



# GSA news & information

VOLUME 1, NUMBER 12

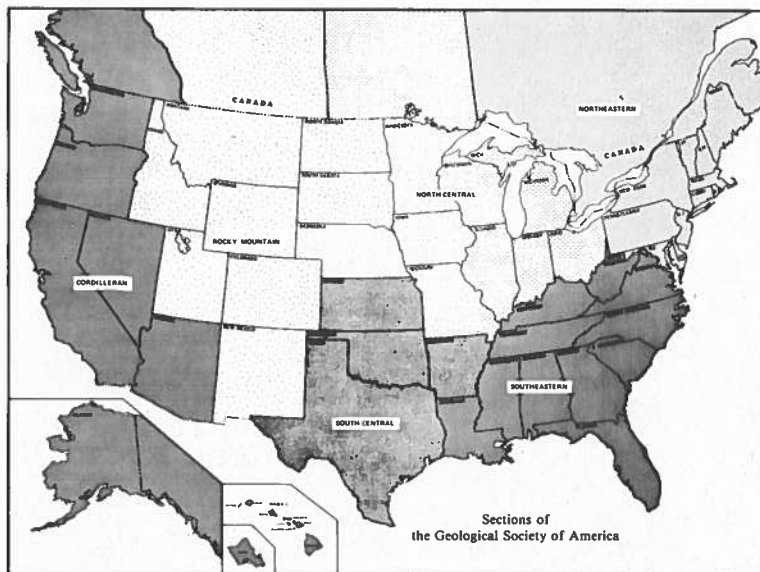
DECEMBER 1979

Each of the Society's six geographical sections identified at right will hold an annual meeting in the spring of 1980.

Although deadlines for abstracts for these meetings have now passed for all except the Rocky Mountain Section (that deadline is December 21), the information below should prove useful as communications continue in preparation for these section meetings.

Preregistration announcements and forms are included in this issue for the Northeastern, Cordilleran, and Southeastern Sections. The announcements and forms for the South-Central and North-Central Sections will be included in the January issue, and for the Rocky Mountain Section in the February issue.

Those who live outside the conterminous United States may receive copies of the 1980 *Abstracts with Programs* for the section meetings too late to take advantage of the



preregistration and housing forms. Therefore, those who are planning to attend any of the section meetings are urged to write to the local

committee officers listed below for copies of the preregistration forms, housing applications, and field trip information.

## GSA SECTION MEETINGS FOR 1980

### South-Central

Wichita, Kansas  
March 3-4, 1980  
Program Committee Chairman,  
David E. Smith  
Department of Geology and Geography  
Wichita State University  
Wichita, KS 67208  
(316) 689-3140

### Southeastern

Birmingham Hyatt House  
Birmingham, Alabama  
March 27-28, 1980  
Program Committee Chairman,  
Michael J. Neilson  
Department of Earth Science  
University of Alabama, Birmingham, AL 35924  
(205) 934-2243

### Northeastern

Benjamin Franklin Hotel  
Philadelphia, Pennsylvania  
March 13-15, 1980  
Program Committee Chairman,  
Lucian B. Platt  
Department of Geology, Bryn Mawr College  
Bryn Mawr, PA 19010  
(215) 525-1000, ext. 353

### North-Central

Indiana University, Bloomington, Indiana  
April 10-11, 1980  
Program Committee Chairman,  
Donald E. Hattin  
Department of Geology  
Indiana University  
Bloomington, IN 47401  
(812) 337-8232

### Cordilleran

Oregon State University, Corvallis, Oregon  
March 19-21, 1980  
Program Committee Chairman,  
E. J. Dasch  
Department of Geology  
Oregon State University  
Corvallis, OR 97331  
(503) 754-2484

### Rocky Mountain

Weber State College, Ogden, Utah  
May 16-17, 1980  
Program Committee Chairman,  
Richard W. Moyle  
Department of Geology and Geography  
Weber State College  
Ogden, UT 84408  
(801) 626-6942

# UPDATE

## Articles in *Bulletin, Part II*, December 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 are available at cost (\$6/month) as a special service to those users (members and nonmember subscribers) who request them. Any such order should be addressed to the Publication Sales Department and be accompanied by advance payment, and no discount can be offered for multiple orders or orders for a sequence of months.

1. Mineral chemistry of some Franciscan blueschist facies metasedimentary rocks from the Diablo Range, California, by Diane E. Moore and J. G. Liou. Doc. no. M91201. (On microfiche: 45 p., 10 figs., 7 tables)
2. Paleoenvironments of the Cuyahoga and Logan Formations (Mississippian) of central Ohio, by Kennard B. Bork and Robert J. Malcuit. Doc. no. M91202. (On microfiche: 57 p., 19 figs., 2 tables)
3. A study of stream braiding, by Le Ba Hong and T.R.H. Davies. Doc. no. M91203. (On microfiche: 21 p., 8 figs., 1 table)

## In December *Geology*

(separates not available)

1. Thin-skinned tectonics in the crystalline southern Appalachians; COCORP seismic-reflection profiling of the Blue Ridge and Piedmont, by F. A. Cook, D. S. Albaugh, L. D. Brown, S. Kaufman, J. E. Oliver, and R. D. Hatcher, Jr.
2. Sequential development of the Appalachian orogen above a master decollement—A hypothesis, by L. D. Harris and K. C. Bayer.
3. Paleogene anatexis along the Gulf of Alaska margin, by T. Hudson, G. Plafker, and Z. E. Peterman.
4. Magnetostratigraphic polarity units—A supplementary chapter of the ISSC *International Stratigraphic Guide*, by IUGS International Subcommittee on Stratigraphic Classification and IUGS/IAGA Subcommittee on a Magnetic Polarity Time Scale.
5. Possible relationships between changes in global ice volume, geomagnetic excursions, and the eccentricity of the Earth's orbit, by M. R. Rampino.
6. Geomagnetic record in Minnesota lake sediments—Absence of the Gothenburg and Eriau excursions, by S. K. Banerjee, S. P. Lund, and S. Levi.
7. Glacial erosion and ice sheet divides, northeastern Laurentide Ice Sheet, on the basis of the distribution of limestone erratics, by J. T. Andrews and G. H. Miller.
8. Cut-offs at an abyssal meander south of Iceland, by P. Lonsdale and C. D. Hollister.
9. Shoreline erosion rates along the middle Atlantic coast of the United States, by R. Dolan, B. Hayden, C. Rea, and J. Heywood.

## • NOTICE •

February 1, 1980, has been set as the deadline for receipt at headquarters of nominations for the Penrose Medal, Day Medal, Honorary Fellowship, and National Medal of Science.

To ensure thorough consideration by the particular subcommittee, please back up each suggested nomination with a brief biographical sketch, a summary of the nominee's chief contributions to geology, and a selected bibliography (maximum of 20).

In choosing nominees, their scientific achievements, rather than their contributions in administration and service, should be considered. Nominations received at headquarters will be forwarded to the appropriate subcommittee chairmen.

## Necrology

Notice has been received of the following deaths: Charles Laurence Baker, East Lansing, Michigan; Harley Barnes, Denver, Colorado; Wilmot H. Bradley, Milbridge, Maine; Leland Don Halvorsen, Kailua-Kona, Hawaii; Thomas Cleon Hiestand, Aurora, Colorado; John W. Huddle, Washington, D.C.; E. R. Larson, Virginia City, Nevada; James A. Miller, Baytown, Texas; George P. Woollard, Honolulu, Hawaii.

## Travel Grant Program for Geochemists

The U.S. National Committee for Geochemistry is seeking funding for its Travel Grant Program to the 26th International Geological Congress (IGC) to be held in Paris, July 7–17, 1980. The Committee seeks to ensure appropriate U.S. participation by providing for approximately 30 partial travel grants to enable geochemists residing in the United States to attend the IGC and the General Assembly of the International Association of Geochemistry and Cosmochemistry (IAGC), to be held in conjunction with the Congress.

