



GSA news & information

VOLUME 1, NUMBER 3

MARCH 1979

Employment distribution of GSA membership

On the recommendation of the Membership Committee, the GSA 1979 dues statement included a questionnaire on the employment status of each member. The committee felt that it would be helpful to them and of interest to all the members to have such information. At the time of writing, out of approximately 9,000 forms returned, nearly 8,000 members had checked the questionnaire, and the charts and comments here are based on the response from this two-thirds of the total membership.

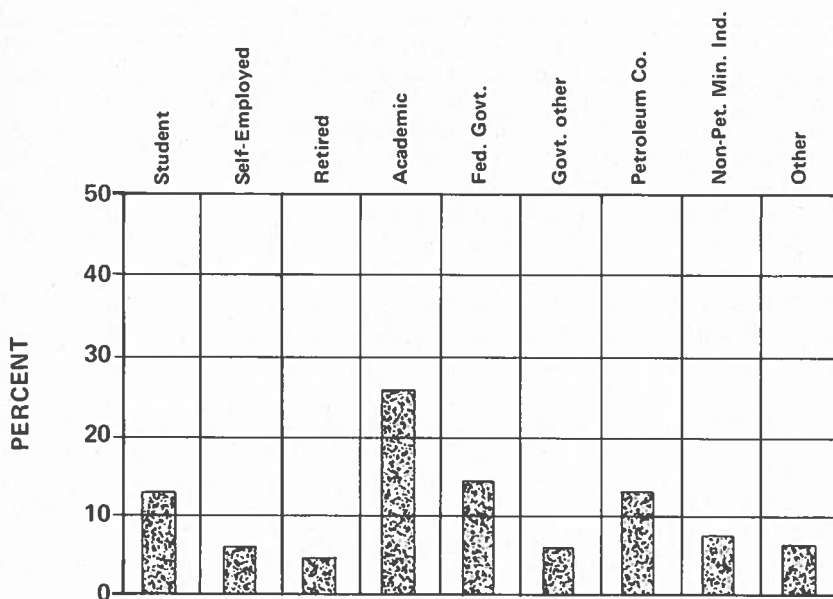
Several facts appear that many of us had not previously known. The most striking of these is that (if we eliminate students and retired members) there is almost an even distribution among three employment groups: academic, with 32.2%; government, with 26.6%; and industry plus self-employed, with 32.4%.

Another interesting aspect is the differing age dis-

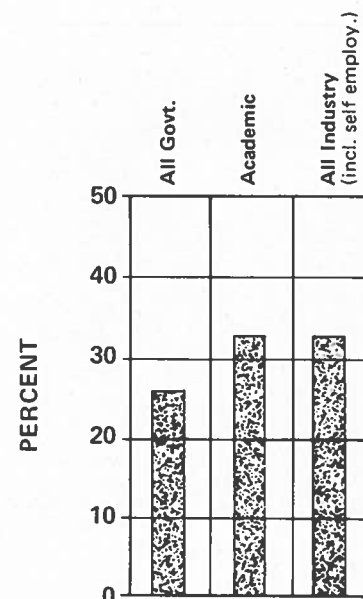
tribution within each of these three groups. The industry group is the youngest, with 23.6% in the age range of 26 to 30, and more than half of them are 40 years of age or younger. The age distribution in the academic group is the most symmetrical, with 50% in the age range of 36 to 50. The age distribution of government employment is the most uniform, although the age range of 31 to 35 is the largest, with 16.2%. There are 13% in the range of 51 to 55. Of the total membership, excluding students, more than half are below the age of 45. Nearly half of the Student Affiliates are in the age range of 26 to 30, with about one-third in the range of 25 or younger.

Two very general conclusions that can be drawn from these data are that the GSA membership is more balanced in employment than some have assumed, and also that the age of the membership is younger than popularly believed.

EMPLOYMENT DISTRIBUTION OF GSA MEMBERSHIP
(As reported on 1979 Dues Statement)



3 GROUP COMPARISON
Excluding Students, Retired,
and others



GSA MEDALS AND AWARDS

The Geological Society of America medals and awards for 1978 were presented at the joint annual meeting of the Society with the Geological Association of Canada and the Mineralogical Association of Canada, in Toronto, October 23–26, 1978. The citations and recipients' replies are published in their entirety in *Bulletin, Part II*, March 1979.

Penrose Medal



Robert M. Garrels

GSA's highest award, the Penrose Medal, was given to Robert M. Garrels. L. S. Sloss in his presentation cited Garrels's early work in geochemistry—in minerals, solutions, and equilibria at near-surface pressures and temperatures. "Garrels, the specialist, evolved, courses were developed, students emerged, books were written and published, and peer recognition was attained—as documented by the GSA Day Medal

and the Geochemical Society's Goldschmidt Award. (Garrels is the fourth scientist to receive the Day and Penrose Medals; the first to win both these and the Goldschmidt Award.)"

In his acceptance, Garrels expressed appreciation for "the Geologists' Medal," as his "motivation always has been to decipher the Earth's past, but much of [his] time has been spent in trying to develop tools and techniques for reading Earth's history."

He thanked Charles H. Behre, Jr., Frank T. Tucher, Jr., Bill Krumbein, and all his colleagues of the past 40 years for early influences "... to show how twigs are bent."

Arthur L. Day Medal



Samuel Epstein

G. J. Wasserburg gave the next presentation to the Arthur L. Day medalist, Samuel Epstein.

Epstein's early work included the Canadian Atomic Energy Commission at the University of Montreal with Arrol and Chackett on extracting and purifying rare gas fission products; at McMaster in Hamilton, Ontario, Harry Thode introduced him to mass spectrometry in 1946. By 1948 he was in charge of Urey's laboratory at the

University of Chicago where Urey and Sam Epstein established a new level for chemical separation and isotopic measurement. "The outcome of this work is now known throughout the scientific world."

Epstein became an associate professor with tenure at Cal Tech in 1954 and has since produced a host of major papers, which form part of the core of stable isotope geochemistry.

"Colleagues . . . were certainly important in helping me contribute to the geological sciences," said Epstein. "I have also had the good fortune of having superb students and postdoctoral fellows working in my laboratory. It is these young people who make a laboratory function. I am proud of their scientific accomplishments over these years, and I cherish their generosity, good will, and friendship."

Kirk Bryan Award



Richard L. Hay

The Quaternary Geology and Geomorphology Division presented the Kirk Bryan Award to Richard L. Hay for his *Geology of Olduvai Gorge*, in which "he brought order to stratigraphic relations that were previously confused and applied an extraordinary combination of skills in sedimentation, geochemistry, mineralogy, and volcanology to comprehend the paleoenvironment of man's earliest ancestors— . . .

a grasp of interdisciplinary concepts that commands the admiration of geologists and archaeologists around the world."

