## SOUTHWEST SECTION

### 11th Annual Meeting
### Lubbock, Texas
### February 6–7, 1969

The 11th annual meeting of the Southwest Section of AAPG will be held on February 6–7, 1969 on the campus of Texas Technological College in Lubbock, Texas.

The Lubbock Geological Society will host the convention. The meeting has been planned by a committee chaired by Grover E. Murray, President of Texas Tech, and assisted by co-chairmen R. B. Mattox and A. D. Jacka.

The theme of the technical program, "Academics and Economics," will be introduced by the keynote speaker, Grover E. Murray. Speakers have been brought together who span the academic and economic aspects of the southwestern United States and northern Gulf of Mexico. Topics cover the range from recent sediments to basement petrology with perspectives from geology, geochemistry, geophysics, and oceanography.

## TECHNICAL PROGRAM SUMMARY

### THURSDAY MORNING, FEBRUARY 6

1. Grover E. Murray, Economics of academics (Keynote address)
2. Robert F. Dill, New evidence on Pleistocene sea-level changes from *Deepstar* dives
3. John W. Antoine, Role of salt tectonics in structural history of western Gulf of Mexico
4. Robert N. Mitchum, John N. Bubb, Douglas Perry, Authigenic and detrital dolomite in unconsolidated deep-water sediments of west Florida slope, Gulf of Mexico
5. James K. Munn, Breedlove field, Martin County, Texas

### THURSDAY AFTERNOON, FEBRUARY 6

6. Robert J. Dunham, (To be announced)
7. Karl W. Klement, Phylloid algal banks
8. Robert F. Sippel, Luminescence petrography of sandstones
9. Alonzo D. Jacka, Observations on sandstone cementation
10. David V. LeMone, Canadian (Early Ordovician) El Paso Group, southern Franklin Mountains, El Paso County, Texas
11. Wilton J. Brown: Bloodworth Northeast field, Coke and Nolan Counties, Texas

### FRIDAY MORNING, FEBRUARY 7

1. Rodger E. Denison, Basement rocks in west Texas and eastern New Mexico
2. Neil D. Opdyke, Paleomagnetic correlation
3. Corwin C. Reeves, Jr., Texas Lineament: Pleistocene-Holocene movement?
4. Wulf A. Gose, Mossbauer studies on a large griphite crystal
5. Robert C. Shumaker, Disharmonic folding in Iran
6. Stanley E. Cebull, Characteristics and tectonic setting of growth faults in eastern Venezuelan basin

### FRIDAY AFTERNOON, FEBRUARY 7

Questions and Discussions

## ABSTRACTS OF PAPERS

(in order of presentation)

GROVER E. MURRAY, President, Texas Technical College, Lubbock, Tex.

Economics of Academics
(Keynote address)

ROBERT F. DILL, U. S. Navy Electronics Laboratory, San Diego, Calif.

New Evidence on Pleistocene Sea-Level Changes from *Deepstar* Dives

(No abstract submitted)

JOHN W. ANTOINE, Dept. of Oceanography, Texas A&M Univ., College Station, Tex.

Role of Salt Tectonics in Structural History of Western Gulf of Mexico

The discovery through the JOIDES drilling program that the Sigsbee Knolls and domes represent intrusive salt bodies has made it necessary to review many old concepts concerning the structural evolution of the Gulf of Mexico. The debate concerning the physiography of the Gulf during the time of salt deposition is now more heated than ever. It has been suggested that, during this time, the Gulf was an ocean basin, a shallow sea, a landmass, or an ocean that had risen to shallow depths above a rising convection cell. Any one of these hypotheses must be able to explain the presence of salt, at least under part of the central basin, if it is to be considered seriously. The possibility that thick salt beds can be deposited at oceanic depths has been questioned. Although at first thought this may discount a hypothesis that places the Gulf basin at great depth during Triassic-Jurassic time, the structure of the bordering continental slopes of the western Gulf suggests an alternate hypothesis: the Gulf is an oceanic basin along the western margins of which great amounts of salt accumulated. This salt migrated toward the basin. The distribution of salt diapirs throughout the area of subsurface salt is controlled mainly by sediment thickness and the distribution of massive carbonate sequences. The change from simple ridge structure to diapir swarms, south to north along the eastern coast of Mexico, indicates the influence of the sedimentary cover. The abrupt termination of the diapirs on the southeast in the Bay of Campeche and the position of the Sigsbee Knolls and domes indicate the important (negative?) role played by the carbonate platforms in the distribution of salt diapirs.

ROBERT N. MITCHUM, Humble Oil & Refining Co., Midland, Tex., JOHN N. BUBB, and DOUGLAS PERRY, Humble Oil & Refining Co., Houston, Tex.

Authigenic and Detrital Dolomite in Unconsolidated Deep-Water Sediments of West Florida Slope, Gulf of Mexico

Core samples from the West Florida slope contain minor but significant amounts of dolomite in unconsolidated deep-water sediments of Tertiary age. Some of this dolomite appears to be authigenic, and its origin cannot be explained by the well-documented mechanism of dolomitization by contact with brines formed by solar evaporation or igneous activity.

The slope sediments were sampled at water depths ranging from 667 to 4,777 ft, and in test holes penetrating as much as 1,000 ft of sediment, mostly coccolith-foraminiferal ooze and terrigenous clay. Dolomite is most common in Pleistocene, Pliocene, and some Miocene sediments.