Travel Grants are to be awarded based in part on the Screening Committee's ranking of geochemistry papers submitted for the 26th IGC. Younger geochemists are encouraged to apply. The Awards Committee plans special consideration for those judged to benefit most by attendance at the IGC and IAGC General Assembly.

Travel Grant application blanks are available from W. L. Petrie, USNC/G, NAS-NRC, 2101 Constitution Ave., Washington, D.C. 20418. Completed applications, including abstracts and copies of papers to be presented, must be received by January 9, 1980.

## GSA News & Information

Vol. 1, no. 12

December 1979

GSA NEWS & INFORMATION (ISSN 0164-5854) is the monthly newsletter of The Geological Society of America, Inc., P.O. Box 9140, Boulder, Colorado 80301. Second-class postage rates paid at Boulder, Colorado, and at additional mailing office.

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

# PENROSE CONFERENCE GUIDELINES

## PURPOSE

The Penrose Conferences were established by the Geological Society of America in 1969 as an important effort in its promotion of the Earth sciences. The conferences provide the opportunity for exchange of current information and exciting ideas pertaining to the science of geology and related fields. They are intended to stimulate and enhance individual and collaborative research and to accelerate the advance of the science by the interactions and development of new ideas. The conferences consist of a critical mass of active scientists from the Society, the national and international science communities, and students, sequestered in an attractive meeting place for several days of focused discussion. The participants do not seek simply to resolve technical controversies; their objectives are to provide stimulus and excitement for their field, to air new ideas and develop new associations, and to provoke new research on important questions.

## SUBJECT/TOPIC

Ideal subjects for conferences are those Earth science topics for which recent work suggests a potential for further significant advances in the near future. Each conference subject should be under current investigation and active discussion by a number of able researchers in the field and/or in the laboratory. Topics should be broad enough so that a range of specialists can discuss them from several points of view, but not so broad that a lack of communication can develop.

## CONVENERS

Conveners must have technical competence and be knowledgeable about current activities in the specialized fields that are to be represented at a conference. Responsibility for organizing a conference normally is shared by two or more conveners, each of whom can draw upon his or her own experience and expertise in developing a well-integrated, effective conference program that will foster communication and stimulate research progress among experts in diverse but related fields. At least one of the conveners must be a member of GSA.

## SIZE/TIME

It is essential that the conferences be informal. Groups should be small enough that personal discussion among all participants is encouraged, and large enough to provide diversity and depth. As an empirical rule, the maximum number for success is about 70. Normally, the minimum number required to convene a conference is 50.

Commonly, the length of a conference is five days, although exceptions may be made at the discretion of the Penrose Conference Committee. Participants are expected to attend the entire conference.

A period of approximately nine to twelve months between the date of approval by the Penrose Conference Committee and the date of the conference is normally required. In no case should there be less than six months from the time of conference announcement in *GSA News & Information* and *Geotimes* and the conference dates.

Care should be taken to avoid scheduling conferences at the same time as other scientific meetings, especially other GSA meetings. Conveners should check the calendar of events in *Geotimes* or call the Penrose Conference Coordinator to establish suitable dates.

## LOCATION

Essential qualities of a good site are that it be removed from the distraction of other meetings and other demands on the time and attention of the participants. The site should offer adequate meeting facilities and comfortable surroundings where participants can live, eat, work, and relax together. Climate, accessibility, meals, sleeping accommodations, recreational facilities, and economy should all be considered in selecting a site.

Although there are no restrictions about holding conferences anywhere in the world, logistics, costs, and other problems dictate caution in organizing conferences outside of North America. The Penrose Conference Committee is of the opinion that conferences held outside of North America may add an important dimension to the Penrose Conference program. However, such conferences are approved only if there are special circumstances that make a North American site much less appropriate. For a conference convened outside of North America, the cost of special liability insurance must be included in the conference budget.

Conveners may suggest specific sites or may indicate to the Coordinator which geographical area would be most suitable for a conference. Selection of the site is made by the Coordinator, in cooperation with the conveners, and with the approval of the Penrose Conference Committee.

## PARTICIPATION

Anyone interested in attending a specific conference is encouraged to contact the conveners of that conference. Conveners initially invite a few key speakers necessary to the organization and success of the conference. Aside from these invitations issued in the early planning stages of a conference, the conveners utilize indications

# Penrose Conference Guidelines

of interest from those actively working in the field to complete the list of conference participants. Participation is not restricted to members of the Geological Society of America. GSA members, however, will receive preference when there is a choice between equally qualified persons. The final decision on participation will be made by the conveners, whose decision shall not be subject to appeal. Acceptances for participation are not transferable.

Participation by graduate students is encouraged by providing incentives such as reduced registration fees. The cost of supporting graduate student participation is to be included in each conference budget.

In addition to *GSA News & Information* and *Geotimes*, all conferences are announced in other Earth science journals, newsletters, and so forth.

All participants are expected to live at the conference site. Spouses, families, and others who are not registered participants are requested not to visit the conference site, and are not allowed to participate in conference activities.

All must pay the full conference registration fee. Some exceptions may be made in the case of international guests when outside funding for them can be obtained. As noted above, participants are expected to attend the full conference.

## SPONSORSHIP

The Geological Society of America is the principal sponsor of the Penrose Conferences; however, the Society welcomes other societies, organizations, and institutions as co-sponsors. Conveners must identify sponsors in their proposals, and the Penrose Conference Committee reserves the right to approve co-sponsors at the time the proposals are being considered. Recognition is given to co-sponsors in the conference announcements, as well as during the conference.

## FINANCING

Each conference must be self-supporting with financial management provided solely by the Coordinator. Conveners are required to confer with the Coordinator, who develops a conference budget based on estimated costs. From this budget, a registration fee is established that covers all costs, such as food and lodging, local transportation, field trips, and miscellaneous conference expenses.

Administrative and other expenses incurred in support of the conferences are offset by a surcharge to be included in the registration fee.

At the conclusion of the conference, a financial report is prepared by the Coordinator for the conveners, the Penrose Conference Committee, and the GSA Council.

## INITIATION OF A PENROSE CONFERENCE PROPOSAL

Anyone interested in convening a Penrose Conference may submit a proposal; but at least one of the conveners must be a member of the Geological Society of America. Each proposal must contain the following:

1. A short expression of the subject, by title.
2. A short outline of the subject.
3. A short statement explaining how a conference on this subject will meet the objectives that have been established for the Penrose Conferences.
4. An initial list of suggested key speakers and their fields of interest.
5. A tentative outline of sessions.
6. A suggested geographic location.
7. A choice of dates and alternate dates (or at least a preference on the time of year).
8. Anticipated number of participants.
9. A description of any field trip that is a suggested part of the conference.
10. A statement on any international guests who might be considered and the source and amount of anticipated financial support for their participation.
11. A statement indicating the willingness of the conveners to abide by the Penrose Conference Guidelines and to cooperate with the Coordinator.
12. Biographic data on the conveners, including a list of publications and projects that qualify them for leading the proposed conference.
13. Identification of co-sponsors, if any, and their role in the conference.

Requests for information about Penrose Conferences in general should be sent to

Penrose Conference Coordinator  
The Geological Society of America  
3300 Penrose Place  
Boulder, CO 80301

Proposals for Penrose Conferences should be sent to

Executive Director  
The Geological Society of America  
3300 Penrose Place  
Boulder, CO 80301

The Penrose Conference Committee reviews the proposals as they are received. In acceptance of a proposal, the Penrose Conference Committee may offer advice, which in some cases may be a condition of acceptance. The committee chairman will address an advisory letter to the conveners calling attention to any matters that seem likely to pose a problem that must be resolved if the conference is to be successful. Proposals are then recommended for approval or rejection by the Society's

# Penrose Conference Guidelines

Executive Committee who reserves full authority for the final approval.

## PENROSE CONFERENCE COORDINATOR

The Society provides to conveners, and requires the use of, the services of a Penrose Conference Coordinator to assist in every area of non-program conference planning. The Coordinator assumes responsibility for negotiating arrangements with the conference facility concerning prices, space for meetings and sessions, food, recreation, lodging, transportation, scheduling projection facilities, and handling other administrative chores as they arise.

