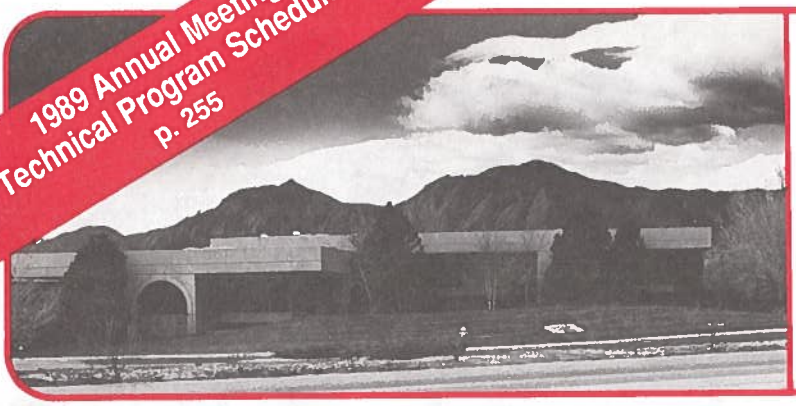
1989 Annual Meeting Technical Program Schedule p. 255



GSA NEWS & INFORMATION

Monthly Newsletter of The Geological Society of America

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VOLUME 11, NUMBER 9, September 1989

Beginning the Second Century

by Brian J. Mitchell
General Chairman, 1989 Annual Meeting

St. Louis, the gateway to the West, welcomes you to the 1989 meeting of the Geological Society of America. Beginning nearly two centuries ago, intrepid explorers, frontiersmen, settlers and their families set out from St. Louis for points unknown in quest of knowledge or a new life, and they pushed the frontiers of our country farther westward. Drawing on the symbolism of the westward expansion, the St. Louis organizing committee has taken "Frontiers in Geoscience" as the theme for the 1989 Annual Meeting.

The committee, consisting of faculty and students from the host institutions, St. Louis University and Washington University, as well as representatives from the University of Missouri at Columbia, the Missouri Division of Geology and Land Survey, the U.S. Army Corps of Engineers, and the Defense Mapping Agency, has planned a memorable meeting with which to begin the second century of the GSA. It will indeed be a "frontiers" meeting, one which emphasizes new discoveries, emerging methodologies and technologies, and their expected influence on geologic research and teaching over the next decade and beyond.

The technical program will differ from programs at previous meetings by including many more theme sessions. These theme sessions have permitted individuals to advocate topics that fall under the overall theme of the meeting. Many of these topics are in the forefront of geoscience research, and include the origins and effects of fluids in the crust, applications of artificial intelligence in geological sciences, rock deformation, crustal processes and structure, new directions in geologic mapping, and important contemporary topics in paleontology, geomorphology, stratigraphy, and sedimentology. Other theme sessions address environmental issues and geoscience education. As in previous years, associated societies and divisions of the GSA will present symposia. Like the theme sessions, these emphasize "frontier" topics in diverse areas of geologic research, ranging from foraminifera to intraplate seismicity to geoscience information.

The St. Louis organizing committee has convened a symposium on Geoscience Research and Public Policy which will address the topics of priorities and funding in geoscience research that might be expected over the next decade. Leaders who are expected to influence policy in these areas will make presentations from the perspective of their offices or positions and respond to questions

(*continued on p. 242*)

1989 Annual Meeting Local Committee members at April planning session. Front row: Michael Klosterman, Eloise Arvidson, Kenneth Taylor, Kenneth Brill. Back row: Guy Smith, Ronald Blouse, Everett Shock, Brian Mitchell, Kevin Shelton, Robert Dymek.

Second Century (*continued from p. 241*)

More 1989 Annual Meeting Local Committee members. Above: Raymond Arvidson; right, upper: Jerry Vineyard, W. Keith Wedge; right, lower: Judith Mitchell, Mark Wuenscher.

from the audience. Participants in science-related offices or government include James F. Hays of the National Science Foundation, Dallas Peck of the U.S. Geological Survey, Frank Press of the National Academy of Sciences, as well as representatives from the United States Senate and House of Representatives. Academic participants are Robert A. Phinney, Princeton University, Peter J. Wyllie, California Institute of Technology, and William Fisher, University of Texas at Austin.

The GSA is sponsoring ten short courses, two of which, on fission track analysis and Quaternary climates, are featured as part of the Frontiers in Geoscience theme. Societies associated with the GSA will offer other short courses, as well as several forums and workshops.

The field trip committee has planned 19 pre- and post-meeting trips to interesting sites over a broad region of the central United States. They cover a spectrum from Precambrian volcanics and metamorphics to recent archeological excavations. During the meeting you may want to take one of four half-day trips in the St. Louis area.

The offering of special events is indeed special. In addition to the traditional Welcoming Party and Alumni Night, there will be a cruise on a Mississippi riverboat with local bands playing blues music, the music that has made St. Louis famous. The 5K/10K runs will go through beautiful Forest Park, site of the 1904 World's Fair and Olympic games. For the first time the GSA will host a photography salon. Amateur photographers will be submitting photographs in both science and nonscience categories which will be displayed and judged at the meeting.

The Science Theater will also include something new. The rapid proliferation of inexpensive video cameras is allowing individuals outside of the usual film/video companies to produce their own videos for classroom or research use. In recognition of this growing phenomenon, the Science Theater will offer a selection of "home-grown" videos produced by geologists.

The Guest Program promises a variety of interesting trips and activities offering historical and contemporary perspectives on St. Louis and nearby areas. The trips range from a visit to historic St. Charles, where the Lewis and Clark expedition began, to the St. Louis riverfront, where it ended, to the cave country of the Ozarks where Jesse James hid out, and of course, to areas of St. Louis noted for historic grandeur or modern importance.

As General Chairman of the 1989 meeting, I welcome you to St. Louis. You will find it to be a vibrant city, particularly in the downtown area and on the riverfront near the meeting site. That vibrance blends with the historic charm of the city and provides a wonderful setting in which to meet. The organizing committee has gone all out to arrange an important and interesting meeting. As Meriwether Lewis and William Clark led their "Corps of Discovery" from St. Louis in 1804 to expand our nation's physical frontiers, we hope that the 1989 meeting of the GSA will contribute to expanding frontiers in geoscience, research, and teaching. It is a meeting that you will want to experience.

Vol. 11, no. 9 GSA News & Information September 1989

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Prepared from contributions from the staff and membership. Executive Director: F. Michael Wahl; Managing Editor: Faith Rogers; Associate Editor: Lee Gladish; Production and Advertising Manager: James R. Clark; Marketing/Advertising Assistant: Ann H. Crawford; Production Assistants: Mona T. Gonzales and Joan E. Manly.

***Advertising:** Contact James R. Clark or Ann H. Crawford (303) 447-2020.

DNAG NEWS

by Allison R. (Pete) Palmer

Updates on Final Wrap-ups of Books Nearly Under Control

As of this writing, just after the 4th of July, the Eastern Pacific volume is paged, indexed, and will go to the printer as soon as Tanya Atwater's tectonic plate is proofed and checked. Because of production delays at our end and Tanya's travels, this will be about mid-August, so the book should be printed and available about Thanksgiving.

The Appalachian-Ouachita volume has been looked over by the editors, and as soon as Warren Manspeizer returns the galley for his megachapter (expected any day), this book will go back to the typesetter for final paging and indexing. The book will go to the printer as soon as we know we have Phil Osberg's plate through the proofing process and composited.

The *Surface Water Hydrology* volume has been looked over by its editor and will be ready for paging as soon as one final chapter text is received from Reds Wolman. The plates for this volume are already printed, and the book will move quickly to the printer when the final chapter is copy edited, typeset, and proofed.

Acknowledgment of the casts of characters for the two latter volumes will be printed in next month's column.

Other Volumes

Nothing new on the Arctic and Caribbean volumes; both sets of editors are now working on dates in late August and early September to go over galleys of their books. Meanwhile, the volume *Archaeological Geology of North America* is rapidly reaching completion and may be a part of the group of books to be available by the end of 1989.

Canadian Volumes

Five of the nine Canadian volumes are complete and through review. One (Quaternary) is at the printer. The others are caught up in delays caused by a government decree that all volumes must be published in both French and English; thus, they are awaiting the completion of the French translations (including figures).

Transects

Transect C-1, *Mendocino Triple Junction to the North American Craton*, is now being printed (3 sheets) and will be available by the time you read this. This completes the set of transects along the Pacific coasts of the conterminous U.S. and Canada. Two transects across the Pacific coast of Mexico are in color separation, as are the stacked, comparative transect sheets for the eastern and western coasts of North America at 1:1,000,000. These should be ready for the printer before the end of the year.

Wall Maps

The *Stress Map of North America* is now plotted and being prepared for printing. This should move rapidly once we get the legend materials from Mary Lou Zoback, and will probably be available sometime this fall.

AGI to Publish Fifth Edition of GeoRef Thesaurus and Guide to Indexing

Searchers of GeoRef online and of the *Bibliography and Index of Geology* have a new edition of a time-saving tool available to guide them for the best possible search results. It contains extensive information on the terms authorized for use by the indexing staff of GeoRef. The *GeoRef Thesaurus and Guide to Indexing*, fifth edition, was published in July.

This new edition of more than 700 pages has 4284 new terms, bringing the total to 20,242 valid index terms. In addition, 7168 terms from the previous edition have been modified. And, for the first time, the thesaurus includes maps of oceans and Alaska with boundaries of geographic index terms.

Lists of terms in the Guide to Indexing section have been reorganized and expanded for this edition. Narrower term relationships have been set for deformation, hydrocarbons, drilling, earthquakes, environment, tectonics, spectra, textures, loading, lateral faults, and magmas. A new relation, prior term (PT), has been added to indicate formerly valid terms. Each term has, if applicable, notes on its meaning and limits in GeoRef, and the year it became a valid term; synonyms and other "used for" terms; prior terms; broader terms; narrower terms; "see also" terms; and coordinates.

The fifth edition of the *GeoRef Thesaurus and Guide to Indexing*, edited by Ruth Shimomura, is published by the American Geological Institute. It costs $75; a microfiche version costs $25. Order the thesaurus from Customer Service Department, American Geological Institute, 4220 King St., Alexandria, VA 22302. You can charge it to your VISA, MasterCard, or American Express card. Call AGI's Customer Service department: (800) 336-4764.

Notice of Council Meeting

The Council of the Society reminds you that meetings of Council are open to all Fellows, Members, and Student Associates as observers, except during executive sessions. Only councilors, officers, and section representatives may speak to agenda items, except by invitation of the chair. Because of space and seating problems, notification of attendance must be received by the Executive Director in advance of the meeting. The next meeting of the Council will be Wednesday morning, November 8, 1989, at the annual meeting in St. Louis.

1989 GSA ANNUAL MEETING & EXPOSITION November 6–9

Detailed descriptions of field trips, short courses, theme sessions, and other meeting events can be found in the August issue of *GSA News & Information*. The August issue also contains registration and housing forms. For additional information you are welcome to call the GSA Meetings Department, (303) 447-2020.

PREREGISTRATION IS DUE BY OCTOBER 6.
HOUSING DEADLINE IS OCTOBER 13.

FOUNDATON NEWS

by Robert L. Fuchs

Two New Trustees Appointed

The Board of Trustees of the GSA Foundation has appointed Peter T. Flawn and William B. Heroy, Jr. to five-year terms ending in 1994. They will assume their new posts at the 1989 GSA Annual Meeting in St. Louis in November. The two vacancies on the board result from the expiration of the terms of Michel T. Halbouty and John C. Maxwell, both of whom have served as trustees since the Foundation was formed in December 1980.

Pete Flawn received his undergraduate degree from Oberlin College, and his M.S. and Ph.D. from Yale University. Flawn worked briefly for the U.S. Geological Survey and then joined the Bureau of Economic Geology at the University of Texas in Austin. He served that institution in a variety of positions, ultimately becoming its president in 1979. Flawn is a member of numerous national organizations, including the National Academy of Sciences, the National Research Council, and the National Academy of Engineering. He is an honorary member of the Association of American State Geologists, and a Fellow of the Geological Society of America. Flawn was a GSA Councilor from 1972 to 1974 and served on the Executive Committee, the Committee on Investments, the Centennial Steering Committee, the Fund-Raising Task Force, and the ad hoc Committee on Enhancement of Mexican Participation in GSA. Flawn was president of GSA in 1978, and he was president of the American Geological Institute in 1988.

Peter T. Flawn

William B. Heroy, Jr.

Bill Heroy graduated from Dartmouth College after majoring in geology and geophysics. He received a Ph.D. degree in geology from Princeton University. His career began in 1941 as a geologist with Texaco. Later, he joined Geotech Corporation, ultimately becoming president in 1961. Subsequently, he was president of the Geotech Division of Teledyne, Inc., and later, was assistant to the president of that company. Heroy joined the faculty of Southern Methodist University in 1979 and also served that institution as vice-president and treasurer. Currently, he holds the title of professor emeritus at SMU. Heroy is a Fellow of GSA and a member of the Society of Exploration Geophysicists, the Society of Economic Geologists, AAPG, and a life member of AGU. He has served GSA extensively since the early 1960s, on numerous committees, as an associate editor, as a councilor, and as treasurer and a member of the Executive Committee from 1977 to 1982.

Trustee Chairman Phil LaMoreaux, upon announcing these appointments, said, "The Foundation's Board of Trustees is extremely pleased to have both Pete Flawn and Bill Heroy accept positions as trustees. We are losing very valued board members Mike Halbouty and John Maxwell, who have been with us right from the beginning and who are precluded by Foundation bylaws from new terms at this time. We couldn't have asked for better replacements to step into their shoes than Pete Flawn and Bill Heroy. These two leaders in our profession have devoted many years to serving GSA, and it is most fortunate for the Society that they are willing to continue in this new capacity."

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Travel Grants—The Students Speak

In the May issue of *GSA News & Information* we reported the quantitative results of the student travel grant program during 1988. This program is jointly sponsored by the GSA sections and the Foundation. Lately, we have been hearing from the students. A sample of their comments follows.

"On behalf of . . . , I would like to thank you and the Rocky Mountain Section of GSA for your generous support. Your travel award greatly offset our travel expenses from Northern Arizona University in Flagstaff, Arizona, to the Spokane, Washington, meeting. We enjoyed the meeting and the opportunity to share our research with that of other workers."

"My presentation went well and the convention was very educational. Many expenses were incurred with slide preparation, travel, and lodging; I could not have done it without your support!"

"I doubt that I would have been able to attend this meeting without the generous financial support of the Society."

"My poster presentation, in conjunction with . . . met with a great success and provided us an opportunity to talk with many other professionals and peers about our work."

"The Denver convention was my first experience with a poster session, and the feedback which I received will be invaluable as I turn now to the task of writing."

"It was an invaluable experience for me to present my research myself, to receive comments first hand, and mostly, to get recognized as a worker in my field, and not merely as so and so's student. I certainly hope that you will continue this program."

Yes, the program is continuing in 1989, and many grants have already been paid to students attending section meetings. Because of the enthusiastic response from GSA sections and the students themselves, the Foundation plans to continue this financial support for the foreseeable future, and we hope to increase the dollar level in future years as the Foundation's income improves.

Donors to the Foundation, May–June, 1989

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Preliminary Announcement and Call for Papers

NORTHEASTERN SECTION, GSA, 25th Annual Meeting

Syracuse, New York
March 4–7, 1990

Syracuse University, together with Colgate University, Cornell University, Hamilton College, and Hobart and William Smith Colleges, will host the Northeastern Section of the Geological Society of America meeting at the Sheraton University Inn and Conference Center on the campus of Syracuse University. The Eastern Section of the Society of Economic Paleontologists and Mineralogists (ES-SEPM), the Northeastern Section of the Paleontological Society (NE-PS), the Eastern Section of the National Association of Geology Teachers (ES-NAGT), and the Association of Women Geoscientists will be meeting with GSA's Northeastern Section. The meeting will run from 7:00 p.m. Sunday, March 4, through noon, Wednesday, March 7.

DETAILED INFORMATION

Information concerning registration, accommodations, and activities will appear in a future issue of *GSA News & Information* and as part of *Abstracts with Programs* for 1990. Requests for additional information or suggestions should be addressed to the General Program Co-Chairmen,

Henry T. Mullins
Department of Geology
Heroy Geology Laboratory
Syracuse University
Syracuse, NY 13244
(315) 443-4706 or 2672

Donald I. Siegel
Department of Geology
Heroy Geology Laboratory
Syracuse University
Syracuse, NY 13244
(315) 443-3607 or 2672

CALL FOR PAPERS

Papers are invited for presentation at oral and poster sessions as well as symposia. A total of twenty minutes (presentation and discussion) will be the format for general technical session presentations, whereas thirty minutes will be an available option for symposia presentations. Papers that place northeastern geology in a global perspective will especially receive priority for presentation. Papers of regional or general interest will also be considered. Poster presentations are highly encouraged, as are student papers. Every attempt will be made to assure that oral and poster sessions will not conflict with related technical sessions.

