GSA news & information

SUPPLEMENT TO GEOLOGY MAGAZINE

MAY 1978

Report of the Committee on Investments

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

The purpose of the Committee on Investments is to advise the Council about investment and reinvestment of the funds, securities, and other capital of the Society. Presently the Committee comprises four members and the Treasurer of the Society, plus two conferees. Also, the Budget Committee Member of the Executive Committee serves as a nonvoting *ex officio* member of this Committee. During the year Michel T. Halbouty of Houston, Texas, concluded his three-year term. Donald A. Parks, Vice-President of Bankers Trust Company in New York City, and C. Harry Burgess, of Abbeville, South Carolina, became new members. Dr. Burgess has previously served on the Committee, both as a member and as chairman.

On December 31, 1977, the market value of the combined investment accounts of the Society was $7,999,230, as compared to $8,449,647 on December 31, 1976, a loss of 5.3%. During the same period of time, the Standard & Poor's 500 Industrials Index decreased 11.5%, the Dow Jones Industrials Average decreased 17.3%, and the Lipper Balanced Fund Index decreased 1.1%. At the end of 1977 the investment accounts were invested 58% in debt and money market instruments and 42% in equities. The income yield of the portfolio was 5.81%.

A program of writing covered call options on certain securities in the portfolio was continued during 1977. This activity was profitable, generating a revenue to the Society of $65,891. At year-end there was an unrealized loss in options written of $6,488.

The Society's investments have been structured into 12 different funds, an organization that has proven with time to be administratively unwieldly. Accordingly, funds with generally similar purposes have been pooled, the result being a structure consisting of four groups of investments:

- The Endowment Fund, comprising the bulk of the Society's invested capital;
- The Reserve Fund, for long-term and periodic needs such as major repairs and employee retirement;
- The Current Fund, which provides a cash reserve to support the Society's everyday operations; and
- The Medal and Awards Fund.

This reorganization was put into effect in mid-January 1978.

The principal money manager and custodian of the Society's investments is the Irving Trust Company, a large financial institution in New York City. Until September 1977 approximately $2 million of the Penrose Endowment Fund was under the management of Faulkner, Dawkins & Sullivan, a New York institutional and research investment company. Faulkner, Dawkins was acquired by Shearson Hayden Stone, Inc., a large national brokerage firm. The Committee was unwilling to have Society funds managed by such an organization and, therefore, cancelled the existing management contract. In view of the benefits derived from having at least one money manager in addition to the Irving Trust Company, the Committee reviewed several candidates and selected Reich and Tang, Inc., to manage $1 million of the En-

(continued on p. 282)

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(Report of the Committee on Investments, continued from p. 281)

dowment Fund. This manager is a small investment advisory firm in New York City handling pension accounts, university endowments, and private funds, totaling about $85 million. Reich and Tang's performance record since the early 1970s has been outstanding.

Respectfully submitted,
ROBERT L. FUCHS, Chairman; AUGUST GOLDSTEIN, JR., DONALD A. PARKS, C. HARRY BURGESS, Members; WILLIAM B. HEROY, JR., Treasurer; HOWARD R. GOULD, *ex officio;* JAMES BOYD, ROBERT E. KING, Conferees

THE GEOLOGICAL SOCIETY OF AMERICA, INC.
SUMMARY OF INVESTMENTS BY FUNDS
IN CUSTODY OF IRVING TRUST COMPANY
December 31, 1977

Principal Amount	Security	Cost	Approximate Market Value
	CURRENT FUND		
$1,138,000.00	Short Term Investments	$1,138,000.00	$1,138,000.00
Total Current Fund Investments		$1,138,000.00	$1,138,000.00
	MAJOR REPAIRS FUND		
$ 121,000.00	Short Term Investments	$ 121,000.00	$ 121,000.00
Total Major Repairs Fund Investments		$ 121,000.00	$ 121,000.00
	PENROSE ENDOWMENT FUND		
$ 853,000.00	Short Term Investments	$ 853,000.00	$ 853,000.00
135,000.00	U.S. Government & Agency Obligations	133,600.50	133,025.00
300,000.00	Foreign Obligations	300,000.00	276,000.00
600,000.00	Corporate	592,822.50	557,750.00
382,503.06	Private Placements	382,386.53	303,641.36
	Common Stocks	505,761.00	1,187,375.00
	Sub-Total	2,767,570.53	3,310,791.36
	PENROSE ENDOWMENT FUND STOCK OPTION INVESTMENT		
	Common Stocks	1,792,807.43	1,845,374.47
	Sub-Total	4,560,377.96	5,156,165.83
	PENROSE ENDOWMENT FUND SECURITIES MANAGED BY REICH & TANG, INC.		
$ 368,623.00	Cash and Cash Equivalents	368,623.00	368,623.00
	Common and Preferred Stock	603,199.00	610,075.00
	Sub-Total	971,822.00	978,698.00
Total Penrose Endowment Fund Investments		$8,299,770.49	$9,445,655.19
	GENERAL RESERVE FUND		
$ 20,000.00	Short Term Investments	$ 20,000.00	$ 20,000.00
	Common Stocks	56,866.86	58,887.50
Total General Reserve Fund Investments		$ 76,866.86	$ 78,887.50
	INCOME STABILIZATION FUND		
$ 277,000.00	Short Term Investments	$ 277,000.00	$ 277,000.00
55,000.00	U.S. Government & Agency Obligations	54,659.00	54,450.00
Total Income Stabilization Fund Investments		$ 331,659.00	$ 331,450.00
	RETIREMENT RESERVE FUND		
$ 106,000.00	Short Term Investments	$ 106,000.00	$ 106,000.00
142,000.00	U.S. Government & Agency Obligations	143,227.50	134,011.10
333,039.61	Corporate	338,850.87	298,032.07
	Common Stocks	340,167.48	333,699.25
Total Retirement Reserve Fund Investments		$ 928,245.85	$ 871,742.42
	PENROSE MEDAL FUND		
$ 4,000.00	Corporate	$ 3,990.00	$ 3,960.00
Total Penrose Medal Fund Investments		$ 3,990.00	$ 3,960.00
	DAY MEDAL FUND		
$ 7,000.00	U.S. Government & Agency Obligations	$ 7,043.75	$ 6,825.00
12,000.00	Corporate	12,000.00	11,880.00
20,000.00	Convertible Fixed Income	22,750.00	16,550.00
	Common Stock	12,006.98	6,150.00
Total Day Medal Fund Investments		$ 53,800.73	$ 41,405.00
	BRYAN MEMORIAL FUND		
$ 7,000.00	U.S. Government & Agency Obligations	$ 6,780.00	$ 6,937.50
6,000.00	Corporate	6,000.00	5,940.00
Total Bryan Memorial Fund Investments		$ 12,780.00	$ 12,877.50
	STEARNS AWARD FUND		
$ 10,000.00	U.S. Government & Agency Obligations	$ 10,000.00	$ 9,962.50
Total Stearns Award Fund Investments		$ 10,000.00	$ 9,962.50
	BIRDSALL AWARD FUND		
$ 10,000.00	Short Term Investments	$ 10,000.00	$ 10,000.00
Total Birdsall Award Fund Investments		$ 10,000.00	$ 10,000.00