The Penrose Conference Coordinator is solely responsible for all financial matters relating to the conference and fieldtrip fees. The Coordinator or a qualified assistant provides on-site assistance during each conference and frees conveners so that they may concentrate on the technical and scientific aspects of the program.

Conveners who have had a proposal approved by the Penrose Conference Committee will receive from the Coordinator (for use as guides) sample letters and forms, as well as a check list that has been found useful by past conveners.

The Penrose Conference Committee requires periodic progress reports from the Coordinator regarding conference planning.

## PROGRAM

Care must be taken not to overstructure the program and to allow sufficient time for free discussion by all participants. It is important to note that all participants need not expect to make formal presentations. Contributions also can be presented in informal discussions or in poster sessions.

## CONFERENCE REPORTS AND PUBLICITY

The conveners assist the Coordinator in the preparation of the conference announcement that is published in appropriate scientific journals. As soon as the conference is over, the conveners are required to send a brief formal report to the Executive Director of the Society. The report should include an evaluation of the technical and logistical success of the conference based on the participants' comments and the conveners' experience, as well as suggestions for improvement of the Penrose Conference format as a whole.

Within three months, the conveners will prepare and

submit a news report for publication in *Geology*. This report will cover the most interesting scientific and technical aspects of the conference, and, wherever appropriate, include recommendations on research opportunities and priorities that were developed during the conference and may be of value to organizations responsible for supporting and coordinating research in the field covered by the conference.

The purpose of the report is to inform those not in attendance of the main trends of thought and discussion that prevailed at the conference. The report should not publish specific data or concepts for which individual participants expect to receive priority through publications authored by them in regular journals of their individual choice. In balancing the opposing needs to inform and to preserve priority, the conveners must perform this task with responsibility and delicacy.

Other similar reports on the conference may be prepared and submitted to other journals for publication, but only after the letter of acceptance to publish the initial report has been received from *Geology*.

As an incentive to free exchange of information and to encourage open and frank discussion, no formal scientific report may be derived from the conference. It is anticipated that symposia, at GSA meetings or elsewhere, may develop from some conferences. These should consist of a related series of formal papers, each reflecting the author's own ideas, rather than a synthesis of what was presented at a particular conference.

The Society hopes and expects that all participants will freely discuss with their colleagues the significant results of their participation. The intent is that the conferences shall promote generation of new concepts and nurture new research efforts in all phases of the Earth sciences.

## GUIDELINES

These guidelines, formulated by the Penrose Conference Committee and approved by the GSA Council, provide rules based on experience gained from past conferences; changes and improvements will be incorporated as experience dictates. Once approval has been given by the Society, the conveners are fully responsible for the conference in accordance with the guidelines, and their acceptance implies agreement to abide by them. In cases of flagrant violation of the guidelines, the Executive Director of the Society is empowered to take appropriate action, including postponement or cancellation of the conference.

# NORTHEASTERN SECTION, GSA, March 13-15, 1980 . . . . .

## PREREGISTRATION FORM

15th Annual Meeting of the Northeastern Section  
 Geological Society of America  
 March 13-15, 1980  
 Philadelphia, Pennsylvania

**PREREGISTRATION DEADLINE—February 13, 1980**

*Only One Registrant to a Form (except Spouse or Guest)*

NAME (last, first, middle) \_\_\_\_\_

ADDRESS \_\_\_\_\_

\_\_\_\_\_

AFFILIATION (for badge) \_\_\_\_\_

\_\_\_\_\_

SPOUSE OR GUEST \_\_\_\_\_

### REGISTRATION FEES (includes smoker and program)

	Before Feb. 13	After Feb. 13	No.	Amount
Professional	\$15.00	\$20.00	1	\$ _____
Student (ID required)	7.50	10.00	1	_____
Spouse or Guest	7.50	10.00	1	_____
Annual Luncheon and Business Meeting, March 14	3.00	3.00	_____	_____
Northeastern Section, Paleontological Society, March 13, Luncheon	9.00	9.00	_____	_____

Visit to Mineral Collection, Bryn Mawr  
 College, by bus *Are you interested?* Yes No

TOTAL (U.S. funds) \$ \_\_\_\_\_

Requests for registration refunds will be honored in full up to **February 27**;  
 after February 27, 25% of the total will be deducted from all refunds.

Make checks payable to **NEGSA 1980 Annual Meeting** and send to

Maria Luisa Crawford  
 Department of Geology  
 Bryn Mawr College  
 Bryn Mawr, Pennsylvania 19010

The 15th Annual Meeting of the Northeastern Section of the Geological Society of America will be held at the Benjamin Franklin Hotel, Philadelphia, Pennsylvania, on Thursday, Friday, and Saturday, March 13 to 15, 1980. Registration begins Wednesday, March 12, 1600 to 2100 hours. The Northeastern Section of the Paleontological Society and the Eastern Section of the Society of Economic Paleontologists and Mineralogists will meet concurrently. The meeting is sponsored by the Philadelphia Geological Society.

### TECHNICAL PROGRAM

**General Program.** Technical sessions will be scheduled on Thursday and Friday mornings and afternoons and on Saturday morning.

**Symposia.** Eight special symposia are scheduled. **Registration badges will be necessary to attend these and other sessions.**

(1) *Late Wisconsin Glaciation of New England* (Grahame Larson)

(2) *Engineering Geology Related to Underground Structures in the Northeast* (A. J. Depman and N. M. Ravneberg)

(3) *Geology and Geochemistry of Uranium, Honoring Alice M. Weeks* (David Grandstaff and Gene Ulmer)

(4) *History of Geology in the Northeast* (William M. Jordan)

(5) *Dynamics of Stratigraphic Accumulation* (Peter Goodwin and W. J. Anderson)

(6) *Coastal Processes in Northeastern United States and the Maritime Provinces* (J. E. Leonard and Evelyn Maurmeyer)

(7) *Offshore Geology* (C. E. Curtis and R. R. Hartman)

(8) *Ordovician Paleocommunities and Paleogeography of Eastern North America* (C. W. Stearn, for NE Section, Paleontological Society)

**Poster Sessions.** One or more poster sessions will be scheduled for papers where that mode of presentation seems most suitable.



# PREREGISTRATION DEADLINE, February 13, 1980

**Projection Equipment** will be available for 2" X 2" slides in carousels. A single projector and screen will be furnished at each session. Please bring your own loaded carousel tray, if possible. A screening room for checking slides will be available.

## SPECIAL EVENTS

**Paleontological Society Luncheon.** Following the Thursday morning symposium, the Northeastern Section of the Paleontological Society will have a luncheon and business meeting. Sign up on the pre-registration form.

**Smoker.** The usual informal smoker will be held on Thursday, March 13, from 2000 to 2300 hours. Free draft beer and soda will be provided; mixed drinks will be available on a cash basis. In response to requests, wine will also be available at a reasonable charge this year. **Registration badges must be worn.**

**GSA Section Lunch and Business Meeting.** These events will be held Friday, March 14, from 1200 to 1330 hours. Note that the cost of this is very low; it is subsidized by the Northeastern Section.

**Tour.** A bus trip to the Bryn Mawr Geology Department mineral collection, one of the best and most extensive in the world, is planned for Friday afternoon, leaving the Ben Franklin Hotel at 1400 hours. If you are interested in this tour, please check the appropriate box on the preregistration form. Bus tickets may be purchased at the meeting.

## GENERAL INFORMATION

**Exhibit Space** will be available in the Ben Franklin Hotel, adjacent to the registration area. Booths for educational institutions are \$60, for commercial enterprises \$120. Contact Earl A. Shapiro, Physics-Geology Department, Rutgers State University, Camden, NJ 08102, telephone (609) 757-6292.

