# GSA news & information

SUPPLEMENT TO GEOLOGY MAGAZINE

JULY 1977


# GET READY!

## for the expanded and speedier new *Bulletin*

The new *Bulletin* will retain the scope and prestige of the present *Bulletin* and at the same time will provide the space required for publication of many longer reports, including those formerly appropriate only for the Special Paper series.

By Council resolution of May 3, 1977, beginning with the January 1979 issue, the GSA *Bulletin* will be issued in two parts; Part I in the same format as the present *Bulletin* and Part II on microfiche.

Part I, which will have the same appearance and outer dimensions as the present *Bulletin*, will ultimately contain only summaries and short articles at a standardized length of approximately two printed pages. However, during a transition period in 1979, Part I may contain a diminishing number of conventional papers like those in the present *Bulletin*.

Part II will be reproduced on 98-frame microfiche and will contain full-length reports as well as reprints of the summary articles in Part I. Most of these reports will be as long as those in the present *Bulletin*; others may be longer if it is required by the subject matter. A few articles in Part II may be equivalent in length to reports formerly published as short Special Papers. All reports in Part II must be represented by summary articles in Part I.

The new *Bulletin* will thus retain the scope and prestige of the present *Bulletin* and at the same time will provide the space required for publication of many longer reports, including those formerly appropriate only for the Special Paper series.

This change in publication policy is necessitated by increased cost of publishing; increased numbers, length, and complexity of articles submitted for the present *Bulletin*; and steadily increasing delay in publication time.

The change will result in several immediate and possible future benefits to authors and to the profession at large: (1) The number of articles and the amount of scientific information that can be printed will increase substantially. (2) After the transition period, the interval between date of acceptance of a manuscript and date of publication will be greatly reduced. (3) Voluntary page charges will be eliminated. (4) All necessary analytical, tabular, or other supporting data may be presented in the longer reports in Part II. (5) Part II of the new *Bulletin* will provide a place for publication of longer reports that cannot be accommodated in the present *Bulletin*. The shorter Special Papers will, therefore, be acceptable for Part II of the new *Bulletin*. (6) As at present, the Map and Chart series will accommodate large folded maps and charts. Reports in this series may be introduced or supplemented by a two-page summary article in Part I of the new *Bulletin*. (7) Parts I and II will be offered on separate subscriptions. The cost of a subscription to Part I will be significantly lower than the 1978 price for the present *Bulletin*, and the cost of subscription to Part II on microfiche will be moderate.

Specific requirements for material submitted to Parts I and II of the new *Bulletin* will be forthcoming in *News and Information*. Completely new instructions for manuscript preparation will be available in a few months.

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There will be an information session about the new *Bulletin* at the Annual Meeting in Seattle.

# GSA research grants awarded to 119 applicants

At its March meeting, the 1977 Committee on Research Grants reviewed 269 applications and recommended 119 of them to the Council for financial support. Twenty-six grants were awarded to M.S. student applicants, 92 to students working toward Ph.D. degrees and one to a post Ph.D. applicant. The total amount awarded was $85,495, with grants ranging from $220 to $1,350 each. These funds consist of $65,000 from the Council from the endowment fund, $13,986 from contributions from industry, $4,530 from past grant recipients, $1,916 from contributions from dues statement check-off, income from the Harold T. Stearns Fellowship Fund, and refunds from previously supported grants.

### Harold T. Stearns Award

The committee voted to recommend Susan C. Leo, Michigan State University, East Lansing, to be this year's recipient of the Harold T. Stearns Fellowship Award for research on one or more aspects of the geology of the circum-Pacific region. Mrs. Leo's project is titled "$^{230}Th/^{238}U$ and isotope systematics of the Quaternary volcanics of the Island of Hawaii."

### Outstanding Mention

The committee has singled out six young scientists and their proposals for special mention in the belief that they should be brought to the attention of the membership of the Society. These individuals are

Steven R. Bohlen, University of Michigan, Ann Arbor: Moderate pressure calibration of natural ferrosilite-fayalite-quartz systems

Douglas W. Charlton, University of California, Santa Barbara: Geology and petrogenesis of the central Ironside Mountain batholith and adjacent meta-volcanogenic rocks of the Hayford terrane, western Paleozoic and Triassic belt, northern California Klamath Mountains

James D. Myers, Johns Hopkins University: Transform fault volcanism: Edgecumbe volcanic field, Kruzef Island, Alaska

Kenneth D. Rose, University of Michigan, Ann Arbor: Mammalian evolution across the Paleocene-Eocene boundary

John Walter Shervais, University of California, Santa Barbara: Petrology and structure of the Alpine Lherzolite Massif at Balmuccia, Italy

Alfred Walker, Lehigh University: The Preston Gabbro: Trace element chemistry and history of formation

### Donations received from industry

The following ten companies, foundations, or individuals made generous donations to augment our funding:

| | |
|---|---|
| Alcoa Foundation | Michel T. Halbouty |
| Ashland Exploration Company | Mobil Oil Corporation |
| Atlantic Richfield Foundation | Shell Development Company |
| Chevron Oil Field Research Co. | Texaco, Inc. |
| Gulf Oil Foundation | Union Oil Co. of California |

### Recipients of donations from industry

Nineteen promising young Earth scientists were chosen as recipients of these donations from industry. The names of the recipients, their institutions, and grant project titles are as follows:

Kevin Thomas Biddle, Rice University: Origin, history and significance of the Carnian (Upper Triassic) Cipit limestone blocks, western Dolomites, Italy

Jutta Lore Hager Binstock, Harvard University: Experimental investigation of the sorption of silica onto synthetic manganese oxyhydroxides

Joanne Bourgeois, University of Wisconsin, Madison: Sedimentology and tectonics of Upper Cretaceous rocks, southwestern Oregon

Alton A. Brown, Brown University: Isotopic studies of Pennsylvanian cyclothems

Jacqueline C. Burton, University of Tennessee, Knoxville: Sulfurization as an ore-mineral forming process

David Joseph Delgado, University of Wisconsin, Madison: Sedimentology and paleoecology of the Galena Group (Middle Ordovician) of the Upper Mississippi Valley

William E. Dietrich, University of Washington, Seattle: Mechanics of river meanders

Robert Jacob Elias, University of Cincinnati: Richmondian (Upper Ordovician) solitary rugose corals of the Cincinnati Arch region, Ohio-Indiana-Kentucky

John R. Giardino, University of Nebraska, Lincoln: Movement of rock glaciers

Anthony Heber Green, University of Toronto: Metallogenesis of the Langmuir nickel deposits, northern Ontario

Joseph Kelley, Lehigh University: Sources of tidal channel suspended sediment, Stone Harbor, N.J.

David G. Morse, Johns Hopkins University: Paleogeography and tectonic implications of the Dawson and Castle Rock formations and the Wall Mountain tuff in the southern Denver Basin, Colorado

Richard J. Reeder, University of California, Berkeley: Chemical inheritance in low temperature diagenetic reactions and its implications

Joan Walshe Roberts, University of North Carolina, Chapel Hill: Barrier island response to wave climate fluctuations, Bogue Banks, North Carolina

# GSA solicits applications for new Science Editor

As you all know, GSA has been operating with temporary interim science editors for the past year and a half and will continue to do so for much of the remainder of 1977. The Society, its Officers and Council, and the headquarters staff are all deeply indebted to Warren Hobbs (and to the USGS who made his availability possible) and to Paul Averitt for the competent and effective job they have done, and are still doing, in filling an interim that might otherwise have been quite difficult for the Society and for authors of scientific papers.

During the past year and a half, it has been the intention and hope of the Committee on Publications and the Council to employ Dr. Peter J. Smith as permanent Science Editor for GSA. However, delay after delay, including problems of a visa from England, have so complicated the problem that by mutual agreement negotiations with Dr. Smith have terminated, and we now start again on a search for a Science Editor for GSA.

Applications are solicited for the position of Science Editor. Requirements call for a mature geological scientist who has demonstrated ability in research in some branch of the geological sciences. The position would be in residence at GSA headquarters in Boulder, Colorado. Responsibilities include, in cooperation with the Associate Editors, the selection of reviewers for all manuscripts submitted for the *Bulletin*, Memoirs, Special Papers, Map and Chart series, and Microform Publications. After the peer review, the Science Editor has the responsibility of evaluating the reviews and making the final decision on acceptance or rejection, or specifying the type of modification that would be required prior to acceptance. Text editing, layout, and production work will continue to be done by a competent in-house staff, but the Science Editor is expected to be available to this staff for assistance on technical problems and also to give assistance to the Executive Director in budgeting and administrative matters. Selection of new Associate Editors and communication with the Associate Editors are also responsibilities of the Science Editor.