Bill Farrand closed his citation with this summary: ". . . the importance of his work lies not only in the author's masterful reconstruction of the Quaternary paleogeomorphology by multifaceted methods, but also in the light that he has shed on the environment of prehistoric man over more than 1.5 million years in equatorial Africa. His work has gone a long way toward changing our ideas about so-called 'pluvial' climate in this area, and thus to provide an important element in the interpretation of the global pattern of Quaternary climatic change."

In his acceptance speech Richard L. Hay said, "The stratigraphy in the gorge quickly proved to be an irresistible puzzle. I love puzzles, and this one took me 12 years to get most of the pieces in the right place. . . . I also found myself drawn to the mystery of early man who, like a geologist, left lumps and chips of rock wherever he went. He prized chert above all other raw materials for his tools, and I have wondered if the geologists' special interest in chert is a dim racial memory of man's stone-age habits."

O. E. Meinzer Award



R. William Nelson

The O. E. Meinzer Award given by the Hydrogeology Division was awarded to R. William Nelson. In presenting the winner, Eugene S. Simpson cited, "his efforts since 1970 have been centered on (1) using models in the solution of pollution problems, (2) developing the contaminant arrival distribution methods, and (3) encouraging use of arrival concepts for evaluating the environmental consequences of subsurface pollution.

"The Meinzer Award is in recognition of a publication describing these arrival distribution concepts that originally appeared in 1976 as a publication of the BCS Richland, Incorporated, . . . 'Evaluating the Environmental Consequences of Ground-water Contamination.'" This paper is the distillation of many years of productive thought and effort. Much that went into it evolved from his previously published works. It is both a technical analysis and a point of view. It represents an important advance in our struggle to establish a sound basis for subsurface waste-disposal management.

E. B. Burwell, Jr., Memorial Award



Nicholas R. Barton

The E. B. Burwell, Jr., Memorial Award of the Engineering Geology Division of GSA presented its annual award to Nicholas R. Barton of the Norwegian Geotechnical Institute. "For the first time in its ten-year history, the award is being made, for good reason, to a person outside North America who is not a member of the Geological Society of America," said Richard W. Gaster in his citation. Barton has consulted in rock mechanics,

slope stability, and tunnel support problems in Peru, South Africa, New Guinea, and Kenya, as well as in Norway.

The paper which attracted the attention of the Burwell Award Committee was published in the *International Journal of Rock Mechanics and Mining Sciences* in 1976 and is entitled "The Shear Strength of Rock and Rock Joints."

The Gilbert Cady Award of the Coal Division is given every other year and was not awarded at the Toronto meeting.

AEG ANNUAL MEETING TO BE HELD OCT. 2-6, 1979

The annual meeting of the Association of Engineering Geologists will be held October 2-6, 1979, in Chicago, Illinois. The meeting will feature a short course on applications of engineering geology, two days of field trips, and two days of technical sessions, following the general theme "State of the art in engineering geology."

The short course, whose title will be announced at a later date, will be held on October 2. The field trips, scheduled for October 3 and 6, will include visits to problem areas of the Lake Michigan shoreline, to tunnels being constructed for the renowned Chicago deep tunnel project, and to other sites of interest to engineering geologists.

The technical sessions, scheduled for October 4 and 5, will include

topics on dam inspections, ground-water, coal mining, and legal aspects of geological practice. Various evening entertainment and cultural activities are planned.

For further information, contact Abe Dolgoff, Chairman, c/o Sargent & Lundy Engineers, 55 East Monroe Street, Chicago, IL 60603. Telephone: (312) 269-7142.

SEVENTH WORLD CONFERENCE ON EARTHQUAKE ENGINEERING

The Seventh World Conference on Earthquake Engineering is planned for September 8 to 12, 1980, in Istanbul, Turkey. The scope of the conference includes geoscience aspects, civil and structural engineering aspects, social and economic aspects, and planning and regulatory aspects of the field of earthquake engineering.

Those who wish to submit papers to this conference are requested to send 400-word abstracts to the secretary of the organizing committee and two copies to the president's office of the IAEE: Jai Krishna, President, IAEE, 22 (2) Civil Lines, Roorkee-247667, INDIA.

The deadline for submission of abstracts is April 30, 1979. A maximum of two papers per person will be accepted for presentation; however, a special session will be provided for presentation of progress reports of institutions engaged in earthquake engineering.

Additional information about exhibition, enrollment, and the conference in general may be obtained from the conference secretary: Aybars Gürpınar, Secretary, 7. WCEE, Yüksel Caddesi 7/B, Ankara, TURKEY.

GSA EMPLOYMENT SERVICE OPERATES THROUGHOUT THE YEAR

GSA maintains a computer file, updated continuously throughout the year, of persons seeking jobs. The information contained on this file includes the applicants' areas of interest, years of experience, and educational background. An interested employer with an opening submits the job requirements and receives a computer printout of all applicants whose qualifications match those requirements. It is then up to the employer to contact applicants in whom he or she is interested.

The minimum fee for employers requesting computer printouts is \$45 for two specialty listings; \$12 for each additional specialty listing.

Applicant registration is \$15 per year and includes participation in the Annual Meeting Interview Service. The GSA Employment Service is operated by the Membership Department as a benefit to our members and to the profession. You do not need to be a member of GSA to use this service.

Apply soon so your name can be included on printouts sent to employers who use the year-round service.

CONSIDER JOINING US IN SAN DIEGO FOR THE 1979 ANNUAL MEETING EMPLOYMENT INTERVIEW SERVICE NEXT NOVEMBER

Each fall, GSA holds an Employment Interview Service during its annual meeting. Recruiters rent interview both space for a nominal charge, and staff is available to help schedule interviews. For those applicants attending the meeting, job descriptions are available and interviews may be arranged.

Additional information may be obtained by writing to:

Charlene Bicknell
Membership Department
Geological Society of America
3300 Penrose Place
Boulder, CO 80301
(303) 447-2020

APPLICANT AND EMPLOYER FORMS
ARE BACK-TO-BACK ON THE FOLLOWING PAGES

GSA PUBLICATIONS

Articles in *Bulletin, Part II*, March 1979

Articles in *Bulletin, Part II* are listed below. (Summaries only of these articles are in *Bulletin, Part I*.) Articles in *Part II* are not on the separate subscription.

Paper copies of *Part II* in its entirety will be made at cost (\$6/month) as a special service to those users (members and nonmember subscribers) who request them. Any such order should be accompanied by advance payment, and no discount can be offered for multiple orders or orders for a sequence of months.

1. Role of the Melones fault zone in the structural chronology of the North Yuba River area, western Sierra Nevada, California, by S. E. Cebull and R. L. Russell. Doc. no. M90301 (On microfiche: 17 p., 3 figs.)
2. Deformation at various scales in the South Mountain anticlinorium of the central Appalachians, by Shankar Mitra. Doc. no. M90302 (On microfiche: 35 p., 17 figs.)
3. Estimating densities in contoured orientation diagrams, by J. Ramsden and D. M. Cruden. Doc. no. M90303 (On microfiche: 28 p., 6 figs., 6 tables.)
4. Medals and Awards for 1979. Doc. no. M90304 (On microfiche: 25 p., 5 figs.)