Two general groups of dolomite occur: (1) a northern suite of "ideal" composition, silt-size, abraded and ragged, rhombic dolomite crystals; and (2) a southern suite of calcium-rich, sand-size, euhedral, rhombic dolomite crystals that show no evidences of abrasion or corrosion. Sediments containing the northern suite of dolomite crystals have high percentages of terrigenous clay material; associated dolomite appears to be of detrital origin, and transported to the depositional site together with the clay. The calcium-rich dolomite of the southern suite is interpreted as authigenic and probably formed in water depths similar to present depths. From analysis of interstitial waters, this dolomite probably formed from water similar in composition to normal seawater.

JAMES K. MUNN, Pan American Petroleum Corp., Fort Worth, Tex.

BREEDLOVE FIELD, MARTIN COUNTY, TEXAS

The Breedlove field is in northwest Martin County, Texas, approximately 30 mi north of Midland. The field is only a few miles east of the axis of the Midland basin and on the east flank of the ancient Tobosa basin. Stratigraphically, the field is northeast of the limit of Devonian carbonate deposition and the Silurian carbonate section (major producing zone in the field) has a maximum thickness of 550 ft near the field and thins north and east toward the margin of Tobosa basin—a result of pre-Woodford erosion and nondeposition. The Silurian section is overlain by the Woodford Shale of Devonian and Early Mississippian ages, has an average thickness of 100–120 ft, and is separated from the underlying Ordovician Montoya Formation by the Sylvan Shale that ranges in thickness from 0 to 10 ft.

The field was discovered in July 1951 with the completion of the Pan American Production Company No. 1 Breedlove. This well, 660 ft from the south and 4,620 ft from the east lines of League 258, Briscoe County School Land Survey, tested (flowing) 2,341 b/d of 40° oil at 60°F through a ¾-in. choke from perforations between 12,078 and 12,118 ft after washing with 600 gal of mud acid. The productive zone is in the upper part of the Silurian.

The Silurian reservoir consists predominantly of white to light-gray, finely to coarsely crystalline dolomite. Production is on an asymmetric anticline which plunges southwest. The accumulation is controlled on the north by a porosity barrier and on the south by the closure of the fold. A stratigraphically controlled, tilted water table is in the field.

Currently, there are 42 wells producing from the Silurian. Through January 1, 1968, these had produced 14,883,391 bbl. Other production in the field includes: (1) Spraberry (6 wells), cumulative production to January 1, 1968, 502,702 bbl; (2) Wolfcamp (2 wells), cumulative production, 41,528 bbl (abd.); and (3) Strawn (1 well), cumulative production, 94,370 bbl (abd.).

ROBERT J. DUNHAM, Shell Development Co., Houston, Tex.

(To be announced)

KARL W. KLEMENT, Dept. of Geosciences, Texas Technological College, Lubbock, Tex.

PHYLLOID ALGAL BANKS

Phylloid algal banks form reservoir rocks in Upper Pennsylvanian shelf carbonates in many oil provinces of the United States. They are of special exploration interest in the Strawn (Desmoinesian) of West Texas and eastern New Mexico. Furthermore, the quantity of hydrocarbons in major fields which produce from these stratigraphic traps compares favorably with that produced from structural traps.

Phylloid algal banks were studied by the writer. Data were derived from studies of surface and subsurface occurrences of these carbonate buildups. The stratigraphic and regional distribution of these algal banks, their mode of formation, their environmental dependencies, and their synecological associations with other fossil assemblages were studied together with the evaluation of reservoir properties, such as formation and destruction of porosity, log characteristics, production data, and statistics on primary and secondary reserve estimates of major representative fields.

Algal mounds are formed by the sediment-baffling action of leaf-like (*i.e.*, "phylloid") algae of the *Ivanovia* group, a branch of $CaCO_3$-secreting green algae of the family Codiaceae. The dense, pitchy growths of these algae on local shoals on the sea floor form an efficient sediment baffle. Fine-grained carbonate sediment accumulates between the algal blades where it is sheltered from winnowing by wave and current action. This results in the gradual building of a mound-like accumulation of sediment in those places where dense growths of these algae occurred. Thus, these algal mounds are biogenic banks, which, if preserved in the geologic record, would be bioherms and biostromes.

Lithologic and paleontologic evidence indicates that these algal banks preferred shallow-water, wave-sheltered shelf environments in areas of clean carbonate deposition, distant from sources of land-derived clastics. Changes of water depth during transgressive and regressive cycles apparently exercised a sensitive control on the growth of these algae. The most luxuriant growth of these algae is obviously confined to an energy level below wave base, although these algae probably could endure intermittent higher wave action. Whenever the water became too shallow and the algal growths were above wave base, the algal mound development was interrupted. In many places, algal mounds are interbedded with layers of cleanly winnowed, well-sorted calcarenite or oölite.

Phylloid algae have been reported in the United States from areas in southeast Kansas, the Panhandle of Oklahoma, north-central Texas, the eastern shelf of the Midland basin, the northwestern shelf of the Delaware basin, Hueco Mountains, Franklin Mountains, Sacramento Mountains, Robledo Mountains, and the Four Corners area. These phylloid algae range in age from Morrowan to Wolfcampian in the United States, and to early Middle Permian in Europe. The major occurrences of these algal banks in the Permian basin area are in strata of Desmoinesian, Virgilian, and Wolfcampian ages.

In general, algal banks show evidence of a high primary porosity which formed when the highly warped algal blades were piled into a mound having a loose, or open fabric. The presence of such high primary porosity and permeability commonly leads to the development of secondary leaching porosity. Most commonly, the $CaCO_3$ mud matrix between the algal blades is leached. Selective leaching of the algal blades