The format of the *Bulletin* will be modified starting with the 1979 volume year, as explained on the first page of this News & Information section, and the Science Editor will be responsible for guiding authors into the new format as it develops.

In the course of development of the Society's publication program, it is possible that the new Science Editor will also assume the responsibilities for *Geology*.

The volume of work involved is indicated by the fact that more than 400 manuscripts of a wide range in length are examined each year by the Science Editor, and an additional 200 short manuscripts are examined each year by the editor of *Geology*. The position requires full-time effort.

Leon T. Silver, chairman of the GSA Committee on Publications, is chairman of the search committee. Applications or inquiries should come to the Executive Director. Applications MUST BE AT HEADQUARTERS BEFORE SEPTEMBER 5, 1977. They will be sent on to the search committee. Compensation will be comparable to academic salaries; GSA employees are under the TIAA-CREF retirement system.

## RESEARCH GRANTS . . .

Robert K. Suchecki, University of Texas, Austin: Sedimentology and petrology of the Upper Jurassic and Cretaceous Great Valley sequence, northern Sacramento Valley, California

Cynthia Taylor, Oregon State University, Corvallis: Geology and geochemistry of a massive sulfide deposit and associated volcanic rocks, Blue Creek District, Oregon

J. Craig Tingey, Michigan State University, East Lansing: Terrestrial and marine plant microfossils of the Lower Cretaceous Bear River Formation in the southern overthrust belt of southwestern Wyoming and their implications in paleoenvironmental interpretations and preliminary zonation

Joseph Rogers Wadsworth, Jr., University of Georgia, Athens: Effects of tidal range on morphology and distribution of tidal channels

Gary A. Zarillo, University of Georgia, Athens: Hydrodynamics and sedimentation in the Duplin River, Sapelo Island, Georgia

### Donations from former recipients

In response to our request for donations for the research grants program from former grant recipients, we are continuing to receive donations at headquarters. Persons who have contributed to this fund through March 1977 are listed below.

| | |
|---|---|
| W. Owen Bement | John P. Platt |
| T. J. Carrington | Jesse Paul Shore |
| John C. Crelling | Daniel P. Spangler |
| Michael O. Garcia | John Suppe |
| Donald G. Hadley | George W. White |
| David L. Mari | |

Application forms and detailed instructions for 1978 grants will be sent, upon request, by the Executive Director, Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301. *Please write for new forms*. The deadline date for filing applications is February 15, 1978.

# Report of the Treasurer

*To the Council and Membership of The Geological Society of America, Inc.:*

This report is for the calendar year 1976. I am pleased to say that 1976 was a successful year financially and that the long string of operating losses finally ended. The figures used in this report are taken from the financial statements of the Society, as audited by Peat, Marwick, Mitchell and Company.

As of December 31, 1976, Current Assets of the Society were $10,089,329 and Current Liabilities were $1,425,979, giving a current ratio of 7.1:1. This is highly satisfactory.

Total operating revenue in 1976 was $2,884,905 and total operating expenses were $2,585,474. The net gain from operations was $299,431, which is more than three times as large as in 1975. Sale of investment securities produced a gain of $62,968 in 1976, which compares with a loss of $353,730 in 1975. Thus, the overall swing was from a deficit of $257,293 in 1975 to a gain of $362,399 in 1976. This improved operating record resulted from many things; among the more important were improved sales of publications and a very profitable convention in Denver, but the most important factor was the close attention to costs by the Council and the Headquarters staff in general, and by John C. Frye in particular. By any standard, the GSA was very well managed in 1976.

The pie diagrams on Source and Application of Funds for 1976 show our major items of income and expense. They will repay your close study.

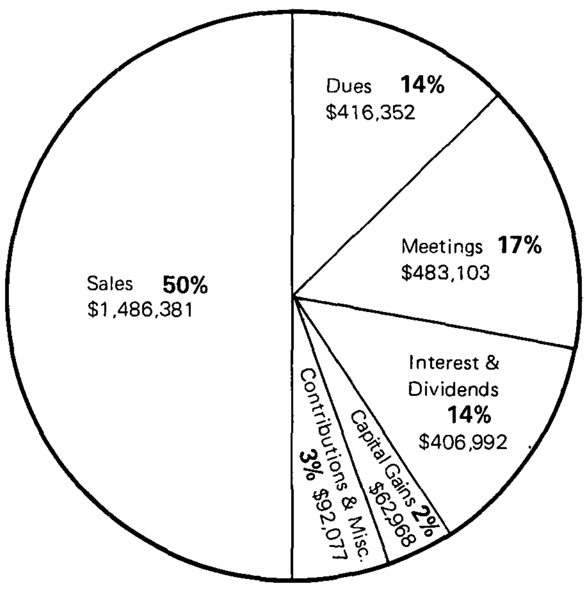
With this report I end my four-year term as Treasurer and my six consecutive years as Councillor. Your new Treasurer is William B. Heroy, Jr., who is extremely well suited for the job and has a superb background in fiscal and budgetary matters. I leave the GSA in good hands.

My deepest thanks to all of you for entrusting me with the supervision of the Society's investments and fiscal welfare. It has been the greatest of pleasures to work with the Officers and Councillors over this long period, and I found all of them deeply devoted to the best interests of the Society.

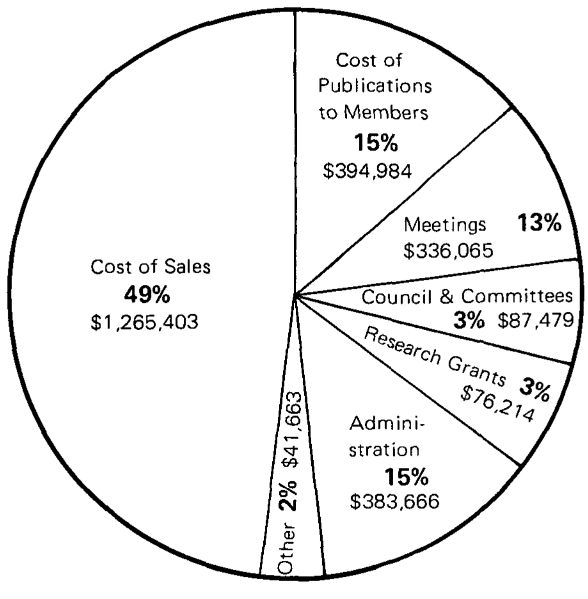
Respectfully submitted,
August Goldstein, Jr.

**THE GEOLOGICAL SOCIETY OF AMERICA SOURCE AND APPLICATION OF FUNDS, 1976**

**REVENUE $2,947,873**




**EXPENSE $2,585,474**




**NET INCREASE IN COMBINED FUND BALANCE: $362,399**

# Annual Report for 1976 The Geological Society of America

## AUDITORS' STATEMENT FROM PEAT, MARWICK, MITCHELL & CO.

PEAT, MARWICK, MITCHELL & CO.
CERTIFIED PUBLIC ACCOUNTANTS
1600 BROADWAY
DENVER, COLORADO 80202

To the Council of
The Geological Society of America, Inc.:

We have examined the balance sheet of The Geological Society of America, Inc. as of December 31, 1976 and the related statement of revenue, expenses and changes in fund balances for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the aforementioned financial statements present fairly the financial position of The Geological Society of America, Inc. at December 31, 1976 and the results of its operations and changes in fund balances for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Peat, Marwick, Mitchell & Co.

March 11, 1977

## THE GEOLOGICAL SOCIETY OF AMERICA
### COMPARATIVE STATEMENT OF FINANCIAL CONDITION
### COMBINED FUNDS
### DECEMBER 31, 1975, AND DECEMBER 31, 1976

| Assets | 1975 | 1976 |
|---|---|---|
| Cash on hand and in bank | $ 227,523 | $ 338,378 |
| Accounts receivable, net of allowance | 94,473 | 72,738 |
| Accrued interest receivable | 78,289 | 84,618 |
| Inventories | 514,268 | 495,942 |
| Prepaid expense and deferred charges | 106,919 | 90,209 |
| Investments (at cost) | 7,680,142 | 8,070,010 |
| Land, buildings & equipment, net of depreciation | 968,701 | 937,434 |
| | 9,670,315 | 10,089,329 |
| Liabilities and fund balances | | |
| Accounts payable | 112,710 | 139,807 |
| Accrued expenses payable | 31,145 | 27,799 |
| Deferred dues and subscription revenue | 1,225,509 | 1,211,405 |
| Other deferred credits to income | — | 46,968 |
| Total liabilities | 1,369,364 | 1,425,979 |
| Fund balances, December 31 | 8,300,951 | 8,663,350 |
| | $9,670,315 | $10,089,329 |