**Science Theater.** A science theater is being arranged through the courtesy of the U.S. Geological Survey.

**Travel Information.** The Benjamin Franklin Hotel will contain the entire meeting. It is located at Chestnut and Ninth Streets, in downtown Philadelphia. The Schuylkill Expressway reaches city center from the west, and Interstate 95 reaches city center from north and south. The limousine from the airport stops at the Benjamin Franklin Hotel. If you come by rail, the 30th Street Station, on the main line from Washington to New York, has an entrance to the subway that goes to 8th and Chestnut, one block from the hotel.

**Accommodations.** The Ben Franklin is the headquarters hotel because it is the most reasonable in price that could hold this group. The hotel can house all of us if the reservation deadline is met. Rooms may be available later than February 13. The **preferred** rooms are slightly larger than the **standard** rooms. The **quadruple** occupancy suites include two adjacent rooms, each containing two twin beds, with a shared bath. Those who wish to share a room with more individuals than the rated occupancy are requested to pay the cot fee for each extra occupant.

## HOUSING FORM

**FOR USE ONLY WITH THE BENJAMIN FRANKLIN HOTEL**

Northeastern Section, Geological Society of America  
March 13-15, 1980, Philadelphia, Pennsylvania

NAME (last, first, middle) \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP \_\_\_\_\_

NAMES OF OTHER ROOM OCCUPANTS \_\_\_\_\_

## ACCOMMODATIONS

	<u>Standard</u>	<u>Preferred</u>
<input type="checkbox"/> Single Occupancy	\$27.00 per person per day	\$29.00 per person per day
<input type="checkbox"/> Double Occupancy	\$17.00 per person per day	\$18.00 per person per day
<input type="checkbox"/> Quadruple Occupancy	\$13.50 per person per day	

Cots available at \$8.00 per person per day. Number of cots needed \_\_\_\_\_

**ADD 6% TAX TO ALL RATES**

Children 18 years and younger in same room with parents at no charge.

ARRIVAL DATE \_\_\_\_\_ TIME (a.m.) \_\_\_\_\_ (p.m.) \_\_\_\_\_

DEPARTURE DATE \_\_\_\_\_ TIME (a.m.) \_\_\_\_\_ (p.m.) \_\_\_\_\_

CHECKOUT TIME IS 1 p.m.

**DO NOT PHONE IN RESERVATIONS  
TO THE BENJAMIN FRANKLIN HOTEL**

Mail to:

Benjamin Franklin Hotel  
Chestnut at Ninth Street  
Philadelphia, PA 19105

# SOUTHEASTERN SECTION, GSA, MARCH 27-28, 1980 . . . .

The Southeastern Section of the Geological Society of America will hold its 29th Annual Meeting at the Birmingham Hyatt House, Birmingham, Alabama, March 27 and 28, 1980. The meeting is hosted by the Department of Earth Science, Univer-

sity of Alabama in Birmingham, the Department of Geology and Geography, University of Alabama, Geological Survey of Alabama, and the Geology Department, Auburn University.

## PREREGISTRATION FORM

Southeastern Section of the Geological Society of America  
29th Annual Meeting  
March 27-28, 1980, Birmingham, Alabama

(for office use only)

ck/m.o. n. \_\_\_\_\_ \$ \_\_\_\_\_  
Personal check                      other check  
Issued by \_\_\_\_\_

Name: (last, first, middle) \_\_\_\_\_

Registered as:            Professional             Student             Spouse/Guest

Spouse/Guest name for badge \_\_\_\_\_

Affiliation: (Abbreviate for badge) \_\_\_\_\_

Professional Address: \_\_\_\_\_

City, State, Zip: \_\_\_\_\_

Phone: (Business) ( \_\_\_\_\_ )                      (home) ( \_\_\_\_\_ )

GSA Member:    yes \_\_\_\_\_ no \_\_\_\_\_                      Speaker:    yes \_\_\_\_\_ no \_\_\_\_\_

GSA Student Associate            yes \_\_\_\_\_ no \_\_\_\_\_

Enclosed is a check or money order (U.S. funds only) payable to:

The Geological Society of America, Southeastern Section, in the amount of \$ \_\_\_\_\_ for:

- \_\_\_\_\_ Preregistration (before March 10) at \$25 per person
- \_\_\_\_\_ Registration (after March 10) at \$30 per person
- \_\_\_\_\_ Student preregistration\* (before March 10) at \$12.50 per person
- \_\_\_\_\_ Student registration\* (after March 10) at \$15 per person
- \_\_\_\_\_ Guest/Spouse preregistration at \$13.50 per person
- \_\_\_\_\_ Guest/Spouse registration at \$16 per person
- \_\_\_\_\_ GSA banquet, Hyatt House, March 27, at \$13.50 per person

### ALL FIELD TRIP REGISTRANTS MUST ALSO PREREGISTER FOR THE GENERAL MEETING

- \_\_\_\_\_ **Field trip 1**, Sedimentary Environments of the Eutaw Formation in Eastern Mississippi and Alabama at \$90 per person
- \_\_\_\_\_ **Field trip 2**, Depositional Setting of the Mississippian Hartselle Sandstone and Lower Bangor Limestone in Northwest Alabama at \$90 per person
- \_\_\_\_\_ **Field trip 3**, Geology of the Pine Mountain Window and Adjacent Terraines of the Alabama and Georgia Piedmont Province at \$90 per person
- \_\_\_\_\_ **Field trip 4**, A New Pleistocene Vertebrate Fauna from Little Bear Cave, Colbert County, Alabama at \$35 per person

\*Valid ID will be required at on-site registration.

MAIL FOR DELIVERY BY MONDAY, MARCH 10, 1980, TO:

D. Joe Benson, Department of Geology and Geography  
University of Alabama, University, AL 35486

To register more than one person, please duplicate or request additional forms.

## REGISTRATION

Registration is required for all those attending the meeting, field trips, and spouses' program. Registration will be held in the Birmingham Hyatt House on March 26 from 1700 to 2130 hours and during the meeting.

**Preregistration forms must be received by March 10, 1980.**

Refunds on cancelled preregistrations will be made in full until March 10, 1980. After that date, no refunds will be made except for cancelled field trips.

## WELCOMING PARTY

A welcoming party for all those attending the meeting will be held from 2000 to 2200 hours on Wednesday, March 26, at the Birmingham Hyatt House.

## SYMPOSIA

- (1) *Stratigraphy, Sedimentology, and Paleogeology of Mississippian Rocks*; W. A. Thomas
- (2) *History of the Geological Sciences in the Antebellum South*; James X. Corgan
- (3) *Vertebrate Paleontology*; Judith A. Schiebout
- (4) *Special Registration for Geologists*; G. L. Stirewalt

## FIELD TRIPS

**Field trip registrants MUST ALSO preregister for the meeting.**

Field trip registration is on a first-come, first-served basis. If a trip is oversubscribed, the full registration fee will be refunded to late registrants. **Field trip preregistration must be received by March 10, 1980, accompanied by payment in full.** Trips may be cancelled owing to low numbers of registrants or for reasons beyond our control. Full refunds will be made under such circumstances. No other trip refunds will be made after March 10, 1980.

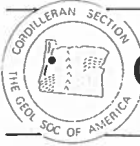
**1. Sedimentary Environments of the Eutaw Formation in Eastern Mississippi and Alabama** (March 29—leave 0800 hours; March 30—return 1700 hours). Leader: R. S. Taylor.

Lithofacies and biofacies changes in the Eutaw Formation from Columbus, Mississippi, to Phoenix City, Alabama, are identified through a study of lithologic, faunal and floral characteristics. Lateral and vertical changes in lithology, mineralogy, primary and secondary sedimentary features, trace fossils, macro fauna, micro fauna and flora are used in delineating Eutaw depositional systems. Limit 38; cost \$90.

**2. Depositional Setting of the Mississippian Hartselle Sandstone and Lower Bangor Limestone in Northwest Alabama.** Field trip will depart Birmingham 1830 hours, March 28,







# CORDILLERAN SECTION, GSA, March 19-21, 1980 . . .

The Cordilleran Section of the Geological Society of America will hold its 76th Annual Meeting with the 67th Annual Meeting of the Pacific Coast Section of the Paleontological Society on the campus of Oregon State University, Corvallis, Oregon, on March 19 to 21, 1980. Hosts for the meeting are the Department of Geology and the School of Oceanography, Oregon State University.