Report of the Committee on Research Grants

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

The Committee on Research Grants, consisting of Steven M. Stanley, Peter R. Vail, William E. Benson, conferee, and B. Clark Burchfiel, Chairman, met in Boulder at Society headquarters on March 19, 1977. Each member of the Committee had studied all proposals prior to the meeting, thus the review process was very efficient.

The Committee was pleased at the increase from $50,000 to $65,000 approved by the Council for the basic budget of the Committee on Research Grants. The committee received continuing support from industries and foundations. The following ten companies or foundations made generous donations totaling $13,986 to augment our funding: Alcoa Foundation, Ashland Exploration Company, Atlantic Richfield Foundation, Chevron Oil Field Research Company, Gulf Oil Foundation,

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Michel T. Halbouty, Mobil Oil Corporation, Shell Development Company, Texaco, Inc., Union Oil Company of California. In addition, the excellent response of previous grant recipients to a letter soliciting their help provided an additional $4,530. Other additions to the budget amounted to $1,916 including donations from dues statement check-off, interest from the Harold T. Stearns Fund, and refunds from previously supported grants. The total budget for 1977 at the time of the committee meeting was $85,432, an increase from a 1976 budget of $69,585.

The total number of applications was 269 or approximately the same as in 1976 (256) and the overall quality remained high. Support was recommended for 119 proposals, or 44 percent of the total, with an average grant of $718. The total amount requested was $243,912 and the amount awarded was $85,495, representing 35% of that requested.

In May, the Council approved a motion saying that the unexpended funds from the six GSA sections student field trip subsidizations for 1977 be returned to the Society for use in funding the alternates in the 1977 research grants program. This amounted to $3,692, which enabled the committee to award all ten alternates named at the March 19 meeting.

Susan C. Leo of Michigan State University, East Lansing, received the Harold T. Stearns Award. The committee singled out six young scientists and their proposals for special mention and 19 promising young Earth scientists were chosen as recipients of the donations from industry.

The Penrose Research Grants represent one of the few sources of funds for the promising young Earth scientists with a need for modest support for dissertation research. The committee felt that many of the research proposals that were not awarded funds were worthy of support, and thus recommended increased support from the Society budget for 1978 along with intensifying its program soliciting donations from industry and past recipients of Penrose Research Grants.

The review process continues to work well, and the members of the Committee feel privileged to have been a part of it.

Respectfully submitted,
STEVEN M. STANLEY
PETER R. VAIL
WILLIAM E. BENSON (Conferee)
B. CLARK BURCHFIEL (Chairman)

1977 RESEARCH GRANTS SUMMARY OF COMMITTEE RECOMMENDATIONS

	Number of applicants	Requested by applicants	Recommended for support
CATEGORY I (Recommended for support)			
M.S. Student applicants	26	$ 25,907	$ 17,250
Ph.D. Student applicants	92	83,930	67,345
Post Ph.D. applicants	1	1,232	900
Subtotal	119	$111,069	$ 85,495
CATEGORY II (alternates)			
M.S. Student applicants	5	$ 3,392	
Ph.D. Student applicants	5	3,891	
Post Ph.D. applicants	0	-0-	
Subtotal	10	$ 7,283	
CATEGORY III (Not recommended for support)			
M.S. Student applicants	65	$ 52,311	
Ph.D. Student applicants	60	55,976	
Post Ph.D. applicants	15	17,273	
Subtotal	140	$125,560	
Grand Total	269	$243,912	$ 85,495
COUNCIL ACTION			
Support all Category I projects	119	$111,069	$ 85,495
Funding declined			
Cancellations	(3)	$ (2,435)	$ (2,000)
Alternates awarded	10	$ 7,283	$ 5,750
Totals awarded in 1977	126	$115,917	$ 89,245

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A PERSONAL MESSAGE

to all Members and Student Associates (those in Option A excepted)

Help us to help you receive your Toronto '78 Abstracts with Programs on time!

The address labels used for the annual meeting book mailing will be generated on **August 15, 1978.** Therefore, your copy will be sent to the address we have on file for you AT THAT TIME. If you know that your address will change by early September—the time the book is expected to be delivered to your door—PLEASE LET US KNOW NOW. **Remember! An address change takes four to six weeks to become effective.**

Please send address changes to Charlene Bicknell, Membership Coordinator, Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301.

Mexican Geological Society Convention

La Sociedad Geologica Mexican (Mexican Geological Society) will hold its national geological convention September 10 through 13 at the Hotel Presidente Chapultepec in Mexico City.

Topics to be explored at the conference include general geology, petroleum geology, mining geology, geohydrology, engineering geology, planning and development, geophysics, and education.

Activities include two field trips, scientific films and audio-visual presentations, and exhibits by consulting firms and equipment manufacturers.

Registration deadline is July 31, but original papers for presentation at the conference must be received by May 15.

Interested persons should request (in Spanish) a circular from: Comite Organizador de la IV Convencion Geologica Nacional, Cipres No. 176, Mexico 4, D.F., Mexico.

Necrology

Notice has been received of the following deaths: Chester A. Arnold, Ann Arbor, Michigan; William A. G. Bennett, Olympia, Washington; Diana Cossack, Struthers, Ohio; Richard M. Eastwood, Groton Long Point, Connecticut; Rollin Farmin, Wallace, Idaho; Ulysses S. Grant IV, Los Angeles, California; Otto H. Haas, Reno, Nevada; David J. Hagar, Lima, Ohio; John R. Hayes, Lakewood, Colorado; Verner E. Jones, Marion, Ohio; Daniel W. Kraus, Princeton, New Jersey; Dwight M. Lemmon, Atherton, California; John L. Lester, Centralia, Illinois; Robert P. Morrison, Toronto, Ontario, Canada; Malcom Christie Oakes, Norman, Oklahoma; Axel Adolph Olsson, Coral Gables, Florida; James J. Purzer, Houston, Texas; Robert H. Rose, Moab, Utah; Edgar P. Rothrock, Vermillion, South Dakota; John R. Sandidge, San Antonio, Texas; Robert W. Schnabel, Denver, Colorado; Douglas R. Semmes, San Antonio, Texas; Norman D. Watkins, Saunderstown, Rhode Island.