# New Members, Fellows, and Students elected

**New Members.** The following 261 persons have been elected to Membership by committee action during the period from September 1, 1976, through March 1, 1977:

Shirley A. Abshier
Gordon E. Adams
Mark L. Adkins
Thomas J. Ahrens
Jan B. Alsen
Fred J. Anders
Mary P. Anderson
Raymond R. Anderson
John V. Arbaugh

David W. Baker
Peter J. Barnett
Barbara J. Bascle
Edward C. Beckles
Edward I. Bloomstein
Karl P. Boles
Janet L. Born
Ray A. Brady
Stephen R. Brand
Paul F. Brown
Thomas R. Bultman
Anthony Buono

Robert P. Cannon
Lawrence E. Carlson
Michael P. Cecile
John F. Chapkowski
Bruce W. Chappell
John L. Cisne
Kevin J. Cole
S. Lynn Coleman
James X. Corgan
Edward A. Corrigan
Charles E. Corry
Terry L. Cox
Anthony J. Crone
Sherman T. Crough

Eugene M. Dauernheim
Peter B. Davies
Robert Elon Davis
Poppe L. De Boer
James E. DeLong, Jr.
Jane N. de Wys
Stephen K. Dickey
Roberta L. Dow
Brent K. Dugolinsky
Richard E. Dunlap II
Philip B. Durgin
Joseph S. Duval

Katharine K. Duvivier
Roger G. Dyer

Anne D. Eckert
George D. Econ
Janell D. Edman
Edward R. Eggleston
Robert L. Ezell

Godratollah Farhoudi
Karl R. Fecht
Michael N. Fein
Richard H. Fillon
Edward L. Follis
Ernest J. Fontaine III
Pamela B. Freudenthal

Mary Lou Galarowicz
John T. Galey, Jr.
Richard M. Garstka
Wilbert P. Gaston, Jr.
Larry W. Geisler
Andrew N. Genes
Ira D. George
Walter A. Gibbins
Betty O. Gibson
Gloria J. Gill
Stephen L. Gillett
Gary B. Glass
Patrick J. Gleason
Martin M. Goldberger
Maria L. Goodman
Vernon C. Gray
Daniel R. Grogan

Marion N. Hamill
Jeanne E. Harris
Alan W. Hart
Masao Hayashi
Rosalind T. Helz
James F. Hild
Hugh D. Hildebrant
John W. Hillhouse
Barbara M. Hillier
Mark A. Hoffman
Frank O. Hollinger
David G. Howell

John H. Janzen
Ralph N. Johnson

Forrest S. Jones
Thomas W. Judkins

Robert F. Kaar
David E. Kahler
Uldis Kaktins
William M. Kaula
Emadeddin Kavary
Maren M. Kiilsgaard
Richard E. King
James T. Kirkland
Roy C. Kiser
Douglas P. Klein
James J. Krajewski
Stephen A. Krajewski
Garry M. Kramchak
Dennis J. Krasowski

Alain Lavenu
James D. Lea
Roger V. Leclerc II
Fred W. Limbach
Robert C. Lindquist
Brian E. Lock
Keith A. Lowell
Gregory A. Ludvigson

Patricia L. Manley
Barbara M. Manner
Thomas A. Markham
Yosef Mart
Richard F. Mast
Robert D. May, Jr.
James E. McClurg
Rae A. Melloh
William Mercer
Chris W. Metzger
Joseph T. Michalowski
Nancy E. Micklich
Cathy D. Mignogna
Glenn E. Miller
James Andrew Miller
Mehdi H. Mirbaba
Shinjiro Mizutani
Gene W. Moeller
Johnnie N. Moore
Daniel P. Mouyard
John M. Murgas

Carl B. Naber
Giovanni Napoleone
Marc E. Nelson
Robert L. Nelson
Christopher E. Neuzil
Eric R. Nielsen
Darrell K. Nordstrom

Maura O'Brien-Marchand
Thomas W. Oesleby
George M. O'Hara
Andrew V. Okulitch
Edward A. Oldenburg
Reginald A. Olson
Miguel Orozco
Kimmie G. Osborn

Richard N. Passero
Martha W. Pendleton
Samuel H. Peppiatt
Kathy D. Peter
Joseph A. Peters, Jr.
Robert M. Petersen
Kazimierz M. Pohopien
Charles R. Ponchak
Barney P. Popkin
Karen W. Porter
Richard W. Porter
Ben A. Potter
Susan A. Price
Michael E. Purucker

Charles A. Ratte
A. Joseph Reed
John M. Rhodes
Jack M. Rice
Robert W. Ridky
Barry W. Roberts
Judith L. Roberts
Frederick N. Robertson
Stephan A. Root
Lisa A. Rossbacher
Winthrop A. Rowe
Robert F. Roy
Bruce Rubin
Dale McElhanon Russell
Kees Rutten

R. Birute Saldukas
Steven A. Sarada
Walter B. Sasser III
Dennis R. Sasseville
Samuel M. Savin
Robert S. Sawin
Malcolm F. Schaeffer
Reinhard Schmidt-Effing
Hans-Ulrich Schmincke
Horst J. Schor
Robert H. Schuler
Charles R. Seeger
Lynn M. Setright
David C. Shafer
Mark E. Shaffer
Donnie R. Shaw
Herbert R. Shaw
Robert W. Shewman

Haraldur Sigurdsson
Dorothy F. Simms
Robert I. Simons
Henry M. Singletary
William J. Siplivy
Doris Sloan
Barbara E. Smith
Ian E. Smith
John P. Sokol
James R. H. Sprinkle
Jeffrey C. Steiner
Ove J. Stephansson
Selton S. Stevens, Jr.
Jack C. Stevenson
Randy B. Stockdale
Roger C. Stoker
Donald G. Strachan
Kenton E. Strickland
Robert J. Stuart
David H. Suek
Charles J. Sullins
Alan P. Sweide
John B. Syptak

Robert L. Tabbert
Bruce A. Taylor
Stephen R. Taylor
Earl V. Tessem
Laird B. Thompson
Harold V. Thurman
John A. Thurston
Joseph V. Tingley
Michael K. Tolliver
Susan H. Truitt

Michael B. Underwood

Nicholas Valkenburg
Willem J. M. van der Linden
Jerry E. Vaninetti
Timothy C. Varney
Patty H. Vaughn
Kim K. Vogel

Linda K. Wackwitz
Burt A. Waite
Edward J. Wall
Joseph L. Wallach
Yun F. Wang
A. Wesley Ward, Jr.
Anthony J. Watkinson
Thomas R. Weaver
Suzanne H. L. Webel
Todd M. Weber
William J. Webster, Jr.
Ralph E. Weeks
Fred H. Wetendorf
Allan J. R. White
Jerry T. Wickham
Michael Wolff
Timothy J. Wolterink
Glenmore P. Wong
Elaine T. Woodruff
Jeffrey C. Wynn

Thomas C. Zeiner

**New Fellows.** The following candidates were elected to Fellowship by Council action at the May 1977 Council meeting:

Don G. Bebout
Daniel Bernoulli
Charles V. Campbell
John Dewey
David B. Duane
Ronald F. Emslie
David W. Folger
Todd P. Harding
William H. Kanes
John T. Kuo
Marcus Milling
J. Casey Moore
William F. Ruddiman
Lee J. Suttner

**New Student Associates.** Listed below are 329 Student Associates who have become affiliated with the Society during the period from September 1, 1976, through March 1, 1977.

Babatunde I. Abayomi
Kathleen D. Abel
James S. Aber
Anthony M. Adigwe
Kimberly A. Allison
Robert Anderhalt
James Lee Anderson
Susan L. Anderson
Thomas C. Anderson
Knut A. Andersson
Jeff S. Arbogast
Ralph H. Armentrout
Brenda L. Atkins
Charles F. Avery

Robert F. Babb II
John Bacheller III
Randall W. Bacon
Tofie S. Balagia
Paul H. Ballou
James D. Balog
Kenneth T. Barrow
Mary Jane Bartholomew
John M. Bartley
John W. Bartley
Robert A. Basse
David W. Beaty
Rex A. Becker
Mark E. Beers
Michael L. Bemski
Robert A. Bennett
Jeffrey R. Benoit
Victor M. Beras
Nicholas H. Blick
Laurie Bloom
Robert J. Bodnar
Daniel J. Bonnet
Corey S. Bowen
Kenneth R. Bradbury
Susan S. Brayton
Terrance P. Brennan
Eugene Brickman
Richard J. Bronson
Robin E. Broomfield
Victor W. Brown
Helen J. Buchberg
Mark E. Burhans
James S. Burling
Cytnhia D. Burr
David R. Buss
Herbert T. Buxton