SYMPOSIA

The following symposia will be presented at the Syracuse meeting. Those wishing to contribute to a symposium should contact the conveners directly. General information regarding symposia can be obtained from Cathryn R. Newton, Department of Geology, Heroy Geology Laboratory, Syracuse University, Syracuse, NY 13244; (315) 443-3710 or 443-2672.

1. **Evolution of Continents.** Doug Nelson, Cornell University, (607) 255-6329.
2. **Phanerozoic Paleogeography, Paleoclimatology, Biogeography and Paleomagnetism.** Rob Van der Voo, University of Michigan, (313) 764-1435.
3. **Geology of Rocks That Aren't There: Reconstruction of Post-Devonian Events in the Northeast.** Dan Karig, Cornell University, (607) 255-5267.
4. **Ice Sheet Margins and Water: Deglaciation within Marine and Lacustrine Basins.** Terry Hughes, University of Maine, (207) 581-2152; Eugene Domack, Hamilton College, (315) 859-4711.
5. **The Grenville Province from Front to Back: Sudbury to Vermont.** James McClelland, Colgate University, (315) 824-1000.
6. **Subglacial Meltwater: Landforms and Sediment.** John Shaw, Queens University, (613) 545-6033 or 545-6030.
7. **Sequence Stratigraphy in the Appalachian Basin: Theory, Scale, Applications, and Interpretations.** Teresa Jordan, Cornell University, (607) 255-3596.
8. **Crustal Signatures of Northern Appalachian-Caledonide Terranes.** Gary Boone, Syracuse University, (315) 443-3869 or 443-2672.
9. **Along-Strike Variations in the Nature of the Alleghanian Orogeny.** Art Goldstein, Colgate University, (315) 824-1000.
10. **Regional Ground-Water Circulation Patterns: The Influences of Tectonism, Basin Development, and Glaciation.** Dorothy Tepper, U.S. Geological Survey, (607) 272-8722.
11. **Global Biological Events in Earth History.** George McGhee, Rutgers University, (201) 932-2044; Peter Sheehan, Milwaukee Public Museum, (414) 278-2741; sponsored by the Paleontological Society and IGCP 216.
12. **Ground-Water Contamination: How Real are the Hazards?** Don Siegel, Syracuse University, (315) 443-3607 (mini-symposium and public forum).
13. **Clinton Ironstone** (SEPM and IGCP 277). Edward Cotter, Bucknell University, (717) 524-3026.

POSTER SESSIONS

Poster booths (8′ × 8′) will be framed by pipe and drape and have three 4′ × 8′ Homosote tack boards. For general information regarding poster sessions, contact Teresa Jordan, Department of Geological Sciences, Snee Hall, Cornell University, Ithaca, NY 14853; (607) 255-3596. Poster sessions will be held in the Goldstein Auditorium of the Schine Student Center on the Syracuse University campus immediately adjacent to the Sheraton Conference Center.

Special Poster Session

Classic Field Sites for Teaching Earth Science in the Northeast sponsored by Eastern Section and New England Section of NAGT. Those wishing to contribute to this special poster session should contact Jim O'Connor, University of District of Columbia, Environmental Science Department, 4200 Connecticut Ave. NW, Washington, D.C. 20008, (301) 593-7831.

ABSTRACTS

Abstracts are limited to 250 words and must be submitted camera-ready on the official 1990 GSA abstract form available from

Abstracts Coordinator
Geological Society of America
P.O. Box 9140
Boulder, CO 80301
(303) 447-8850

or

Donald Woodrow
Geoscience Department
Hobart and William Smith Colleges
Geneva, NY 14456
(315) 789-5500, ext. 215

(*continued on p. 247*)

Northeastern Section (*continued from p. 246*)

Send one original and five copies of abstracts to be considered for all general technical sessions and poster sessions to Technical Program Chairman Donald Woodrow, Geoscience Department, Hobart and William Smith Colleges, Geneva, NY 14456. Abstracts (one original and five copies) for all symposia should be sent to Symposia Coordinator Cathryn R. Newton, Department of Geology, Heroy Geology Laboratory, Syracuse University, Syracuse, NY 13244.

ABSTRACTS ARE DUE NOVEMBER 9, 1989

Acceptance or rejection of abstracts will be based on review by the Technical and Symposia Program Committees. Abstracts will be judged on the basis of scientific merit, information content, and readability. There is no limit to the number of abstracts that may be submitted, but no more than two abstracts bearing an individual's name as first author will be accepted. No author may give more than one oral presentation. Notification of acceptance or rejection will be made by early December 1989.

PROJECTION EQUIPMENT

All slides must fit in a standard 35-mm carousel tray. Two projectors and two screens will be provided in all technical sessions and symposia. If possible bring your own loaded tray labeled with name, session, and time of paper.

EXHIBITS

Exhibits of geological research equipment and educational material will be on display in the Goldstein Auditorium adjacent to poster sessions and refreshments. Booths (8′ × 8′) will be framed with pipe and drape and contain tables and chairs. Special rates are available for nonprofit and educational organizations. For additional information, contact Barbara Tewksbury, Department of Geology, Hamilton College, Clinton, NY 13323, (315) 859-4011.

SPECIAL EVENTS

Heroy Open House—Sunday, March 4—An open house featuring the research facilities of the Heroy Geology Laboratory will be available from noon to 5 p.m.

Plenary Session—Sunday, March 4—A plenary session will be held in Goldstein Auditorium of the Schine Student Center beginning at 7 p.m. The keynote address, Appalachian-Caledonian Geology and the Evolution of Tectonic Thought will be given by John F. Dewey, Oxford University.

Welcoming Party—Sunday, March 4—A welcoming party with liquid refreshment and hors d'oeuvres will be held in the lounge of the Schine Student Center immediately following the Plenary session.

Geology Photo Contest—Sunday, March 4—A contest for geologically interesting photographs (color or black and white) will be held in the Art Gallery of the Schine Student Center Lounge in conjunction with the welcoming party. Photographs must be large-format size; cash prizes of $100 for first place, $50 for second, and $25 for third will be awarded. For further information, contact Special Events Coordinator Gary Boone, Department of Geology, Heroy Geology Laboratory, Syracuse University, Syracuse, NY 13244, (315) 443-3607 or 443-2672.

NE GSA Annual Banquet—Monday, March 5—Regency Room of the Sheraton Convention Center, 7:30 p.m. to 10:00 p.m.

Public Forum—Tuesday, March 6, evening—A mini-symposium and open discussion will be held on *Ground-Water Conatmination: How Real Are the Hazards* in the Regency Room of the Sheraton Conference Center. The general public will be welcome. For further information contact Donald Siegel, Department of Geology, Heroy Geology Laboratory, Syracuse University, Syracuse, NY 13244, (315) 443-3607 or 443-2672.

SHORT COURSES

Two short courses will be held in the Heroy Geology Laboratory on Sunday, March 4.

1. **Role of Critical Thinking in Geology Education.** Paul Pinet, Department of Geology, Colgate University, Hamilton, NY 13346.
2. **Subsidence and Thermal History of Extensional Basins: Techniques and Examples.** Leigh Royden, Department of Earth, Atmospheric, and Planetary Science, MIT, Cambridge, MA 02139.

For further information on short courses contact Short Course Coordinator Art Goldstein, Department of Geology, Colgate University, Hamilton, NY 13346, (315) 824-1000, ext. 201.

SCIENCE THEATER

A wide variety of scientific films and videos of geologic interest, including a "classic film festival," will be presented at lunchtime and in the evening. For further information or suggestions, contact Bob Darling, Science Theater Coordinator, Department of Geology, Heroy Geology Laboratory, Syracuse University, Syracuse, NY 13244, (315) 443-3828 or 443-2672.

REGISTRATION

Registration will begin at noon on Sunday, March 4, in the lobby of the Heroy Geology Laboratory. All subsequent registration will be in the lobby of the Sheraton Conference Center. Meeting participants are *strongly encouraged* to use Sunday, March 4, as a travel day and register Sunday afternoon in the Heroy Lobby in order to participate in the plenary session and welcoming party Sunday evening. In addition, a full slate of technical programs will begin 8 a.m. Monday morning. Registration forms will be provided in the December issue of *GSA News & Information*.

HOUSING

Blocks of rooms have been reserved at the Sheraton University Inn, Holiday Inn downtown, and the Hotel Syracuse. Guaranteed rates will be per room regardless of the number (maximum 4) of occupants. All three hotels have restaurants and there are many inexpensive restaurants on Marshall Street immediately adjacent to the Sheraton, as well as a cafeteria at the Schine Student Center. *For conference planning and budgetary purposes it is critical that meeting participants preregister.* February 9, 1990 has been established for receipt of hotel reservations. Accommodation reservations received after this date will be on a space-available only basis. Please preregister and make your hotel reservations as early as possible! A housing form will be provided in the December issue of *GSA News & Information*.

Preliminary Announcement and Call for Papers

SOUTH-CENTRAL SECTION, GSA, 24th Annual Meeting

Stillwater, Oklahoma
March 5–6, 1990

The South-Central Section of the Geological Society of America will meet on the Oklahoma State University Campus. The meeting is sponsored by the School of Geology of Oklahoma State University, and will be held jointly with the Midcontinent Section of the National Association of Geology Teachers.

CALL FOR PAPERS

Papers are invited for oral presentation at technical sessions and symposia, or in poster sessions. The format for technical sessions will be fifteen minutes for presentation and five minutes for discussion. Poster sessions will be available for viewing for one-half day or a full day. Papers of regional interest to geologists in the south-central United States, as well as those of general geological or educational interest, will be considered for the program.

STUDENT PAPERS

To encourage student participation, cash awards for travel to the meeting and for outstanding papers will be presented. Special student accommodation rates have also been arranged. Judging for travel awards will be based upon evaluation of abstracts for quality of research and writing. Outstanding paper awards will be judged upon both quality of research and effectiveness of presentation. To be eligible, only students may be listed as authors on the paper, and it must be designated on the abstract form as a student paper.

REGISTRATION

Preregistration will be by mail. Forms will accompany the Final Announcement in the December issue of *GSA News & Information*. On-site registration will take place on Sunday, March 4, 1990, from 3 to 8 p.m. in the Conference room of the Noble Research Center and will continue there daily from 7:45 a.m. to 5 p.m. for the duration of the meeting. For lower registration fees and to assist the local committee in planning, *PREREGISTER BY FEBRUARY 9, 1990!*

SYMPOSIA

The following symposia have been organized or are planned. Authors of papers to be considered for inclusion in a symposium should send abstracts directly to the convener. Contact the convener(s) as well for further information.

1. **Pander Society Symposium.** Scott M. Ritter, School of Geology, Oklahoma State University, Stillwater, OK 74078.

This one-day symposium will focus upon recent advances in stratigraphical, paleobiological, and geochemical applications of the phylum Conodonta.

2. **Tectonic Habitat and Structural Styles in the Midcontinent and Southern Oklahoma: Implications for Hydrocarbon Accumulations.** Ibrahim Cemen and Zuhair Al-Shaieb, School of Geology, Oklahoma State University, Stillwater, OK 74078.

The symposium will focus on current structural and tectonics research in the southern midcontinent and southern Oklahoma regions and intends to provide a well-organized discussion on the interactions of different structural styles. These two regions contain several diverse structural styles ranging from rift tectonics in the Nemaha ridge area and wrench tectonics in the Wichita and Arbuckle Mountains, to a well-developed fold and thrust belt in the Ouachita Mountains. The symposium plans to address persisting questions related to the structural and tectonic evolution of these regions. It will also include several presentations on the relation between the structural styles and hydrocarbon accumulations in these areas based on the research within the last decade.

3. **Paleontological Society Symposium—Middle Carboniferous Biostratigraphy: Recent Advances.** Patrick K. Sutherland, School of Geology and Geophysics, University of Oklahoma, Norman, OK 73019; Walter L. Manger, Dept. of Geology, University of Arkansas, Fayetteville, AR 72701.

The South-Central Section of the Paleontological Society will sponsor a one-day symposium devoted to recent advances in middle Carboniferous biostratigraphy. Presentations are invited dealing with aspects of Chesterian, Morrowan, and Atokan faunal and floral sequences. Publication of a symposium volume is planned in the Circular series of the Oklahoma Geological Survey.

4. **Petroleum Migration: From Organic Matter to the Reservoir.** Colin Barker, Dept. of Geosciences, University of Tulsa, Tulsa, OK 74104.

5. **Applied Hydrogeology.** Wayne A. Pettyjohn, School of Geology, Oklahoma State University, Stillwater, OK 74078.

During the past few years a number of fundamental concepts have been developed that allow a better understanding of groundwater recharge, flow, discharge, and mass transport. This symposium will consist of presentations that deal with these concepts and techniques, all of which can or have been applied to the evaluation of regional hydrogeology and the investigation of contaminated sites.

6. **National Association of Geology Teachers Symposium.** Samuel Wells, Northeast Oklahoma A&M, Miami, OK 74354.

FIELD TRIPS

1. **Depositional Facies, Karst Features, and Styles of Deformation in the Arbuckle Mountains, Oklahoma.** A one-day field trip to examine several outcrops in the Arbuckle Mountains. Participants will be introduced to the results of ongoing research on the Arbuckle Group. Various interesting features of the shoaling-upward sequences, thermal dolomite, karstification, and exposures of other subaerial features will be emphasized in addition to the several structural features. Zuhair Al-Shaieb and Ibrahim Cemen, School of Geology, Oklahoma State University, Stillwater, OK 74078.

2. **Middle Carboniferous Lithofacies and Biostratigraphy of the Southern Ozarks.** The South-Central Section of the Paleontological Society is sponsoring a two-day, premeeting field trip to examine lithofacies changes and biostratigraphic relations within Chesterian and Morrowan rocks along a traverse from north-central Arkansas to northeastern Oklahoma. Planned in conjunction with Symposium 2. Walter L. Manger, Dept. of Geology, University of Arkansas, Fayetteville, AR 72701; Patrick K. Sutherland, School of Geology and Geophysics, University of Oklahoma, Norman, OK 73019.

3. **Paleozoic Stratigraphy and Conodont Biostratigraphy of the Arbuckle Mountains, Oklahoma.** A two-day field trip to examine excellent exposures of Ordovician to middle Carboniferous strata of the Arbuckle Mountains in light of recent conodont

(*continued on p. 249*)

South-Central Section (*continued from p. 248*)

studies. Planned in conjunction with Symposium 1. James E. Barrick, Dept. of Geosciences, Texas Tech University, Lubbock, TX 79409; Jeffrey A. Bauer, Shawnee State University, Portsmouth, OH 45662; Raymond L. Ethington, Dept. of Geology, University of Missouri—Columbia, Columbia, MO 65211; Robert C. Grayson, Jr., Dept. of Geology, Baylor University, Waco, TX 76798.

ABSTRACTS

Abstracts are limited to about 250 words and must be submitted camera-ready on the official 1990 GSA abstract form available from

Abstracts Coordinator
Geological Society of America
P.O. Box 9140
Boulder, CO 80301
(303) 447-8850

or

School of Geology
Oklahoma State University
105 Noble Research Center
Stillwater, OK 74078-0451
(405) 744-6358

Send one original and five copies of abstracts to be considered for technical sessions, carefully marked for type of session (oral or poster) and category of interest, to the Technical Program Chairman,

Arthur W. Cleaves
School of Geology
Oklahoma State University
105 Noble Research Center
Stillwater, OK 74078-0451
(405) 744-6358

Send one original and five copies of abstracts for symposia directly to the convener (first name following symposium topic or title). Acceptance or rejection of all abstracts will be based upon technical review. Abstracts will be judged on the basis of scientific merit, informative content, readability, and significant problems. You may submit as many abstracts as you wish, but no more than two bearing an individual's name as first author will be accepted for the program. No author may give more than one oral presentation. Authors will be notified of acceptance or rejection during December 1989.

ABSTRACTS ARE DUE NOVEMBER 3, 1989

PROJECTION EQUIPMENT

All slides must be 2" × 2" and fit in a standard carousel tray. Two projectors and two screens will be provided in each technical session. Please bring your own loaded carousel trays. A speaker ready room equipped with projectors will be available for review and practice. Overhead projectors will not be available.

EXHIBITS

Exhibits will be adjacent to the technical session rooms. The cost of booths for educational and nonprofit institutions will be reduced. For further information contact

Scott M. Ritter
School of Geology
Oklahoma State University
105 Noble Research Center
Stillwater, OK 74078-0451

SPECIAL EVENTS

A welcoming party will be held on Sunday evening, March 4. The annual banquet is scheduled for Monday evening, March 5, and will feature a distinguished geologist as speaker.

DETAILED INFORMATION

Information concerning registration, accommodations, and activities will appear in the December 1989 issue of *GSA News & Information* and in the South-Central Section *Abstracts with Programs* for 1990. Requests for additional information or suggestions should be addressed to the General Chairman,

Scott M. Ritter
School of Geology
Oklahoma State University
105 Noble Research Center
Stillwater, OK 74078-0451
(405) 744-6358

Preliminary Announcement and Call for Papers

CORDILLERAN SECTION, GSA, 86th Annual Meeting

Tucson, Arizona
March 14–16, 1990

The Cordilleran Section of the Geological Society of America will meet on the campus of the University of Arizona in Tucson, in conjunction with the Pacific Section of the Paleontological Society. The meeting is sponsored by the Department of Geosciences, University of Arizona, and is also hosted by the Arizona Geological Survey and the Tucson Field Office of the U.S. Geological Survey.