LETTERS FROM MEMBERSHIP

I read with interest the "Statement: Peter J. Smith and the Geological Society of America" in the November issue of *Geology* in which Mr. Smith explains how he was thwarted by the U.S. State Department in his bid to become Science Editor with the Society. His statement has stirred memories of how, in my turn, I too did not become Editor with the Society.

As it happened, in March 1966 the Geological Society of America sent a copy of a vacancy announcement to all its members soliciting applicants for the position of Editor. On April 5, I mailed a letter of application which was followed by letters of endorsement and support from many colleagues. In May and again in June, I was interviewed by the Executive Secretary, first in Menlo Park and then at the Society's headquarters in New York City. Then I heard nothing until August, when a friend of long standing, who was privy to what happened in GSA circles, told me it had been decided a woman was not acceptable as Editor and I would not get the job. He pointed out for whatever solace I could take from it or for whatever humor I could see in it, the Society was "over a barrel" so to speak, for although I was not acceptable as Editor, my application could not be rejected because no other qualified person had applied and because it was supported by letters from many people whose recommendations could not be ignored. I immediately withdrew my application.

Several years ago as part of a survey being conducted by the Society, I was contacted to find out if I thought there was any sex discrimination in the geosciences. I replied affirmatively and gave the above account of my experience. Some months later my interviewer and I chanced to meet and he told me "there were several red faces around the conference table" when he reported my experience back to GSA.

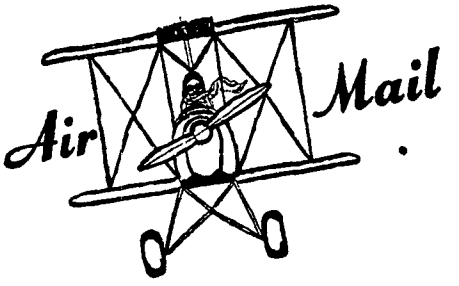
Fortunately, I find I am able to relate this incident without rancor and hope time also will help temper the anger and frustration Mr. Smith must now feel.

Helen M. Beikman
Fellow, The Geological Society of America
4 Stowe Lane
Menlo Park, California 94025

Note: We are not aware that Dr. Smith was intentionally thwarted by the State Department. *John C. Frye*

NOTE:

All members living outside North America will probably receive *Abstracts with Programs* **after** the meeting unless they write to GSA headquarters and ask to have them sent



TORONTO '78 ANNUAL MEETING – OCTOBER 23-26, 1978

The annual meeting will be early this year. Therefore, we would like to draw your attention to the fact that 1978 deadlines will be earlier than usual. The abstract deadline will be June 1, 1978, and the meeting and field trip preregistration deadline will be August 31, 1978. In addition to preregistration forms, the second announcement will contain forms for making reservations for housing, field trips, society functions, and guest activities. The announcement will be published in the JULY issue of *News & Information*, and we recommend that if you wish to preregister, you give the forms your prompt attention. Additional copies may be obtained from the Annual Meeting Secretary, Geological Society of America, 3300 Penrose Place, Boulder, Colorado 80301.

Appreciation extended to critical reviewers of *Geology*

In addition to the Editorial Board, during 1977 the following reviewers critically read and evaluated manuscripts submitted for publication in *Geology*. Their time, efforts, and dedication on behalf of their colleagues and the journal are much appreciated.

Hans D. Ackermann
M. G. Audley-Charles

William Back
A. W. Bally
Daniel S. Barker
Myron G. Best
Peter Birkeland
David Blackwell
Arthur L. Bloom
Enrico Bonatti
Earl E. Brabb
Edwin H. Brown
H. Robert Burger

Charles E. Chapin
David S. Chapman
Clement G. Chase
Lindrith Cordell
Joseph R. Curray

James F. Devine
James Dewey
John Dewey
William R. Dickinson

David H. Eggler
Donald P. Elston
Jack F. Evernden

A. G. Fischer
Robert L. Folk

Ian Gibson
Richard H. Groshong, Jr.

Thomas C. Hanks
Robert D. Hatcher, Jr.
Richard L. Hay
Carl Hedge
Norman Herz
David Hill
Joseph M. Hoare
S. Warren Hobbs
Alan D. Howard

Roy L. Ingram
W. Porter Irwin

Tracy L. Johnson

W.S.F. Kidd
Ronald W. Kistler
David Krinsley

John C. Lahr
C.R.B. Lister

Don R. Mabey
Bruce Malfait
William Manton
Winthrop Means
J. H. Mercer
Daniel F. Merriam
John Milliman
Robert B. Mixon
Paul Mohr
George Moore
J. Casey Moore
Eldridge M. Moores
Robert A. Morton
A. Lee McAlester
Alexander R. McBirney
Robert McLaughlin

Charles W. Naeser

John Obradovich
Leroy A. Odom
Dennis O'Leary

L. C. Pakiser
A. R. Palmer
Zell E. Peterman
Wallace Pitcher
Dean C. Presnall

Paul C. Ragland
Nicholas Ratcliffe
Loren A. Raymond
Mark Rich
Dietrich H. Roeder
Peter A. Rona
Paul Roper

Leonard G. Schultz
Glenn R. Scott
Donald T. Secor, Jr.
E. Craig Simmons
Norman Sleep
Alan L. Smith
John Splettstoesser
David Stewart
Chandler A. Swanberg

D. H. Tarling
Maurice J. Terman

T. R. Walker
E.H.T. Whitten
Sherwood W. Wise
Lee A. Woodward
Lauren A. Wright
Thomas L. Wright

Isidore Zietz

Opening for Director, National Geodetic Survey

The following announcement concerning an opening in the position of Director, National Geodetic Survey, has been received at GSA headquarters:

Thorough knowledge of geodesy, geophysics, and surveying. Demonstrated management ability. Ph.D. in geodesy, geophysics, surveying or related physical sciences. Salary — $47,500. Subject to U.S. Civil Service Commission approval. Location — Rockville, Maryland. Apply to Department of Commerce, National Oceanic and Atmospheric Administration, 6001 Executive Boulevard, Rockville, Maryland 20852, AD415:NYB. Equal Opportunity Employer.

