in this area, the present investigation revealed the presence of additional Foraminifera species which either have not been recorded previously or else were misidentified.

The undoubtedly early Eocene age of the shelly limestone commonly referred to as the "Ewekoro Formation" is substantiated by the presence of important index Foraminifera species including *Bolivina ottaensis* Reyment, *Globorotalia bollii* El-Naggar, and *Pseudohastigerina wilcoxensis* (Cushman & Ponton).

The biostratigraphic units established in the area have been correlated with equivalent units elsewhere in the western state. Detailed lithostratigraphic data in the form of charts and cross sections reveal the variability within the different units.

Data have led to the unmistakable conclusion that the deposition of the entire sequence referred to as "IMO Formation" occurred in a shallow-marine environment that succeeded the deposition of the Abeokuta Formation. The shelly limestone hitherto assigned a formational status is a member of the IMO Formation.

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TIME-TRANSGRESSIVE ASPECTS OF SOME CRITICAL PLANKTONIC SPECIES

The origin of *Globigerina bulloides* in temperate areas occurs in the middle Miocene in Neogene zones 9 or 10, whereas in tropical sections it appears in the upper Miocene in Neogene zones 16 or 17, a cool-water cycle. In both cases it could be represented as being derived from *Globigerina praebulloides*. The origin of the temperate *Globorotalia (Turborotalia) pachyderma*, dextrally coiled, occurs in Neogene zone 13 or just below in temperate areas, whereas it invaded subtropical areas only during the principal cold cycles subsequent to deposition of zone 13.

Forms of *Neogloboquadrina* lacking umbilical toothlike structures such as *N. dutertrei subcretacea* appeared in tropical and warm temperate areas in the late Miocene. *Neogloboquadrina dutertrei dutertrei* with umbilical toothlike structures appeared near the end of Pliocene or at the beginning of Pleistocene time in Neogene zone 22 in tropical areas, whereas the primitive forms continued into the Holocene in temperate areas. Thus, there is an apparent extinction datum plane of the primitive form near the end of Neogene zone 21 deposition in tropical areas but not in temperate areas. Coiling characteristics and form ratios distinguish this group from *Globorotalia (Turborotalia) pachyderma*.

Praeorbulina spp. appear initially in the lower Miocene Neogene zone 8 in tropical areas; isomorphs of this genus appear initially in temperate areas in Neogene zones 11 or 12. The earlier forms originated from species of *Globigerinoides* whereas those in temperate areas appear to have originated from *Globigerina*.

Ecologic-evolutionary relations are responsible for these and many other kinds of time-transgressive aspects of planktonic datum planes.

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NIAGARAN REEF EXPLORATION IN NORTHERN MICHIGAN BASIN

Silurian Niagaran reefs, a majority of which contain hydrocarbons, have been found in the northern part of the Michigan basin. These are pinnacle reefs similar to those in southeastern Michigan and Ontario and are present within a narrow belt along the northern flank