ENVIRONMENT

Tucson is a city of approximately half a million people located in the Sonoran Desert of southern Arizona only an hour by car or bus from Nogales on the international border with Mexico. Maximum and minimum temperatures in mid-March, which may be windy but is seldom wet, range from 65°–85°F to 40°–55°F, respectively.

CALL FOR PAPERS

Papers are invited for presentation in technical sessions, symposia, theme sessions, and poster sessions. Papers dealing with all aspects of the Cordilleran region of North America are encouraged. Technical sessions will allow 15 minutes for presentation and 5 minutes for discussion. Symposia and theme sessions may allow equivalent or longer times for presentation at the option of conveners and the symposium coordinator.

CONFERENCE LANGUAGES

[Idiomas Para Las Conferencias]

Abstracts and presentations of papers may be in either English or Spanish. [Los resumenes y presentaciones de los trabajos pueden ser en inglés o español.]

FIELD TRIPS

Both premeeting and postmeeting field trips are planned. For details, contact the respective field trip leaders. Questions should be addressed to Field Trip Coordinator George E. Gehrels, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-6026 (direct) or 621-6024 (department). Preregistration forms will be available in the December 1989 issue of *GSA News & Information*.

Premeeting

1. **Cenozoic Stratigraphy and Tectonics of the Safford, Tonto, and Payson Basins** (2 days). Dale Nations, Department of Geology, P.O. Box 6030, Northern Arizona University, Flagstaff, AZ 86011-6030, (602) 523-7180; Brenda Houser, USGS–Tucson; David Brumbaugh, Northern Arizona University; Larry Anderson, Bureau of Reclamation, Denver.
2. **Geomorphology and Quaternary Geology of the Pitaycachi Fault of Northeastern Sonora, Mexico, Site of the 1887 Sonoran Earthquake** (2½ days). Philip Pearthree, Arizona Geological Survey, 845 North Park Avenue, Tucson, AZ 85719, (602) 882-4795; William B. Bull, University of Arizona.
3. **Juxtaposition of Contrasting Crustal Levels, 1.65 Ga Mazatzal Orogen, Arizona** (2 days). Karl Karlstrom, Department of Geology, P.O. Box 6030, Northern Arizona University, Flagstaff, AZ 86011-6030, (602) 523-7171; Sam Bowring, Washington University; Michael L. Williams, University of Massachusetts; Clay M. Conway, USGS—Flagstaff.
4. **Altar/Caborca Geology: Mid-Cretaceous Sedimentation/Compression and Tertiary Extension** (3½ days). Cesar Jacques-Ayala, Instituto de Geología, UNAM, Apdo. Postal 1039, 83000 Hermosillo, Sonora, Mexico, 011-52-621-75019; Juan Carlos Garcia y Barragan, Instituto de Geología, UNAM; Kees DeJong, University of Cincinnati.
5. **Late Cretaceous and Tertiary Deformation of the Santa Catalina Metamorphic Core Complex** (2 days). Stephen Naruk, Shell Western E&P, Inc., P.O. Box 576, Houston, TX 77001, (713) 870-4414; Ann Bykerk-Kauffman, University of Arizona.
6. **Paleozoic Stratigraphy of the Whetstone Mountains, Cochise County, Arizona** (2 days). Joseph F. Schreiber, Jr., Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-2153; W. Marc Connolly, Department of Geology, Texas A&M University, College Station, TX 77843, (409) 845-2451; Richard K. Armin, Unocal Corporation; Robert W. Stanton, Texas A&M; Augustus K. Armstrong, New Mexico Bureau of Mines and Mineral Resources.
7. **The Early Jurassic Cordilleran Magmatic Arc in Southern Arizona: Plutons to Sand Dunes** (2½ days). Nancy Riggs, Geology Department, University of California, Santa Barbara, CA 93106, (805) 961-2782; Gordon Haxel, USGS—Flagstaff; Cathy Busby-Spera, University of California—Santa Barbara.
8. **Styles of Deformation of the Cordilleran Orogeny** (3 days). Harald Drewes, U.S. Geological Survey, Box 25046, M.S. 905, Denver Federal Center, Denver, CO 80225, (303) 236-5647.
9. **Cretaceous Caldera Systems, Tucson and Sierrita Mountains** (2 days). Peter Lipman, U.S. Geological Survey, Box 25046, M.S. 903, Denver Federal Center, Denver, CO 80225, (303) 236-1020; Chris Fridrich, Las Vegas, Nevada; David Sawyer, USGS—Denver.
10. **Cucurpe Gold deposit Near Magdalena, Sonora** (2 days). John Guilbert, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-2509.
11. **Quaternary and Environmental Geology of the Northeastern Gulf of California** (4 days). Owen Davis, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-7953; Alan Cutler, Keith Meldahl, University of Arizona; Nick Lancaster, Arizona State University; Brian Lock, University of SW Louisiana; Joseph F. Schreiber, Jr., Manuel Palacios-Fest, University of Arizona; Chris Shaw, George C. Page Museum.

Postmeeting

12. **Quaternary Geology and Geologic Hazards of the Canada del Oro Region** (1 day). William B. Bull, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-2219; Edgar J. McCullough, Jr., Peter Kresan, University of Arizona.
13. **Tectonostratigraphic Development and Strain History of the Magdalena Metamorphic Core Complex, Sonora, Mexico** (2½ days). Jonathan Nourse, Division of Geological Sciences, California Institute of Technology, Pasadena, CA 91125, (818) 356-6590.
14. **Late Cretaceous and Early Tertiary Deformation and Plutonism, South-Central Arizona** (2 days). Dick Tosdal, U.S.

(continued on p. 251)

Cordilleran Section (*continued from p. 250*)

Geological Survey, 345 Middlefield Road, Menlo Park, CA 94025, (415) 329-5423; Gordon Haxel, USGS—Flagstaff; Tom Anderson, University of Pittsburgh.

15. **Late Cenozoic San Pedro Valley Deposits and Geoarcheology** (2 days). Everett H. Lindsay, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-6022; C. Vance Haynes, University of Arizona; Gary Smith, University of New Mexico; Richard Ernst, University of Arizona.

16. **Calderas in 3-D, Chiricahua Mountains, Arizona** (2 days). John Pallister, U.S. Geological Survey, Box 25046, M.S. 903, Denver Federal Center, Denver, CO 80225, (303) 236-1023; Edward du Bray, USGS—Denver.

17. **Tectonics and Stratigraphy of the Paleozoic and Triassic Southern Margin of North America, Sonora, Mexico** (4 days). John H. Stewart, U.S. Geological Survey, M.S. 901, 345 Middlefield Road, Menlo Park, CA 94025, (415) 329-5412; Forrest Poole, Keith Ketner, USGS—Denver; Raul Madrid, Palo Alto, California; Jaime Roldan, Instituto de Geología, UNAM; Ricardo Amaya, Universidad de Sonora.

18. **Mesozoic Thrusting, Synplutonic Deformation, and Miocene Overprinting, Harcuvar Complex: A Section through the Pre-Tertiary Crust of West-central Arizona** (2 days). Stephen Richard, Institute for Crustal Studies, University of California, Santa Barbara, CA 93106, (805) 961-8426; Stephen Laubach, Bureau of Economic Geology, University of Texas; Stephen Reynolds, Jon Spencer, Arizona Geological Survey.

19. **Silverbell Porphyry Copper System** (1 day). Spencer R. Titley, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-6018.

SYMPOSIA

The following symposia will include both invited papers and selected volunteered papers. Prospective authors are encouraged to contact the respective conveners. Questions should be addressed to Symposium Coordinator Judith Totman Parrish, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-4595 (direct) or 621-6024 (department).

1. **Paul E. Damon Symposium: Magmatism and Orogeny in the Colorado Plateau and Basin and Range Provinces.** Richard L. Armstrong, Department of Geological Sciences, University of British Columbia, Vancouver, BC V6T 2B4, Canada.

2. **Paleontological Society Symposium: Quaternary Paleoecology of Southwestern North America.** Stephen M. Rowland, Department of Geosciences, University of Nevada, Las Vegas, NV 89154; Andrew S. Cohen, Department of Geosciences, University of Arizona, Tucson, AZ 85721.

3. **Geochemical and Geophysical Characteristics of the Lower Crust in the Southwest.** Joaquin Ruiz, Department of Geosciences, University of Arizona, Tucson, AZ 85721.

4. **Paleozoic Stratigraphy and Tectonics of the Southern Cordillera.** Joseph F. Schreiber, Jr., Department of Geosciences, University of Arizona, Tucson, AZ 85721.

5. **Southern Continuation of the Cordilleran Miogeocline and the Paleozoic Continental Margin of Northern Mexico.** John H. Stewart, U.S. Geological Survey, M.S. 901, 345 Middlefield Road, Menlo Park, CA 94025.

6. **Mesozoic Evolution of Southwestern North America.** Stephen J. Reynolds, Arizona Geological Survey, 845 North Park Avenue, Tucson, AZ 85719.

7. **Mid-Tertiary Cordilleran Volcanism: Relations to Plate Convergence versus Intraplate Processes.** Peter Lipman, U.S. Geological Survey, M.S. 903, Box 25046, Denver Federal Center, Denver, CO 80225-0046.

8. **The Environmental History of the American Southwest during the Last Glacial Termination: The Black Mat.** Owen K. Davis, Department of Geosciences, University of Arizona, Tucson, AZ 85721.

9. **Geologic Maps of Metamorphic Core Complexes and Highly Extended Areas** (poster symposium). Jon Spencer, Arizona Geological Survey, 845 North Park Avenue, Tucson, AZ 85719.

THEME SESSIONS

Theme sessions are similar to symposia in their focus on specific topics, but each is an open forum where all papers are volunteered (whereas symposia include many invited papers). Prospective authors are encouraged to contact the respective conveners. The following theme sessions have been proposed and will be held if enough relevant papers are submitted.

1. **Transition between the Basin and Range and the Colorado Plateau.** Robert B. Scott, U.S. Geological Survey, M.S. 913, Box 25046, Denver Federal Center, Denver, CO 80225-0046.

2. **Cordilleran Lithospheric Seismic Investigations.** Roy A. Johnson, Department of Geosciences, University of Arizona, Tucson, AZ 85721.

3. **Gold in Cordilleran Settings.** Spencer R. Titley, Department of Geosciences, University of Arizona, Tucson, AZ 85721.

4. **Topography and Orogeny: The Evolution of Elevation in the Cordillera.** Clement G. Chase, Department of Geosciences, University of Arizona, Tucson, AZ 85721.

ABSTRACTS

Abstracts are limited to about 250 words and *must* be submitted camera-ready on the official 1990 GSA abstract form, available from Abstracts Coordinator, Geological Society of America, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020.

ABSTRACT DEADLINE: NOVEMBER 14, 1989

An original and five copies of all volunteered abstracts should be sent to Program Coordinator Roy A. Johnson, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-4890 (direct) or 621-6024 (department). Authors who think that a paper might be suitable for inclusion in a theme session or symposium should send an extra copy of the abstract to the appropriate convener (see lists above).

An original and five copies of all invited abstracts should be sent to Symposium Coordinator Judith Totman Parrish, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-4595 (direct) or 621-6024 (department), and an extra copy of the abstract should be sent to the appropriate symposium convener (see list above).

Abstracts will be reviewed for informative content and format, appropriate geographic coverage (Cordilleran region), and originality. Only one volunteered paper may be presented by each individual, although a person may also co-author papers presented by others and may present additional papers invited for symposia.

PROJECTION EQUIPMENT

All slides must be 2" × 2" and fit standard 35-mm carousel trays. Two projectors and two screens will be available for all oral sessions, but overhead projectors will *not* be available. Please bring loaded carousel trays, if possible.

(*continued on p. 252*)

Cordilleran Section (*continued from p. 251*)

POSTER SESSIONS

Four half-days of poster sessions, including one poster symposium (see above), will be available (Wednesday p.m., Thursday a.m. & p.m., Friday a.m.). Poster sessions will be located adjacent to the exhibit area. Please identify your preference for a poster session on the GSA abstract form if you wish to take advantage of this highly effective means of communication.

EXHIBITS

Exhibits will be located one block from the registration area; snacks and refreshments will be continuously available for exhibit visitors. The cost of standard booths will be $250 for commercial exhibitors and $125 for educational or nonprofit institutions. For further information and space reservations, contact Exhibits Coordinator Joseph F. Schreiber, Jr., Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-2153 (direct) or 621-4051 (department).

STUDENT SUPPORT

The GSA Cordilleran Section has funds available for grants to support GSA Student Associates who are contributing to the meeting. Students are strongly encouraged to apply for these grants, and we anticipate that most students who qualify will be funded to some degree. Application letters must be received by January 31, 1990, by the Section Secretary Bruce A. Blackerby, Department of Geology, California State University, Fresno, CA 93740, (209) 294-2955 (direct) or 294-3086 (department). Applications should include certification that the student is a GSA Student Associate of the Cordilleran Section and is presenting a paper or poster session at the Tucson meeting. Students from Mexico and Central America need not be GSA Student Associates to be eligible for student grants.

EVENING EVENTS

After-hours events will include a no-host welcoming party on Tuesday evening, a keg poster session on core complexes and superextension, alumni gatherings on Wednesday evening, and a geosciences forum following an informal buffet of Arizonan/ Sonoran food on Thursday evening.

GUEST ACTIVITIES

A program of spouse and guest excursions will include visits to the Arizona-Sonora Desert Museum, the Amerind Foundation, and other local attractions.

TRAVEL ARRANGEMENTS

Reduced airfare options, with flexibility for premeeting and postmeeting field trips, will be available for those attending the sessions in Tucson. Detailed information will be provided in the final meeting announcement and should be consulted before making your travel arrangements.

SPECIAL REGISTRATION

To encourage attendance by geoscientists from Mexico and Central America, registration fees (but not field trip fees) will be waived for participants who reside in that region. Admission to technical sessions will also be free for precollege earth-science teachers.

DETAILED INFORMATION

Information concerning registration, travel, accommodations, and activities will appear in the December 1989 issue of *GSA News & Information* and as part of the Cordilleran Section *Abstracts with Programs* for 1990. Preliminary questions and suggestions should be addressed to General Chairman William R. Dickinson, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-4051.

Penrose Conference on Nonmarine Cretaceous Correlations To Meet in May 1990

A GSA Penrose Conference "Correlation of Nonmarine Cretaceous Strata" will be held May 9–13, 1990, in Breckenridge, Colorado. Conveners are Niall J. Mateer, 1467 N. 17th, Laramie, WY 82070, (307) 721-4946; and Norman O. Fredericksen, USGS, 970 National Center, Reston, VA 22092, (703) 648-5277.

Stratigraphic research on the Cretaceous system has focused mainly on marine strata due largely to the rich and well-defined paleontological record. The nonmarine Cretaceous strata are more difficult to correlate and have been largely ignored worldwide.

The correlation of nonmarine Cretaceous strata has been attempted using a variety of fossils and, more recently, other stratigraphic criteria. A problem, however, has been the lack of coordination between workers using different fossil groups and workers using newer stratigraphic techniques (e.g., high-resolution and seismic stratigraphy) with respect to nonmarine sequences.

Nonmarine biostratigraphic zonations in North America are limited to pollen and spores, and to a lesser extent, fossil vertebrates, although other fossil groups are used on other continents (e.g., ostracods). The localized effects of climate, ecology, and dispersal on all fossil groups (e.g., pollen/spores, plant megafossils, mammals, reptiles, molluscs, ostracods, conchostracans) are not fully understood, and this impairs our ability to assess their contributions to a potentially comprehensive biostratigraphic zonation. There is a necessity to improve correlations with marine fossil zones where suitable interfingerings occur.

Because of the inherently discontinuous nature of most nonmarine strata, there is a need to integrate a comprehensive biostratigraphic zonation with other, nonbiological stratigraphical methodologies (e.g., event stratigraphy, high-resolution stratigraphy, magnetostratigraphy, chemostratigraphy). Initial research has been forthcoming in these areas, but relatively little unified research has been published.

Despite the long history of study of nonmarine Cretaceous strata and fossils in the western interior of North America, much of the stratigraphy is informal and based on many assumptions lacking hard data (e.g., the supposedly ubiquitous Lower Cretaceous hiatus separating the presumed Jurassic Morrison Formation from the mid-Cretaceous strata; the status of the Dakota unit).

Outside North America similar problems exist, although these often have different biases owing, for example, to differential abundances of various fossils, or to the state of local expertise.

The purpose of this conference is to develop some implications for nonmarine strata outside of the Cretaceous system and for the Global Sedimentary Geology Program project "Cretaceous Rhythms, Events, and Resources."

These are the issues that this conference will consider. The Cretaceous system has been chosen due to

- The activities of IGCP-245, "Nonmarine Cretaceous Correlations"
- The great extent of nonmarine Cretaceous rocks in the western interior
- The current interest in these strata (e.g., the K-T boundary, stratigraphic setting of dinosaurs, economic deposits).