Call for posters—Remote Sensing Symposium

The 1978 meeting of the Geological Society of America in Toronto will convene a symposium entitled "Geological Applications of Satellite Remote Sensing." The symposium will include a morning session devoted to invited papers to be followed by a major afternoon poster session. Individuals interested in presenting a poster graphically and visually illustrating recent work in applying satellite remote sensing to geologic activities should submit an abstract (original and two copies, on GSA abstract forms) no later than June 1, 1978, to: GSA SYMPOSIUM, BOX 20, GERMANTOWN, MARYLAND 20767.

Memorials Volume VII now available

Memorials Volume VII is now available, containing the following memorials: Agatin Townsend Abbott (1917–1975) by Gordon A. Macdonald; Paul Harrison Bird (1900–1974) by Francis Irving; John Manning Birdsall (1902–1975) by P. E LaMoreaux and H. C. Barksdale; Bernard William Blanpied (1897–1975) by Claude N. Valerius; Arthur Edward Brainerd (1885–1974) by George R. Downs; Carl Colton Branson (1906–1975) by L. R. Wilson;

Maurice Lyman Brashears (1908–1975) by Jack B. Graham; Francis Cameron (1902–1975) by F. Stuart Miller; Frank Cook Greene (1886–1975) by Wallace B. Howe; David Tressel Griggs (1911–1974) by John M. Christie; Horacio J. Harrington (1910–1973) by John J. De Benedetti; Olaf Holtedahl (1885–1975) by Christoffer Oftedahl; Walter Frederick Hunt (1882–1975) by Kenneth K. Landes; Marshall Kay (1904–1975) by Robert H. Dott, Jr.; Samuel Howell Knight (1892–1975) by J. D. Love and Jane M. Love; Davis M. Lapham (1931–1974) by Arthur A. Socolow; Chester Ray Longwell (1887–1975) by A. D. Howard and W. C. Smith; Thomas Ellison Mullens (1925–1975) by Lawrence C. Craig;

Charles Merrick Nevin (1892–1975) by Louis de A. Gimbrede; Clarence Samuel Ross (1880–1975) by T. P. Thayer; Francis Ruellan (1894–1974) by Professor J. Dresch; Rolf F. Rutsch (1902–1975) by Hollis D. Hedberg; Frank Caleb Sturges (1909–1975) by Shailer S. Philbrick; Hans Ernst Thalmann (1899–1975) by William W. Hay; George Dewey Thomas (1898–1975) by Claude N. Valerius; Everett Pepperrell Wheeler 2nd (1900–1974) by S. A. Morse; Max Gregg White (1916–1975) by John A. Reinemund; Oscar Wilhelm (1897–1975) by J. D. Edwards; Horace Elmer Wood 2nd (1901–1975) by G. G. Simpson; Charles Douglas Woodhouse (1888–1975) by R. W. Webb and R. M. Norris; Francis M. Van Tuyl (1887–1975) by L. W. LeRoy.

Third International Congress on History of Oceanography to be held in September 1980

The Third International Congress on the History of Oceanography will be held at Woods Hole, Massachusetts, U.S.A., September 22–26, 1980. As part of the celebration of the 50th Anniversary of the Woods Hole Oceanographic Institution, the Congress will be followed the next week (Sept. 29–Oct. 4) by an assembly on current and future oceanography.

The Congress has the approval of both the International Union of History and Philosophy of Science and the Centre International d'Histoire de l'Océanographie.

Expressions of interest in this Congress, particularly from those who plan to contribute papers on any aspect of the history of oceanography, will be most welcome *as soon as possible*. Daniel Merriman, *Professor Emeritus of Biology*, Yale University, has accepted the chairmanship and all communications should be addressed to him at 298 Sperry Road, Bethany, Connecticut 06525, U.S.A.

ABSTRACTS DEADLINE REMINDER

The deadline for abstracts for the Toronto meeting is a month earlier than last year. Please NOTE!! Deadline for receipt of abstracts at GSA headquarters or in Toronto is JUNE 1, 1978. Mail abstracts to either Abstracts Secretary, Geological Society of America, 3300 Penrose Place, Boulder, CO 80301 OR to Toronto '78, P.O. Box 4170, Postal Station A, Toronto, Ontario, Canada M5W 1T2. Please NOTE: The $20 abstract fee is no longer required.

NEW PROCEDURES ANNOUNCED FOR ORDERING GSA BOOKS AND MAPS

Richard Drozda, controller of GSA, announces that the following procedures are now effective. The fiscal policy of the Society requires payment in advance for all orders, including orders from Fellows, Members, and Student Associates of GSA:

1. **PAYMENT MUST ACCOMPANY ALL ORDERS that total less than $25.00 and that originate within North America (U.S.A., Canada, Mexico) and possessions of the U.S.A.**
2. **PAYMENT MUST ACCOMPANY ALL ORDERS that originate from outside North America and possessions of the U.S.A. Orders that originate in Continental Europe must continue to be sent to the Society's exclusive distributor: Office International de Librairie, Avenue Marnix 30, B1050 Brussels.**
3. **Orders for more than $25.00 that originate in North America and possessions of the U.S.A. will be accepted for 30-day billing. Postage and handling charges will be added to invoices. The Society reserves the right to limit credit to organizations and individuals with established lines of credit.**
4. **ALL Fellows, Members, and Student Associates must send their orders to Boulder and must compute and deduct the membership discount. Discounts will not be allowed unless claimed. Member discount is stated on the reverse side of the 1978 membership card.**
5. **All payments must be in U.S. funds (check or draft, money order, UNESCO coupons).**

Ninth International Congress of Carboniferous Stratigraphy and Geology to be held May 1979

The Organizing Committee for the Ninth International Congress of Carboniferous Stratigraphy and Geology invites you to attend the May 1979 meetings in Washington, D.C. and at the University of Illinois at Urbana-Champaign.

IX-ICC is co-sponsored nationally by the Association of American State Geologists, American Association of Petroleum Geologists, Geological Society of America, Paleontological Society, Society of Economic Paleontologists and Mineralogists, and Paleobotanical Section of the Botanical Society of America. Co-hosts for the technical sessions are the Illinois State Geological Survey and University of Illinois; co-sponsors in Illinois are the Field Museum of Natural History, Illinois State Museum, and Southern Illinois University. IX-ICC is an official event of the centennial celebration of the United States Geological Survey.