Aubrey T. Cameron, Jr.
C. Scott Cameron
Frank A. Camilli
Steven C. Cande
Thomas W. Carlson
William D. Carlson
Alan K. Chamberlain
Gary W. Chandler
Jack Chang
Douglas W. Charlton
Karen R. Christopherson
Maureen J. Cichetti
Richard E. Cisler
Andrew S. Cohen
James R. Connolly
Keith T. Conrad
Umberto R. Costa
G. Allan Crawford
Michael F. Crawford
James A. Crockett
Shirley A. Cropper
Terry R. Cullen

Peter S. Dahl
Jerry B. Dahm
John K. Dane
Lawrence H. Davis
Michael P. Dempsey
Ed H. Dewitt
Melville P. Dickenson
John H. Dilles
David C. Dobson
Sharon Doherty
Francis S. Dombkowski
David R. Donica
Jessica E. Donovan
Paul A. Dooley
Elizabeth A. Downie
Catherine J. Draeger
David A. Drapela
Neil M. Dubrovsky
Edward F. Duke
Dean A. Dunn

John R. Easter
Nancy L. Emerson
Paul J. English
Parrish N. Erwin, Jr.
Susan V. Eubank

Michael J. Farrar
Michael E. Farrell
Earl F. Fashbaugh
William M. Fay
Charles B. Fears
Jerry D. Ferguson
Christopher J. Foell
Joan E. Fryxell

William P. Gagnon
Richard C. Geesaman
Allan K. Gibbs
Kevin C. Gillen
John G. Gillespie, Jr.
Holly J. Glaser
Amy J. Goldmintz
Richard R. Goldstein
Judith M. Goshorn
Stephen J. Gosselin
Siegfried F. Grabs
Edward J. Graham
Lou M. Graydon
Ethan L. Grossman

Sandra M. Hagstrom
Sidney W. Haley
Frank R. Hall
Robert W. Hall
J. Clark Hanna
Lori C. Hansen
Trevor N. Hart
Hal L. Heitman
Steven J. Hendrick
Lauralee Hendricks
Sharon D. Henson
Scott D. Heule
Joseph R. Hewitt
David A. Higgs
James C. Himanga
Kurt C. Hinaman
Jim S. Holik
Alan M. Holtzman, Jr.
Emily M. Hundley
Houston B. Hunt
Kim S. Hutchinson
Kenneth R. Hutchison
Joy Hyde

Gregory J. Indelicato

Bruce L. Jernigan
Thomas K. Joeckel
David A. John
Kathleen E. Johnson
Markes E. Johnson
Jay G. Jones
John M. Journeay
Zane K. Judge

Sikiru D. Kadri
Lawrence P. Karasevich
Karl E. Karlstrom
Robert J. Karnauskas
David H. Keehn
James A. Kilburg
Hobart M. King
Gail L. Kirchner
Thomas L. Klockenbrink
Roger J. Kuhns

Ed Landing
Robert A. Landress
Laura H. Lasseter
Sydney K. Lawler
Chao-Shing Lee
Richard D. Lefever
Chester S. Lide
Robert B. Lieber
Paul G. Lillis
Lois E. Lindemuth
Bruce M. Loeffler
Curtis L. Longpine
Grant W. Lowey
Gayle E. Lux

Stephen B. Mabee
Duncan MacKenzie III
Cary T. Madden
Curtis P. Malizzi
Bruce L. Markley
Ronald L. Martino
Douglas G. Martinson
James E. Mathewson
James E. Matush, Jr.
Philippe Maurice
Lon A. McCarley
Mike McCarrin
Lon A. McCullough
Patricia F. McDowell
Dwain E. McGarry
Paul B. McKay
William F. McKenzie
William S. Meddaugh
Kenneth L. Meek
Jane A. Messenger
Robert R. Metzger
Thomas S. Metzger
Dann Meyer
Maurice A. Meylan
Jacqueline Michel
Andrew J. Miller
Eric J. Milton
Judith A. Mitchell
Victoria E. Mitchell
Eric M. Moeller
George K. Moncure
Scott C. Monroe
Gary L. Moore
Janet E. Moorman
Peter A. Moreau
James K. Mortensen
Stephen O. Moshier
David R. Muerdter
Lance E. Murakami

Robert A. Nilson
Thomas P. Niquette
Carlie R. Nowlin, Jr.
Jeffrey E. Nunneley
Joseph A. Nuth III
Christopher J. Nye

Deborah A. Odell
Linda E. Okland
Lawrence J. Oliva
Wayne C. Orlowski
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Kathleen M. Parkin
Pamela R. Parks
Rachel K. Paull
Robert C. Pease
Robert R. Peterson
William L. Petro
Fernando R. Pires
Joseph T. Plahuta
Thomas L. Plawman
Jonathan A. Powell
Eric M. Prasse
William L. Prior
Elizabeth V. Pritchard
Barry S. Pulver

Carlos D. Quintana

James M. Ray
Carl R. Reszka, Jr.
Jerry R. Rick
Michael D. Riley
Rochelle L. Rittmaster
Carlo H. Rivera
Edward J. Rogers
Jane C. Rogers
John E. Roth
David B. Rowley
Christopher H. Ruby

Susan M. Samberg
Susan A. Santarcangelo
David A. Sawicki
Kenneth C. Sawyer III
Kathryn M. Scanlon
Sigrid C. Schroder
George B. Schultz
Dennis C. Schumaker
David C. Schuster
Mark J. Severson
Tom C. Shackleton
Robert Shamlian
Brian R. Shaw
Jeffrey W. Shaw
Susan I. Shepley
Janet E. Shines
Alexander N. Shor
Robert D. Shuster
Steven W. Sinclair
Bradford W. Sincock
Roy S. Sites
Christy H. L. Smith
Shea C. Smith
Jan F. Smolko
Elisa R. Sobelman
Stephanie E. Sofranoff
Joan M. Spaw
Paul D. Spudis
James R. Stark
Phillip A. Steidl
Paul J. Steigner
Holly J. Stein
Robert J. Stern
Anne E. Stevenson
Marjorie L. Stockton
Leah V. Street
Steven J. Strong
Charles R. Strout III
Eric T. Sundquist

Elahe Tabesh
Kenneth B. Taylor
Ronald L. Teseneer
Keith S. Thompson
Joseph C. Thornton
Dino Titaro
Margo I. Toth
W. A. Trembly
Robert C. Trentham
Alvydas Tuminas

William J. Ullman
James S. Ulrick
Steven I. Usdansky

Roy B. Vanarsdale
Lawrence B. Vaningen III
Steven A. Volz
Roxie L. Voran

Claudia T. Waddell
Roger K. Wallace, Jr.
Ronald J. Wallace
Barbara D. Wehrfritz
Marcus P. Weinmeister
Timothy C. Welch
James T. Whitesell
Margaret A. Widmayer
Paul D. Willette
Richard L. Williams
Wesley R. Wilson
C. Gil Wiswall
Michael B. Womer
Kenneth V. Wood

Kenneth W. Yarbrough
Hasan Yazicigil
Pinab O. Yilmaz
William W. Young
Georgia Yuan
Donald A. Yurewicz

Marjorie L. Zeff
John J. Zucca

# Fellows invited to sponsor Members for Fellowship

GSA has two classes of membership—Fellows and Members—and the response from the most recent poll indicates that the majority wants it to stay that way. This places an obligation on all Fellows to sponsor qualified members for transfer to Fellowship. As many have forgotten the qualifications for Fellowship (if they ever knew), they are repeated here.

**FELLOWS, PLEASE GET BUSY!**

## ELIGIBILITY REQUIREMENTS

A candidate for Fellowship shall have had 8 years of professional experience in geology or related fields. Graduate study may be substituted for a maximum of 3 of these 8 years. Except by specific action of the Council, an individual shall have been a Member for at least 1 year before becoming eligible for application for Fellowship.

## QUALIFICATIONS FOR FELLOWSHIP

To meet the standards for Fellowship, a candidate is not required or expected to qualify in each of the below categories. If his accomplishments are limited to one of the last three categories, however, they should be *particularly outstanding*; if they are distributed among two or more categories, the diversity of his efforts will be correlated with the quality.

1. **RESEARCH.** Qualification under this category is evidenced by contributions to the advancement of geologic knowledge through the development of new geologic data or through the interpretation of geologic data. Contributions to geologic sciences may be made not only through research in geology, but also through research in related fields in physics, chemistry, oceanography, biology, etc.

Research usually contributes most effectively to the advancement of science if it is made generally available through recognized types of scientific publications. However, publications constitute a qualification for Fellowship only if they present the results of research of good quality.

It is recognized that in some organizations individuals are restrained from publishing their research except in private reports of restricted distribution. However, under certain circumstances this research may still constitute a contribution to the advancement of geologic knowledge. Some contributions from research may never have been recorded in any written form.