In March *Geology* (separates not available)

1. Geological development of the Cordilleran metamorphic core complexes, by George H. Davis and Peter J. Coney

2. Middle and late Proterozoic evolution of the northern Canadian Cordillera and Shield, by G. M. Young, C. W. Jefferson, G. D. Delaney, and G. M. Yeo
3. Late Jurassic Independence dike swarm in eastern California, by James H. Chen and James G. Moore
4. Seismicity, faulting, and geophysical anomalies in Nemaha County, Kansas: Relationship to regional structures, by D. W. Steeples, S. M. DuBois, and F. W. Wilson
5. Relative crustal subsidence from leveling data in a seismically active part of the Rio Grande rift, New Mexico, by Robert E. Reilinger and James E. York
6. Remnants of a probable Tertiary impact crater in south Texas, by William F. Wilson and Douglas H. Wilson
7. Cyclic anoxic events in the Early Cretaceous Tethys Ocean, by H. Weissert, J. McKenzie, and P. Hochuli
8. Probable sponge borings in Lower Ordovician limestone of Sweden, by Maurits Lindström
9. Penrose Conference Report: Magnetic structure of oceanic basement, by James M. Hall and Paul Johnson, conveners

GSA News & Information

Vol. 1, no. 3

March 1979

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Prepared from contributions from the staff and membership by John C. Frye, Executive Director; Jo Fogelberg, Publications Manager; and June Thomas, Judy Hall, and Renée Gitchell, Production Assistants.



**THE
GEOLOGICAL SOCIETY
OF AMERICA**

3300 Penrose Place · Boulder, Colorado 80301

SEE REVERSE FOR EMPLOYER'S FORM.

APPLICATION FOR EMPLOYMENT MATCHING SERVICE

(Please type or print legibly with **Black Ink**)

A _____ -1

Name _____ Date _____
(last name first)

Mailing address _____

City _____ State A _____ -2 Zip code _____ Telephone number (____) _____
Area code Number

Date available _____ If not U.S. citizen, list visa _____

TYPE OF POSITION DESIRED

Specialty Codes (see list below) Interested in Specific interest Seeking Will accept employment in

Choose as many as three that best describe your expertise in order of importance.

1. _____ 2. _____ 3. _____

Academic Administrative Full-time U.S. only
 Government Exploration/Production Part-time U.S. with foreign assignments
 Industry Field Summer Either
 Any Research
 Teaching

A _____ -3

EXPERIENCE

Present specialty (see Specialty Code list) _____ Years of experience in this specialty _____

Present employer _____ May he be contacted? Yes No

If you do not wish to be listed for employment with a specific organization, check here and list organization on an attached sheet.

Give number of years experience for any of the following that are applicable:

Administrative _____ Exploration/Production _____ Field _____ Research _____ Teaching _____ Total professional experience _____

Foreign languages _____ Spoken (fluency) _____ Written _____

ACADEMIC TRAINING

College or University	Degree (rec'd or expected)	Year	Major	Minor

Postgraduate work in (field) _____ Number of years _____

SPECIALTY CODES

Select those that best describe your ability. Use codes in bold face only when other breakdowns are inadequate.

100. Economic Geology	221. organic	330. Library	454. paleobotany	622. photogrammetry
101. coal geology	222. inorganic	350. Mathematical Geology	455. paleoecology	630. Science Editing
102. energy resources	223. stable isotopes	351. computer science	500. Petroleum Geology	650. Sedimentology
103. metallic deposits	224. unstable isotopes	352. statistical geology	501. exploration	700. Seismology
104. nonmetallic deposits	250. Geomorphology	400. Mineralogy	502. subsurface stratigraphy	720. Stratigraphy
105. ore microscopy	251. Pleistocene geology	401. crystallography	503. structural geology	721. Cenozoic
120. Engineering Geology	300. Geophysics	410. Museum (curator)	520. Petrology	722. Mesozoic
121. hard rock	301. exploration	420. Oceanography	521. igneous	723. Paleozoic
122. soft rock	302. paleomagnetism	421. marine geology	522. metamorphic	724. Precambrian
150. Environmental Geology	303. theoretical	422. coastal geology	523. sedimentary	750. Structural Geology
151. public education and communication	320. Hydrogeology	450. Paleontology	550. Planetology	751. tectonics
200. General Geology	321. hydrochemistry	451. invertebrate	600. Regional Geology	752. tectonophysics
220. Geochemistry	322. ground water	452. vertebrate	620. Remote Sensing	800. Volcanology
	323. surface water	453. micropaleontology	621. photogeology	

Resumé must be attached. Only one page typewritten on one side will be accepted for reproduction to employers. Include concise detail of work experience and college majors and minors on degrees.

Fee—\$15.00. Payment must accompany form. Make check payable to the Geological Society of America.

I agree to release GSA or their representatives from responsibility for errors that may occur in processing or distributing this data. I understand that GSA makes no guarantee of contact by an employer in this service. I agree to notify GSA Employment Service immediately of (1) change of address, (2) acceptance of a position.

Signature (required) _____

This application will be active for 1 year.

SEE REVERSE FOR APPLICANT'S FORM.



**THE
GEOLOGICAL SOCIETY
OF AMERICA**

3300 Penrose Place • Boulder, Colorado 80301

EMPLOYER'S REQUEST FOR EARTH SCIENCE APPLICANTS

(Please type or print legibly with Black Ink)

R _____ -1

Name _____ Date _____

Organization _____

Mailing address _____

R _____ -2

City _____ State _____ Zip code _____ Telephone number (____) _____ Area code _____ Number _____

SPECIALTY CODES (see list below)

List the specialty code numbers that best define the requirements of this position.

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____

SPECIALTY CODES

100. Economic Geology	221. organic	330. Library	454. paleobotany	622. photogrammetry
101. coal geology	222. inorganic	350. Mathematical Geology	455. paleoecology	630. Science Editing
102. energy resources	223. stable isotopes	351. computer science	500. Petroleum Geology	650. Sedimentology
103. metallic deposits	224. unstable isotopes	352. statistical geology	501. exploration	700. Seismology
104. nonmetallic deposits	250. Geomorphology	400. Mineralogy	502. subsurface stratigraphy	720. Stratigraphy
105. ore microscopy	251. Pleistocene geology	401. crystallography	503. structural geology	721. Cenozoic
120. Engineering Geology	300. Geophysics	410. Museum (curator)	520. Petrology	722. Mesozoic
121. hard rock	301. exploration	420. Oceanography	521. igneous	723. Paleozoic
122. soft rock	302. paleomagnetism	421. marine geology	522. metamorphic	724. Precambrian
150. Environmental Geology	303. theoretical	422. coastal geology	523. sedimentary	750. Structural Geology
151. public education and communication	320. Hydrogeology	450. Paleontology	550. Planetology	751. tectonics
200. General Geology	321. hydrochemistry	451. invertebrate	600. Regional Geology	752. tectonophysics
220. Geochemistry	322. ground water	452. vertebrate	620. Remote Sensing	800. Volcanology
	323. surface water	453. micropaleontology	621. photogeology	

Type of organization

- Academic
 Government
 Industry
 Other _____

Minimum degree required

- None
 B.A. or B.S.
 M.A. or M.S.
 Ph.D.