Technical Sessions. Broad themes of the Congress, directed toward the Carboniferous, include stratigraphy, economic geology of solid and fluid fuels, geochemistry of sedimentary rocks, non-metallic and metallic deposits, paleontology, radioactive age determinations, coal petrology, engineering geology, sedimentology, theoretical and applied geophysics, paleogeography, geotectonics, paleoclimatology, and paleoecology.

The technical sessions of IX-ICC will provide the opportunity for geologists interested in coal to meet with those interested in oil and natural gas. The Congress program will be theoretical as well as applied. All phases of geology that concern rocks of Carboniferous age will be explored. Coal deposits of all ages will be discussed.

Fifteen premeeting and postmeeting field trips will highlight type areas and key sections of the Mississippian and Pennsylvanian Systems throughout the United States.

Inquiries concerning the Congress should be addressed to

Mackenzie Gordon, Jr., President,
or
Ellis L. Yochelson, Secretary-General,
both at
IX-ICC, 1979
Museum of Natural History
Washington, D.C. 20560, USA

May BULLETIN briefs

Brief summaries of articles in the May 1978 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.*

• 80501—The Cordilleran orogenic belt between Nevada and Chihuahua.

Harald Drewes, U.S. Geological Survey, Denver, Colorado 80225. (17 p., 4 figs.)

The Cordilleran orogenic belt of North America was formed during an orogeny which occurred in Cretaceous and Paleocene time. The belt is marked by a zone of strong folding and thrust faulting that extends from Alaska to Guatemala. However, between southern Nevada and northeastern Chihuahua, the belt is so obscured that some geologists doubt its continuity. A recent study of part of the Nevada-Chihuahua interval provides evidence that the belt is continuous, without major interruption; the complications are the result of pre-orogenic and post-orogenic tectonic events. With due regard for these complicating factors, a structure section through southeastern Arizona and southwestern New Mexico closely resembles sections through southwestern Canada, regions near Salt Lake City and Las Vegas in the United States, and northern Mexico. In each region, supracrustal rocks were tectonically transported east-northeastward a distance probably more that 100 km. The style of deformation suggests a near-surface environment, probably mainly controlled by décollement between a prism of miogeosynclinal rocks and crystalline basement rocks. Those features which vary between the regions reflect differences in tectonic position within the belt (for example, closer to foreland or hinterland, or depth of exposure), in anisotropy of preorogenic rocks (variations in older structural features), or in subsequent geologic history.

• 80502—Is compaction a factor in organic diagenesis?

Walter E. Reed, Gerhard Oertel, Department of Geology, University of California, Los Angeles, Los Angeles, California 90024. (5 p., 1 fig., 2 tbls.)

Compaction was measured in six drill-core samples of marls from the Wilkins Peak and Tipton Shale Members of the Eocene Green River Formation, Sweetwater County, Wyoming, by the degree of preferred orientation of clay mineral grains. The preferred orientation was measured with an X-ray goniometer, and the compaction was calculated by application of the theory of March (1932), in which one assumes that the clay grains were originally oriented at random. Associated organic materials were exhaustively extracted by solvents and were identified by gas and thin-layer chromatography.

The amount of solvent-soluble organic compounds increases with depth. The proportional share of alkanes is approximately constant. Odd-carbon dominance of the nC_{17} alkane decreases rapidly and monotonically with depth, while the ratio of nC_{16} plus nC_{18} alkanes to alkenes increases in a reciprocal fashion. The carbon preference index of alkanes of higher molecular weight is fairly constant at a value of 2 except in one sample (CPI = 3.2), which is much less compacted than all the others. There appears to be a correlation between compaction and the content of pristane relative to the nC_{17} alkane, superposed on a general decrease of pristane concentration with depth. Phytane, on the other hand, is concentrated in shallow and deep samples, with a minimum in between, and it shows no correlation with compaction.

The phytane content reflects either the nature of contributing biotas or possible early alteration of organic detritus, whereas pristane seems to respond to later, gradual alteration, possibly governed by catalysis on sediment grain surfaces. This catalysis could be enhanced by mechanical scraping and breaking of grains during compaction. Attenuation of the odd-carbon preference of the freshly deposited organic compounds may be similarly affected by catalytic processes.

• 80503—Erosion of fine-grained marine sediments: Seafloor and laboratory experiments.

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Estimates of threshold erosion velocities have been obtained in the field and in the laboratory for marine mud relatively rich in organic matter and having a active infauna. A sea-floor flume was used to erode undisturbed sediments on the sea floor, and a laboratory flume was used to study the effects of sampling, redeposition, bioturbation, organic-matter content, and compaction time on erosion resistance.

Critical shear velocity, u_{*c}, for erosion of muds in situ ranged from 0.32 to 0.84 cm/s, and u_{*c} was apparently independent of season or bulk physical properties. Erosion was often but not always initiated in biogenically disturbed parts of the bed. Lee drifts around small bed-roughness elements were the most common constructional bedforms observed during the sea-floor experiments, and narrow and shallow longitudinal furrows were the most commonly observed erosional features. Tidal u_{*c} values measured at the field site were of the same magnitude as the u_{*c} values measured with the sea-floor flume.

Mean u_{*c} for muds redeposited and bioturbated for 1 to 60 days in the laboratory flume (0.92 cm/s) was greater by a factor of two than mean u_{*c} for muds eroded in situ (0.45 cm/s). As bioturbation time in the laboratory increased, u_{*c} decreased. Increases in sediment organic content were found to increase u_{*c} systematically in flat, nonbioturbated laboratory beds.

• 80504—Pollen in Santa Barbara Basin, California: A 12,000-yr record.

Linda Heusser, Box 608, Tuxedo, New York 10987. (6 p., 4 figs.)

Palynomorphs in the rhythmites of the Santa Barbara Basin record the response of vegetation to paleoecologic changes of the past 12,000 yr and also reflect fluviomarine changes. Upland coniferous communities dominant in the early part of the record (~12,000 to ~7800 B.P.) were succeeded in importance by lowland and cismontane communities in which *Quercus* and Asteraceae reached optimal development ~5700 B.P. Subsequently, chaparral and coastal sage scrub associations became increasingly important, particularly since ~2300 B.P. Inferred climatic fluctuations involve the replacement of wet, cool conditions by warmer, drier climate culminating at ~5700 B.P.