2. **ADMINISTRATIVE WORK.** Evidence for qualification under this category consists of a list of responsible positions held in the administration or management of geological work in surveys, institutes, schools, laboratories, commercial companies, societies, etc. Adequate evidence of the administrative scope involved and its bearing on the advancement of geologic science should be considered.

3. **TRAINING OF GEOLOGISTS.** Outstanding contributions toward the production and development of adequately trained and competent geologists may qualify an individual for Fellowship. Evidence for qualification under this category is provided principally by the persons trained or developed (associates, employees, students). The candidate is further qualified by the special procedures, teaching methods, training courses, etc., that he has used and textbooks or training guides that he has prepared. The evaluation of the candidate's contributions in training, educating, stimulating, or inspiring others to greater competence as geologists rests with his sponsors.

4. **OTHER ACTIVITIES.** It is recognized that in exceptional cases candidates may qualify for Fellowship through outstanding services to the geological sciences that do not fall strictly under the preceding categories. Among such are: extended service in bibliographic or editorial work in the field of the geologic sciences, involving abundant subject-matter knowledge and constant awareness of newly published research results; continuing activity in scientific commissions and advisory groups, which requires broad but intensive use of geologic data for planning purposes; participation in activities concerned with utilization of geologic manpower, requiring thorough knowledge of current advances in geologic sciences and their application.

**Write for application forms: Membership Department, Geological Society of America, 3300 Penrose Place, Boulder, CO 80301.**

## GOING .........

### GOING ..... GONE . . .

The 5% discount for cash with order will be a thing of the past beginning January 1, 1978. All our current order forms state "When payment accompanies order, 5% may be deducted. When member or quantity discount is applicable, it should be deducted before the 5% is computed."

There is now a time limit on that 5% discount. All cash orders postmarked January 1, 1978, and thereafter must be accompanied with full payment, less applicable member or quantity discount. So, don't delay any longer getting your order in for that Special Paper, Memoir, and (or) part of the *Treatise on Invertebrate Paleontology* you just haven't got around to ordering yet.

GSA will continue to absorb postage and handling charges on all orders that are received with full payment.

# Council approves two Penrose Conferences for 1978

### Relative Chronology of Thrusting in the Southern and Central Appalachians

A Penrose Research Conference sponsored by the Geological Society of America will be held May 7–12, 1978, at Unicoi Conference Center, Helen, Georgia. The subject of the conference will be "Relative Chronology of Thrusting in the Southern and Central Appalachians: Its Significance and Relationships to other Orogenic Processes."

There is a chronology of thrusting presently emerging in the Southern and Central Appalachians that appears to be related to the processes of metamorphism, plutonism, and sedimentation in the orogen. A major part of this is no doubt related to the configuration of the ancient (Late Precambrian) continental margin of North America and subsequent plate interactions throughout the Paleozoic.

While the focus of the conference is to be primarily upon the Appalachians, it is imperative that comparisons be made to other mountain chains. The Appalachians will therefore serve here as a model, and generalizations may be made concerning the interrelationships between thrusting and other processes in all mountain chains. Hopefully, this will shed some light upon the general theory of mountain building through plate interactions and other processes, as well as point the way toward new avenues of research.

The conference fee will be $250. This will cover transportation from Atlanta International Airport to Helen, Georgia, meals and lodging at the Conference Center, and return transportation to Atlanta International Airport. There will be an optional two-day field trip across the Blue Ridge of parts of Georgia and North Carolina on May 12–13 at an additional cost of $75.

The conveners of this conference will be Robert D. Hatcher, Jr., Geology Department, Clemson University, Clemson, SC 29631 and R. David Dallmeyer, Department of Geology, University of Georgia, Athens, Georgia 30602. Deadline for applications is December 1, 1977.

### Geophysics and the Structure of Folded Belts

"Geophysics and the Structure of Folded Belts" will be the topic of another Penrose Conference sponsored by the Geological Society of America to be held in mid-September 1978 in Locarno, Switzerland.

Structural mapping of mountain ranges shows that large portions of a pre-existing sialic basement are often remobilized and characterized by complex structures formed by polyphase ductile flow. Radiometric age determinations suggest repeated periods of basement remobilization. Reflection and refraction work into and across mountain ranges suggest layering in the crust and possible velocity inversions.

The intent of the conference is to bring field geologists, petrologists, geochronologists, geophysicists, and rock mechanics specialists together to explain the limitations of their methods and compare and contrast their results. Emphasis will be on comparing alpine geology with geology of the Western Cordillera of North America, but data from other orogens will be integrated.

Locarno has been selected as the site because it allows visiting a section across the lower continental crust and upper mantle in the southern Alps (Ivrea Zone), which can then be compared with the structures of the remobilized sialic basement of the penninic folds.

Conference costs will be announced at a later date and will exclude travel costs. Participants will be expected to arrange for their own travel unless transportation by charter becomes desirable.

Do not wait for an invitation! Instead, if interested, apply for participation before April 1, 1978, to allow the conveners sufficient time for planning and logistics. For information or to indicate your interest in attending, please write to B. C. Burchfiel, MIT, 54-1010, Cambridge, Massachusetts 02139.

## AGI minority participation program scholarships

The American Geological Institute will again offer scholarships for geoscience majors who are United States citizens and members of the following ethnic minority groups: Blacks, American Indians, and Hispanics. Approximately 50 such awards (ranging from $500 to $1,250) were granted in 1977–1978. About the same number (and amounts) will be awarded for 1978–1979.

The term "geoscience" is used broadly to include major study in the fields of geology, geochemistry, geophysics, hydrology, meteorology, oceanography, and space and planetary sciences.

Monies for support/funding of this program are administered by the AGI Minority Participation Program Advisory Committee and have come from six member societies, more than 14 mining, petroleum, geological supply, and geophysical companies, and many individuals. GSA, by way of the direct contributions of its members, helps support the AGI Minority Scholarship Program.

Requests for application materials or nominations for scholarships should be addressed to William H. Matthews III, Director of Education, American Geological Institute, Box 10031, Lamar University Station, Beaumont, Texas 77710. The deadline for filing the completed application is February 1, 1978.

# LETTER

We agree with Mignogna (*Geology*, April, 1977, p. 219) that many presentations at the 1976 GSA Annual Meeting were poorly prepared and that slides were often defective or sloppy. This criticism also applies to section meetings, which are usually just as bad.

How do you get speakers to improve their presentations? Already more than one-third of the abstracts submitted for the Annual Meeting are rejected, and there is no guarantee that a good abstract will turn into a good talk. Rejecting more abstracts (by increasingly arbitrary criteria) is not likely to improve significantly the quality of presentations. Slide reviews haven't worked very well for other organizations, and requiring speakers to submit manuscripts of talks in advance would create far more headaches than it could possibly cure.

If an individual wishes to give a bad talk, there is at present nothing much anyone can do about it. We believe members of the audience should be invited to address specific comments to individuals who make a particularly good or a particularly bad presentation.

We have decided to try using "feedback forms" at the 1977 Annual Meeting in Seattle. They will give the audience a chance to comment on the content and (or) quality of presentations. These forms will be included in the registration packet and will be available in the session rooms. Completed forms will be collected at the meeting, sorted by GSA staff members in Boulder, and mailed to the speakers after the meeting. In this way, specific comments can be directed to specific individuals.

We hope that prospective speakers, knowing that a badly presented talk could earn them several hundred irate comments, may take the time to prepare a good talk with good illustrations. Some, however, may choose to ignore the problem and learn the lesson the hard way—but, we hope, before the next Annual Meeting or section meeting.

John T. Whetten
Department of Geological Sciences
University of Washington
Seattle, Washington 98195

R. Scott Babcock
Department of Geology
Western Washington State College
Bellingham, Washington 98225

**The Olympic Hotel, 4th and Seneca (206) 682-7700, with lower rates, has just been named the headquarters hotel for the Seattle annual meeting. This is a change from the Washington Plaza Hotel, as announced in the April issue of GSA News & Information.**

## Announcements and Call for Papers for 1978 GSA Section Meetings

Because the Sections will use different means for generating the $20 charge per abstract in 1978, please refer to the instruction sheet that accompanies the abstract form for specific instructions pertaining to a particular Section.