## REGISTRATION

Registration will be by preregistration and also in the main lobby of Nendel's Inn, 1550 NW 9th Street, Tuesday, March 18, from 1600 to 2100 hours, and in the lobby at the southeast corner of Wilkinson Hall during the meeting. Preregistration costs are \$20 for professionals, \$2 for GSA Student Associates, and \$5 for other students. On-site registration is \$30 for professionals and \$5 for all students. Preregistration materials may be picked up at Nendel's Inn on March 18 or at Wilkinson Hall during the meeting. All are urged to take advantage of the lower preregistration rates. **Preregister before March 1, 1980 (or February 15, if field trips are included).**

Refunds on cancelled preregistrations will be made until March 10, 1980, less a \$5 processing fee. After March 1, refunds will be made for registration and luncheons, but not for field trip fees, unless the trip is cancelled. After March 14, 1980, refunds will be made only for cancelled trips.

## WELCOMING PARTY

On Tuesday evening, March 18, a no-host cocktail party will be held at Nendel's Inn, 1550 NW 9th Street, Corvallis, from 1930 to 2300 hours.

**QUESTIONS OR PROBLEMS.** Contact Robert Yeats, Department of Geology, telephone (503) 754-2484, or George Keller, School of Oceanography, telephone (503) 754-2542, Local Chairmen, both at Oregon State University, Corvallis, OR 97331.

## SYMPOSIA (organizers in parentheses)

- (1) *Tectonics of Small Plates of the*

*Pacific* (Gordon Ness and Dale Bibee)

- (2) *Mineral Deposits of the Pacific Northwest* (Miles Silberman and C. W. Field)

- (3) *Estuarine and Coastal Processes of the Pacific Northwest* (Paul D. Komar)

- (4) *Forest Geomorphology of the Pacific Northwest* (Frederick J. Swanson)

- (5) *Cenozoic Volcanism of Central and Eastern Oregon* (Gordon Goles)

- (6) *Mesozoic Tectonics of the Pacific Northwest* (Darrel S. Cowan)

- (7) *History of Geology in the Pacific Northwest* (Ellen Drake)

- (8) *Permian Lithostratigraphy and Biostratigraphy of the Western U.S.* (H. Gilmour and Bruce Wardlaw)

- (9) *Recent Advances in Pacific Coast Cenozoic Biostratigraphy* (Warren Addicott and John Armentrout)

## GENERAL TRAVEL INFORMATION

Corvallis is serviced by airports at Eugene and Portland. The Eugene Airport is 40 miles from Corvallis; Risen's Limousine Service of Corvallis meets all flights. The Portland Airport is 85 miles from Corvallis. The CAP airport limousine to Corvallis leaves the Portland Airport daily at 0730 and 1830 hours. Greyhound bus service is available to Corvallis from Portland and Eugene. The closest Amtrak station is in Albany, 11 miles northeast of Corvallis. During the meeting, shuttle bus service between the Corvallis motels and Oregon State University will be provided.

## PROJECTION EQUIPMENT

Carousel projection equipment will be provided for standard 2" x 2" (35 mm) slides only (dual projectors by prior request only). Speakers should bring their own loaded carousel trays, if possible. Carousel trays and previewing facilities will be available.

## GSA ANNUAL LUNCHEON

All registrants are invited to the GSA luncheon to be held in the Memorial Union on the OSU campus. The meal will be served Thursday, March 20, at 1215 hours for a price of \$5 per person. Tickets must be purchased by 1200 hours, March 19.

## FIELD TRIPS

(Note: All field trip registrants **MUST ALSO** preregister for the meeting.)

Field trip registration is on a first-come, first-served basis. If a trip is oversubscribed, the full trip registration fee will be refunded to late registrants. All field trip registrants will receive a copy of the field trip guide book for all field trips. Field trip preregistration **must be received in Corvallis by February 15, 1980**, accompanied by payment in full. Trips may be cancelled owing to low numbers of registrants or for reasons beyond our control. Full refunds will be made under such circumstances. No other trip refunds will be made, unless the request is received on or before March 1. Unless otherwise notified, field trip registration should be considered confirmed. All trips will start at the parking lot behind the Oceanography Building between NW 27th Street and Arnold Way. Participants should have warm clothing, including hat and rain gear.

## Premeeting

1. **Volcanic and Volcaniclastic Geology, East Flank of Central Cascade Mountains to Deschutes River, Oregon** (March 17-18). Leader: E. M. Taylor, Early Pleistocene and Pliocene volcanic activity in the central High Cascade Range as recorded by ash-flow tuffs, lahars, and other volcaniclastic deposits. Includes two lunches and transportation (vans). Leave 0800 hours, March 17; return 1800 hours, March 18. Limit 25. \$38. Lodging in Bend not included, but rooms will be reserved when registration completed.

2. **Paleogene Stratigraphy and Structure along the Klamath Borderland, Oregon** (March 17-18). Leaders: Ewart M. Baldwin and Rauno Perttu. The Paleogene basin in southwestern Oregon is separated from the Klamath Mountains by the right-lateral Canyonville fault zone, along which there was approximately 40 km separation during the early Paleogene. Sedimentary facies in western Oregon, affected by both vertical and lateral movement along the Canyonville fault zone, will be examined. Includes two lunches, transportation (vans), and lodging (March 17, based on double occupancy). Leave 0800 hours, March 17; return 1800 hours, March 18. Limit 25. \$52.

3. **Tertiary Geology of the Central Part of the Oregon Coast Range** (March 17-18). Leaders: Parke D. Snively, Jr., Norman S. MacLeod, Weldon W. Rau, and Alan R. Niern. Lithostratigraphy, sedimentology, and biostratigraphy of middle Eocene to middle Miocene marine sedimentary rocks and the petrochemistry of early to middle Eocene pillow lavas, late Eocene alkaline basalt and camptonite, nepheline syenite intrusives, and middle Miocene basalt flows and breccias will be described. An overview of the tectonic and stratigraphic framework of the adjacent continental margin will be presented. Includes two lunches, transportation (bus), and lodging (March 17, based on double occu-

# PREREGISTRATION DEADLINE, March 1, 1980

pancy). Leave 0800 hours, March 17; return 1800 hours, March 18. Limit 41. \$58.

**4. Metamorphic Geology of the North Central Klamath Mountains, California** (March 16-18). Leaders: M. A. Kays and M. M. Donato. Examination of Paleozoic and Triassic metamorphic geology, including the occurrence of medium-grade schists and gneisses probably derived from oceanic crust, associated blueschists and greenschists, and metamorphosed intermediate, basic, and ultrabasic plutonic rocks. Includes two lunches, transportation (vans), and lodging (March 16 and 17, based on double occupancy). Leave 1300 hours, March 16; return 2000 hours., March 18. Limit 36. \$82.

**5. Late Eocene Paleogeology of Southwestern Washington** (March 18). Leaders: J. M. Armentrout, L. Nesbitt, K. McDougall, and P. T. Jefferis. A special Paleontological Society field trip to two of Washington State's best known and most productive macro- and micro-fossil localities: Big Bend of the Cowlitz River, Cowlitz Formation, and early late Eocene shelf deposit, and the Porter Bluff sequence, Lincoln Creek Formation, a late Eocene upper slope sequence. Includes lunch and transportation (vans). Leave from Portland 0730 hours; return to Portland 1900 hours; arrive in Corvallis 2100 hours. Limit 30. \$32.

#### During Meeting

**6. Mary's Peak: Structure of the Eastern Flank of the Oregon Coast Range** (March 20 or 21). Leaders: Robert D. Lawrence, Charles Rosenfeld, and Bill Ruddiman. Stratigraphy, structure, and geomorphology of the eastern flank of the Oregon Coast Range. Major feature is the Corvallis fault with perhaps 7,500

ft of vertical separation with late Eocene motion. Includes lunch and transportation (vans). Four and one-half-hour field trip. Time and day of departure and registration for trip to be posted at meeting. \$17.50.