• 80505—Petrology of the Rocklin pluton and associated rocks, western Sierra Nevada, California.

Samuel E. Swanson, Geology Department, Appalachian State University, Boone, North Carolina 28608. (8 p., 10 figs., 2 tbls.)

The Rocklin pluton is a Lower Cretaceous quartz diorite that is intrusive into Upper Jurassic plutonic (Penryn pluton) and metamorphic rocks about 30 km northeast of Sacramento, California. The Rocklin pluton varies from hornblende quartz diorite near Folsom to leucocratic, muscovite-bearing granodiorite in the quarry exposures at Rocklin. The mineral zonation is very regular and is in-

terpreted to be the result of fractional crystallization beginning near Folsom and ending at Rocklin.

Compositions of aplite dikes and mineral assemblages in the contact aureole permit an estimate to be made of the load pressure at the time of intrusion. Minimum pressures estimated from the dike compositions range from 0.5 to 1.5 kb. Metamorphic mineral assemblages indicate an estimated load pressure of 3 to 6 kb, with the large range due to uncertainties in the aluminosilicate triple point. Combining both estimates gives a preferred value of 2 to 3-kb load pressure for the intrusion of the Rocklin pluton.

Intrusion of the Rocklin pluton followed a period of complex deformation in the Sierra Nevada that is referred to as the Nevadan orogeny. New K-Ar analyses of hornblende and biotite confirm the results of Curtis, Evernden, and Lipson and give an intrusive age of 128 m.y. In about 15 m.y., during Late Jurassic time, sedimentary and volcanic rocks were deposited, buried, recrystallized to low-grade slates and schist, isoclinally folded, and intruded by quartz diorite plutons. This complex history has been interpreted as reflecting the collision of an island arc with the North American plate. Analysis of the radiometric dates on the Penryn and Rocklin plutons and the age of the metamorphic rocks places the time of the proposed collision at about 143 m.y. ago.

• 80506—Early diagenetic, nonhydrothermal Na-alunite in Jurassic flint clays, Makhtesh Ramon, Israel.

Ron Goldbery, Department of Geology and Mineralogy, Ben Gurion University of the Negev, Beer Sheva, Israel. (12 p., 10 figs., 4 tbls.)

A newly discovered deposit of aluminum sulfate minerals within kaolinite claystones of the Middle Jurassic Inmar Formation at Makhtesh Ramon is described.

The sulfate minerals as determined by X-ray diffraction, chemical analysis, and differential thermal analysis are predominately members of the alunite-natroalunite solid-solution series with subordinate jarosite (Potassium-iron sulfate) and minor amounts of woodhouseite [$CaAl_3(PO_4)(SO_4)(OH)_6$]. Three distinct modes of occurrence were recognized for the sulfate minerals: (1) thin beds, 1 to 8 cm thick and laterally extensive, (2) pods concentrated in a horizon parallel to bedding and (3) fine disseminations within the claystone.

The host sequence is composed predominantly of kaolinite claystone with minor amounts of carbonaceous shale, flint clay, siltstone, and massive interbeds of quartzarenite. Two distinct facies, whose origins are related to the genesis of the sulfates, have been defined within the sequence. They are the coaly facies, characterized by organic-rich shaly claystone, and the flint-clay facies, composed of massive, homogeneous, and brecciated flint clay.

The pure well-ordered kaolinite of the claystone in the coaly facies has mineralogic properties similar to those of the flint-clay facies; both facies were probably formed by similar processes. In contrast to this, the other claystone parts of the host sequence contain higher quartz concentrations, disordered kaolinite, and minor amounts of illite.

Inasmuch as the sulfate mineralization occurred in both the flint-clay facies and coaly facies, their origin is postulated as being nonhydrothermal and closely related to the environmental conditions that accompanied deposition. The interpretation of an early diagenetic origin for the Na-alunite is based on the nature of textural fabrics within the alunite pods that were caused by segregation of a kaolinite + epiclastic quartz assemblage from a relatively homogeneous alunite assemblage. Fractionation into a kaolinite + quartz assemblage and an alunite assemblage could only have occurred before compaction, probably by a process of colloidal segregation during stages of dewatering.

The mineralogic characteristics of claystone within the flint-clay facies and coaly facies developed mainly in situ within swampy depressions by a process of upward leaching such as that proposed by Keller and others for the origin of Missouri flint clay. Furthermore, authigenic pyrite formed in response to an environment of negative Eh and was subsequently oxidized to H_2SO_4 by subaerial exposure of the swamp sediments. The diagenetic reorganization of colloidal clays by reaction with the sulfuric acid is considered to be the dominant process in the formation of the alunite.

• 80507—Textural and chemical variations of olivine and chrome spinel in the East Dover ultramafic bodies, south-central Vermont.

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Regional metamorphism of upper-greenschist to epidote-amphibolite facies produced variations of olivine and chrome spinel textures and compositions within the East Dover ultramafic bodies that can be attributed to differing intensities of recrystallization of the ultramafic rocks. Olivine shows a progressive change from highly strained grains in the least recrystallized rocks to relatively strain-free grains in the most recrystallized rocks. Fo content of olivine bears a direct relationship to texture: with increase in degree of recrystallization, olivine changes composition from Fo_{90} to Fo_{97}. Chrome spinel grains are ubiquitously rimmed by opaque spinels. Variations in thickness of these rims and shape of the translucent chrome spinel cores occur in a regular manner. Thickest rims occur around the most anhedral cores, and these are found in the most strongly recrystallized rocks. Euhedral chrome spinels with thin opaque spinel rims are found in the least recrystallized rocks. With increasing recrystallization, Mg/(Mg + Fe) and Al/(Al + Cr) ratios increase in the spinel cores.

Zones of intensity of recrystallization indicated by both olivine and spinel textures and compositions are geographically concentric with the map outlines of the ultramafic bodies. Observed textural and compositional variations suggest a reaction involving simultaneous serpentinization and recrystallization of olivine in the presence of an oxidizing fluid. Partial buffering of this fluid (which originated in the country rocks) and subsequent development of a substantial f_{O_2} gradient between the margins and cores of the larger ultramafic bodies resulted in a more nearly complete reaction at the margins than in the cores of the bodies. This reaction need not have occurred as a single event and equilibrium was only maintained on the scale of hand specimens (f_{O_2}, olivine composition) to fractions of mineral grains (spinel composition).

• 80508—Penokean deformation and associated metamorphism in the western Marquette Range, northern Michigan.