**SOUTH-CENTRAL,** March 6–7, 1978
University of Tulsa, Tulsa, OK
**Abstract deadline: October 13, 1977**
Please submit completed abstracts to
Norman J. Hyne, General Chairman, Dept. of Earth Sciences, University of Tulsa, Tulsa, OK 74104, (918) 939-6351, ext. 515

**NORTHEASTERN,** March 9–11, 1978
Sheraton Boston Hotel, Boston, MA
**Abstract deadline: October 13, 1977**
Please submit completed abstracts to
David C. Roy, Program Chairman, Dept. of Geology and Geophysics, Boston College, Chestnut Hill, MA 02167, (617) 969-0100 Ext. 3640

**CORDILLERAN,** March 29–31, 1978
Arizona State University, Tempe, AZ
**Abstract deadline: October 21, 1977**
Please submit completed abstracts to
Michael F. Sheridan, Program Chairman, Dept. of Geology, Arizona State University, Tempe, AZ 85281, (602) 965-5081

**SOUTHEASTERN,** April 5–6, 1978
Chattanooga Choo Choo, Hilton Hotel, Chattanooga, TN
**Abstract deadline: November 4, 1977**
Please submit completed abstracts to
Robert L. Wilson, General Chairman, Dept. of Geology and Geography, University of Tennessee, Chattanooga, TN 37201, (615) 755-4404

**ROCKY MOUNTAIN,** April 28–29, 1978
Brigham Young University, Provo, UT
**Abstract deadline: November 28, 1977**
Please submit completed abstracts to
Wade Miller, Program Chairman, Dept. of Geology, Brigham Young University, Provo, UT 84602, (801) 374-1211, ext. 3918

**NORTH-CENTRAL,** May 1–2, 1978
University of Michigan, Ann Arbor, MI
**Abstract deadline: December 2, 1977**
Please submit completed abstracts to
John L. Dorr, Jr., Program Chairman, Dept. of Geology and Mineralogy, University of Michigan, Ann Arbor, MI 48109, (313) 764-1435

gsa publications

## Metallogenetic Provinces of Mexico and Geochronologic Chart of Mexico (Contribution of Mexico to the Metallogenetic Chart of North America).

MC-13 — By Guillermo P. Salas. 1976. One sheet, in color, 63½" × 44¼". Scale, 1:2,000,000. Folded, $7.50; rolled, $9.00.

Compiled by Guillermo P. Salas, the metallogenetic map (scale 1:2,000,000) is displayed on a white planimetric sheet which shows political boundaries, major localities, and bathymetric contours; the sheet measures about 3.7 by 5.3 ft. A small inset map (1 in. = 350 km) outlines the six metallogenetic provinces of Mexico, and another small inset map shows the general distribution of radiometrically determined ages, in broad-range categories, that have been obtained throughout Mexico. There is no tectonic map beyond the small outline map of metallogenetic provinces.

The mineral deposits, which are named on the map, are shown and elaborated by combinations of symbols whose colors, shapes, and ornament denote elements present, genesis, morphology of deposits, and age of mineralization. Subsidiary letters indicate how the metal is combined (native elements and oxides; sulfides; silicates; sulfates; carbonates and phosphates; halides and fluorides). There are eight regional geologic environments distinguished and symbolized on the map plus seven principal types of associated igneous rocks. Eleven types of ore deposits are distinguished (pegmatite deposits; stratabound chemical sediments other than evaporites; skarn or greisen deposits; placer deposits; stockworks, pipes, and deposits of irregular or indefinite shape; evaporites; veins and shear zones; concordant deposits in igneous rocks; laterites; stratabound, mainly disseminated deposits other than known placers; replacement deposits). Also noted are deposits of salt, asbestos, talc, kyanite, coal, graphite, and diamonds.

The comparative importance of each deposit (that is, "large," "medium," and "small") is indicated by the overall size of the symbols used.

Consejo de Recursos Minerales, Mexico City, has published Bulletin 21e, in Spanish, to accompany the metallogenetic map. The American Association of Petroleum Geologists has published a summary in English in its Memoir 21, p. 515–518.

## Geologic Map of the Humboldt Lopolith and Surrounding Terrane, Nevada

MC-14 — By Robert C. Speed. 1976. One sheet, in color, 39" × 29½", with four-page text and one foldout figure in black and white. Scale, 1:81,000. Folded, $5.00; rolled, $6.00.

The Humboldt lopolith crops out in three fault-block ranges (West Humboldt Range, Stillwater Range, and Clan Alpine Mountains) and occurs in the subsurface of the two intervening valleys (Carson Sink and Dixie Valley), in west-central Nevada. The lopolith underlies an area of about 1,000 $km^2$ in the western Basin and Range province; its volume is calculated to be between 1,700 and 2,500 $km^3$ by magnetic modeling. The geologic map, which is multicolored, encompasses the area bounded by lat 39°45′N and 40°15′N, and long 117°30′W and 118°30′W (scale 1:81,000); overall map size is approximately 1 by 0.7 m. A four-page paper on the geology of the area accompanies the map. Sources of supplemental information, incorporated in the map, are B. M. Page (part of the Stillwater Range) and R. E. Wallace and others (Buffalo Mountain quadrangle), published in 1965 and 1969, respectively.

The Humboldt lopolith is a dish-shaped complex of intrusive and extrusive rocks of Middle Jurassic age. It almost exclusively intrudes or is in depositional contact with Jurassic sedimentary rocks which are the youngest marine deposits in the region. The lopolith, its wall rocks, and subjacent pelitic rocks constitute the Fencemaker allochthon, which was thrust over lower Mesozoic shelf deposits during or after emplacement of the lopolith. Depth to the pre-Tertiary basement in the valleys, shown by contours on the map, was approximated by two- and three-dimensional gravity models.

Volcanic cap rocks consist of basaltic flows, breccia, and dikes, together with basalt-derived sedimentary rocks. The underlying intrusive rocks comprise two major compositional groups: gabbroic (gabbro, picrite, and anorthosite) and sodic (keratophyre, albitite, scapolitite, and diorite). In the interior, gabbroic rocks grade upward to sodic rocks within 100 to 300 m of the intrusive roof. Layering and igneous foliation are well developed in intrusive rocks of the peripheral zone.

This publication is the first to treat the geology of the igneous complex as a whole and to indicate that the shape of the complex is lopolithic.

## Free-Air Gravity Field of the Norwegian Greenland Seas

MC-15 — By Manik Talwani and Gisele Grønlie. 1976. One sheet, in color, 41 3/4" × 32." Contoured at 25-mgal intervals. Folded, $4.50; rolled, $5.50.

The map encompasses the oceanic region between Greenland and Norway, extending from the Shetland Islands northward to Svalbard archipelago in the Arctic Ocean. The map region is bounded by lat 60°N and 81°N, and long 30°E and 30°W, an area of nearly 6 million sq km. The scale is approximately 75 km/in. The gravity field is shown by contours at 25-mgal intervals, which are multicolored; bathymetric contour intervals are 200 and 500 fathoms. The data are primarily from VEMA cruises 23, 27, 28, 29, and 30.

## Reconnaissance Geologic Map of Coastal Sonora between Puerto Lobos and Bahia Kino

MC-16 — By R. Gordon Gastil, Daniel Krummenacher and others. 1977. One sheet, in color, 17″ × 46¼″. Scale, 1:150,000. Note: The geology of this area is described in *Geological Society of America Bulletin*, v. 88, no. 2, p. 189–198. Folded, $5.00; rolled, $6.00.

Coastal Sonora between Bahia Kino and Puerto Lobos (lat 28°45′N to lat 30°15′N) forms a belt 25 km wide and 120 km long, including the adjacent Isla Tiburón (the largest island in Mexico) which measures 30 km long and 20 km wide. The region contains steep ranges separated by wide alluvium-filled valleys that are crossed by innumerable intermittent drainage systems.

The map is essentially a photogeologic reinterpretation and synthesis of student field maps. The map units that are used to represent the Cenozoic stratigraphy are an attempt to establish some order and correlation with a limited number of K-Ar dates. The map, which shows seven cross sections, and a separately published report illustrate the classes of rocks and the structural styles within the area, but they must not be regarded as a stratigraphic or petrographic study.

The region can be subdivided into four structural-petrographic subprovinces: an inland subprovince in which unmetamorphosed upper Precambrian and Cambrian strata rest on older Precambrian gneiss and three other subprovinces in which Cenozoic volcanic strata rest on metamorphosed strata of post-Precambrian age intruded by granitic rocks of Mesozoic age. One of these latter subprovinces displays basin-and-range fault blocks; a second has northwest-trending strike-slip(?) faults; and the third, Isla Tiburón, shows structure related to the Neogene dilation of the Gulf of California depression.

The granitic rocks range from gabbro to granite and have K-Ar cooling ages of from 91 to 30 m.y. The Cenozoic volcanic strata have been separated into five age groups. The lowermost volcanic strata (pre–22 m.y. B.P.) are composed predominantly of rhyolite and basalt. These are followed by a sequence of predominant andesite (~20 to 18 m.y. old), a sequence of partially marine conglomerate and pyroclastic deposits, and a widespread, predominantly rhyolitic sequence (~14 to 10 m.y.). All strata 10 m.y. old or older are involved in basin-and-range–type tilting. Volcanic strata less than 8 m.y. old are nearly flat-lying.