#### Postmeeting

**7. Volcanic Geology of the Western Cascade Range, Upper Clackamas and North Santiam River Drainages, Oregon** (March 22-23). Leaders: James L. Anderson, Kathleen J. Manning, and Paul E. Hammond. Stratigraphy and structure of the Western Cascade, Columbia River Basalt, and High Cascade Groups, with emphasis on interrelationships of the three. Discussion will include volcanic facies, hypabyssal intrusions, alteration, late Cenozoic deformation, landslides, hot springs, and glaciation. Includes two lunches and transportation (bus). Leave 0730 hours, March 22, arrive 1830 hours at Salem; leave 0730 hours, March 23, and return 1830 hours to Corvallis. Limit 41. \$40. Lodging in Salem not included, but rooms will be reserved when registration completed.

**8. Beach Processes and Erosion Problems on the Oregon Coast** (March 22). Leaders: Paul D. Komar, John V. Byrne, and Herbert G. Schlicker. Several areas of sand spit and sea cliff erosion and coastal landslides will be visited. Pleistocene marine terraces composed of dune, beach, and shelf sands will be inspected. Beaches visited will range from fine sand through cobbles so that the processes of waves, currents, and sedimentation can be contrasted. Includes lunch and transportation (bus). Leave 0800 hours, return 1800 hours. Limit 41. \$23.

**9. Cenozoic Stratigraphy, Sedimentology, and Biostratigraphy of Coos Bay and Cape**

**Blanco Areas, Southwestern Oregon** (March 21-23). Leaders: J. M. Armentrout, W. O. Addicott, R. Janda, K. McDougall, and B. Roth. Emphasis will be on lithostratigraphic and biostratigraphic facies interpretation of Cenozoic sequences. Facies examined include fluvial to bathyal environments with special attention to subsea fan, shelf-channel, neritic sand, beach and delta depositional sequences. Includes two lunches, transportation (bus), and lodging (March 21 and 22, based on double occupancy). Leave 1730 hours, March 21; return to Corvallis 1800 hours, March 23; arrive Portland Airport 2100 hours. Limit 48. \$86.

**10. Geomorphology and Hydrology in the H. J. Andrew Experimental Forest, Western Cascades, Oregon** (March 22). Leaders: F. J. Swanson, R. L. Fredriksen, R. D. Harr, and D. N. Swanson. Field trip will visit sites of research on erosional impacts of forest management practices, earthflow movement in relation to water availability, and large organic debris in streams. Includes lunch and transportation (vans). Leave 0730 hours, return 1800 hours. Limit 30. \$24.

#### GUIDEBOOKS

All field trip guides will be published as a single volume by the Oregon Department of Geology and Mineral Industries. One copy of this volume will be provided to participants of each field trip. Additional copies will be on sale by DOGAMI during the meeting. After the meeting the guidebook (Bulletin 101) will be available from DOGAMI, 1069 State Office Building, Portland, OR 97201.

#### HOTEL INFORMATION

About 250 rooms have been reserved in the hotels listed below. Registrants must make their own reservations, identifying themselves as registrants at the GSA convention. Corvallis is relatively short on hotel rooms, so reservations should be made early, preferably prior to February 15, at which time the reserved block of rooms will have to be relinquished.

#### Hotels and Rates

*Nendel's Inn 1550 NW 9th Street (503) 753-9150	Single: \$26.25 Double: \$31.50	*Riverview Inn 101 NW Van Buren (503) 752-9601	Single: \$21.00 Double: \$28.00
*Shanico Inn 1113 NW 9th Street (503) 754-7474	Single: \$19.00 Double: \$23.00	*Towne House Motor Inn 350 SW 4th Street (503) 753-4496	Single: \$22.05 Twin: \$29.40
*Country Kitchen Motel 800 NW 9th Street (503) 753-7326	\$21.50 and up		

\*Shuttle bus service between motels and convention activities on campus will be provided. Cheaper multiple-occupancy rates can be arranged at all motels.

Rates include 5% hotel occupancy tax and are those in effect in September 1979. Increases due to inflation may occur prior to the meeting.

If assistance is needed in making reservations, or if the listed hotels are full, contact the Corvallis Area Chamber of Commerce, 350 SW Jefferson, (503) 757-1505, for assistance. Latecomers may be accommodated in the nearby communities of Albany and Philomath.

The OSU Geology Club is making arrangements for space in fraternity and sorority houses at \$5 per night. You must provide your own sleeping bags and be prepared for the floor. Send reservations and at least one night's lodging to: Geology Club, Department of Geology, Oregon State University, Corvallis, OR 97331. Indicate the nights you plan to use these accommodations.

**PREREGISTRATION FORM**

76th Annual Meeting, Cordilleran Section, Geological Society of America  
 67th Annual Meeting, Pacific Coast Section, Paleontological Society  
 March 19-21, 1980, Corvallis, Oregon

Name (last, first, initial) \_\_\_\_\_

Registered as  PROFESSIONAL  GSA STUDENT ASSOCIATE  OTHER STUDENT

If accompanied by spouse or guest, list name for badge \_\_\_\_\_

Address (street) \_\_\_\_\_

City, State, Zip \_\_\_\_\_

Phone (business) ( ) \_\_\_\_\_ (home) ( ) \_\_\_\_\_

Affiliation (abbreviate for badge) \_\_\_\_\_

GSA Member: Yes  No

Speaker: Yes  No

**REGISTRATION FEES:**

Preregistration (before March 1) . . . . .	\$20.00	\$ _____
Registration (after March 1—on site) . . . . .	\$30.00	\$ _____
GSA Student Associates (before March 1) . . . . .	\$ 2.00	\$ _____
GSA Student Associates (after March 1—on site) . . . . .	\$ 5.00	\$ _____
Other Students with I.D. (before or after March 1) . . . . .	\$ 5.00	\$ _____
GSA Annual Luncheon (Thursday, March 20) . . . . .	\$ 5.00	\$ _____

**FIELD TRIPS**

**Premeeting**

1. Volcanic Geology, East Flank of Cascades (March 17-18) . . . . .	\$38.00	\$ _____
2. Klamath Borderland (March 17-18) . . . . .	\$52.00	\$ _____
3. Central Coast Range, Oregon (March 17-18) . . . . .	\$58.00	\$ _____
4. Metamorphic Geology, North Central Klamaths (March 16-18) . . . . .	\$82.00	\$ _____
5. Late Eocene Paleocology, Southwestern Washington (March 18) . . . . .	\$32.00	\$ _____

**During Meeting**

6. Mary's Peak (March 20 or 21) . . . . .	\$17.50	\$ _____
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On-site registration. Please indicate: Expect to take this trip:  Yes  No

**Postmeeting**

7. Volcanic Geology, Western Cascades (March 22-23) . . . . .	\$40.00	\$ _____
8. Beach Processes, Oregon Coast (March 22) . . . . .	\$23.00	\$ _____
9. Cenozoic of Coos Bay and Cape Blanco (March 21-23) . . . . .	\$86.00	\$ _____
10. Geomorphology, Andrew Experimental Station, Western Cascades (March 22) . . . . .	\$24.00	\$ _____

All field trip registrants **MUST ALSO** preregister for the meeting.

**TOTAL** \$ \_\_\_\_\_  
 All fees must be paid in U.S. currency.

Make all checks payable to Cordilleran Section GSA and mail **BEFORE** March 1, 1980, with this preregistration form to:

**David Zopf**  
 School of Oceanography  
 Oregon State University  
 Corvallis, OR 97331

If field trip registration is included, registration fee must be received **BEFORE FEBRUARY 15, 1980**. Refund on cancelled preregistration will be made until March 10, 1980, less a \$5.00 processing fee. No refunds will be made after March 14, except for cancelled field trips.