The conference will consist of a full-day field trip which will visit the nonmarine Cretaceous-Tertiary boundary section at South Table Mountain and selected localities along the Dakota Hogback, all near Golden, Colorado. Scientific and logistical details of the field trip will be assembled into a brief handout. The remaining three days will consist of brief key presentations by invited speakers followed by extensive discussion periods. The key themes will be paleontology, magnetostratigraphy, paleoclimates, sedimentology, and nonclimatic impacts on the stratigraphic record, with the emphasis being on their correlation potential.

Participation will be limited to 70 persons. Prospective participants should apply by *January 15, 1990*, outlining their interest in this conference and their current research to either convener. The conference registration fee will be about $550.

Penrose Conference on Large Lakes and Their Stratigraphic Record Scheduled for September 1990

A GSA Penrose Conference "Large Lakes and Their Stratigraphic Record" will be held September 9–13, 1990 at the Granlibakken Conference Center at Lake Tahoe, California. Conveners are Andrew S. Cohen, Department of Geosciences, University of Arizona, Tucson, AZ 85721, (602) 621-4691; and Thomas C. Johnson, Department of Geology, Duke University Marine Laboratory, Beaufort, NC 28516, (919) 728-2111.

Large lakes of the world span all climatic zones and vary significantly in their origin, chemistry, and response to climatic forcing. During the past few years, significant new information has been obtained on the structure and sedimentology of modern large lakes and concurrently there has been renewed interest in the sedimentology, structure, geochemistry, and paleontology of ancient lacustrine basins. The time is appropriate for geologists working on ancient lake deposits and sedimentologists, geophysicists, and limnologists working on modern lakes to communicate their interests, problems, and recent results for the purpose of providing a better perspective for the formulation of future research directions.

Large lakes behave as small oceans in many respects. They are large enough to respond to large-scale climatic events—at times in very dramatic ways. They contain distinct inshore and offshore zones, pelagic and benthic ecosystems, and in some instances, very strong chemical gradients as, for example, between oxygenated surface waters and anoxic bottom waters. Many contain well-developed sublacustrine fans and associated turbidite features, as well as sufficiently strong deep-water circulation to cause major erosional surfaces and current drift deposits. Evaporites of widely varying composition occur in some lakes, and extensive carbonate sequences and organic-rich facies in others. Sedimentation rates in large lakes typically fall in the range of 0.1–5 m/ka. Consequently, lacustrine sediments carry a record of Earth history that is resolvable to decades, if not years. The age of some large tectonic lakes may exceed 10 m.y.; thus, they hold the longest high-resolution record of global change in existence on our planet.

This conference will concern the genesis, diagenesis, and interpretation of lake sediments: the modern processes that influence them, the structure of basins that contain them, and their record of global change. The first goal of the conference on stratigraphy and depositional systems of large lakes is to provide a forum in which geological limnologists, paleolimnologists, and

(*continued on p. 254*)

Sarewitz Named GSA Congressional Science Fellow for 1989–1990

Daniel R. Sarewitz has been selected as the fourth GSA Congressional Science Fellow. He will work as a special legislative assistant on the staff of a committee or member of the U.S. Congress from September 1989 through August 1990.

In this position, Sarewitz will advise members of Congress on the implications of geology- and other science-related legislative matters. Also, he will focus on science education policy, particularly at the university level. "President Bush has emphasized his commitment to improving science and math education in America, so this is a propitious time to pursue legislative and budgetary initiatives," he said in his application for fellowship. "It is widely argued that science education in the United States is inadequate. Shortages of well-trained scientists and engineers are predicted for the future, and, of more to concern to me, nonscientists (including legislators), are increasingly ill-equipped to evaluate issues that have scientific or quantitative underpinnings."

Sarewitz received his B.S., with honors, in geology from Haverford College in 1978, his M.S. from Oregon State University in 1983, and his Ph.D. in geology in 1986 from Cornell University. Since 1986, he has been a research associate for the Department of Geological Sciences at Cornell. Previously, he worked as a geological consultant in the Department of Geology at Indiana University, developing tectonic models for earthquake distribution in Soviet Central Asia; as a research assistant at Cornell analyzing structural, stratigraphic, and geophysical data bearing on the evolution of the Eurasia/Philippine Sea plate boundary; and as a staff engineer in private industry studying techniques for coal dust suppression and fire control in mines. He recently was in the USSR to study the relations between geologic structures and active seismicity in the Garm region. In addition, Sarewitz was the chief scientist on the *R/V Moana Wave*, implementing and supervising a survey of the Philippine interior seas.

The Fellowship

The GSA Congressional Science Fellowship is intended as a way to obtain first-hand experience in the public policy process and to educate the earth science community about the need for informed involvement; to demonstrate the value of such science-government interaction; and to make practical contributions to the more effective use of scientific and technical knowledge in government. Requirements for the fellowship include exceptional competence in some area of the earth sciences, cognizance of a broad range of matters outside the fellow's particular area, and a strong interest in working on a range of public policy problems.

The fellowship is funded by GSA and by a grant from the U.S. Geological Survey. Guided by the American Association for the Advancement of Science, the program places highly qualified, accomplished scientists with the offices of individual members of Congress and committees for a one-year assignment. Fellows perform in much the same way as regular staff members; they have the opportunity to be involved in varied legislative, oversight, and investigative activities. They offer their special knowledge, skills, and competence for the opportunity to acquire experience and the chance to contribute to the formulation of national policy. The GSA Congressional Fellow reports periodically to the GSA membership and to the USGS during the one-year period.

Selection Committee

On the selection committee for the fellowship this year were Chairman Clement F. Shearer, USGS; William R. Greenwood, USGS; Marcus Milling, University of Texas at Austin; and ex officio members James E. Evans, 1988 GSA Congressional Fellow; and F. Michael Wahl, GSA Executive Director.

Penrose Conference on Large Lakes (*continued from p. 253*)

geologists studying pre-Pleistocene lake deposits can discuss topics of mutual interest. Prior to the establishment of the IGCP-219 working group on lakes, geoscientists from these three subdisciplines had limited interaction. Recent meetings and published symposia volumes demonstrate that within specific interest groups there is movement toward synthesizing the knowledge of neo- and paleolimnologists. The second goal of the conference is to broaden this synthesis beyond specific areas of study and create a dialogue among (for example) the sedimentologist monitoring bottom current effects on deep water sediment transport, the Quaternary paleolimnologist investigating the taphonomy of pollen assemblages, and the petroleum explorationist looking for mechanisms to explain the occurrence of subtle deep-water lacustrine stratigraphic traps. All three of these disciplines may have more interests in common than is currently realized.

The conference will consist of 3½ days of oral presentations, poster sessions, discussions, and two field trips. Sessions will be organized around four major themes: (1) The Lake as a Small Ocean; (2) Basin Analysis of Lake Deposits; (3) The Interpretation of Ancient Large-Lake Deposits; and (4) Lake Deposits as Records of Regional and Global Change. Each thematic session will be opened by a keynote presentation, to be followed by a limited number of formal talks followed by extended discussion. Daily informal poster sessions will be scheduled to allow all interested participants to present recent research results.

The first field trip will be a half-day excursion to examine the coastal sedimentology and depositional processes of modern Lake Tahoe. The second field trip will examine the limnology and Quaternary sedimentology and stratigraphy of Mono Lake, California. Both field trips will provide excellent opportunities for examining the controls exerted by structure, limnology, and volcanic processes on facies distribution in two well-studied tectonic lake basins. The Quaternary history of the Mono Lake basin will provide an excellent forum for discussions of the impact of global climatic change on lacustrine stratigraphy.

The conference will be limited to 50–60 participants who are actively pursuing research on the geology of large lakes or the stratigraphic record of lake deposits. Prospective participants should send a letter of application stating the relevance of their research to the conference to either of the co-conveners. The deadline for applications is **April 1, 1990**. The registration fee is not yet determined but probably will be about $600. It includes food, lodging, and field trips. Limited suppport will be available for qualified graduate students and overseas participants.

CONTENTS OF THE TECHNICAL PROGRAM

1. Search here for the topics in which you are interested.
2. Refer to the following Program Schedule for details.
3. Speaker information will be listed in the abstracts volume and in the on-site Program.

SYMPOSIA

S1. Geoscience Research and Public Policy, *1989 Annual Meeting Committee Frontiers Symposium* ... Nov. 8
S2. Cenozoic Deep-Sea Foraminifera: Distribution and Environments, *CF* ... Nov. 7
S3. Molecular Approaches to Paleoclimatic and Paleoenvironmental Reconstruction, *GS, OGD Division* ... Nov. 5
S4. Frontiers in Geoscience Information, *GIS* ... Nov. 6
S5. Application of Modern Powder Diffraction Techniques to Problems in Mineralogy and Geology, *MSA* ... Nov. 6
S6. Remote Sensing and Geographic Information Systems: Techniques on the Frontier of Change, *NAGT* ... Nov. 6
S7. Radiations and Recoveries from Mass Extinctions, *PS* ... Nov. 6
S8. Potential for Olympic Dam-type Cu-Au-U-REE Deposits in the Proterozoic Granite-Rhyolite Terranes, Midcontinent, USA, *SEG* ... Nov. 6
S9. Mississippi Valley-type Deposits, *SEG* ... Nov. 5
S10. Becker and Van Hise's Challenges: Geology and Geophysics Since 1904, *History Division* ... Nov. 7
S11. Geological Exploration of the Solar System: Past, Present, and Future, *Planetary Division* ... Nov. 7
S12. The Legacy of T. C. Chamberlin, *Quaternary/Geomorphology Division* ... Nov. 7
S13. Implications for the Geological Sciences from Recent Developments in Geochemical Techniques and Instrumentation, *GS, OGD Division* ... Nov. 7
S14. Sigma Gamma Epsilon Research Poster Symposium, *SGE* ... Nov. 7
S15. Geological Controls on the Regional Distribution of Archaeological Sites, *Archaeology Division* ... Nov. 8
S16. Modern and Ancient Environments of Coal Formation, *Coal Division* ... Nov. 6
S17. Site Characterization for Conditions of Non-Darcian Flow, *Engineering and Hydrogeology Divisions*, Parts I & II ... Nov. 9
S18. Intraplate Seismicity and Deformation: Geological and Geophysical Constraints, *Geophysics Division* ... Nov. 7
S19. Rates and Duration of Deformational Processes and Orogenic Events, *Structure/Tectonics Division*, Parts I & II ... Nov. 6

THEME SESSIONS—Oral and Poster

T1. Geological Mapping in the Next Several Decades Parts I & II (Posters) ... Nov. 7
T2. The Effects of Man on the Mississippi River and Its Delta ... Nov. 9
T3. Correlation and Basin Analysis of Nonfossiliferous Sedimentary Rocks ... Nov. 9
T4. Magma Currents, Melt Migration, and Geochemical Transport in Mafic Igneous Complexes ... Nov. 8
T6. Trace Element and Isotopic Studies with the Ion Microprobe Parts I (Posters) & II ... Nov. 9
T7. Sub-Mediterranean "Giant Salt" as a Deep-Water Brine Precipitate: An Alternative to the Evaporate Hypthesis ... Nov. 9
T8. Quantitative Structural Geology: The Nature, Mechanism, and Implications of Natural Deformation, Parts I & II ... Nov. 8
T11. Global Sedimentary Geology ... Nov. 7
T12. A Growing Crisis in (Geo)Science Education, Parts I & II ... Nov. 9
T13. The Lunar Science Frontier: Implications for the Earth's Past and Future, Parts I & II ... Nov. 9
T14. Tectonometamorphism, Parts I, II, III, & IV (Posters) ... Nov. 7, 8, 9
T15. Continental Dynamics ... Nov. 6
T17. Mantle Plumes and Mass Extinctions ... Nov. 6
T18. Geoscience and the Arts, Parts I & II (Posters) ... Nov. 8
T19. New Concepts in Understanding Fluid-Rock Interactions at High Temperatures: Problems and Solutions ... Nov. 6
T21. Frontiers of Fluid-Inclusion Research, Parts I & II ... Nov. 9
T22. Application of Artificial Intelligence, Expert System, or Knowledge-Based System Methods in Geological Sciences ... Nov. 8
T23. Determining the Relative Timing of Pluton Emplacement and Regional Deformation ... Nov. 9
T24. Geomorphic Processes and Landform Evolution ... Nov. 6
T25. Late Eocene–Oligocene Climatic and Biotic Evolution ... Nov. 6
T26. Hydrothermal Organic Geochemistry ... Nov. 6
T27. Cretaceous Record of the Eastern Margin of the Western Interior Seaway (Posters) ... Nov. 9
T28. Hydrogeologic Challenges for the Next Decade ... Nov. 6
T29. Thermal and Hydrologic Evolution of Accretionary Prisms: Modern and Ancient Examples, Parts I (Posters) & II (Posters) ... Nov. 9
T30. Origin of Brines in the Earth's Crust ... Nov. 9
T31. Geologic Causes of Natural Radionuclide Anomalies ... Nov. 7
T32. Rock-Water Interactions in Carbonate Rocks and Sediments, Sedimentary Geology Division, Parts I & II ... Nov. 8

VOLUNTEERED POSTER SESSIONS

Poster Session I ... Nov. 6
Geochemistry, Engineering and Environmental Geology, Petroleum Geology
Poster Session II ... Nov. 6
Geomorphology/Glacial, History of Geology, Micropaleontology, Structural Geology
Poster III ... Nov. 7
Geophysics, Remote Sensing, Geoscience Information, Paleontology, Mineralogy/Crystallography
Poster IV ... Nov. 7
Coal, Geochemistry, Stratigraphy
Poster Session V ... Nov. 8
Igneous Petrology, Tectonics
Poster Session VI ... Nov. 8
Hydrogeology, Volcanology, Geology Education, Economic Geology
Poster Session VII ... Nov. 9
Archaeology, Metamorphic Petrology, Planetary Geology, Precambrian Geology, Quaternary Geology
Poster Session VIII ... Nov. 9
Marine Geology, Sedimentology, Tectonics/Geophysics

VOLUNTEERED ORAL SESSIONS

Archaeology ... Nov. 8
Coal ... Nov. 6
Economic Geology I ... Nov. 7
Economic Geology II ... Nov. 7
Economic Geology III ... Nov. 9
Economic Geology IV ... Nov. 9
Engineering Geology ... Nov. 8
Environmental ... Nov. 7
Experimental Petrology ... Nov. 7
Geochemistry I ... Nov. 6
Geochemistry II ... Nov. 7
Geochemistry III ... Nov. 8
Geochemistry IV ... Nov. 9
Geological Education ... Nov. 9
Geomorphology I ... Nov. 7
Geomorphology II ... Nov. 8
Geophysics ... Nov. 7
Geoscience Information ... Nov. 7
Glacial Geology ... Nov. 6
History of Geology ... Nov. 8
Hydrogeology I ... Nov. 6
Hydrogeology II ... Nov. 8
Igneous Petrology I ... Nov. 6
Igneous Petrology II ... Nov. 7
Igneous Petrology III ... Nov. 8
Igneous Petrology IV ... Nov. 9
Marine Geology/Oceanography ... Nov. 8
Metamorphic Petrology I ... Nov. 8
Metamorphic Petrology II ... Nov. 8
Metamorphic Petrology III ... Nov. 9
Micropaleontology I ... Nov. 6
Micropaleontology II ... Nov. 8
Mineralogy/Crystallography I ... Nov. 6
Mineralogy/Crystallography II ... Nov. 8
Paleontology I ... Nov. 6
Paleontology II ... Nov. 7
Paleontology III ... Nov. 8
Paleontology IV ... Nov. 8
Paleontology V ... Nov. 9
Paleontology VI ... Nov. 9
Petroleum Geology ... Nov. 7
Planetary Geology/Remote Sensing ... Nov. 9
Precambrian Geology ... Nov. 6
Quaternary Geology I ... Nov. 8
Quaternary Geology II ... Nov. 9
Sedimentology/Sedimentary Petrology I ... Nov. 6
Sedimentology/Sedimentary Petrology II ... Nov. 6
Sedimentology/Sedimentary Petrology III ... Nov. 7
Sedimentology/Sedimentary Petrology IV ... Nov. 7
Sedimentology/Sedimentary Petrology V ... Nov. 9
Sedimentology/Sedimentary Petrology VI ... Nov. 9
Stratigraphy I ... Nov. 6
Stratigraphy II ... Nov. 6
Stratigraphy III ... Nov. 7
Structure I ... Nov. 7
Structure II ... Nov. 7
Structure III ... Nov. 9
Tectonics I ... Nov. 6
Tectonics II ... Nov. 8
Tectonics III ... Nov. 8
Tectonics IV ... Nov. 9
Tectonics V ... Nov. 9
Tectonics/Geophysics I ... Nov. 7
Tectonics/Geophysics II ... Nov. 9
Volcanology ... Nov. 6

Standard Abbreviations: CF—Cushman Foundation; GS—Geochemical Society; GIS—Geoscience Information Society; MSA—Mineralogical Society of America; NAGT—National Association of Geology Teachers; PS—Paleontological Society; SGE—Sigma Gamma Epsilon

1989 TECHNICAL PROGRAM SCHEDULE

SUNDAY
NOVEMBER 5

A.M.

