sible facies relationships between the several types of limestone may contribute to a better understanding of the sedimentary environment.

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CARBONATE CYCLES: LOWER PENNSYLVANIAN MARBLE FALLS FORMATION, MASON AND KIMBLE COUNTIES, TEXAS

Samples from detailed measured sections were successfully classified by using Folk's descriptive limestone classification. Later in the investigation genetic rock categories (facies) that reflect ecologic environments were recognized and classified separately. The nine facies are shown in the following table.

Facies Name	*Characteristics*	*Inferred Environment*
1. Mottled facies	Pale yellowish brown fragmental biosparite and burrowed biomicrite containing fusulinids, paleotextulariids, *Calcitornella*, *Millerella*, and *Bradyina*	Nearshore and tidal flat of transgressive and regressive facies tracts
2. Churned dark fragmental facies	Dark gray fragmental biomicrite with disoriented grains	Middle shelf; transgressive facies tract
3. Laminated dark fragmental facies	Laminated, locally graded, dark fragmental spiculitic biomicrite; evenly bedded with shale interbeds	Seaward slope beyond shelf edge; mostly transgressive facies tract
4. Light fragmental facies	Light gray fragmental biomicrite and pelmicrite	Middle shelf, seaward of *Ivanovia* facies; transgressive facies tract
5. *Ivanovia* facies	Light olive-gray *Ivanovia* biolithite	Middle shelf with dark fragmental facies to landward, and light fragmental facies to seaward; transgressive facies tract
6. Tubular alga facies	Medium to light gray, delicately branching red alga biolithite; probably a growth form of *Komia*	Shelf edge in deep or protected areas; transgressive facies tract
7. *Komia* facies	Coarse-grained, light gray biosparite, containing *Komia*, fusulinids, and crinoid fragments; or fine-grained biosparite and biomicrite containing *Calcitornella*, *Millerella*, and calcite spicules	Shelf edge in shallow or turbulent areas; transgressive facies tract, or seaward slope beyond shelf edge; regressive facies tracts
8. *Chaetetes* facies	*Chaetetes* biostromes in pale yellowish brown biomicrite containing mat algae, fusulinids, *Calcitornella*, *Komia* fragments, paleotextulariids, *Bradyina*, *Ozawainella*, laminated shell fragments and gastropods.	Shelf, on surfaces of bypassing; regressive facies tract
9. Shale facies	Very dark gray shale	Shelf and seaward slope beyond shelf; mostly transgressive facies tract

A transgressive facies tract can be identified, comprising four depositional areas: (1) nearshore and tidal flat, bearing the mottled facies; (2) middle shelf composed either totally of the churned dark fragmental facies or of *Ivanovia* banks with the churned dark fragmental facies to landward and the light fragmental facies to seaward; (3) shelf edge with algal banks or knolls, the tubular alga facies in deeper or protected areas, the *Komia* facies in turbulent or shallow areas; (4) seaward slope bearing the laminated dark fragmental facies grading seaward to the shale facies.

The regressive facies tract begins with the seaward migration of the mottled facies and the lateral expansion of the *Komia* facies. It culminates on the shelf with the mottled facies and *Chaetetes* facies which developed on a surface of bypassing, and on the slope by deposition of debris transported from the *Komia* facies.

Cycles have four phases: (1) minor transgression with shale at the base overlain by a poorly developed regressive facies tract; (2) slight regression with a poorly developed regressive facies tract; (3) major transgression with well developed transgressive facies tract; (4) major regression with well developed regressive facies tract.

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APPALACHIAN TECTONIC DEFORMATION AND THE DEEP BASIN

Much of the central Appalachian region fits a single geometric pattern that is bilaterally symmetrical to an axis or radius passing N. 40°W. from the Baltimore dome through the high point of the Nittany arch. Many elements are likewise concentric to a focus situated on that axis near Baltimore and (or) are symmetrically tangential to a baseline that crosses the above axis at right angles in the vicinity of Baltimore. It is suggested that all of these symmetrical features result from (a) primary uplift of the Baltimore dome with outward gravitational sliding in the overlying skin of sediments; (b) a secondary forward movement along the axis of a crustal block containing the Baltimore dome; or (c) some combination of these two factors.

There is possible distortion of this symmetry along a conjectured slip- or wrench-fault at about Lat. 40° N., which may involve a dextral offset amounting to 80 or more miles along a trace now concealed by younger sediments or the Atlantic Ocean, from the Susquehanna River eastward to the Kelvin Seamount Group, 400 miles offshore at Lat. 40° N.