Minimum professional experience

- None
 1-5 yrs
 6-10 yrs

Experience desired (yrs)

	None	1-5	Over 5
Administrative	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Exploration/Production	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Field	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Research	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Teaching	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Amount for printout listing
 \$45 for two specialty listings \$ _____
 \$12 for each additional listing \$ _____
 \$125 for entire applicant file \$ _____

1. I agree to use this service for valid recruiting purposes.
 2. I agree that no placement charges will be assessed to any applicant participating in the GSA Employment Matching Service.

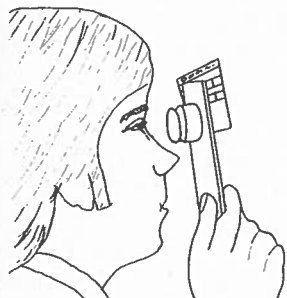
Total fee enclosed \$ _____
 or invoice requested \$ _____

Signature (required) _____

How to select a microfiche reader

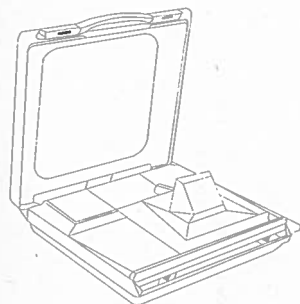
The first issue of the new-format GSA *Bulletin* has been published, and many GSA Fellows and Members have received, or soon will receive, a copy of *Part II* of the January 1979 issue of the *Bulletin*.

Part II of the *Bulletin*, which contains the complete articles of reports summarized in *Part I*, is on microfiche. Because many individuals have inquired about the type, availability, and cost of microfiche readers, the following general information has been compiled to assist in determining and locating the reader that will best serve individual need.



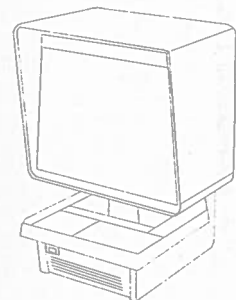
HAND-HELD READERS

Hand-held readers are designed to allow quick access to information at the office, in the field, or on an airplane. One will conveniently fit into a pocket or purse for use wherever needed. Hand-held readers combine top-quality optics in a compact, portable, and rugged design. The large eyepiece permits comfortable viewing without eyestrain. The graduated-dial focus control adjusts for clear, sharp, generally distortion-free images. Hand-held readers are operated from ambient light or from artificial light powered by batteries or a 110-volt adapter. Hand-held readers measure about 15 x 5 x 3 cm and range in price from \$15 to \$90.



PORTABLE READERS

Portable readers provide a mobile medium for reference to microfiche while traveling, on the job site, or in the office. These light-weight, compact, sturdy units are designed for easy transport between location. Most portable readers fold into a case similar in size to a briefcase. Optional features include interchangeable lenses for different magnifications, and wall projection capabilities for group presentations. Portable readers are designed for 110-volt, battery pack, or 12-volt operation. Portable readers are about 35 x 40 x 10 cm and range in price from \$150 to \$260.



DESK READERS

Desk readers are generally larger and more durable than portable readers. They have a greater image viewing area, a wider choice of operational features, and will accept different types of microform formats. Lamp intensity variability for maximum eye comfort, built-in voltage converter, and variable screen angle are a few of the optional features available on desk readers. Average dimensions for desk readers are 53 x 40 x 32 cm and range from \$130 to \$500.

Additional information and advertising brochures on the above described readers and on reader-printers, generally used by libraries and corporations, may be obtained by contacting any of the representative manufacturers, distributors, and information organizations listed below:

Bell & Howell
Business Equipment Group
6800 McCormick Road
Chicago, IL 60645

Datagraphix, Inc.
P.O. Box 82449
San Diego, CA 92138

Eastman Kodak
343 State Street
Rochester, NY 14650

Kistlers Data Management
500 E. 41st Avenue
Denver, CO 80216

3M Microfilm Systems
3M Center
St. Paul, MN 55101

Minolta Corporation
101 Williams Drive
Ramsey, NJ 07446

NCR Corporation
9095 Washington Church Road
Miamisburg, OH 45342

National Micrographics Assoc.
8728 Coleville Road
Silver Spring, MD 20910

Realist Inc.
N93 W16288 Megal Drive
Menomonee Falls, WI 53051

Taylor-Merchant Corporation
25 W. 45th Street
New York, NY 10036

University Microfilms International
300 N. Zeeb Road
Ann Arbor, MI 48106

Washington Scientific Industries, Inc.
Micrographics Division
Long Lake, MN 55356

ROCKY MOUNTAIN SECTION, GSA, May 24-25, 1979

The Rocky Mountain Section will hold its 32nd Annual Meeting at Colorado State University, Fort Collins, Colorado. The meeting is sponsored by the Department of Earth Resources.

Student registrants must present proper identification. Official registration badges will be required for admission to meeting activities.

and afternoons in the A wing, Andrew G. Clark Building.

Symposia. Two special symposia are scheduled.

1. U.S. Geological Survey Centennial (W. R. Hansen)
2. Fluvial Sediments: Transport and Deposition (S. A. Schumm and F. G. Ethridge)

campus housing unit. Registration during the meeting will be from 0800 to 1600 hours in the Main Floor Lobby of the A wing of the Andrew G. Clark Building. Preregistrants may pick up badges, banquet and luncheon tickets, field trip tickets, and on-campus housing assignments at the registration tables.

Preregistration Fee Refund Policy.

Requests for preregistration refunds will be honored in full up to May 10, 1979. After May 10, 25% of the total will be deducted from all refunds. An exception to this rule is made for refunds for over-subscribed field trips, which will be made in the full amount regardless of the date.