SESSION 1, 8:30 a.m., CCC:121-122/125-126
S9. SEG SYMPOSIUM: MISSISSIPPI VALLEY-TYPE DEPOSITS I

P.M.

SESSION 2, 1:00 p.m., CCC:130
S3. GS-OGD SYMPOSIUM: MOLECULAR APPROACHES TO PALEOCLIMATIC AND PALEOENVIRONMENTAL RECONSTRUCTION

SESSION 3, 1:00 p.m., CCC:121-122/125-126
S9. SEG SYMPOSIUM: MISSISSIPPI VALLEY-TYPE DEPOSITS II

MONDAY
NOVEMBER 6

A.M.

SESSION 4, 8:00 a.m., CCC:265-266
GS—GEOCHEMISTRY I: ORGANIC AND STABLE ISOTOPE GEOCHEMISTRY

SESSION 5, 8:00 a.m., CCC:264
MSA—VOLCANOLOGY

SESSION 6, 8:00 a.m., CCC:Hall B
POSTER SESSION I: DIAGENESIS AND SEDIMENTARY GEOCHEMISTRY

SESSION 7, 8:00 a.m., CCC:Hall B
POSTER SESSION I: ENGINEERING GEOLOGY

SESSION 8, 8:00 a.m., CCC:Hall B
POSTER SESSION I: ENVIRONMENTAL GEOLOGY

SESSION 9, 8:00 a.m., CCC:Hall B
POSTER SESSION I: PETROLEUM GEOLOGY

SESSION 10, 8:00 a.m., CCC:267
PRECAMBRIAN GEOLOGY - AGES, ISOTOPES, AND BIF'S

SESSION 11, 8:00 a.m., CCC:120-124
S16. GSA COAL GEOLOGY DIVISION SYMPOSIUM: MODERN AND ANCIENT ENVIRONMENTS OF COAL FORMATION

SESSION 12, 8:00 a.m., CCC:121-122/125-126
S19. GSA STRUCTURAL GEOLOGY AND TECTONICS DIVISION SYMPOSIUM: RATES AND DURATION OF DEFORMATIONAL PROCESSES AND OROGENIC EVENTS

SESSION 13, 8:00 a.m., CCC:276
S4. GIS SYMPOSIUM: FRONTIERS IN GEOSCIENCE INFORMATION

SESSION 14, 8:00 a.m., CCC:131-132
S7. PS SYMPOSIUM: RADIATIONS AND RECOVERIES FROM MASS EXTINCTIONS

SESSION 15, 8:00 a.m., CCC:123-127
S8. SEG SYMPOSIUM: POTENTIAL FOR OLYMPI C DAM-TYPE Cu-Au-U-REE DEPOSITS IN PROTEROZOIC GRANITE-RHYOLITE TERRANES, MIDCONTINENT, U.S.A.

MONDAY
NOVEMBER 6

A.M. (continued)

SESSION 16, 8:00 a.m., CCC:261-262
SEQUENCE STRATIGRAPHY I

SESSION 17, 8:00 a.m., CCC:275
T24. GEOMORPHIC PROCESSES AND LANDFORM EVOLUTION

SESSION 18, 8:15 a.m., CCC:274
HYDROGEOLOGY I

SESSION 19, 8:15 a.m., CCC:260
MSA—MINERALOGY/CRYSTALLOGRAPHY I

SESSION 20, 8:30 a.m., CCC:130
CF—MICROPALEONTOLOGY I

SESSION 21, 8:30 a.m., CCC:270
T26. HYDROTHERMAL ORGANIC GEOCHEMISTRY

P.M.

SESSION 22, 1:00 p.m., CCC:264
COAL GEOLOGY

SESSION 23, 1:00 p.m., CCC:270
GLACIAL GEOLOGY

SESSION 24, 1:00 p.m., CCC:265-266
MSA—IGNEOUS PETROLOGY I: VOLCANISM AND THEORETICAL CONSTRAINTS ON MAGMA EVOLUTION

SESSION 25, 1:00 p.m., CCC:Hall B
POSTER SESSION II: GEOMORPHOLOGY AND GLACIAL

SESSION 26, 1:00 p.m., CCC:Hall B
POSTER SESSION II: HISTORY OF GEOLOGY

SESSION 27, 1:00 p.m., CCC:Hall B
POSTER SESSION II: MICROPALEONTOLOGY

SESSION 28, 1:00 p.m., CCC:Hall B
POSTER SESSION II: STRUCTURAL GEOLOGY

SESSION 29, 1:00 p.m., CCC:123-127
PS—PALEONTOLOGY I: TAPHONOMY

SESSION 30, 1:00 p.m., CCC:276
S5. MSA SYMPOSIUM: APPLICATION OF MODERN POWDER DIFFRACTION TECHNIQUES TO PROBLEMS IN MINERALOGY AND GEOLOGY

SESSION 31, 1:00 p.m., CCC:274
S6. NAGT SYMPOSIUM: REMOTE SENSING AND GEOGRAPHIC INFORMATION SYSTEMS: TECHNIQUES ON THE FRONTIER OF CHANGE

SESSION 32, 1:00 p.m., CCC:260
SED/SED PET I: CARBONATE DIAGENESIS

SESSION 33, 1:00 p.m., CCC:261-262
SEQUENCE STRATIGRAPHY II

SESSION 34, 1:00 p.m., CCC:130
T15. CONTINENTAL DYNAMICS

MONDAY
NOVEMBER 6

P.M. (continued)

SESSION 35, 1:00 p.m., CCC:120-124
T19. NEW CONCEPTS IN UNDERSTANDING FLUID-ROCK INTERACTIONS AT HIGH TEMPERATURES: PROBLEMS AND SOLUTIONS

SESSION 36, 1:00 p.m., CCC:275
T25. LATE EOCENE-OLIGOCENE CLIMATIC AND BIOTIC EVOLUTION

SESSION 37, 1:00 p.m., CCC:267
TECTONICS I: CORDILLERAN REGION

SESSION 38, 1:30 p.m., CCC:121-122/125-126
T17. MANTLE PLUMES AND MASS EXTINCTIONS

SESSION 39, 1:30 p.m., CCC:131-132
T28. HYDROGEOLOGIC CHALLENGES FOR THE NEXT DECADE

SESSION 40, 3:00 p.m., CCC:261-262
SED/SED PET II: SEDIMENTARY PROCESSES AND PETROLOGY

TUESDAY
NOVEMBER 7

A.M.

SESSION 41, 8:00 a.m., CCC:270
GEOPHYSICS: CRUSTAL GEOPHYSICS AND AMS

SESSION 42, 8:00 a.m., CCC:274
GIS—ISSUES AND TRENDS IN GEOSCIENCE INFORMATION

SESSION 43, 8:00 a.m., CCC:264
GS—GEOCHEMISTRY II: MINERAL SOLUTION AND HYDROTHERMAL PROCESSES

SESSION 44, 8:00 a.m., CCC:260
MSA—IGNEOUS PETROLOGY II: CONSTRAINTS ON MANTLE PROCESSES, ANORTHOSITES, AND MAFIC PLUTONIC ROCKS

SESSION 45, 8:00 a.m., CCC:Hall B
POSTER SESSION III: T1: GEOLOGICAL MAPPING IN THE NEXT SEVERAL DECADES I

SESSION 46, 8:00 a.m., CCC:Hall B
POSTER SESSION III: GEOPHYSICS OF THE MIDCONTINENT

SESSION 47, 8:00 a.m., CCC:Hall B
POSTER SESSION III: REMOTE SENSING

SESSION 48, 8:00 a.m., CCC:Hall B
POSTER SESSION III: GIS—GEOSCIENCE LIBRARY SPACE AND FACILITY PLANNING

SESSION 49, 8:00 a.m., CCC:Hall B
POSTER SESSION III: PS—PALEONTOLOGY

SESSION 50, 8:00 a.m., CCC:Hall B
POSTER SESSION III: MSA—MINERALOGY/CRYSTALLOGRAPHY

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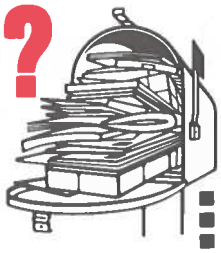

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INSIDE

Northeastern Section 1990 Meeting ..... p. 246
South-Central Section 1990 Meeting ..... p. 248
Cordilleran Section 1990 Meeting ..... p. 250
1989 Annual Meeting Technical Program ..... p. 255

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TUESDAY
NOVEMBER 7

A.M. (continued)

SESSION 51, 8:00 a.m., CCC:121-122/125-126
S11. GSA PLANETARY GEOLOGY DIVISION SYMPOSIUM: GEOLOGIC EXPLORATION OF THE SOLAR SYSTEM: PAST, PRESENT, AND FUTURE

SESSION 52, 8:00 a.m., CCC:123-127
S12. GSA QUATERNARY GEOLOGY AND GEOMORPHOLOGY DIVISION SYMPOSIUM: THE LEGACY OF T. C. CHAMBERLIN

SESSION 53, 8:00 a.m., CCC:130
S2. CUSHMAN FOUNDATION SYMPOSIUM: CENOZOIC DEEP-SEA FORAMINIFERA: DISTRIBUTION AND ENVIRONMENTS

SESSION 54, 8:00 a.m., CCC:276
SED/SED PET III: CLASTIC FACIES I (NONMARINE) LAKES, PEDS, AND RIVERS

SESSION 55, 8:00 a.m., CCC:261-262
SEG—ECONOMIC GEOLOGY I: SEDIMENT-HOSTED ORES/Cu-Ni AND PLATINUM DEPOSITS

SESSION 56, 8:00 a.m., CCC:267
STRATIGRAPHY III: BOUNDARY PROBLEMS, GEOCHRONOLOGY, AND CHRONOSTRATIGRAPHIC MARKERS

SESSION 57, 8:00 a.m., CCC:265-266
STRUCTURE I: THRUST BELTS

SESSION 58, 8:00 a.m., CCC:275
T11. GLOBAL SEDIMENTARY GEOLOGY

SESSION 59, 8:00 a.m., CCC:131-132
T14. TECTONOMETAMORPHISM I

SESSION 60, 8:00 a.m., CCC:120-124
T31. GEOLOGICAL CAUSES OF NATURAL RADIONUCLIDE ANOMALIES

SESSION 61, 10:00 a.m., CCC:274
PS—PALEONTOLOGY II: PALEOBOTANY

SESSION 62, 10:00 a.m., CCC:270
TECTONICS/GEOPHYSICS I: CONTINENTAL INTERIORS

P.M.

SESSION 63, 1:30 p.m., CCC:261-262
ECONOMIC GEOLOGY II: "POTPOURRI"

SESSION 64, 1:30 p.m., CCC:267
GEOMORPHOLOGY I

SESSION 65, 1:30 p.m., CCC:260
MSA—EXPERIMENTAL PETROLOGY: FLUIDS, MINERALS, AND MELTS

SESSION 66, 1:30 p.m., CCC:270
PETROLEUM GEOLOGY

SESSION 67, 1:30 p.m., CCC:Hall B
POSTER SESSION IV: S14. SGE: INAUGURAL RESEARCH POSTER SYMPOSIUM

SESSION 68, 1:30 p.m., CCC:Hall B
POSTER SESSION IV: COAL GEOLOGY

TUESDAY
NOVEMBER 7

P.M. (continued)

SESSION 69, 1:30 p.m., CCC:Hall B
POSTER SESSION IV: GS—GEOCHEMISTRY

SESSION 70, 1:30 p.m., CCC:Hall B
POSTER SESSION IV: STRATIGRAPHY

SESSION 71, 1:30 p.m., CCC:274
S10. GSA HISTORY OF GEOLOGY DIVISION SYMPOSIUM: BECKER AND VAN HISE'S CHALLENGES: GEOLOGY AND GEOPHYSICS SINCE 1904

SESSION 72, 1:30 p.m., CCC:130
S13. GEOCHEMICAL SOCIETY SYMPOSIUM: IMPLICATIONS FOR THE GEOLOGICAL SCIENCES FROM RECENT DEVELOPMENTS IN GEOCHEMICAL TECHNIQUES AND INSTRUMENTATION

SESSION 73, 1:30 p.m., CCC:276
SED/SED PET IV: CLASTIC FACIES II (MARINE): DELTAS TO BASINS

SESSION 74, 1:30 p.m., CCC:265-266
STRUCTURE II: FAULTS, FOLDS, AND DEFORMATION PROCESSES

SESSION 75, 1:30 p.m., CCC:121-122/125-126
T1. GEOLOGICAL MAPPING IN THE NEXT SEVERAL DECADES II

SESSION 76, 1:30 p.m., CCC:131-132
T14. TECTONOMETAMORPHISM II

SESSION 77, 1:45 p.m., CCC:123-127
S18. GSA GEOPHYSICS DIVISION SYMPOSIUM: INTRAPLATE SEISMICITY AND DEFORMATION: GEOLOGICAL AND GEOPHYSICAL CONSTRAINTS

SESSION 78, 2:00 p.m., CCC:120-124
ENVIRONMENTAL GEOLOGY

WEDNESDAY
NOVEMBER 8

A.M.

SESSION 79, 8:00 a.m., CCC:275
GS—GEOCHEMISTRY III: CRUSTAL EVOLUTION AND GEOCHEMICAL MODELING

SESSION 80, 8:00 a.m., CCC:261-262
HYDROGEOLOGY II

SESSION 81, 8:00 a.m., CCC:267
MARINE GEOLOGY AND OCEANOGRAPHY

SESSION 82, 8:00 a.m., CCC:Hall B
POSTER SESSION V: MSA—IGNEOUS PETROLOGY

SESSION 83, 8:00 a.m., CCC:Hall B
POSTER SESSION V: TECTONICS

SESSION 84, 8:00 a.m., CCC:274
PS—PALEONTOLOGY III: EVOLUTION: RADIATION AND EXTINCTION

SESSION 85, 8:00 a.m., CCC:260
QUATERNARY I

HIGHLIGHTS OF EVENTS

SUNDAY, NOVEMBER 5

Cervantes Convention Center:

- Registration, 10:00 a.m. to 7:00 p.m.
- Exhibits Open and Welcoming Reception, 6:00 p.m. to 9:00 p.m.
- Frontiers Photo Salon Opens, 6:00 p.m. to 9:00 p.m

MONDAY, NOVEMBER 6

Cervantes Convention Center:

- Registration, 7:30 a.m. to 5:00 p.m.
- Exhibits, 9:00 a.m. to 5:00 p.m.
- Science Theater, Room 263, 9:00 a.m. to 4:30 p.m.

Guest Tour—Day In The Park, 9:30 a.m. to 4:30 p.m.

Guest Tour—Geologic Story of the St. Louis Riverfront, 8:00 a.m. to 10:00 a.m.

Engineering Geology Luncheon, 12:00 noon, Adam's Mark, St. Louis Ballroom C

History of Geology Luncheon, 12:00 noon, Adam's Mark, St. Louis Ballroom B

GSA Employment Service Forum, 1:00 p.m., Sheraton, Boulevard B

GSA Presidential Address and Awards Ceremonies, 5:30 p.m., Adam's Mark, Promenade Ballroom A, B, C

GSA Awards Reception, 6:30 p.m., Adam's Mark, Promenade Ballroom D

Alumni Night, 7:00 p.m. to 9:30 p.m., group receptions, Adam's Mark, St. Louis Ballroom

TUESDAY, NOVEMBER 7

Cervantes Convention Center:

- Registration, 7:30 a.m. to 5:00 p.m.
- Exhibits, 9:00 a.m. to 5:00 p.m.
- Science Theater, Room 263, 9:00 a.m. to 4:30 p.m.

Guest Tour—Cave Tour, 9:30 a.m. to 4:30 p.m.

Guest Tour—St. Louis Grandeur, 9:30 a.m. to 2:30 p.m.