The nature of the deep part of the central Appalachian basin is reviewed in the light of a general theory of

Appalachian tectonic deformation which accepts the foregoing hypotheses as valid. This reappraisal strongly supports the "no-basement" concept of deformation wherein structures of the sedimentary cover are independent of those in the basement. It suggests that depths to the basement may be considerably less than those predicted by customary calculations; that the true configuration of the top of the basement may not be calculated implicitly from the assumed thickness of overlying sediments; and that structural trend-lines in the basement may not be those of the sediments above.

The loose-ended crystalline Reading prong (of the Hudson Highlands) and South Mountain prong (of the Blue Ridge) are both believed to have slid westward away from the Baltimore dome. Both are regarded as having over-ridden their own original roots and now occupy an "overthrust" position. The unusual deformation of the anthracite region of eastern Pennsylvania is attributed to this shift of the Reading prong. The Burning Springs anticline is thought to be a late effect, also crescentic or arcuate with respect to the Baltimore dome.

Most deep Appalachian wells are drilled on surface-visible anticlines. Probably the synclines show strata least removed from their pre-deformational position. An isopach map utilizing only synclinal data seems to show sedimentary trends extending toward, rather than converging along, the site of the present Blue Ridge. A palinspastic map is presented on which the arcuate folds of the central Appalachians are eliminated in line with the thesis here explained. When delineated on this restored base map, isopachs for several mid-Paleozoic series still show curvature concentric with the Baltimore dome. This is believed to demonstrate an original domal, rather than lineal, source for these clastic sediments.

Finally, the lineation or extension of certain undescribed "non-fold" trends—perhaps joints facilitating the migration of oil or gas—seems also to follow the geometric pattern controlled by the N. 40° W. axis and its N. 50° E. baseline. It is thus suggested that the regionwide Appalachian occurrence of oil and gas is a definite function of the pattern being described.

ROCKY MOUNTAIN SECTION 13TH ANNUAL MEETING, CASPER, WYOMING, APRIL 21–24

The Thirteenth Annual Meeting of the Rocky Mountain Section, A.A.P.G., will be held April 21–24, 1963, in Casper, Wyoming. Convention headquarters will be at the Henning Hotel with registration beginning Sunday noon and continuing on Monday morning. Exhibits and the technical program will be held at the Natrona County Fair Ground Industrial Building. Shuttle-bus service will provide transportation between downtown hotels and the fairgrounds.

This year's theme, "An Appraisal of the Geological Part of Petroleum Exploration," promises to provoke considerable thought concerning the geologist's past accomplishments, his role today with the advanced tools, research, and thinking available to him, as well as his role in the future. A panel discussion of the topic, "Appraisal of Geologists in Exploration," will be a special part of the program. The panel composed of leaders from the industry will be moderated by Warren Beebe.

The keynote address will be given by John T. Isberg; Superior Oil Company. General chairman is John B. Carrier. James A. Barlow, Jr., is chairman of the technical program.

On the lighter side, a full program of entertainment for visitors and their wives has been arranged, beginning with a cocktail party Sunday evening sponsored by the Wyoming Geological Association.

Inquiries may be addressed to John Carrier, Box 1025, Casper, Wyoming.

MONDAY MORNING, APRIL 22

Registration and Exhibits

Natrona County Industrial Building

Executive Committee Business Meeting

MONDAY AFTERNOON, APRIL 22

Symposium on Exploration and Development in Rocky Mountain Region During Past Year

Introduction and Comments by the Moderator

John Partridge, Consultant, Casper, Wyoming

Montana

George Darrow, Consultant; Billings Geological Society

North and South Dakota

Steven Harris, Consultant, and Kye Trout, Jr., Little Missouri Minerals, Inc.; North Dakota Geological Society

Wyoming

Willis H. Alderman, Pan American Petroleum Corporation; Wyoming Geological Association

Utah

Stanley D. Conrad, Richfield Oil; Intermountain Association of Petroleum Geologists

Colorado

John Rold, California Company; Rocky Mountain Association of Geologists

Four Corners

Ken Carter, Consultant; Four Corners Geological Society

TUESDAY MORNING, APRIL 23

Invocation

Call to Order and Introductions

John B. Carrier, Consultant, general chairman

Welcome by Host Society

David A. Moore, President, Wyoming Geological Society

Keynote Address

John T. Isberg, President, The Superior International Oil Company

Panel Discussion: Appraisal of Geologists in Exploration

Opening Statement by Moderator

Warren Beebe, Consultant, Boulder, Colorado

Fifteen-Minute Statements by Panel Members

C. L. Larson, Jr., Vice-President and Rocky Mountain Division Manager, Pan American Petroleum Corporation, Casper

H. A. (Dave) True, Jr., True Oil Company, Casper