John S. Klasner, Department of Geology, Western Illinois University, Macomb, Illinois 61455. (12 p., 10 figs., 1 tbl.)

Geologic studies of Precambrian rocks in northern Michigan indicate that the Penokean orogeny, which occurred about 1.9 b.y. ago, consisted of four stages of deformation, three of which occurred during a prolonged period of regional metamorphism. The first two stages of deformation were possibly caused by gravity sliding northward off an ancestral Penokean range located in central Wisconsin. The deformation probably started while the sediments were still soft, and it produced a pervasive west-northwest–trending foliation in the middle Precambrian rocks. The third and fourth stages of deformation were caused by uplift of rigid blocks of lower Precambrian basement rocks; this uplift produced prominent grabens such as the Marquette and Republic troughs. Metamorphism began very early in the deformational sequence, peaked during the third stage of deformation, and ended in a period of retrograde metamorphism.

• 80509—Rhythmic spacing and origin of pools and riffles.

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Quantitative analysis of the spacing of pools in bedrock and alluvial stream channels in California, Indiana, Virginia, and North Carolina suggests that the tendency for streams to meander in the vertical (or third) dimension, as in the horizontal plane, is a fundamental characteristic of many streams that is independent of material type. Simple linear-regression and correlation models reveal that approximately 70% of the variability of the spacing of pools can be explained by the variability of channel width. Analysis of the spacing of 251 pools in 11 streams, utilizing the Kolmogorov-Smirnov goodness of fit test and one-way analysis of variance suggests that the hypothesis that the data from bedrock and alluvial channels are from the same population cannot be rejected at the 0.05 level of significance.

Morphologic maps and field observations of stream channels incised in sandstone, limestone, metavolcanic rock, and syenite suggest that although these streams have much in common with alluvial stream channels, there exist considerable differences in certain aspects of channel morphology. This results because bedrock control of morphology locally may be more significant than the effects of general processes that tend to produce rhythmic channel forms such as pools and riffles. However, local controls tend to mask rather than destroy the effects of more general processes that produce the third dimension of meandering streams.

• 80510—Tectonic significance of petrofabric studies along the Chewack-Pasayten fault, north-central Washington.

Robert D. Lawrence, Department of Geology, Oregon State University Corvallis, Oregon 97331. (13 p., 9 figs., 2 tbls.)

The Chewack-Pasayten fault is a major steeply dipping tectonic boundary that trends N30°W across north-central Washington and adjacent British Columbia for at least 250 km. It is the eastern boundary of the Cenozoic Methow trough and is here interpreted to have been the eastern boundary of the early Late Cretaceous Tyaughton trough. It separates Paleozoic and Mesozoic plutonic rocks on the northeast from Mesozoic and Cenozoic volcanic and sedimentary rocks on the southwest.

A 1.5-km-wide zone of cataclastic fluxion structure (S) containing a mineral lineation (L) is present in the granitic rocks adjacent to the fault. S is steeply dipping and has a N15°W trace that is en echelon to the fault trace. L is subhorizontal in S. Detailed interpretation of fabric elements in this zone are used herein to interpret one phase of the tectonic history of the fault. Plagioclase shape and crystallographic fabrics suggest rigid body rotation of plucked augen. Quartz-shape fabrics suggest ductile flattening and recrystallization. Quartz *c*-axis fabrics suggest crystal glide in response to compression perpendicular to S similar to recent experimental results. Microfractures in quartz tentatively are interpreted as stress relief phenomena. Mica shape and crystallographic fabrics suggest crystal glide, rotation, and fracture. All of these results indicate that the strain in the cataclastic zone may be described by an ellipse oriented with the axis of maximum finite shortening perpendicular to S and the axis of maximum finite elongation parallel to L. This is interpreted to reflect left-lateral simple shear motion during the early Late Cretaceous development of the cataclastic zone. The exposed portion of the cataclastic zone originally developed at a depth of about 2 km and at a temperature of 300 to 400 °C.

Slickensided shear joints in volcanic rocks record compression nearly at right angles to the fault that is probably related to middle Late Cretaceous folding. Associated fault motion, if any, would have been high-angle reverse. Later, at higher structural levels, normal motion on the fault disrupted the cataclastic zone and created the Methow trough in early Cenozoic time.

• 80511—Interpretation of olivine zoning: Study of a maar from the San Francisco volcanic field, Arizona.

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Fe-Mg zoning in olivine represents a disequilibrium state that reflects the physical and chemical environment the mineral has experienced. Olivine crystallization is affected by changes in the magmatic environment. The types of profiles we have observed include (1) homogeneous crystals, (2) homogeneous cores and zoned rims, (3) zoning extending uniformly across the crystal, (4) composition profiles that change in steps across the crystal, and (5) irregular zoning resulting from alteration and oxidation. Stepped profiles appear to have resulted from episodic changes in the magmatic environment. Calculations show that the steps could have formed owing to changing pressure as magma pulsed toward the surface.

Olivines from crater 160, a maar in the San Francisco volcanic field, Arizona, differ markedly in their zoning profiles. Comparison of separate flows indicates a common parent magma and suggests that a near-surface magma chamber did not exist. Probable correlations between a complex feeder dike and specific nearby flows were made.

• 80512—Uyak Complex, Kodiak Islands, Alaska: A Cretaceous subduction complex.

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The Uyak Complex is a chaotic assemblage of gray chert and argillite, wacke, greenstone, radiolarian chert, and gabbroic and ultramafic rocks. The simplest interpretation of these rocks is that the gabbroic and ultramafic rocks and greenstone represent basal oceanic crust upon which the radiolarian chert, gray chert and argillite, and wacke were deposited, respectively, at a mid-ocean rise, on the abyssal ocean floor, and in an oceanic trench. Fossils are scarce in the complex and range in age from mid-Permian to mid–Early Cretaceous. The Uyak Complex was emplaced by underthrusting to the northwest beneath lower Mesozoic metamorphic, igneous, and sedimentary rocks. During underthrusting, brittle rock types were broken into phacoids of all sizes and suspended in the less competent matrix of gray chert and argillite with their longest dimensions aligned subparallel to cataclastic foliation. Prehnite and pumpellyite developed extensively in lithologies of suitable composition.