Discussion with GSA Congressional Science Fellow, 12:15 p.m., Cervantes, Rooms 261–262

Sedimentary Geology Breakfast, 7:00 a.m., Adam's Mark, St. Louis Ballroom F

Assoc. for Women Geoscientists Breakfast, 7:00 a.m., Adam's Mark, St. Louis Ballroom B

Geophysics Luncheon, 12:00 noon, Adam's Mark, St. Louis Ballroom F

GIS Luncheon, 12:00 noon, Adam's Mark, St. Louis Ballroom B

Hydrogeology Luncheon, 12:00 noon, Adam's Mark, Promenade Ballroom F

MSA Luncheon, 12:15 p.m., Adam's Mark, Promenade Ballroom D

NAGT Luncheon, 11:45 p.m., Adam's Mark, St. Louis Ballroom H

1989 TECHNICAL PROGRAM SCHEDULE

WEDNESDAY
NOVEMBER 8

A.M. (continued)

SESSION 86, 8:00 a.m., CCC:130
S15. GSA ARCHAEOLOGICAL DIVISION SYMPOSIUM: GEOLOGICAL CONTROLS ON THE REGIONAL DISTRIBUTION OF ARCHAEOLOGICAL SITES

SESSION 87, 8:00 a.m., CCC:123-127
T14. TECTONOMETAMORPHISM III

SESSION 88, 8:00 a.m., CCC:270
T18. GEOSCIENCE AND THE ARTS I

SESSION 89, 8:00 a.m., CCC:121-122/125-126
T32. ROCK-WATER INTERACTIONS IN CARBONATE ROCKS AND SEDIMENTS I

SESSION 90, 8:00 a.m., CCC:120-124
T8. QUANTITATIVE STRUCTURAL GEOLOGY: THE NATURE, MECHANISM, AND IMPLICATIONS OF NATURAL DEFORMATION I

SESSION 91, 8:00 a.m., CCC:276
TECTONICS II: CIRCUM-ATLANTIC PALEOZOIC OROGENS

SESSION 92, 8:30 a.m., CCC:265-266
CF—MICROPALEONTOLOGY II

SESSION 93, 8:30 a.m., CCC:264
ENGINEERING GEOLOGY

SESSION 94, 10:15 a.m., CCC:123-127
MSA—METAMORPHIC PETROLOGY I: THERMOBAROMETRIC STUDIES

P.M.

SESSION 95, 1:30 p.m., CCC:264
ARCHAEOLOGY AND HISTORY OF GEOLOGY

SESSION 96, 1:30 p.m., CCC:267
MSA—METAMORPHIC PETROLOGY II: METAMORPHIC PHASE EQUILIBRIA

SESSION 97, 1:30 p.m., CCC:265-266
MSA—MINERALOGY/CRYSTALLOGRAPHY II

SESSION 98, 1:30 p.m., CCC:Hall B
POSTER SESSION VI: HYDROGEOLOGY

SESSION 99, 1:30 p.m., CCC:Hall B
POSTER SESSION VI: MSA—VOLCANOLOGY

SESSION 100, 1:30 p.m., CCC:Hall B
POSTER SESSION VI: NAGT—GEOLOGY EDUCATION

SESSION 101, 1:30 p.m., CCC:Hall B
POSTER SESSION VI: SEG—ECONOMIC GEOLOGY

SESSION 102, 1:30 p.m., CCC:Hall B
POSTER SESSION VI: T18. GEOSCIENCE AND THE ARTS II

SESSION 103, 1:30 p.m., CCC:274
PS—PALEONTOLOGY IV: PALEOECOLOGY—AUT- AND SYN-

SESSION 104, 1:30 p.m., CCC:131-132
S1. 1989 LOCAL COMMITTEE SYMPOSIUM: GEOSCIENCE RESEARCH AND PUBLIC POLICY

WEDNESDAY
NOVEMBER 8

P.M. (continued)

SESSION 105, 1:30 p.m., CCC:261-262
T22. APPLICATION OF ARTIFICIAL INTELLIGENCE, EXPERT SYSTEM, OR KNOWLEDGE-BASED SYSTEM METHODS IN GEOLOGICAL SCIENCES

SESSION 106, 1:30 p.m., CCC:121-122/125-126
T32. GSA SEDIMENTARY GEOLOGY DIVISION: ROCK-WATER INTERACTIONS IN CARBONATE ROCKS AND SEDIMENTS II

SESSION 107, 1:30 p.m., CCC:275
T4. MAGMA CURRENTS, MELT MIGRATION, AND GEOCHEMICAL TRANSPORT IN MAFIC IGNEOUS COMPLEXES

SESSION 108, 1:30 p.m., CCC:120-124
T8. QUANTITATIVE STRUCTURAL GEOLOGY: THE NATURE, MECHANISM, AND IMPLICATIONS OF NATURAL DEFORMATION II

SESSION 109, 1:30 p.m., CCC:276
TECTONICS III: TECTONICS/GEOCHRONOLOGY

SESSION 110, 3:00 p.m., CCC:260
GEOMORPHOLOGY II

SESSION 111, 4:15 p.m., CCC:275
MSA—IGNEOUS PETROLOGY III: VOLATILE CONTENTS AND URANIUM VARIATIONS IN SILICIC MAGMA CHAMBERS

THURSDAY
NOVEMBER 9

A.M.

SESSION 112, 8:00 a.m., CCC:270
GS—GEOCHEMISTRY IV: SEDIMENTARY GEOCHEMISTRY AND DIAGENESIS

SESSION 113, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: ARCHAEOLOGY

SESSION 114, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: MSA—METAMORPHIC PETROLOGY

SESSION 115, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: PLANETARY GEOLOGY

SESSION 116, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: PRECAMBRIAN GEOLOGY

SESSION 117, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: QUATERNARY GEOLOGY

SESSION 118, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: T6. TRACE ELEMENT AND ISOTOPIC STUDIES WITH THE ION MICROPROBE

SESSION 119, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: T14. TECTONOMETAMORPHISM IV

THURSDAY
NOVEMBER 9

A.M. (continued)

SESSION 120, 8:00 a.m., CCC:Hall B
POSTER SESSION VII: T21. FRONTIERS OF FLUID INCLUSION RESEARCH I

SESSION 121, 8:00 a.m., CCC:276
PS—PALEONTOLOGY V: GENERAL PALEONTOLOGY

SESSION 122, 8:00 a.m., CCC:267
SED/SED PET V: CARBONATE FACIES

SESSION 123, 8:00 a.m., CCC:120-124
SEG—ECONOMIC GEOLOGY III: GOLD I SEDIMENT-HOSTED AND EPITHERMAL DEPOSITS

SESSION 124, 8:00 a.m., CCC:274
T12. A GROWING CRISIS IN (GEO)SCIENCE EDUCATION I

SESSION 125, 8:00 a.m., CCC:260
T13. THE LUNAR SCIENCE FRONTIER: IMPLICATIONS FOR EARTH'S PAST AND FUTURE

SESSION 126, 8:00 a.m., CCC:265-266
T2. THE EFFECTS OF MAN ON THE MISSISSIPPI RIVER AND ITS DELTA

SESSION 127, 8:00 a.m., CCC:261-262
T23. DETERMINING THE RELATIVE TIMING OF PLUTON EMPLACEMENT AND REGIONAL DEFORMATION

SESSION 128, 8:00 a.m., CCC:130
T27. CRETACEOUS RECORD OF THE EASTERN MARGIN OF THE WESTERN INTERIOR SEAWAY I

SESSION 129, 8:00 a.m., CCC:123-127
T29. THERMAL AND HYDROLOGIC EVOLUTION OF ACCRETIONARY PRISMS: MODERN AND ANCIENT EXAMPLES I

SESSION 130, 8:00 a.m., CCC:131-132
T30. ORIGIN OF BRINES IN THE EARTH'S CRUST

SESSION 131, 8:00 a.m., CCC:275
TECTONICS IV: CARIBBEAN, TETHYAN ASIAN

SESSION 132, 8:00 a.m., CCC:264
TECTONICS/GEOPHYSICS II: PLATE TECTONICS, CRUSTAL GEOPHYSICS, AND EXTENSIONAL TECTONICS

SESSION 133, 8:10 a.m., CCC:121-122/125-126
S17. GSA HYDROGEOLOGY AND ENGINEERING GEOLOGY DIVISIONS SYMPOSIUM: SITE CHARACTERIZATION FOR CONDITIONS OF NON-DARCIAN FLOW I

P.M.

SESSION 134, 1:00 p.m., CCC:264
MSA—IGNEOUS PETROLOGY IV: PLUTONIC ROCKS

KEY: CCC = Cervantes Convention Center

THURSDAY
NOVEMBER 9

P.M. (continued)

SESSION 135, 1:00 p.m., CCC:270
MSA—METAMORPHIC PETROLOGY III: CHEMICAL, TEXTURAL, AND THERMAL ASPECTS

SESSION 136, 1:00 p.m., CCC:Hall B
POSTER SESSION VIII: MARINE GEOLOGY AND OCEANOGRAPHY

SESSION 137, 1:00 p.m., CCC:Hall B
POSTER SESSION VIII: SEDIMENTOLOGY

SESSION 138, 1:00 p.m., CCC:Hall B
POSTER SESSION VIII: TECTONICS/GEOPHYSICS

SESSION 139, 1:00 p.m., CCC:Hall B
POSTER SESSION VIII: T27. CRETACEOUS RECORD OF THE EASTERN MARGIN OF THE WESTERN INTERIOR SEAWAY II

SESSION 140, 1:00 p.m., CCC:Hall B
POSTER SESSION VIII: T29. THERMAL AND HYDROLOGIC EVOLUTION OF ACCRETIONARY PRISMS II

SESSION 141, 1:00 p.m., CCC:276
PS—PALEONTOLOGY VI: BIOSTRATIGRAPHY AND BIOGEOGRAPHY

SESSION 142, 1:00 p.m., CCC:267
QUATERNARY II

SESSION 143, 1:00 p.m., CCC:121-122/125-126
S17. GSA HYDROGEOLOGY AND ENGINEERING GEOLOGY DIVISIONS SYMPOSIUM: SITE CHARACTERIZATION FOR CONDITIONS OF NON-DARCIAN FLOW II

SESSION 144, 1:00 p.m., CCC:123-127
SED/SED PET VI: PROVENANCE AND CLASTIC DIAGENESIS

SESSION 145, 1:00 p.m., CCC:120-124
SEG—ECONOMIC GEOLOGY IV: GOLD II EPITHERMAL, METAMORPHIC-HOSTED, AND OTHER DEPOSITS

SESSION 146, 1:00 p.m., CCC:130
STRUCTURE/TECTONICS: EXTENSIONAL TERRANES

SESSION 147, 1:00 p.m., CCC:274
T12. A GROWING CRISIS IN (GEO)SCIENCE EDUCATION II

SESSION 148, 1:00 p.m., CCC:131-132
T21. FRONTIERS OF FLUID-INCLUSION RESEARCH II

SESSION 149, 1:00 p.m., CCC:265-266
T6. TRACE ELEMENT AND ISOTOPIC STUDIES WITH THE ION MICROPROBE

SESSION 150, 1:00 p.m., CCC:261-262
T7. SUB-MEDITERRANEAN "GIANT SALT" AS A DEEP-WATER BRINE PRECIPITATE: AN ALTERNATIVE TO THE EVAPORITE HYPOTHESIS

THURSDAY
NOVEMBER 9

P.M. (continued)

SESSION 151, 1:00 p.m., CCC:275
TECTONICS V: TECTONICS/SEDIMENTATION/BASIN ANALYSIS

SESSION 152, 1:30 p.m., CCC:260
T13. THE LUNAR SCIENCE FRONTIER: IMPLICATIONS FOR EARTH'S PAST AND FUTURE II

SESSION 154, 2:30 p.m., CCC:260
PLANETARY GEOLOGY/REMOTE SENSING

SESSION 153, 2:45 p.m., CCC:274
NAGT—GEOLOGY EDUCATION

SESSION 155, 3:00 p.m., CCC:261-262
T3. CORRELATION AND BASIN ANALYSIS OF NON-FOSSILIFEROUS SEDIMENTARY ROCKS

HIGHLIGHTS OF EVENTS

WEDNESDAY, NOVEMBER 8

Cervantes Convention Center:

- Registration, 7:30 a.m. to 2:00 p.m.
- Exhibits, 8:00 a.m. to 4:00 p.m.
- Science Theater, Room 263, 9:00 a.m. to 4:30 p.m.

Guest Tour—A Visit to St. Charles, 9:30 a.m. to 2:30 p.m.

Guest Tour—Historic St. Louis Walking Tour, 9:30 a.m. to 11:30 a.m.

Coal Geology Luncheon, 12:00 noon, Adam's Mark, St. Louis Ballroom B

GS Luncheon, 12:30 p.m., Adam's Mark, Promenade Ballroom B

Quaternary Geology & Geomorphology Luncheon, 12:00 noon, Adam's Mark, Promenade Ballroom E

SEG Luncheon, 11:30 a.m., Adam's Mark, Promenade Ballroom D

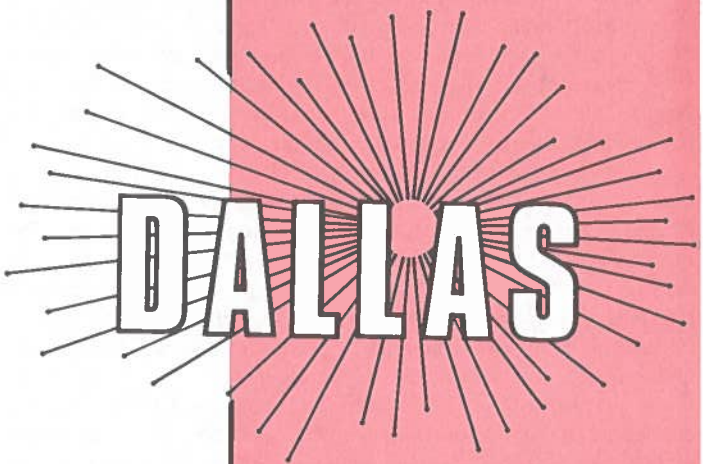
BLUES CRUISE, 7:30 p.m., The President Riverboat

THURSDAY, NOVEMBER 9

Cervantes Convention Center:

- Registration, 7:30 a.m. to 12:00 noon
- Science Theater, Room 263, 9:00 a.m. to 4:30 p.m.

Let's do it again next year in Dallas



OCTOBER 29–NOVEMBER 1, 1990

GSA Division and Section Awards for 1989

The **Coal Geology Division** presented its second annual Antoinette Lierman Medlin Scholarship Award in 1989 to Eric J. Daniels, University of Illinois, for his proposal titled "Coal Mineralogy of Pennsylvanian Anthracite Region." The Division considers proposals from any full-time graduate student who is conducting research in coal geology.

The **Geophysics Division** presented its second annual Allan V. Cox Student Research Award in 1989, for an outstanding student research proposal submitted to the GSA Research Grants Program, to Robert V. Enright, a Master's candidate at Florida State University. The award was for his research project titled "The Response of Well-Water Levels in a Confined Aquifer, Sarasota County, Florida, to Oceanic Tidal Loading."

The **Quaternary Geology and Geomorphology Division** awarded Mackin grants to two students in 1989. Master's degree candidate Garrett Jackson, University of Arizona, will study "Tectonic Geomorphology of the Toroweap Fault, Western Grand Canyon, Arizona," and Andrew Fox, a Ph.D. candidate from Cornell University will study "Glacial History of the Central Andes Mountains."

Twenty-nine Mackin Grants have been awarded since the Division made its first award in 1974.

The **Sedimentary Geology Division** presented its third annual award for an outstanding student research proposal, submitted to the GSA Research Grants Program, to Harvey A. Cohen, a Ph.D. candidate at Princeton University. The award was for his research project titled "Sedimentologic and Provenance Study of a Microcontinent—Continent Collision: Gravina Belt, Southeast Alaska."

The **Structural Geology and Tectonics Division** presented two awards for outstanding research proposals in 1989. The recipients were Joanne L. Hoffard, M.S. candidate at the University of Nevada, Reno, for "Quaternary Fault History of Western Pahrump Valley and Stewart Valley, Nevada and California," and Karl J. Mueller, Ph.D. candidate at the University of Wyoming, Laramie, for "Cenozoic Extensional History of the Windermere Hills, Elko County, Nevada."

The **North-Central Section** of GSA awarded two research grants to students in the section this year. The recipients and the titles of their research projects are: Jennifer B. Kupperman, University of Illinois, "Short-term Tectonic Subsidence Analysis of Pennsylvanian Cyclothems in a Transect from a Platform to a Foreland Basin," and Zakaria Lasemi, Miami University, for "Porosity Reduction in Microcrystalline Limestones: Recognizing the Relative Effects of Cementation and Compaction." Eligibility is restricted to students attending colleges or universities in the North-Central Section geographic area who have submitted applications to the GSA Research Grants Program. This is the fifth year that the North-Central Section has awarded student grants. There have been twenty awards presented by the Section.

The **South-Central Section** of GSA presented its second annual research awards to qualified students in the Section in 1989. Recipients are students who attend a college or university in the South-Central Section geographic area and have submitted applications to the GSA Research Grants Program. The three awards presented this year went to Kay C. McQueen, Ph.D. candidate at Oklahoma State University, for "Paleohydrology of Black Creek, Oklahoma," and to William A. Bandy and Carlos A. Mortera-Gutierrez, both Ph.D. candidates at Texas A&M University, co-applicants of the proposal "Gravity Study of the Crustal Structure of the Colima Graben—An Incipient Continental Rift in the Western Pacific Coast of Mexico."