# PENROSE CONFERENCE

## Penrose Conference, May 18-23, 1980, "The Role of Pressure Solution and Dissolution Phenomena in Geology"—Application deadline: January 15, 1980

A GSA Penrose Conference entitled "The Role of Pressure Solution and Dissolution Phenomena in Geology: An Interdisciplinary Conference," will be held May 18-23, 1980, in New York State. The conveners are Walter Alvarez, University of California at Berkeley; Terry Engelder, Lamont-Doherty Geological Observatory; and Peter Geiser, University of Connecticut.

A growing awareness has emerged among a diverse group of geologic disciplines that the process generally referred to as "Pressure Solution" has application to a wide variety of geologic phenomena. Pressure-solution mechanisms have been suggested for phenomena ranging from metamorphic differentiation, cleavage formation, and folding processes, to dolomitization and cementation of sedimentary rocks.

Despite this interest, the nature of pressure solution and associated phenomena is still only poorly understood. Transport mechanisms associated with pressure solution may include grain boundary diffusion (Elliott, 1973) and bulk flow along microfractures (Geiser and Sansone, 1979). The role of stress itself is a matter of considerable uncertainty. Other problems include identifying the "sinks" for the dissolved phases and questions on possible catalytic behavior by clay minerals to enhance dif-

fusion. Finally, the nature of the solvent phases themselves and their role in diagenesis and deformation remains poorly understood.

A widely diverse group of investigators, including low temperature geochemists, carbonate petrologists, structural geologists as well as metamorphic and igneous petrologists, are more or less independently investigating various phenomena associated with pressure solution. The purpose of this Penrose Conference is to gather scientists from a wide range of disciplines to discuss various problems each discipline has encountered in studying phenomena associated with pressure solution and dissolution.

Four days will be occupied with discussion, both formal and informal. One day will be devoted to a field trip to examine various pressure-solution phenomena in a section across the Appalachian Mountains from Dutchess County, New York, to the Catskills Mountains.

Those interested in attending the conference should apply to Terry Engelder, Lamont-Doherty Geological Observatory, Palisades, NY 10964.

Deadline for application is January 15, 1980.

# DECEMBER BULLETIN SEPARATES

## Summaries

*At the request of members, the Summaries section may be ordered as one separate by those who have purchased the separates option. To order, write "December Summaries" on coupon.*

• S91201—Mineral chemistry of some Franciscan blueschist facies metasedimentary rocks from the Diablo Range, California: Summary.

*Diane E. Moore, Department of Geology, Stanford University, Stanford, California 94305 (present address: U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California 94025); J. G. Liou, Department of Geology, Stanford University, Stanford, California 94305. (3 p., 1 fig.)*

• S91202—Paleoenvironments of the Cuyahoga and Logan Formations (Mississippian) of central Ohio: Summary.

*Kinnard B. Bork, Robert J. Malcuit, Department of Geology and Geography, Denison University, Granville, Ohio 43023. (4 p., 2 figs.)*

• S91203—A study of stream braiding: Summary.

*Le Ba Hong, Waikato Valley Authority, P.O. Box 4010, Hamilton East, New Zealand; T.R.H. Davies, Department of Agricultural Engineering, Lincoln College, University of Canterbury, Christchurch, New Zealand. (2 p., 1 fig.)*

• S91204—Geologic map and cross section, eastern Ouachita Mountains, Arkansas: Map summary.

*George W. Viele, Department of Geology, University of Missouri, Columbia, Missouri 65211. (4 p., 3 figs.)*

## Bulletin Briefs

Titles and abstracts of conventional articles in the December 1979 GSA Bulletin, Part I are provided on the following pages to aid members who have purchased the separates option to select Bulletin, Part I separates of their choice. See instructions for ordering on page 191.

- 91205—K-Ar geochronology of Oligocene volcanic rocks, Davis and Barrilla Mountains, Texas.

*Donnie F. Parker, Department of Geological Sciences, University of Texas at Austin, Austin, Texas 78712 (present address: Department of Geology, Baylor University, Waco, Texas 76703); Fred W. McDowell, Department of Geological Sciences, University of Texas at Austin, Austin, Texas 78712. (11 p., 4 figs., 4 tbls.)*

Volcanic rocks of the Davis and Barrilla Mountains constitute the largest contiguous segment of the mid-Cenozoic volcanic field of Trans-Pecos Texas. Salic volcanic rocks form a silica-oversaturated series ranging in composition from trachyte to peralkalic rhyolite. Mafic lavas are subordinate in volume to the salic, silica-oversaturated series.

Stratigraphic relations and K-Ar age determinations allow a reconstruction of the evolution of the area. Major volcanic activity occurred in a period of about 3 m.y. in early Oligocene time (38 to 35 m.y. B.P.), during which several large lava shields were constructed and major ash-flow sheets emplaced. A late episode of mafic lava extrusion and intrusion of phonolite bodies remains undated, but may have occurred later than 31.5 m.y. ago.

The silica-oversaturated volcanic rocks are the eruptive products of a group of highly evolved magmas emplaced into high crustal levels during early Oligocene time. In rapid succession, plutons vented to the surface, forming as many as five different eruptive centers, each of which was active for a period not exceeding 1 m.y. The eruptive centers are marked by concentrations of salic lava flows, dike swarms, intrusive masses, and at least one caldera.

- 91206—Aerodynamic and vorticity erosion of Mars: Part I. The formation of channels.

*Marion I. Whitney, Central Michigan University, Mt. Pleasant, Michigan 48859. (17 p., 11 figs.)*

Wind-erosion processes may include much more than generally realized. Besides abrasion caused by sand-grain impact and saltation, there are several other processes that can be classed as aerodynamic. Three of the most important are vorticity, interfacial flow, and aerodynamic lift. Using suspended particles as the tools of erosion, the first two of these modes of erosion account for the development of pits, pit chains, and ultimately linear erosion trends. Aerodynamic lift, which occurs in both negative flow and vorticity, is a means of rendering materials airborne in response to differential pressure at extremely low velocity and without need for saltation. Aerodynamic processes provide system to erosion. Hence, shapes of features in most cases define the flow patterns which produced them.

This paper is designed to demonstrate how to utilize clues that show aerodynamic influence in the shaping of features, how to make assessments of regional flow systems as related to major topographic features, and how to use the data of aerodynamic and vorticity erosion in assessing the origins of certain features on Mars.

- 91207—Aerodynamics and vorticity erosion of Mars: Part II. Vortex features, related systems, and some possible global patterns of erosion.

*Marion I. Whitney, Central Michigan University, Mt. Pleasant, Michigan 48859. (16 p., 18 figs.)*

In Part I of this study, emphasis was placed on local and regional linear wind-erosion systems, particularly in the Tharsis and western Valles Marineris areas. In this, Part II, emphasis is placed on features interpreted to have developed or to have been enhanced by vorticity. Additional emphasis is placed upon correlations between character of topography and type of wind-eroded feature. Examples are: topography that causes vertical air movements promotes the development of centers of vorticity; thus, pits and craters are more abundant on top of and to the lee of plateau-like surfaces than on broad lowlands. In zones of strong confluence of air currents, such as the polar regions, large cyclic systems are developed, and they influence erosion over broad areas. Extremely high features such as the so-called volcanoes on Mars have caldera-like pits at their apices, within and around which there is abundant evidence of erosion by vorticity and interfacial-flow activity. Large centers of vorticity in these craters may also have created the low pressures necessary to establish the pressure gradients that are interpreted to have eroded the furrowed belt that nearly engirdles Mars.

Comprehension of the relationship of furrowed landscape to centers of vorticity and other loci of low pressure permits development of data on both Martian wind patterns and on wind-erosion systems in general.

- 91208—Modern biogenic gas-generated craters (sea-floor "pockmarks") on the Bering Shelf, Alaska.