TECHNICAL PROGRAM

General Program. Technical sessions in the various disciplinary areas will be scheduled on Thursday and Friday mornings

REGISTRATION

Early registration will be conducted from 1500 to 2000 hours, Wednesday, May 23, in Parmalee Hall, the on-

PREREGISTRATION FORM

**32nd Annual Meeting of the Rocky Mountain Section
Geological Society of America
May 24-25, 1979**

PREREGISTER BEFORE MAY 1, 1979

Name _____

Street _____

City, State, Zip _____

Affiliation (for badge) _____

GSA Member: yes no Speaker: yes no

REGISTRATION FEES

	Before May 1	After May 1	
Professional	\$20.00	\$25.00	\$ _____
Student with ID	7.00	9.00	_____
Spouse or guest	3.00	5.00	_____
Buffet banquet	8.50	8.50	_____
Annual meeting luncheon	4.00	4.00	_____
Field trip 1	24.00	24.00	_____
Field trip 2	34.00	34.00	_____
Field trip 3	17.00	17.00	_____
Field trip 4	22.00	22.00	_____
		TOTAL	\$ _____

Make check payable to **Colorado State University** and send before May 1 to:
Office of Conferences and Institutes
Colorado State University
Fort Collins, CO 80523

FIELD TRIPS

All field trips are postmeeting one- or two-day trips. Trip fees include transportation, lunches (on one or both days), and guidebooks (containing all trips). All two-day trips will return to Fort Collins at the end of the first day. Participants using on-campus housing may extend their stay using the housing form. All field trip participants must preregister.

1. Sedimentology and stratigraphy of selected Paleozoic and Mesozoic sequences: Northwest Denver Basin. Field trip includes stops in the Fountain, Ingleside, Satanka, Lyons, Morrison, Lower Dakota, and Laramie-Fox Hills Formations; May 26 and 27. Field trip leaders: Art Berman, Timothy Jackson, Russ Shepard, Rebecca Summer, and William Wescott. Limit: 35 registrants; fee: \$24.00.

2. Precambrian structural relations, metamorphic grade, and intrusive rocks: Big Thompson Canyon, Poudre Canyon, and Virginia Dale areas; May 26 and 27. Field trip leader: William A. Braddock. Limit: 40 registrants; fee: \$34.00.

3. Stratigraphy and soil development in Pleistocene tills of the St. Vrain drainage basin, east slope Front Range; May 26. Field trip leaders: Richard F. Madole and Ralph R. Shroba. Limit: 37 registrants; fee: \$17.00.

PREREGISTRATION DEADLINE, May 1, 1979

4. State line kimberlites; May 26. Field trip leaders: M. E. McCallum and David H. Eggler. Limit: 40 registrants; fee: \$22.00.

SPECIAL EVENTS

Welcoming Party. There will be a welcoming party from 1900 to 2100 hours, Wednesday, May 23. The location will be available at the registration desk. Free beer and soft drinks will be provided. Mixed drinks will be available on a cash basis. Registration badges will be required.

Buffet Banquet. A buffet banquet will be held in Lory Student Center, Thursday evening, May 24. The banquet will begin at 1900 hours. The price is \$8.50.

Luncheon and Annual Section Business Meeting. The luncheon and business meeting will be held in Lory Student Center, Friday, May 25, at 1200 hours. Please purchase luncheon tickets at the time of registration. The luncheon cost is \$4.00.

Spouse/Guest Program. A variety of local tours will be available on May 24 and 25. Information will be available at the registration desk.

GENERAL TRAVEL INFORMATION

Fort Collins is approximately 65 miles north of Denver. Travel time by car from Denver's Stapleton International Airport is about 90 minutes via Interstate 25. Rental car agencies are located at the airport. Continental Trailways buses leave the airport for Fort Collins via the Denver bus terminal at 1000, 1200, 1500, 1630, and 2000 hours daily. The fare is \$6.05 one way. Travel time by bus is approximately three hours.

Direct shuttle service is available from the airport to the Colorado State University campus by Front Range Airport Limousine Services. The service operates on a daily basis at 0930, 1105, 1300, 1430, 1630, 1930, and 2200 hours. The fare is \$10.00 one way. Reservations are required 24 hours in advance and may be made by calling (303) 568-7555 or by writing to Front Range Airport Limousine

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Additional Information may be obtained from

Robert B. Johnson
RMGSA Local Committee Chairman
Department of Earth Resources
Colorado State University
Fort Collins, CO 80523
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ACCOMMODATIONS

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NEW FELLOWS, MEMBERS, AND STUDENTS

New Members. The following 179 persons have been elected to Membership by Council action during the period from May 1, 1978, through September 30, 1978.

Paul D. Anderson	David R. DeMayo	David C. Jones	Theodore V. Petranoff
Joe A. Andrews	Anderson M. Donan	D. Andrew Kemmer	Sam E. Phifer
Rebecca A. Argo	Michael F. Donnelly	Jacqueline S. Kemper	Donald P. Pickei
Arthur J. Armstrong	Albert M. Dowden	Gretchen R. Kent	Sam M. Pickering, Jr.
James W. Ashley	John E. Dreier	John N. Keys	Frances W. Pierce
	John M. Duhon	Robert A. Kirkner	Robert S. Powell
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John A. Barron	Julius P. Edge		George O. Reid
Hans G. Barszczus	Jonathon E. Ericson	Bernard Labesse	Wendel Reiser
Janet M. Bauder	Mary Jane Erikson	Jonathan S. Linker	Dereck Rhodes
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R. Michael Beathard	Melville C. Erskine, Jr.	Harlan G. Low	Oliver J. Roman
Harold R. Beaver			Mark R. Rowland
Terry E. Belunes	Randall H. Ferguson	W. T. MacFarlane	Michael D. Russ
John W. Bender	Rollin Fessenden	B. Edward Margason	Joao S. Santos
David T. Berry	Ken W. Fishel	Gerald B. Margeson	Donald G. Satterwhite
Paul A. Bilzi	Hugh M. French	Ann S. Markel	Barry A. Schatz
Herbert T. Black	Charles R. Frey	Louie B. Martinez	Marie I. Schauer
Horst Bloch	Darryl S. Futrell	Enrique Martinez-Garcia	Wolfgang Schlager
Prentis L. Boatner III		Glenn M. Mason	Jean F. Schneider
William R. Bolton	Richard I. Gibson	Robert E. Matson	Bruce W. Selk
Ernest H. Boswell	Carolyn J. Gimbrone	Douglas D. McGinnis	Muhammad N. Shafiqullah
Joan E. Brasaemle	Kenneth J. Ginnard	Eugene S. McNamara	Joseph W. Sheahan
Marc A. Brennen	Frances F. Glaze	Nancy C. Meade	Steven Slaff
Nancy D. Briggs	Michael V. Glaze	Karen R. Michael	Theodore C. Smith
Erland J. Brock	Bruce L. Golden	John C. Miller	James E. Smitherman III
H. Gassaway Brown III	Wendy J. Goldschmidt	Jean V. Molleskog	Norma W. Stemler
Thomas M. Bruns	Thomas C. Greimel	Dwight M. Moore	Thomas R. Stephenson
Lewis V. Buttron			Norman F. Sweeney
	Keith D. Halloran	T. N. Narasimhan	William J. Tafuri
Roger Q. Callaway	Martin W. Halzel	Mary A. Niccoli	Marsha W. Taylor
Charles H. Cameron	Penelope M. Hanshaw	Carol A. Nieuwenhuis	Michael A. Tolley
John R. Carmony	Lindley S. Hanson	Thaddeus A. Nowak	Linda M. Topp
John A. Carter	Bruce W. Hassinger	Walter E. Nunan	
John J. Casey	Ward L. Hawkins	Sebastian J. Nuzzo	Washington I. Van der Poel III
Linda J. Chermak	Peter Heitzmann		James P. Viard
Jeffry F. Chestnut	Donna S. Hill	Jane P. Ohl	Daniel R. Viste
William J. Christiansen	Margaret G. Hopper	Lewis M. O'Neal	
Betty A. Clark	Robert A. Horner	Gale Organist	William E. Weaver
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Daniel N. Clayton	Dennis K. Hubbard		Karin L. Willoughby
Linda A. Clemens	Keith F. Huff	Harvey W. Parker	Howard M. Winkelbauer
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	Anthony T. Iannacchione	Carl A. Pearson	Ellen L. Ziegler
Noel L. Daniel		Fred L. Peirce	
Mark L. DeJarnette	Louis L. Jacobs		