GSA's **Southeastern Section** awarded research grants to 12 qualified students. They are Joseph L. Allen, East Carolina University, "Analysis of the Lower Pennsylvanian Pocahontas–New River Formational Boundary, Southern West Virginia"; Joseph G. Aylor, Florida State University, "Early Paleozoic History of the Western Blue Ridge Belt, North Carolina—Comparison with Foreland Stratigraphic Evolution"; Stefan Boettcher, University of North Carolina—Chapel Hill, "Structure and Petrology of Sheared Mesozoic Rocks, Iron Mountain, Central Mojave Desert, California"; Roger C. Brewer, University of Alabama, "Mathematical and Physical Modeling of Structures above Salt Diapirs"; Timothy M. Demko, Auburn University, "Paleogeography and Depositional Environments of the Lower Part of the Mary Lee Coal Zone, Pottsville Formation, Black Warrior Basin, Alabama"; Jonathan K. Filer, University of North Carolina—Chapel Hill, "Cyclic Siliciclastic Sedimentation in a Foreland Basin, Upper Devonian of the Appalachian Basin"; Francis C. Furman, University of Tennessee—Knoxville, "Mineralogical and Chemical Changes in the New Albany Shale (Devonian–Mississippian) Associated with the Formation of Mississippi Valley–Type (MVT) Mineralization Brines in the Illinois–Kentucky Fluorite District"; Anne R. Gogola, University of Tennessee—Knoxville, "Depositional and Diagenetic History of the Basal Transgressive Sandstone of the Clinch and Rockwood Formations (Lower Silurian) in Eastern Tennessee"; Amy Jo Haak, University of Kentucky, "Role of Fluid Migration During Thrusting, Western Blue Ridge Province, North Carolina and Tennessee: A Structural and Fluid Inclusion Study"; Choon-Sik Kim, University of Georgia, "Magmatic Evolution of Ore-Related Intrusions in the Tintic and East Tintic Mining Districts, Utah"; William S. Pendexter, Florida State University, "Unsaturated Hydrous Flow and its Contribution to Solute Transport in Sandy Geologic Media"; Sidney A. Young, University of Tennessee—Chattanooga, "Petrography of the Great Smoky Group at Flats Mountain in Moore County, Tennessee."

GSA Research Grants Awarded for 1989–1990

by June Forstrom
Research Grants Administrator

The GSA Committee on Research Grants awarded 210 research grants with its 1989 budget of $180,600. Grants went to 43% of the 496 applicants. The committee—Chairman Elaine R. Padovani, members Thomas H. Anderson, Patricia H. Cashman, Richard H. Groshong, Jr., Patricia A. Jacobberger, Mitchell W. Lyle and National Science Foundation conferee Ian D. MacGregor—met in Boulder, Colorado, in April.

The committee's budget included $150,000 from the Penrose Endowment, and $3500 income from the Harold T. Stearns Fund. It also included $23,500 from the GSA Foundation, as follows: $500 from the Cox Fund (Geophysics Division Award), $700 from the Dillon Fund for Alaska Research, over $13,000 from the GSA Foundation Research Fund (which includes $7000 from oil companies), and over $9000 from Unrestricted Funds.

Of the 210 proposals recommended for support, 66 were master's proposals and 144 were doctoral proposals. The size of the average award increased only slightly, from $850 in 1988 to $859 this year. Proposal requests totaled $534,793.

AWARDS

Gladys W. Cole Memorial Research Award. The committee regrets that there were no qualified applicants for this award in 1989.

John T. Dillon Alaska Research Award. This award was established in 1988 by the family and friends of John Dillon in memory of him and his dedication to field research. Dillon was particularly noted for his radiometric dating work in the Brooks Range, the results of which have had a major impact on the geologic understanding of this mountain range. The 1989 recipient is Arlene V. Anderson, University of Alaska, Fairbanks, for "Relationship between Stratigraphy and Structural Geometry across a Major Structural Boundary, Northeastern Brooks Range, Alaska."

Robert K. Fahnestock Award. This grant is awarded to the applicant with the best proposal in sediment transport or related aspects of fluvial geomorphology. The 1989 recipient is Ted Roy Turner, Montana State University, Bozeman, for "Spatial and Temporal Response of the Madison River to Point Sediment Loading; the Madison Slide, SW Montana."

Harold T. Stearns Fellowship Award. The four recipients of this award, for research on aspects of the geology of the Pacific Islands and the circum-Pacific region, are Wendy A. Bohrson, University of California, Los Angeles, "Geology and Geochemistry of Socorro Island, Mexico"; Carter D. Hull, University of Oregon, Eugene, "Determining Absolute Ages of Authigenic Mineralization by U-Th Disequilibria Techniques in the Mazama Geothermal Wellcore, Crater Lake, Oregon"; Dale A. Kramer, Bowling Green State University, "Sedimentology and Basin Analysis of Sovi Trough (L. Miocene–E. Pliocene), Southwest Viti Levu, Fiji"; and Michael Donald Moore, University of California, Berkeley, "Catastrophic El Niños and Indonesian Droughts: A Paleoclimatic History from Fluorescent Bands in Long-Lived Indonesian Reef Corals."

Outstanding Mention. The committee on Research Grants specially recognized nine of the proposals as being of exceptionally high merit in conception and presentation:
Cynthia L. Balek, University of Illinois, for "A Reassessment of the Genetic Relationship Between the Early Wisconinan Roxana Silt, Late Sangamonian Lag Concentrate, and Sangamon Soil B Horizon"; Paul K. Doss, Northern Illinois University, for "Hydrogeology and Geochemistry of the Miller Woods Wetland System, Indiana Dunes National Lakeshore, Indiana"; Carl-Henry Geschwind, Brown University, for "The Effect of Viscosity and Volatile Content on Eruptive Style: Mount Shasta, California"; Carter D. Hull, University of Oregon, for "Determining Absolute Ages of Authigenic Mineralization by U-Th Disequilibria Techniques in the Mazama Geothermal Wellcore, Crater Lake, Oregon"; Michael E. Lane III, University of Hawaii, for "Dissolution Kinetics of Carbonate Fluorapatite"; Maribeth Hughett Price, Princeton University, for "Characterization of Textures and Their Development and Deformation in Granitoid Rocks"; Jeffrey A. Snyder, University of Colorado, for "Lacustrine Sedimentation and Holocene Glaciation, Lake Linne, Spitsbergen"; Carl I. Steefel, Yale University, for "A Study of the Effects of Coupled Flow, Reaction, and Heat Transfer on the Geochemistry of the Main-Stage Veins at Butte, Montana"; Koren L. Taylor, Florida State University, for "Testing for Scales of Darcian-like Behavior in Fractured Media".

Industrial Donations and Awards. Donations from Marathon Oil Foundation ($5000), and Mobil Oil Corporation ($2000) are funding grants to the following applicants:
Gerilyn Sue Andrews, University of Arizona, for "Differentiation of Stratigraphic Controlling Mechanisms in Selected Ancestral Rocky Mountain Basins"; J. Lincoln Foreman, University of Tennesee, for "Characterization of Fluid Flow Mechanisms and Fluid Compositions Involved in Fluid-Rock Interactions in the Upper Cambrian Nolichucky Shale Using Stable Isotopic and Fluid Inclusion Evidence from Authigenic Calcite and Dolomite"; Lillian M. Hess, City University of New York, for "Petrophysical Reservoir Characteristics, Depositional Environments and Diagenesis of the Red River Formation (Upper Ordovician), Williston Basin, Montana and North Dakota"; John M. Kruger, University of Wisconsin—Madison, for Cement-Stratigraphy and Diagenetic History of the Sub-Kaskaskia Sequence Boundary in the North American Mid-Craton"; Paula Noble, University of Texas—Austin, for "Biostratigraphy and Paleoceanographic Implications of Devonian-Mississippian Radiolarians of the Marathon Basin, West Texas"; Kevin R. Stank, Northern Illinois University, for "Laboratory and Field Investigations of the Influence of Organics on Diagenetic Processes in the Vadose Zone of the Antigua Formation, B.W.I."; Koren L. Taylor, Florida State University, for "Testing for Scales of Darcian-like Behavior in Fractured Media"; Lyndon A. Yose, Johns Hopkins University, for "Stratigraphic Sequences in Triassic Carbonate Platform Systems of the Dolomites, Northern Italy: Indicators of Global Sea-Level Change or Products of Local Tectonics?"

Other Successful Applicants. Other applicants recommended for funding are the following: Lonnie Dean Abbott, L. Barry Albright, Laurie C. Anderson, William E. Andrews, Greg B. Arehart, Joaquin Arroyo-Cabrales, Theodore T. Ball, Edward M. Baltzer, Daniel Barnett, Todd F. Battey, Harriet G. Beale, Brian L. Beard, Brad M. Bebout, Raymond Emil Beiersdorfer, Christopher J. Bell, Laurie D. Benton, Barrie Bernstein, Aimee E. Beveridge, Michael D. Blum, Mitchell Bormack, Frank R. Brunton, Nancy Buening, Jonathan L. Burr, Marta Lucia Calvache, Patricia Campbell, Mary E. Caress, Gerald James Cassidy, Sumit Chakraborty, Lucy W. Chambers, Marshall Chapman, Maryann T. Civil, Charles E. Cline, David W. Clow, Harvey A. Cohen, Drew S. Coleman, Ronadh Cox, J. Warner Cribb, Constance Anne Crossley, Andrew Cullen, Eric J. Daniels, Miles E. Denham, David William

(*continued on p. 262*)

GSA Research Grants (*continued from p. 261*)

Dilkes, Gregory M. Dipple, Lisa Doner, Carl N. Drummond, Richard K. Dunn, Elizabeth A. Eide, G. Lain Ellis, Don Elsenheimer, Robert V. Enright, Owen C. Evans, William L. Evans, Christopher M. Fedo, Nancy E. Fegan, Timothy Philip Fleming, Frank P. Florence, Bruce W. Fouke, Gregory T. French, Madeleine M. Fulford, Michael J. Gefell, A. Mohamad Ghazi, Patrick Goldstrand, Daniel Goldman, Carla Marie Gordon, Ian Robert Gordon, Robert J.W. Gower, G. Michael Grammer, Martha C. Green, Karen Michelle Griffin, Barbara L. Gruver, Timothy L. Gubbels, Giovanni Guglielmo, Jr., Kristin L. Gunckel, Eric Davis Gyllenhaal, Michelle K. Hall, Willis E. Hames, Ursula Hammes, Janet Phillips Hardy, Peter J. Harries, Brian Haskell, Peter H. Hennings, Jason F. Hicks, Thomas Andrew Hickson, Joseph V. Hill, Joanne L. Hoffard, Jennifer A. Hogler, John M. Holbrook, Ann E. Holmes, Daniel K. Holm, Marcie R. Horowitz, Bernard A. Housen, Haolan Huang, Alan George Hull, Lewis Edward Hunter, Hiram S. Jackson, Jay L. Jackson, Robert Matthew Joeckel, Claudia C. Johnson, William Jeffrey Johnson, Christine R. Jump, Larry B. Kellison, Kirt Anton Kempter, Kathleen M. Kemp, Ray Kenny, John D. Kingston, Stephen Troy Kiorpes, Diane Clemens Knott, Timothy J. Kroeger, Robert H. Lander, George D. Langstaff, David Lehmann, Michael Felix Lerch, Monica Listokin, James Douglas Loch, Clinton C. Lum, Steven P. Lundblad, Paula Beth Maat, Hattie Elizabeth MacLellan, Paul C. Manega, Curtis R. Manley, Anne M. Matherne, Jeffrey L. Mauk, David S. McCormick, Robin John McDowell, Mark McNaught, Joseph G. Meert, William Meurer, Christopher Miller, Brent Miller, Martin G. Miller, Neale J. Misquitta, Ann Elizabeth Moran, William R. Morris, Karl J. Mueller, Douglas J. Mullett, Sandor Mulsow, Maria Mutti, Matthew J. Novak, Chang Whan Oh, Bradley N. Opdyke, D. Jeffrey Over, Donald L. Pair, Lisa Ellyn Park, Mark E. Patzkowsky, Andrew C. Phillips, Philip M. Piccoli, Nicholas Pinter, David Edward Price, Fred S. Pulka, Ian James Richards, Kenneth D. Ridgway, Robert C. Roback, Christa J. Sadler, Scott D. Sampson, Carl David Scharpf, Roy Walter Schlische, Bennetta L. Schmidt, David L. Schwarz, James Stewart Scoates, Gail D. Sease, Geoffrey O. Seltzer, Keith William Shanley, Mukul Sharma, Brian Edward Silfer, John L. Smale, Douglas Paul Smith, Elizabeth Stark, Lori Stewart, James D. Suydam, Terry W. Swanson, Gregory Hawkes Symmes, Kent M. Syverson, Stephen B. Taylor, Christina Terhune, Geoffrey Thyne, David Joseph Topping, Charles H. Trupe, Jeffrey R. Unruh, Anne H. Walton, Jiamin Wan, Xiaomin Wang, John Robert Webster, Kathryn A. West, Christopher Whittle, Maureen E. Wilks, Kathleen Woida, John C. Yarnold, Douglas M. Yates, Robert S. Young.

In Memoriam

Ivan Barnes
Palo Alto, California
May 11, 1989

George H. Chase
Dale City, Virginia
April 18, 1989

William H. Callahan
Franklin, New Jersey

Carol Faul
Philadelphia, Pennsylvania

W. Storrs Cole
Sun City, Arizona
June 14, 1989

John J. Fisher
Kingston, Rhode Island

Hunter Yarborough
Houston, Texas
June 11, 1989

GeoRef's New CD ROM of USGS Publications Now Available from AGI

More than 70,500 references to U.S. Geological Survey documents are now on a CD ROM titled *Publications of the U.S. Geological Survey*. The data base on the CD ROM, available from the American Geological Institute, includes 55,092 references to U.S. Geological Survey reports and maps published from 1880 to 1988; 15,227 references to non-Survey publications with Survey authors, published from 1983 to February 1989; and 225 references to reports produced by the Hayden, King, Powell, and Wheeler surveys.

The data base consists of complete bibliographic references and GeoRef index terms for topics and locations as part of each reference. Reports with chapters by different authors have complete references for each chapter. The sheet size, scale, and latitude and longitude are given for maps. Each reference has an average of 13.4 index terms; some references have abstracts. Current prices are included for each USGS publication in stock and available for purchase. The source of the data base is GeoRef.

GeoRef includes 1.5 million references and is updated monthly with more than 6,000 new references. It is available online through STN, Maxwell Online, DIALOG, and in Canada through CAN/OLE.

The USGS publications data base on CD ROM is available as an annual subscription, and subscribers are required to sign a license agreement. Every year a new, cumulated CD ROM will be available by March 1. Monthly updates for January-November will also be available on diskettes.

The CD ROM annual subscription costs $350 a year, or $500 a year including the monthly updates. A user's manual and toll-free customer support number are provided. Included are two versions of Personal Librarian, one of which runs in Microsoft Windows. Initial subscriptions to this CD ROM are on a trial basis. If returned within 30 days, no payment need be made.

Meet the GSA Congressional Science Fellow

Elizabeth Robinson will be available at an informal lunch-hour session on Tuesday, November 7, during the GSA 1989 Annual Meeting in St. Louis. This open forum is sponsored by the GSA Geology and Public Policy Committee. Meeting location will be announced later.

Municipal Solid Waste Issues in Congress

by Beth Robinson
1988–1989 GSA Congressional Science Fellow

Last year, the *Khian Sea* steamed onto the front pages of America's newspapers. For two years, the garbage barge searched in vain for a place to deposit its rotting, blackened garbage while Haiti, Guinea-Bissau, the Bahamas, Honduras, and the Dominican Republic refused to allow it into their ports. Although America produces enough garbage to fill many barges every day, our waste policies reflect the aimless voyage of the *Khian Sea*.

Soon, we may have no place left to put our garbage. We now place over 80% of our trash into landfills. Yet, nearly half of the states will lose their landfill capacity in the next ten years. Some states (New Jersey, Florida, and New York) may run out even sooner.

Most states face nearly insurmountable barriers to siting a new landfill. Many communities feel that it should not be in their backyard. The geology and ground water have often been ignored in the siting and construction of landfills so that many have problems with ground-water contamination or methane production.

Many other countries produce less trash than we do. The average American produces 3.5 lbs of garbage per day, in New York the average is 4.0 lb/day. Yet, in Tokyo, the average is 3.0 lb/day; in Paris, 2.4 lb/day; in Hamburg, 1.9 lb/day; and, in Rome, only 1.5 lb/day.

Along with producing less trash, other nations also treat it differently. West Germany recycles 15%, converts 30% to energy, and landfills 55%; Japan recycles 50%, converts 23% to energy, and landfills only 27%. America recycles 10%, incinerates 5–10%, and landfills over 80%. In America we have been blessed with so much land that we have not had to search for alternatives to landfilling, but those days are over.

Congress has begun to look at these problems. At least twenty separate bills have been proposed and most have a strong emphasis on alternatives to landfilling. With the coming debate over the reauthorization of the Resource Conservation and Recovery Act (RCRA), a more comprehensive approach can also be taken. RCRA prescribes a hierarchical approach to waste problems: waste reduction, recycling, incineration, and landfilling. However, our national hierarchy is exactly the opposite in practice. Landfilling is the most common method of dealing with waste, followed by incineration and recycling, and finally, reduction. Emphasis will be placed on reversing this hierarchy during this round of legislation.

Problems also exist with each of the waste treatment methods and legislation may be needed to address them. Poor siting and construction at landfills has led to leachate and methane contamination. Leachate forms when rain water percolates through a landfill, dissolving parts of garbage. Methane also collects at landfills and, in some cases, has become so concentrated it has ignited.