# July BULLETIN briefs

*Brief summaries of articles in the July 1977 GSA* Bulletin *are provided on the following pages to aid members who chose the lower dues option to select* Bulletin *separates of their choice. The document number of each article is repeated on the coupon and mailing label in this section.*

• 70701—World's view—from Alph to Zipf. Address as Retiring President of the Geological Society of America, Denver, Colorado, November 1976.

*R. E. Folinsbee, University of Alberta, Edmonton, Alberta, Canada.* (11 p., 19 figs., 2 tbls.)

• 70702—Comparison of volcanic features of Elysium (Mars) and Tibesti (Earth).

*Michael C. Malin, Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, California 91125 (present address: Planetology and Oceanography Section, Jet Propulsion Laboratory, Pasadena, California 91103).* (12 p., 7 figs., 1 tbl.)

The Elysium volcanic province on Mars and the Tibesti volcanic province in Chad, Africa, were studied using Mariner 9, Landsat and Apollo photography. Elysium Mons on Mars and Emi Koussi on Earth show remarkable similarities in summit caldera and flank morphologies. Each has a large central caldera ~12 km in diameter and from 500 to 1,000 m deep; both calderas contain numerous craters and large, irregular pits. Channel-like features which head at the calderas and taper downslope show evidence of collapse and possible lava erosion. Elysium Mons rises some 14 ± 1.5 km above its base, and the summit is about 20 km above the 6.1-mbar mean martian pressure surface. Crater size/frequency analysis indicates most of the craters are of endogenic origin. The subdued, hummocky terrain on the flanks are distinctly different from the slopes of the younger Tharsis Ridge volcanoes, showing little if any sign of recent material flow.

The lack of aqueous erosional forms on Elysium Mons argues strongly against recent (~ $10^5$ to $10^6$ yr) pluvial episodes. The forms and associations of features throughout the Elysium region suggest that central volcanism started earlier in Elysium than in Tharsis and that the source of the Elysium volcanics has been chemically evolved, with evidence of silicic magma. Finally, the data are consistent with the view that the martian crust has been stable and essentially motionless for an extended period of martian geologic time.

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• 70703—Strain paths and folding of carbonate rocks near Blue Ridge, central Appalachians.

*John Wickham, Mike Anthony, School of Geology and Geophysics, University of Oklahoma, Norman, Oklahoma 73069 (present address, Anthony: ESSO Inter America, 396 Alhambra Circle, Coral Gables, Florida 33134).* (5 p., 10 figs.)

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Two-dimensional incremental and accumulating strain paths have been calculated from displacement paths preserved by syntectonic, fibrous growths of calcite in ten specimens from limbs of various folds of the Conococheague Formation. The folds are asymmetric, possess a slaty cleavage, and consist of multilayers of mechanically stiff domomite interlayered with less stiff limestone in which displacement paths were measured. The strain paths are referred to a local, rotating coordinate frame which is approximately defined by the strata as they rotate during folding. The calculated strain paths give an estimate of the change in orientation of the principal directions of strain with respect to layering on fold limbs. As expected, the principal extensional strain begins at a high angle to layering and rotates toward layering as folding progresses. The sense of rotation reverses on opposite fold limbs, and one limb tends to have smaller magnitudes of rotation than the other. Similar strain paths occur on the limbs of finite-element computer models of asymmetric folds produced by buckling single layers inclined as much as 15° to the direction of boundary shortening. Although the natural folds are multilayers, comparison with the computer models indicates that strata near Blue Ridge were locally inclined as much as 15° to the direction of bulk shortening. If this direction was nearly horizontal, some strata may have had dips as high as 15°NW prior to late Paleozoic deformation.

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• 70704—Correlation of aeroradioactivity and geology in southeastern Connecticut and adjacent New York and Rhode Island.

*Richard Goldsmith, Isidore Zietz, U.S. Geological Survey, Reston, Virginia 22092; H. R. Dixon, U.S. Geological Survey, Denver, Colorado 80225.* (10 p., 4 figs., 1 tbl.)

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Radioactivity patterns in southeastern Connecticut, adjacent Rhode Island, and New York closely reflect bedrock units. This relationship is not greatly affected by surficial deposits of Pleistocene age, because most deposits are locally derived and bedrock outcrops are relatively abunddant. Most bedrock units are medium- to high-grade metasedimentary, metavolcanic, and metaplutonic rocks that range in age from possible Precambrian to middle Paleozoic. The rest are postmetamorphic granite and pegmatite of late Paleozoic age. The area is on the west flank of an anticlinorium of granitic gneiss and subordinate metasedimentary and metavolcanic rocks at a place where the anticlinorium changes trend from north to east. The Honey Hill and Lake Char faults mark a zone of low-angle faulting between the granite-gneiss terrane and stratified rocks of the Merrimack synclinorium to the north and west. The east-trending Honey Hill fault marks the southern end of the Merrimack synclinorium.

Four fields denoting different levels and patterns of radioactivity coincide with major geologic provinces. The granite-gneiss terrane, which contains abundant potassic, ledge-forming granitic rocks (the Sterling Plutonic Group), coincides with a field of relatively high radioactivity in which subordinate lows reflect outcrop areas of quartzitic rocks of the Plainfield Formation. This terrane is flanked to the west and north by layered metavolcanic rocks of mafic to intermediate composition belonging mostly to the Quinebaug Formation. These rocks coincide with a field of relatively low to moderate levels of radioactivity. The lowest level within this field is produced by the Preston Gabbro, which is at the right-angle bend in the structure.

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• 70705—Geophysical investigation of the structural framework of the Newark-Gettysburg Triassic basin, Pennsylvania.

*John Randolph Sumner, Department of Geological Sciences, Lehigh University, Bethlehem, Pennsylvania 18015.* (8 p., 4 figs., 1 tbl.)

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A residual gravity map of the Newark-Gettysburg Triassic basin has been constructed using approximately 5,000 gravity stations that are nominally 1 to 5 km apart. In a general way, the map shows gravity lows over Triassic sedimentary rocks and gravity highs over Triassic diabase bodies and pre-Triassic rocks that flank the basin. Steep gravity gradients within the basin, but near the margins, are interpreted to be due to vertical offset on faults within the basin. The presence of these presumed faults along parts of the southern margin indicates that the basin is not a simple half-graben, but is internally faulted, with irregular sediment thicknesses.

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• 70706—Timber Mountain–Oasis Valley caldera complex of southern Nevada.

*Robert L. Christiansen, U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025; Peter W. Lipman, W. J. Carr, F. M. Byers, Jr., Paul P. Orkild, K. A. Sargent, Geological Survey, Federal Center, Denver, Colorado 80225.* (17 p., 4 figs., 4 tbls.)

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The Timber Mountain–Oasis Valley caldera complex lies within a volcanic field in southern Nevada that once covered 11,000 km². The caldera complex, active from 16 to 9.5 m.y. ago, was the source of nine voluminous rhyolitic ash-flow sheets and numerous smaller rhyolitic tuffs and lava flows. Several centers of basaltic and related volcanism were active before the complex formed, continued around its periphery during caldera activity, and have since overlapped the caldera complex. Extensional normal faulting and perhaps deep-seated right-lateral deformation preceded, accompanied, and followed evolution of the caldera complex and its surrounding volcanic field.

The youngest major structure of the complex is the Timber Mountain resurgent caldera, 25 by 30 km across. Several stages of its development can be documented: (1) magmatic insurgence accompanied by gentle tumescence, formation of a ring-fracture zone, and minor rhyolitic volcanism; (2) eruption about 11 m.y. ago of a voluminous ash-flow sheet, caldera collapse during the eruption, and postcollapse caldera infilling by sediments and

rhyolite flows; (3) renewed ash-flow eruptions and further caldera collapse; (4) resurgent doming of the cauldron block; and (5) postcollapse rhyolitic volcanism and filling of the caldera by sediments.

Only parts of the older calderas are preserved, but they can be interpreted in terms of evolutionary cycles similar to that of the Timber Mountain caldera. Major tectonic intersections appear to have controlled the locations and certain structural features of each major volcanic source area.

Differentiation at high crustal levels of the silicic magmas related to the caldera complex produced compositionally zoned ash-flow sheets. High-level differentiation also is represented at most of the basaltic centers of the field. Each caldera cycle probably represents a separate batch of rhyolitic magma that rose high into the crust, differentiated in place, and partly erupted to the surface. Each of these magmas probably rose independently through the crust, but all of them were related ultimately to a single magmagenetic system, as were the basaltic magmas of the field. The silicic magma bodies consolidated to form large shallow granitic plutons, and the caldera complex now overlies a small composite granitic batholith.