*Hans Nelson, D. R. Thor, U.S. Geological Survey, Menlo Park, California, 94025; M. W. Sandstrom, Department of Earth and Space Sciences, University of California, Los Angeles, California 90024 (present address: Research School of Earth Sciences, Australian National University, P.O. Box 4, Canberra 2600, Australia.); K. E. Kvenvolden, U.S. Geological Survey, Menlo Park, California 94025. (9 p., 5 figs., 1 tbl.)*

As many as 1,340 small craters per square kilometre cover the sea floor of Norton Sound in the northeastern Bering Sea. The craters are circular pits, 1 to 10 m in diameter and less than 1 m deep, observed on sonographs over 20,000 km<sup>2</sup> of northern Norton Sound sea floor. Craters typically are associated with acoustic anomalies, near-surface peaty mud, and gas-charged sediment.

The peaty mud is a thick (>1.5 m), nonmarine pre-Holocene deposit that is now covered by a 1- to 3-m-thick layer of Holocene marine mud in the area of the craters. The peaty mud (2% to 8% organic carbon) contains abundant biogenic methane [ $C_1/(C_2 + C_3) = 256$  to 7,669] with carbon isotope ( $\delta^{13}C$ ) values of  $-69\%$  to  $-75\%$ . Decomposition of organic debris in the peaty mud apparently



charges the mud with gas. The peaty and gassy zones attenuate sound waves and cause acoustic anomalies on high-resolution seismic profiles in the area with craters.

The craters are forming now, as shown by the disruption of modern ice gouges by the craters. In the absence of storms, the gas apparently is trapped in the peaty mud in a saturated state by the cover of Holocene mud. Periodically, possibly during storms, the gas escapes through the thin Holocene cover and forms craters.

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• 91209—A statistical method for relative-age dating of moraines in the Sawatch Range, Colorado.

C. Dan Miller, U.S. Geological Survey, Box 25046, Mail Stop 903, Federal Center, Denver, Colorado 80255. (12 p., 4 figs., 5 tbls.)

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A relative-age classification of Pleistocene moraines in the northern Sawatch Range, Colorado, has been developed using information- and graph-theoretic methods applied to moraine morphology and weathering characteristics.

At 89 stations on moraines in the study area, measurements were made of the six best age-dependent criteria; listed in order of importance, they are percentage of pitted granite, percentage of fresh granite, depth of pitting, width of moraine crest, surface-boulder frequency, and distal-moraine slope angle. Data were evaluated using computer programs CHARANAL (character analysis) and GRAPH (similarity clustering analysis) to produce an age classification of stations according to similarity with respect to the six criteria. Groups of moraines were then tentatively assigned Rocky Mountain geologic-climate names on the basis of weathering parameters and qualitative consideration of deposit morphology, downvalley position, and soil-profile development.

Two pre-Bull Lake(?) glaciations are recognized in the area and tentatively correlated with the Cedar Ridge and Sacagawea Ridge Glaciations described by Richmond (1960, 1962, 1965) in the Rocky Mountains. Early(?) and late Bull Lake(?) glaciers occupied Lake Creek Valley; however, evidence of Bull Lake Glaciation was not found in the valleys of East Brush Creek or Nolan Creek. Early Pinedale glaciers occupied all major valleys in the study area, and most were more extensive than late Bull Lake glaciers, possibly explaining the lack of evidence in some valleys for Bull Lake Glaciation. Most valleys in the northern Sawatch Range were again glaciated during middle and late Pinedale time.

The information- and graph-theoretic methods used in this study are useful tools for relative-age dating of Pleistocene deposits. Use of the methods (1) allows more objective age classification of glacial deposits to be made on the basis

of qualitative data and measurements of several or many weathering characteristics, (2) may help to determine whether deposits represent different glaciations or phases of the same glaciation, and (3) may aid in correlation of glacial deposits between regions of similar climate and bedrock over great distances.

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• 91210—Black Shell turbidite, Hatteras Abyssal Plain, western Atlantic Ocean.

R. Douglas Elmore, Department of Geology and Mineralogy, University of Michigan, Ann Arbor, Michigan 48104; Orrin H. Pilkey, Department of Geology and Marine Laboratory, Duke University, Durham, North Carolina 27708; William J. Cleary, Department of Earth Sciences, University of North Carolina at Wilmington, Wilmington, North Carolina 28401; H. Allen Curran, Department of Geology, Smith College, Northampton, Massachusetts 01063. (12 p., 9 figs., 4 tbls.)

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An upper Pleistocene turbidite with a volume of at least  $10^{11}$  m<sup>3</sup> (100 km<sup>3</sup>) has been traced in 35 piston cores over a 44,000 km<sup>2</sup> area of the Hatteras Abyssal Plain. Entering the plain from the Hatteras Canyon System, the flow traveled uninterrupted for at least 500 km in a southerly direction and resulted in a tongue-shaped turbidite with a width between 100 and 140 km and a thickness of as much as 400 cm. This turbidite appears to be one of the largest, if not the largest, single turbidite yet to be correlated between deep-sea cores and to be mapped on an abyssal-plain floor.

Correlation of the unit is based on grain size, mineralogy, relative thickness, and similarity of sequences in the cores. Because correlation between cores is based largely on sand-layer characteristics, the turbidite cannot be traced beyond the last occurrence of a distinct sand layer in the distal (southerly) direction. The turbidite is characterized by its high percentage (2% to 50%) of blackened mollusk shell fragments, which led to the informal name Black Shell turbidite, and by a coarser grain size than other turbidites in the same cores.

The maximum thickness of the turbidite's sand part is in the center of the abyssal-plain basin, whereas maximum thicknesses of lutite and of the total turbidite are displaced east of the center line of the depositional basin. Depending on lateral position in the flow, the sands texturally comprise a wide range of graywackes, and mineralogically they constitute a suite ranging from lithic arkoses to quartzarenites. Sand petrology indicates that the fluviially derived terrigenous fraction came from United States mid-Atlantic coast rivers, whereas molluscan and foraminiferal bioclastic components indicate an initial shallow-shelf origin from the vicinity of Cape Hatteras, North Carolina.

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It appears that the turbidity current began as a massive shelf-edge slump. Sand came from the shelf edge; mud was picked up on the upper continental slope. The flow apparently evolved from a slump into a high-concentration flow as it moved down slope. Characteristics in the axial center zone, such as poor sand sorting, high mud content, Bouma AE sequences, and discontinuous vertical grading, suggest deposition from a high-concentration flow. The nature of the characteristics changed (better sorting, more continuous vertical grading, more complete Bouma sequences, and lower mud content) as the flow spread, reflecting deposition from a low-concentration turbidity current.

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- 91211—Tectonic origin for Sudbury, Ontario, shatter cones.

*Michael E. Fleet, Department of Geology, University of Western Ontario, London, Ontario N6A 5B7, Canada. (6 p., 7 figs.)*

Detailed petrographic examination of Mississagi quartzite from the Sudbury basin in southeastern Ontario, Canada, reveals that the conical fractures previously identified as shatter cones are lined with sheet-silicate minerals characterized by oriented biotite and chlorite. These mineralized conical fractures crosscut the main deformation features in

the rocks. Deformation features in hand specimens from the sampled localities—south Kelly Lake and Laurentian University campus—include serrated and interlocked quartz grain boundaries, extensive subgrain boundary development within quartz grains, primary recrystallization of quartz, and plagioclase cataclasis; these features were probably formed during the Penokean orogeny. The conical fracture zones are therefore late Penokean in age. The mineralization associated with the conical fractures developed by syntectonic crystallization under conditions of nonhydrostatic compressive stress and low strain rates. This is indicated by, in particular, an echelon sigmoidal biotite and chlorite aggregates, crosscutting grain relationships, and slickenside surfaces with steps and fibrous striations. The orientation of the sigmoidal biotite and chlorite aggregates is consistent with  $\sigma_1$  parallel to the cone axes. Thus, the conical fractures postdate emplacement of the nickel intrusion, and they do not appear to be a cryptoexplosion feature.

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- 91212—Fluvial adjustments to the spread of tamarisk in the Colorado Plateau region: Discussion and reply. (2 p.)

Discussion: *Benjamin L. Everitt, 606 Black Hawk Way, Salt Lake City, Utah 84108.*

Reply: *William L. Graf, Department of Geography, Arizona State University, Tempe, Arizona 85281.*



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