New Fellows. The following candidates were elected to Fellowship by Council action at the November 1978 Council meeting:

Theodore J. Armbrustmacher	W. Brian Harland	Nicholas Rast
W. Robert A. Baragar	Hugh Hay-Roe	N. A. Rupke
John D. Bredehoeft	Pierre Lasalle	Sigmund D. Schwarz
Tor L. Brekke	Donald H. MacDonald	John S. Scott
Tomas Feininger	Louis J. Maher, Jr.	William R. Seager
Lewis B. Gustafson	John R. Rand	Jean Sougy

New Student Associates. Listed below are 188 Student Associates who have become affiliated with the Society during the period from May 1, 1978, through September 30, 1978.

Mark J. Alpert	Robert E. Fisher	Yehuda Lilo	Richard W. Robinson
Robert J. Altamura	Gary R. Foote	Thomas E. Lion	Nanette E. Rogstad
Peter C. Anderson	Mark Fuhrmann	George H. Long	
Carl S. Backlund	Ralph M. Garza	Camille I. Mancuso	Alan R. Satterlee
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Dennis J. Bebel	Philip R. Grant	L. Mike McAtee	Barbara J. Sheinberg
Richard R. Belyea	Byron D. Gulick	William F. McCaffrey	John S. Snow
William C. Beyer	Alberto A. Gutierrez	Pressly H. McCance III	Janet G. Snyder
James V. Bikun		M. C. McCartney	Pamela J. Snyder
Michael P. Bingham	Perry L. Harding	John C. McDonald	Robert G. Strauss
Marilyn R. Blair	Robert L. Harrison	Anne M. Meltzer	Jurgen Strehlau
Michael S. Bonkowski	William K. Hart	Carl V. Mendelson	Hoyt B. Sutphin, Jr.
Adrienne T. Bonnet	Charles M. Hartfelder	Michael M. Mifkovic	Susan E. Tanges
Michael G. Boos	Jason B. Hartman	Randall C. Mills	Douglas W. Taylor
David J. Borns	Dion L. Heinz	Seta Z. Mishaikoff	Sandra Jo Terwilliger
Gloria J. Brangenberg	Michael D. Higgins	Richard B. Moore	Elizabeth E. Theilig
Dixie L. Brodie	Samuel L. Hilderbrand	Wilhelm C. Muller	Todd A. Thomas
James R. Broome	Kenneth G. Hilfiker		John F. Thompson
G. Van Ness Burbach	Lawson B. Hill	Rainer J. Newberry	Douglass R. Tietbohl
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Joseph A. Curiale		Patrick S. Penland	Glen T. Vadera
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Harvey A. Deutsch	Paula J. Kinnard	John J. Ponczynski	Anna-Elisabeth M. Wagner
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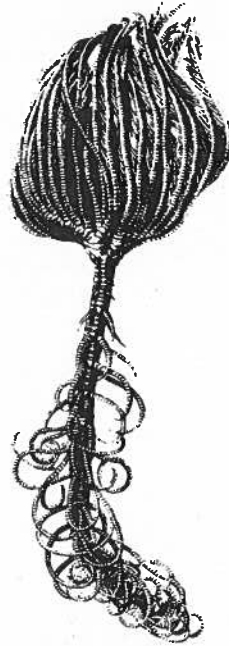
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Volume 3: pages T813-T1027, figures 549-619. Covers the systematics of post-Paleozoic crinoids including the subclass Articulata; references; index. Volume 3 purchased separately \$13

NOTE: PART T is offered as a set of three volumes for \$55 and each volume is offered separately: Volume 1, \$27; Volume 2, \$26; Volume 3, \$13.

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PENROSE CONFERENCES

May 15 deadline announced for applications for Penrose Conference on komatiites

A Penrose Conference on komatiites, sponsored by the Geological Society of America, will be held in northern Ontario, Canada, August 20–25, 1979. Conveners of the conference are N. T. Arndt, Department of Geological Sciences, University of Saskatchewan, Saskatoon, S7N 0W0; and Christopher Brooks, Département de Géologie, Université de Montréal, Montréal H3C 3J7.

Topics to be discussed during the conference include field, petrological, and geochemical characteristics of komatiites; regional variations; petrogenesis; associated mineral deposits; problems of definition and nomenclature.

A field trip to komatiite localities in the area will be included as part of the conference. Attendance will be limited to about 60 persons, and the fee will be about \$300. Application deadline is May 15, 1979. For information or if you are interested in attending this conference, please write to one of the conveners and explain your interest in the subject.

Penrose Conference on role of pore pressure on deformation in geologic processes scheduled

A Penrose Conference on the role of pore pressure on deformation in geologic processes is being sponsored by the Geological Society of America. The conveners of the symposium are T. N. Narasimhan, Earth Sciences Division, Lawrence Berkeley Laboratory, Berkeley, California; W. N. Houston, Department of Civil Engineering, University of California, Berkeley, California; and Amos Nur, Department of Geophysics, Stanford University, Stanford, California. The conference is tentatively sched-

uled for November 8–12, 1979, in San Diego, California. The conference will last for six days from Sunday (arrival and registration) to the following Friday (adjournment).

There exist many field problems in the field of Earth sciences that are significantly governed by the relationships between pore pressure and deformation. Comprehension of the physics of the phenomena involved is essential to a proper understanding of these problems. Research work on the study of these phenomena is being pursued simultaneously by workers in a variety of disciplines that includes hydrogeology, structural geology, geophysics, seismology, soil mechanics, soil physics, and petroleum engineering.