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• 70707—Geometry of plate accretion.

*J. F. Dewey, W.S.F. Kidd, Department of Geological Sciences, State University of New York at Albany, Albany, New York 12222.* (9 p., 3 figs.)

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A steady-state model for plate accretion at oceanic ridges, developed using constraints mainly from western Newfoundland ophiolite complexes, involves four main rheological components: (1) a convectively cooling lid accelerating from the ridge axis across a zone of decreasing dike-injection rate and thickening by the addition of extrusive basalts above and gabbro underplating beneath; (2) a wedge-shaped magma chamber with a flat floor; (3) a differentially subsiding wedge of cumulates; and (4) a narrow axial partially melting lherzolite-derived diapir from which basalts are liberated over a narrow axial welt into the magma chamber and from which residual harzburgites are plated near the axis below the base of the subsiding cumulates. The axial depth of the magma chamber determines the thickness of plated gabbro. The basal width of the magma chamber and the height of the partially melted welt control the thickness of cumulates and the final attitude of cumulate banding.

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• 70708—Evolution of the Norwegian-Greenland Sea.

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Geological and geophysical data collected aboard R/V *Vema* during five summer cruises in the period 1966 to 1973 have been used to investigate the geological history and evolution of the Norwegian-Greenland Sea. These data were combined with earlier data to establish the location of spreading axes (active as well as extinct), the age of the ocean floor from magnetic anomalies, and the locations and azimuths of fracture zones. The details of the spreading history are then established quantitatively in terms of poles and rates of rotation. Reconstructions have been made to locate the relative positions of Norway and Greenland at various times since the opening, and the implications of these reconstructions are discussed here.

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• 70709—A geophysical study of the southern continental margin of Australia: Great Australian Bight and western sections.

*Michael König, Manik Talwani, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964 and Department of Geological Sciences, Columbia University, New York, New York 10027.* (15 p., 8 figs., 1 tbl.)

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Marine gravity, magnetic, bathymetric, and seismic reflection and refraction measurements, most of them made aboard U.S.N.S. *Eltanin*, were used to study the western and central sections of the southern continental margin of Australia. The data are presented as profiles across the margin.

A magnetic quiet zone extends from west of Tasmania to the western border of the Great Australian Bight. In the Great Australian Bight area, the seaward quiet-zone boundary parallels the oldest marine magnetic lineation south of Australia, anomaly 22. An isostatic gravity high very nearly coincides with this isochron. There are no corresponding anomalous topographic features, but seismic profiler records generally show basement peaks occurring in the vicinity and seaward of anomaly 22. A conspicuous magnetic low is located near the landward boundary of the quiet zone; it separates the subdued signature of the magnetic quiet zone proper from high-amplitude, short-wavelength magnetic anomalies of shallow origin on its continentward side. It is associated with an isostatic gravity high and a significant topographic break of the continental slope. Most seismic profiler records show probable shallow basement corresponding to the rough magnetic signature landward of the prominent magnetic low. Seismic profiler and limited refraction data indicate greater depths to basement underlying the magnetic quiet zone than on either side.

To the west of the Great Australian Bight, the magnetic lineations older than anomaly 19 are not well defined. The prominent magnetic low is continuous along the western and central margin, as are the isostatic gravity high and the topographic break in the slope associated with it. The area immediately seaward of the magnetic low is occupied by irregular, noncorrelatable magnetic anomalies. Available seismic data indicate a greater thickness of sediments for this zone than for adjacent seaward area.

We have examined several magnetics and gravity models to explain the geophysical anomalies of the Great Australian Bight area. One possible model assumes that non-oceanic subsided basement underlies the magnetic quiet zone, that the seaward quiet-zone boundary marks the juxtaposition of shallow oceanic and deeper non-oceanic basement, and the landward boundary represents a structural discontinuity, probably a normal fault, within continental-type basement. In this model, the basement subsidence of the magnetic quiet zone is isostatically com-

pensated by a lateral change in density. It is not possible to eliminate all other models for the origin of the area occupied by the magnetic quiet zone.

• 70710—Sediment distribution and structural framework of the Barents Sea.

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Marine geophysical surveys in the Barents Sea have provided new data on the main structural elements and the distribution of sediments. The area is divided into four main regions on the basis of the sediment distribution and the seismic velocities: (1) The area between Svalbard, Bear Island, and Hopen—the Svalbard Platform—is underlain by high-velocity sediments (sea-floor velocities of 3.8 to 4.4 km/s) probably of early Mesozoic and late Paleozoic age. (2) There are two regional sedimentary basins—the east-west North Cape Basin between Bear Island and Norway and the southwest-trending Novaya Zemlya Basin between Hopen and Novaya Zemlya. The basins appear to merge into an extension of the Pechora Basin in the southeastern Barents Sea. The sea-floor velocity is generally in the range of 2.5 to 3.1 km/s, and the sediments are probably of Mesozoic and late Paleozoic age. The main structural fabric is southwest-northeast. (3) On the western continental margin there is a low-velocity wedge (1.8 to 2.4 km/s) of Cenozoic material deposited on top of the layers found in the basins. (4) A region of outcropping basement is found adjacent to the southern coastline.

The area developed as an epicontinental shallow sea that was connected with the sedimentary basins now found on the margins of Norway and Greenland. The major part of the Barents Sea was above sea level during most of the Tertiary Period. The data indicate that the basins are of interest for commercial exploration.

• 70711—Barents Sea continental margin sonobuoy data.

*R. Houtz, C. Windisch, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964.* (7 p., 8 figs., 2 tbls.)

Results from 68 closely spaced sonobuoys obtained aboard R/V *Bartlett* are combined with 30 published sonobuoy results obtained aboard R/V *Vema* to provide about 300 velocity solutions from the Barents Sea area and its western continental margin. Sections have been compiled from the closely spaced Bartlett stations, and statistical regressions of sediment sound velocity versus depth were made with all the available data. It was found that distinct geologic provinces from this region can be characterized with five separate velocity-depth curves, based on the regressions. The very low velocity gradient in the thick Tertiary wedge of sediments just west of the Barents shelf probably indicates rapid, deltaic deposition. More than 9 km of subbottom penetration was achieved in this Tertiary wedge.

• 70712—Extinct triple junction south of Greenland and the Tertiary motion of Greenland relative to North America.

*Yngve Kristoffersen, Manik Talwani, Lamont-Doherty Geological Observatory, and the Department of Geological Sciences of Columbia University, Palisades, New York 10964.* (13 p., 14 figs., 2 tbls.)

Geophysical data collected by R/V *Vema* during cruises from 1960 to 1973 in the area south of Greenland were used to establish details of the magnetic lineation pattern and the basement morphology associated with an extinct triple junction. The sequence of magnetic anomalies 20 to 24 (49 to 60 m.y. B.P.) is continuous from the western flank of the Reykjanes Ridge into the Labrador Sea north and south of the triple junction and defines a period of simultaneous sea-floor spreading in the Norwegian Sea, the North Atlantic, and the Labrador Sea. At the time of anomaly 20 (49 m.y. B.P.) a major slowdown in the rate of spreading of the Labrador Sea Ridge occurred, and it met with extinction prior to the time of anomaly 13 (~40 m.y. B.P.). The magnetic lineation pattern shows the amount of opening in the Labrador Sea between the interval spanned by anomalies 13 to 21 and that spanned by anomalies 21 to 23. An independent estimate of the relative motion between Greenland and North America was obtained from the difference in the opening between Greenland and Europe and that between North America and Europe. This second estimate predicts more opening of the Labrador Sea than is observed. Bounds can nevertheless be placed on the early Tertiary relative motion between Greenland and North America, and this motion compares well with the history of tectonic deformation in the Canadian Arctic islands during the Eurekan orogeny.

• 70713—Medals and awards for 1976.

Presentation of the Penrose Medal to Preston E. Cloud, Jr. *Citation by Digby J. McLaren. Response by Preston E. Cloud, Jr.*

Presentation of the Arthur L. Day Medal to Hans Ramberg. *Citation by Paul H. Reitan. Response by Hans Ramberg.*

Presentation of the Kirk Bryan Award to Geoffrey Stewart Boulton. *Citation by Laurence H. Lattman. Response by Geoffrey S. Boulton.*

Presentation of the Oscar E. Meinzer Award to Shlomo P. Neuman and Paul A. Witherspoon. *Citation by Stanley N. Davis. Response by Shlomo P. Neuman and Paul A. Witherspoon.*

Presentation of the E. B. Burwell, Jr., Award to David J. Varnes. *Citation by Frank W. Wilson. Response by David J. Varnes.*



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