The Uyak Complex correlates to the northeast with a similar assemblage of deep-sea rocks on the Barren Islands and with the McHugh Complex on the Kenai Peninsula and near Anchorage. The Uyak-McHugh belt defines a probable subduction complex trending northeast for at least 600 km along the margin of southwestern Alaska. The time of emplacement of this mélange is uncertain, but fossils present indicate that it occurred after mid–Early Cretaceous time. To the southeast, the Uyak is underthrust by deformed turbidites of the Kodiak Formation, which are interpreted to have been deposited in an oceanic trench and accreted to the Alaskan margin in Late Cretaceous time. The relationship between the Uyak Complex and Kodiak Formation is uncertain, but they may represent two phases, or two facies, of Late Cretaceous accretion.

Two large bodies of schist, referred to as the Kodiak Islands schist terrane, occur along the northwest border of the Uyak. The Kodiak Islands schist terrane is a blueschist-bearing metamorphic belt that has yielded mainly Early Jurassic K-Ar mineral ages. Similarities in K-Ar ages, metamorphism, and tectonic setting support a correlation between the Kodiak Islands schists and the Seldovia schist terrane on southern Kenai Peninsula. The Upper Triassic Shuyak Formation structurally overlies the Kodiak Islands schist terrane and Uyak Complex but is separated from them by a long, narrow pluton emplaced in Early Jurassic time. The Shuyak is a little-deformed formation of volcanic and volcaniclastic rocks. It correlates with similar rocks on the Alaska and Kenai Peninsulas, which together outline a lower Mesozoic forearc basin; K-Ar ages show that much of the Alaska-Aleutian Range batholith was intruded coeval with deposition in this forearc basin. A likely interpretation of these rocks is that the Kodiak-Seldovia schists are the only vestige of a subduction complex emplaced along the margin of southwestern Alaska during the prominent early Mesozoic volcanoplutonic activity recorded on the Alaska and Kenai Peninsulas and the Kodiak Islands.

• 80513—Rhinegraben and the Alpine system.

J. Henning Illies, Gerhard Greiner, Geologisches Institut, Universität Karlsruhe, D 75 Karlsruhe, Germany. (13 p., 12 figs., 1 tbl.)

The regional stress field in and around the Rhinegraben rift system and in the adjacent parts of the Alps has been investigated by a series of "Doorstopper" in situ stress determinations. This is a stress-relief method that measures rock strain by destressing the rock with an overcoring operation. The maximum component of horizontal compression was found to trend approximately northwest to north-northwest. The excess horizontal stress culminates in the central Alps, decreases abruptly at the north-

ern margin of this mountain range, and has relatively low values in the foreland area of the Rhinegraben.

Alpine folding and thrusting ceased in Pliocene time, but strong epeirogenic uplift continues today. While plate-tectonics compression relaxed, stresses caused by topographic effects and unloading increased within the rising mountain body. The directions of maximum horizontal compression are about normally oriented to the isobases of Holocene uplift. The measured excess stresses obviously are not sufficient for thrust progression, since the Alps are considerably consolidated.

The Rhinegraben was formed as an extensional rift valley in mid-Eocene to early Miocene time. The remaining zone of weakness trends about parallel to the sinistral shear of the active regional stress field. Because of this, the rift belt has been remodeled into a shear zone; its slip rates are related to the lateral extension of the Alpine mountain body farther south. Deflected by two changes in the graben's axial trend, the neotectonic deformations of the individual graben segments demonstrate a varying interaction of shear with compression in one case or shear with extension in the others. Where active shearing ceases at the northern end of the graben, the shift of the South German block is transmitted directly to the northward adjacent Rhenish massif. This massif reacts by secondary movements along pre-existing discontinuities, by horizontal flexuring, and by seismic activity. Farther north, in the Lower Rhine embayment, the Holocene peri-Alpine stress regime causes extensional rifting and subsidence.

Tectonic effects to be ascribed to the Holocene regional stress pattern may be recognized back to mid-Pliocene time. Before that, in early Pliocene to mid-Miocene time, tectonic deformations were controlled by different stress regimes. Plate-tectonics processes in the rigid sphere were complemented by plastic mass compensations within the asthenosphere. Mantle rise was an additional factor controlling the Tertiary process of extensional rifting.

• 80514—Old Rb-Sr whole-rock isochron apparent ages from Lower Cambrian psammites and metapsammites, southeastern New York.

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Samples from two outcrops of Poughquag Quartzite and an outcrop of Lowerre Quartzite yield nearly linear arrays of points on Rb-Sr whole-rock isochron diagrams, but the apparent ages range between 600 and 1,000 m.y. If

the Lowerre Quartzite and the Lower Cambrian Poughquag Quartzite are correlative, these ages may be interpreted as maximum deposition ages that are no younger than the time of deposition and no older than the age of the source terrane (provenance age). This behavior of metamorphosed psammatic rocks contrasts with the behavior of metamorphosed pelitic rocks in southeastern New York which tend to yield minimum depositional ages bounded by the time of deposition and the time of metamorphic closure. The difference in age is believed to be a function of (1) the abundance, in the initial sediment, of unaltered detritus versus altered and diagenetic materials, and (2) the hydrous phase present during metamorphism. Unaltered detrital grains will tend to retain provenance Rb-Sr ages, whereas diagenetic minerals and weathered grains will tend to re-equilibrate during sedimentary processes and subsequent metamorphism. During metamorphism, water produced by dehydration reactions will promote the open-system behavior of rubidium, strontium, and strontium isotopes. Psammitic rocks that lack hydrous phases are more likely to remain closed systems on the scale of a hand sample during metamorphism than pelitic rocks, allowing them to retain their premetamorphic Rb-Sr age pattern. Thus the apparent age of metasedimentary rocks can have a variety of geological interpretations. The Rb-Sr whole-rock isochron method must be applied cautiously to metamorphic rocks of uncertain origin, even where the array of analyzed points on an isochron diagram is linear.

• 80515dr—Geophysical study of the continental margin of Southern Africa: Discussion and reply. (6 p.)

Discussion: *Roger A. Scrutton, Grant Institute of Geology, University of Edinburgh, Edinburgh, EH9 3JW, United Kingdom.*

Reply: *Philip D. Rabinowitz, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964.*

• 80516dr—Nucleation and growth of plagioclase, Makaopui and Alae lava lakes, Kilauea Volcano, Hawaii: Discussion and reply. (4 p.)

Discussion: *Norman Gray, Department of Geology and Geophysics, University of Connecticut, Storrs, Connecticut 06268.*

Reply: *R. James Kirkpatrick, Scripps Institution of Oceanography, A-031 La Jolla, California 92093.*

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