The purpose of the proposed conference is to bring together the latest developments in the understanding of the relationships between deformation and pore pressures. The emphasis of the conference will be on understanding the physics of the phenomena, which, hopefully, will provide a common denominator transcending disciplinary barriers. Tentative topics included in the sessions include mechanisms of pore-pressure generation; effective stress laws; stress-strain relations and material properties; failure criteria; induced seismicity; liquefaction; subsidence, fault movements, and earth fissures; hydraulic fracturing; response of aquifers to Earth tides; stability of natural slopes, and so on.

The registration fee will be between \$275 and \$300 per person including food and lodging. No field trips are proposed. Limited support is available to a few graduate students. Attendance will be limited to about 70 persons. Application deadline is July 1, 1979. Those desiring to attend the conference are requested to write to T. N. Narasimhan, Earth Sciences Division, Room 1012D, Building 90, Lawrence Berkeley Laboratory, Berkeley, California 94720.

MARCH BULLETIN

Summaries

At the request of members, the Summaries section may be ordered as one separate by those who have purchased the separates option.

• S90301—Role of the Melones fault zone in the structural chronology of the North Yuba River area, western Sierra Nevada, California: Summary.

S. E. Cebull, L. R. Russell, Department of Geosciences, Texas Tech University, Lubbock, Texas 79409 (present address, Russell: Shell Development Company, Bellaire Research Center, P.O. Box 431, Houston, Texas 77001).

• S90302—Deformation at various scales in the South Mountain anticlinorium of the central Appalachians: Summary.

Shankar Mitra, Department of Earth and Planetary Sciences, Johns Hopkins University, Baltimore, Maryland 21218 (present address: Department of Geological Sciences, Cleveland State University, Cleveland, Ohio 44115).

• S90303—Estimating densities in contoured orientation diagrams: Summary.

J. Ramsden, Atmospheric Sciences Division, Alberta Research Council, Edmonton, T6G 1K8 Alberta, Canada; D. M. Cruden, Departments of Civil Engineering and Geology, University of Alberta, Edmonton, T6G 2G7 Alberta, Canada.

• S90304—Geological Society of America Medals and Awards for 1978.

Penrose Medal to Robert M. Garrels. *Citation by L. L. Sloss. Response by Robert M. Garrels.*

Arthur L. Day Medal to Samuel Epstein. *Citation by G. J. Wasserburg. Response by Samuel Epstein.*

Kirk Bryan Award to Richard L. Hay. *Citation by William R. Farrand. Response by Richard L. Hay.*

continued on page 46 ...

O. E. Meinzer Award to R. William Nelson. *Citation by Eugene S. Simpson. Response by R. William Nelson.*

E. B. Burwell, Jr. Award to Nicholas R. Barton. *Citation by Richard W. Galster. Response by Nicholas R. Barton.*

Bulletin Briefs

Titles and abstracts of conventional articles in the March 1979 GSA Bulletin, Part I are provided on the following pages to aid members who have purchased the separate option to select Bulletin, Part I separates of their choice. See instructions for ordering on page 47.

- 90305—Post-industrial society, mineral resources and supplies, public policy, geology and geologists, and some central questions.

Peter T. Flawn, Department of Geological Sciences, The University of Texas at Austin, Austin, Texas 78712. (5 p.)

Address as Retiring President of the Geological Society of America, Toronto, Canada, October 1978

- 90306—Geochemistry of Mesozoic marginal basin floor igneous rocks from southern Chile.

Andrew D. Saunders, John Tarney, Department of Geological Sciences, University of Birmingham, Birmingham B15 2TT, England; Charles R. Stern, Ian W. D. Dalziel, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964. (22 p., 17 figs., 7 tbls.)

Extension behind a Late Jurassic continental margin volcanic arc in southern Chile caused rifting and the development of a narrow marginal basin floored by oceanic crust. Extension ceased and the basin was closed and uplifted in mid-Cretaceous time, so the basin floor is now exposed as the upper part of an autochthonous ophiolite complex composed of gabbros, sheeted dikes, and pillow lavas, with minor plagiogranite and associated siliceous dikes. Many of the rocks are altered. The metamorphic grade increases from zeolite or greenschist facies in the pillow lavas to amphibolite facies in the gabbros, but the maximum intensity of recrystallization occurs in the sheeted dike unit and is associated with loss of Rb and K and increasing K/Rb ratio, contrasting with the effects produced by low-temperature alteration of basalts by sea water. Metamorphic effects seem to be related to hydrothermal convective systems operating at the spreading axis at the time of basin formation.

Geochemically, the rocks have affinities with mid-oceanic ridge basalts, but K, Rb, and Ba contents and Ba/Sr and Ce/Yb ratios are higher and K/Rb ratios are lower in the least altered rocks than in mid-oceanic ridge basalts. Similar features are apparent in some other marginal basin basalts. Fractionation trends are tholeiitic, the mafic rocks displaying a wide range of Fe/Mg ratios (0.9 to 5.2) but without any concomitant silica enrichment. Rare-earth elements, TiO₂,

and Zr correlate positively and Cr and Ni negatively with Fe/Mg, while the gabbros have lower contents of some incompatible elements as a result of their cumulate nature.

The leucocratic rocks within the mafic complex have been derived from two distinct sources. Some trondhjemites and granophyres have compositions indicating derivation by refusion of continental material bordering the mafic complex. The plagiogranites, however, have a distinctive geochemistry, consistent with an origin by high-level differentiation of the mafic magmas. Such rocks, normally lying in or just below the sheeted dike unit, may be a common if minor component of oceanic crust.

- 90307—Progressive deformation and orogenic uplift at the southern extremity of the Andes.

Ian W. D. Dalziel, Keith F. Palmer, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964 (present address, Palmer: Box 7333, Boroko, Port Moresby, Papua New Guinea). (22 p., 14 figs.)

The Middle to Upper Jurassic and Lower Cretaceous silicic volcanic and sedimentary rocks of Isla de los Estados, Argentina, at the southern extremity of the Andean Cordillera, have been interpreted to lie on the rear (continental) side of an Early Cretaceous marginal basin. The basin floor was uplifted, together with the magmatic arc on its Pacific side, in mid-Cretaceous time. Uplift was accompanied by inhomogeneous deformation of the rocks of the magmatic arc, of the basin floor, and particularly of those on the continental side of the basin.

Detailed structural analysis shows that the rocks of Isla de los Estados are disposed in a major asymmetric, non-cylindrical syncline. The island, nearly 1,000 m high, lies in the core of this fold. A strong slaty cleavage developed prior to the large-scale folding. Both bedding and early slaty cleavage were reoriented by this folding. A new foliation axial planar to the large syncline is present only on the inverted limb in the more strongly compressed eastern area. Late, flat-lying cleavages are also most strongly developed in the east, but in the lower limb of the fold.

The structures are all interpreted to be the result of progressive deformation of the rocks during a single period of regional compression. The sequence of strains correlates closely with that deduced from theoretical and experimental studies of buckling. The early cleavage is thought to have developed during initial shortening of the layering of the rocks. Subsequent buckling of the thick multilayer of competent silicic volcanics produced the syncline. The late, flat-lying cleavages are considered to have resulted from gravitationally induced vertical shortening produced by the greatly increased overburden of the tectonically thickened rock pile.

The dominant northward vergence of the structures undoubtedly reflects the uplift of the Pacific margin of the continent, but the initial layer-parallel shortening indicates the operation of a stress system with maximum compressive principal stress subhorizontal and at right angles to the Pacific margin. The crustal thickening resulting from the horizontal shortening and the buckling seems to have played a major role in the mid-Cretaceous orogenic uplift of the southernmost part of the Andean Cordillera.

• 90308—Evolution of the São Paulo Plateau (southeastern Brazilian margin) and implications for the early history of the South Atlantic.

Naresh Kumar, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964 (present address: Atlantic Richfield Company, P.O. Box 2819, Dallas, Texas 75221); L.A.P. Gambôa, Lamont-Doherty Geological Observatory of Columbia University, Palisades, New York 10964, and Department of Geological Sciences, Columbia University, New York, New York 10027. (13 p., 7 figs.)

The São Paulo Plateau is a prominent marginal plateau in the southeastern Brazilian margin. Its surface displays a rough morphology either because of diapiric structures that have pierced and/or dome the overlying sediments or because of outcrops of igneous basement rocks. The plateau is bounded to the north and south by fracture zones and appears to be situated on oceanic crust created between Neocomian and Aptian time. At the end of Aptian, the segment of the initial spreading center that was bounded by the fracture zones that now form the northern and southern boundaries of the plateau shifted to the east. The newly created segment of the spreading center formed the eastern boundary of the plateau.

The stratigraphy of the plateau has been inferred through correlation of seismic-reflection profiles with the drilling data from Deep Sea Drilling Project site 356, located on the southeastern corner of the plateau. We have attempted a comparison of the sedimentary facies of the plateau with those of the Santos Basin, a shelf basin located adjacent to the plateau. A continuous evaporitic layer of Aptian age extends from the basin to the plateau. In Albian time, shallow-platform limestone was deposited in the basin, while open-marine limestone was deposited on the plateau. Coarse conglomerates were deposited in the basin during Turonian-Coniacian time, whereas distal turbidites were contemporaneously deposited on the plateau. A major transgression in Maestrichtian time trapped the terrigenous sediments within the Santos Basin and halted terrigenous sedimentation on the plateau. Cenozoic sediments in both areas are open marine. The sedimentary history of the Santos Basin and the São Paulo Plateau thus suggests that the two regions have been structurally continuous at least since Late Cretaceous time. The region occupied by the plateau has acted as a depocenter and has evolved as a marginal plateau since the termination of evaporitic deposition in the South Atlantic.

• 90309—Geochemistry of Brokeoff volcano, California.

John C. Fountain, Department of Geological Sciences, State University of New York at Buffalo, Amherst, New York 14226. (7 p., 4 figs., 3 tbls.)

Brokeoff volcano, a High Cascade stratovolcano located in Lassen Volcanic National Park, California, is composed primarily of andesite, with subordinate amounts of basalt, basaltic andesite, dacite, rhyodacite, and rhyolite. A geochemical study was undertaken to investigate the genetic relationship between members of the basalt-andesite-dacite-rhyolite magma series.

Both major-element and trace-element abundances vary regularly with the silica content of the lavas. Relatively small increases in K, Rb, and Ba abundances preclude derivation of most of the rhyodacites by fractional crystallization. A model is proposed for the generation of andesite by partial melting of a garnet peridotite and generation of rhyodacite by partial melting of a similar source at greater depths, followed by hornblende fractionation.

A small volume of dacites and rhyodacites have distinctly higher incompatible element abundances and were probably produced by fractional crystallization of the andesite. Andesites and dacites produced by flank eruptions are characterized by complex phenocryst assemblages and were most likely formed by mixing of andesite and rhyodacite magma. It is concluded that members of the basalt-andesite-dacite-rhyolite magma series are not related by a single process, but probably by several processes, even at a single volcanic center.

• 90310—The relationship between channel shape and sediment characteristics in the channel perimeter.

Theodore K. Miller, School of Public and Environmental Affairs, Indiana University, Bloomington, Indiana 47401; Lawrence J. Onesti, Department of Geography, Indiana University, Bloomington, Indiana 47401. (4 p., 2 figs., 2 tbls.)

The hypothesis that channel perimeter sediment characteristics exercise control over the shape (width-to-depth ratio) of alluvial channels is well established in the literature. Schumm's analyses of Great Plains streams constitute a particularly important set of evidence in this regard. A reanalysis of Schumm's data using multiple regression techniques suggests that channel perimeter sediment character-

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- 90311dr—Oligocene and Miocene metamorphism, folding, and low-angle faulting in northwestern Utah: Discussion and reply. (5 p.)

Discussion: *Max D. Crittenden, Jr., U.S. Geological Survey, Menlo Park, California 94025.*

Reply: *Robert R. Compton, Department of Geology, Stanford University, Stanford, California 94305; Victoria R. Todd, U.S. Geological Survey, Menlo Park, California 94025.*

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- 90312d—Specification of fabric shapes using an eigenvalue method: Discussion. (3 p., 1 fig.)

Discussion: *P. R. Cobbold, D. Gapais, Centre Armoricaïn d'Etude Structurale des Socles, Centre National de la Recherche Scientifique, Université de Rennes, Avenue du Général Leclerc, 35042 RENNES-Cedex, France.*

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- 90313dr—The Colorado Lineament: A Middle Precambrian wrench fault system: Discussion and reply. (4 p., 2 figs.)

Discussion: *Steven I. Dutch, Science and Environmental Change, University of Wisconsin—Green Bay, Green Bay, Wisconsin 54302.*

Reply: *Lawrence A. Warner, Department of Geological Sciences, University of Colorado, Boulder, Colorado 80309.*

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- 90314dr—Vertical tectonics in the middle Himalayas: An appraisal from recent gravity data: Discussion and reply. (3 p.)

Discussion: *Subimal Sinha Roy, Geologisk Institutt, Universitetet i Bergen, Avdaling A., Jach Frielesgt 1, 5014 Bergen, Norway (present address: 55/1 Brahma Samaj Road, P.O. Behala, Calcutta 700034, India).*

Reply: *M. N. Qureshy, Department of Science and Technology, Government of India, Technology Bhavan, New Mehrauli Road, New Delhi-110029, India.*

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- 90315dr—The extraordinary striated outcrop at Saqsaywamán, Peru: Discussion and reply. (1 p.)

Discussion: *James M. Schopf, Department of Geology, Ohio State University, Columbus, Ohio 43210.*

Reply: *Tomas Feininger, Departement de Geologie, Université Laval, Quebec, P. Q. G1K 7P4, Canada.*



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