Almost 70% of landfills that are currently operating will close in the next 15 years. Siting of new landfills is a very contentious issue all over the nation. Because each state has its own regulations, some lax and others tough, Congress is considering developing a uniform minimum standard for siting landfills.

A number of bills in Congress have also dealt with the problems of incineration. Incinerator ash and effluent can contain high concentrations of toxic substances and, in many cases, ash from burning household refuse will constitute hazardous waste. If an incinerator is not run properly, these problems are made worse. The new generation of incinerators is much better than the older generation and even more improvements are expected. However, new incinerators will solve only part of the problem.

Congress may move to treat incinerator ash as a hazardous waste under RCRA. To dispose of the ash, a manifest would be kept from cradle to grave. Some incinerators have hazardous waste landfills nearby, but others will need to transport the material.

The last method of treating trash, recycling, is also not risk free. Many recycling processes are dangerous, as are those that went into manufacturing the original product. These recycling facilities will have to be issued permits and be monitored by the Environmental Protection Agency. Nevertheless, recycling is an excellent method of dealing with municipal waste. Many bills have been proposed to increase the recycling effort, from innovative methods of creating a national market for recycled goods to a national bottle bill. Most likely one or perhaps a number of approaches to recycling will be included in a comprehensive bill.

Finally, to get at the root of the problem, we must reduce the amount of waste that we produce. We must study ways of limiting our trash and give incentives to companies to redesign the products to produce less waste. Perhaps even more important, we must educate the public about solid waste problems and what can be done about them.

A Role for Geoscientists

Geoscientists have much to contribute to legislation on these issues, especially with the problems with siting landfills. Congress may act on these issues this year, and hearings have already been held on municipal solid waste issues in the House Subcommittee on Transportation, Tourism and Hazardous Materials of the Energy and Commerce Committee in preparation for the reauthorization of RCRA.

Members of GSA should feel free to call or write their congressman, or the chairmen of the appropriate committees, if they have any thoughts that they would like to add to the discussion. The committee chairmen on these issues are Energy and Commerce chairman Representative Dingell and subcommittee chairman Representative Luken in the House, and Environment and Public Works chairman Senator Burdick and subcommittee chairman Senator Baucus in the Senate. The coming debate will be worth the effort.

Editor's note: Elizabeth Robinson, GSA congressional Science Fellow for 1988–1989, is completing her term in the office of Congressman Richard A. Gephardt. The fellowship, which is for a one-year term, is jointly sponsored by funds from GSA and a grant from the USGS.

1989 Annual Meeting Symposia Highlights

This is the third in a series of four articles highlighting symposia to be presented in St. Louis at the 1989 GSA Annual Meeting. The first and second of the series appeared in the June and July issues of *GSA News & Information*. The fourth will appear in the October issue. The August registration issue of *GSA News & Information* gave a complete listing of symposia titles and authors.

S12. The Legacy of T. C. Chamberlin
Sponsored by the Quaternary Geology and Geomorphology Division
Conveners: Allan F. Schneider, University of Wisconsin—Parkside; Henry H. Woodard, Beloit College.
Speakers: Reid A. Bryson, Robert H. Dott, Jr., University of Wisconsin—Madison; Tod A. Frolking, Denison University; W. Hilton Johnson, University of Illinois—Urbana; James C. Knox, University of Wisconsin—Madison; Donald Mikulic, Illinois State Geological Survey; Meredith E. Ostrom, Wisconsin Geological and Natural History Survey; Allan F. Schneider, University of Wisconsin—Parkside; Daniel Schroeder, Beloit College; Laurence L. Sloss, Northwestern University; John Tandarich, University of Illinois—Urbana; Henry H. Woodard, Beloit College.

This symposium will honor Thomas Chrowder Chamberlin, one of America's truly great geologists of the past. One of its original fellows, Chamberlin later served as president of the Geological Society of America (1894) and was the recipient of the Society's first Penrose Medal (1927). His influence in the field of natural science was not restricted to geology but pervaded virtually every scientific discipline of his day. Because of his long association with midwestern geology, it seems only appropriate that the Society pay tribute to this distinguished scientist at its St. Louis Annual Meeting in the heart of the midwest.

One purpose of the symposium will be to survey the scientific ideas and contributions of Chamberlin, to trace these ideas through the past 125 years, to assess them in the light of current scientific thought, and to examine the importance of his contributions in the context of the 1989 Annual Meeting theme "Frontiers in Geoscience." Thus, speakers will analyze not only the significance of Chamberlin's contributions to scientific advances in the past, but how they may affect the future direction of geoscience. Papers will be presented on such significant Chamberlin contributions as the concept of multiple working hypotheses as scientific method, the origin of planet Earth, climatic change and the causes of continental glaciation, the classification of Quaternary glacial deposits, and the geomorphic history of the Driftless Area. A second objective will be to review the distinguished career of Chamberlin in his several professional capacities as a teacher, an administrator, a scientist, and an editor. Papers will focus on Chamberlin's career as a professor at Beloit and Chicago, as state geologist of Wisconsin, as president of the University of Wisconsin, as founder and chairman of the geology department at Chicago, and as founder and editor of the *Journal of Geology*. Several papers on the program will integrate these two objectives.

S13. Implications for the Geological Sciences from Recent Developments in Geochemical Techniques and Instrumenation
Sponsored by the Geochemical Society
Conveners: J. Michael Rhodes, University of Massachusetts; Alan Zindler, Lamont-Doherty Geological Observatory.

About a quarter century ago, the introduction and development of many new instrumental methods for measuring major, trace, and isotopic abundances in rocks, minerals, and waters led to the quantification of geochemistry and petrology. Today we are at a similar threshold, with new generation instruments, as well as many totally new and varied analytical techniques. We have an increased capacity to analyze more elements and isotopes at lower concentrations, in smaller sized samples and on the surfaces of materials. Many of these techniques are expensive and require large facilities. The days of "a chicken in every pot" are probably gone. We will need to consider maintaining regional analytical facilities to be readily available to a wide clientele of geoscientists. This symposium will provide an overview by recognized leaders in their fields of many of these techniques, emphasizing their present and potential value for solving a wide range of geological problems.

S14. Sigma Gamma Epsilon Research Symposium
Sponsored by Sigma Gamma Epsilon
Conveners: Austin A. Sartin, Centenary College; Charles J. Mankin, Sigma Gamma Epsilon.

The inaugural Sigma Gamma Epsilon symposium was organized to recognize the wide range of research being conducted by students in the earth sciences. The symposium offers a forum for young geoscientists to present their research before a national audience. It is critical for these geoscientists to have their research efforts receive the open dialogue necessary for the advancement of the earth sciences. Research projects being conducted in geology, hydrology, geophysics, mining, geological engineering, petroleum engineering, geochemistry, and any other phase of earth science are eligible for the sixteen slots to be presented in the poster symposium.

Sigma Gamma Epsilon, the national honor society of the earth sciences, became an Associated Society of the Geological Society of America in 1987. The research symposium was proposed by the student delegates at the 32nd Biennial Convention of Sigma Gamma Epsilon to encourage its membership and other young geoscientists to participate in a national effort to inform the geoscience community of the many scientific advancements being achieved by undergraduate and graduate students at colleges and universities across the country.

S15. Geological Controls on the Regional Distribution of Archaeological Sites
Sponsored by the Archaeological Geology Division
Convener: Robert M. Thorson, University of Connecticut.

This symposium will examine and illustrate how geologic factors influence the distribution of archaeological sites in a variety of geographic and geologic settings. Speakers will address the question, "To what extent does the presence or absence of archaeological remains for any time period reflect actual human settlement or demographic patterns, rather than the vagaries of the stratigraphic record?" As geologists, we view the physical record of former human activity as being strongly skewed and filtered by noncultural processes responsible for the occupancy, burial, detection, and destruction of archaeological strata. Each stratigraphic association—alluvial, shoreline, eolian, underwater, periglacial, rock shelters—has unique processes that control or modify the distribution of human remains within a site and within a region. For example, apparent chronologic gaps in the archaeologic record may be due to differential postemplacement destruction or burial of sites rather than to cultural factors. Spatial gaps in site distributions are equally affected by geologic processes. Reconstructing the

(*continued on p. 265*)

Symposia Highlights (*continued from p. 264*)

settlement patterns and demographics of prehistoric peoples, an objective at the heart of archaeology, must take into account the influence of the geologic filter.

The protection of our archaeological heritage is mandated by federal and state laws under the rubric of "Cultural Resource Management" (CRM). A primary objective of CRM research is to identify and assess the importance of a site prior to human disturbance, which all too often lies beneath the blade of a bulldozer. The development of a lithostratigraphic model for predicting the probability of site occurrence and age would facilitate CRM goals by improving survey strategies and on-site assessments. Thus, an improved understanding of the geologic filter could be put to immediate and practical use. Examples of such uses will be described by some of our speakers.

S16. Modern and Ancient Environments of Coal Formation

Sponsored by the Coal Geology Division

Conveners: James C. Cobb, Kentucky Geological Survey; C. Blaine Cecil, USGS, Reston.

Modern scientific theories about the origin of coal date back to the late eighteenth century when peat was first identified as the precursor of coal. Recently, scientific interest in the origin of coal deposits has been directed at identifying the type of peat swamp in which a particular coal was formed. Existing models for the formation of coal have focused on those modern depositional environments which best explain the origin of clastic deposits in coal-bearing sequences. Applications of models of coal formation based primarily on these clastic depositional environments require assumptions to be made to account for the occurrence of coal deposits. "Doming," of peat swamps, for example, is being cited in the geologic literature as a possible process which results in thick, low-ash and low-sulfur coals. However, there is little published research on the geologic characteristics of modern domed peat swamps.

Equatorial domed peat deposits in coastal Indonesia and Malaysia are possible analogs for the occurrence of some extensive, thick, low-ash and low-sulfur coals. Recent research on these peat deposits includes peat petrography, palynology, geochemistry, mineralogy, hydrology, and sedimentology. The geologic characteristics of these peat deposits are used to set constraints on criteria for the interpretation and recognition of peat-forming environments in the rock record.

The purpose of this symposium is to present the geologic characteristics of modern equatorial domed peat deposits and relate them to the origin of coal. Applications of the "doming" model based on these peats to coals will be presented. Tectonic, eustatic, and climatic conditions of these domed peats will be related to the rock record, as will the clastic sedimentary deposits adjacent to the domed peats. This symposium will influence the future direction of coal geology as researchers focus on recognizing the types of swamps which formed a given coal bed.

For 1989 Annual Meeting information: GSA Meetings Department, (303) 447-2020

The Age of Dinosaurs Short Course

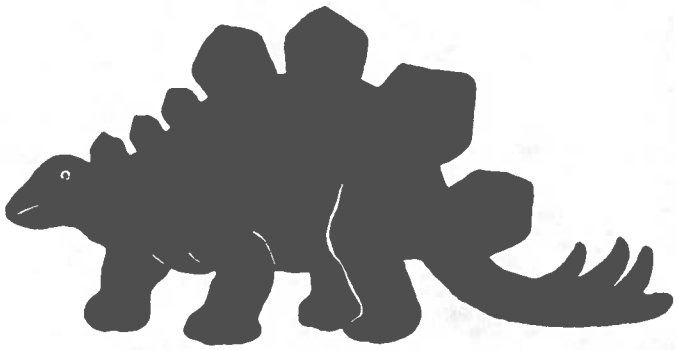
Sunday, November 5, 8:15 a.m. to 5:30 p.m., Adam's Mark Hotel. Cosponsors: National Association of Geology Teachers, Paleontological Society, and Society of Vertebrate Paleontology.

This course is designed to bring nonspecialists up to date on recent advances in the knowledge of dinosaurs and to provide participants with a basis on which to develop an introductory dinosaur course in their own institutions. Dinosaurs are an endless source of interest for students, and they can be used to teach a spectrum of concepts from molecular evolution to geophysics. Dinosaur courses currently enroll 600 or more students and can stimulate all kinds of students to learn more about Earth and life history. (Department Chairs, please note!) This course will be taught by 12 dinosaur specialists, and ample discussion time is planned. Short course notes will supplement lectures and provide references. Geological, ecological, and evolutionary aspects will be covered along with new ideas and issues. The focus will be on both explaining recent advances and showing participants how to set up a dinosaur course.

Faculty: K. Padian, D. Fastovsky, B. H. Tiffney, P. Sereno, D. B. Norman, J. McIntosh, T. Rowe, P. J. Currie, J. A. Gauthier, M. Lockley, J. D. Archibald, D. Chure.

No cost. Short course notes will be available on-site for approximately $15. PREREGISTRATION IS REQUIRED. To reserve a seat, please fill out the form and send by **OCTOBER 1, 1989,** to

Kevin Padian
Museum of Paleontology
University of California
Berkeley, CA 94720



Please reserve a seat for me at the Age of Dinosaurs Short Course, Sunday, November 5, 1989 at the GSA Annual Meeting in St. Louis.

Name _____

Institution _____

Address _____

_____

_____

PHOTOGRAPHY

Frontiers Photo Salon

An attraction at the GSA Annual Meeting in St. Louis this year will be GSA's first photo contest. Entries will be judged on basis of impact, content, composition, and overall presentation.

- Color or black and white prints.
- Print size: minimum of 8″ × 10″; up to maximum of 20″ × 24″.
- Prints mounted on white, blue, beige, or black mat board.
- Description of print on front lower edge of mat board.
- Your name and address on back of mat board.
- Only 1 entry per photographer.

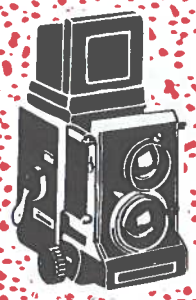
Entries will be screened for suitability. Photos will be displayed on the second level of Cervantes Convention Center. Judging, by GSA editors, will take place on Sunday, November 5. First, second, and third place prizes will be awarded. First place color winner will appear on the cover of *Geology*. (Photos that have already appeared on the cover of *Geology* are not eligible.)

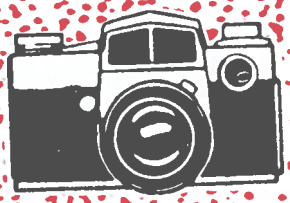
All entries will be returned by November 30, 1989.

To enter, fill out the entry form and send it, along with your photo, before *OCTOBER 1* to

Raymond E. Arvidson
Dept. of Earth & Planetary Sciences
Washington University
Campus Box 1169
St. Louis, MO 63130

Questions? Call GSA Meetings Dept., (303) 447-2020





Clip and send with entry by *October 1*

Name _____

Institution _____

Address _____

City _____ State _____ ZIP _____

Telephone number: ( ) _____

Description of photo: _____

_____

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MEETINGS

(Asterisk indicates new or changed information)

1989

New Frontiers for Hazardous Waste Management Third International Conference, September 10-13, 1989, Pittsburgh, Pennsylvania. Information: NUS Corporation, Park West Two, Pittsburgh, PA 15275.

Crustal Geochemical Cycles Symposium, during American Chemical Society National Meeting, September 10-15, 1989, Miami Beach, Florida. Information: James R. Herring, U.S. Geological Survey, M.S. 939, Box 25046, Federal Center, Denver, CO 80225; (303) 236-5559.

3rd International Conference on Palaeoceanography, September 10-16, 1989, Cambridge, England. Information: I. N. McCave or N. J. Shackleton, Dept. of Earth Sciences, University of Cambridge, Downing St., Cambridge CB2 3EQ, England; phone 44-223-333422/334876.

23rd International Conference of Safety in Mines Research Institutes, September 11-15, 1989, Washington, D.C. Information: John N. Murphy, U.S. Bureau of Mines, Pittsburgh Research Center, P.O. Box 18070, Pittsburgh, PA 15236; (412) 892-6601.

Focus '89, Nuclear Waste Isolation in the Unsaturated Zone, September 18-21, 1989, Las Vegas, Nevada. Information: D. Burton Slemmons, School of Mines, Center for Neotectonic Studies, University of Nevada, LME 400, Reno, NV 89557-0047.

SIAM Conference on Mathematics of Geophysical Sciences, September 18-21, 1989, Houston, Texas. Information: SIAM Conference Coordinator, 1400 Architects Bldg., 117 S. 17th St., Philadelphia, PA 19103-5052; (215) 564-2929.

14th International Conference of Organic Geochemistry, September 18-22, 1989, Paris, France. Information: Yolande Rondot, Institut Français du Pétrole, BP 311, 92506 Rueil-Malmaison cedex, France; phone 33(1) 47.49.02.14; telex A 203050 F.

7th Annual Denver GeoTech, September 23-26, 1989, Denver, Colorado. Information: Denver GeoTech 1989, c/o C. B. & Associates, 13 S. Van Gordon, #200, Lakewood, CO 80228.

Clay Minerals Society, September 23-28, 1989, Sacramento, California. Information: J. L. Past, Dept. of Civil Engineering, California State University, Sacramento, CA 95819; (916) 278-6081.

***SIAM Conference on Mathematical and Computational Issues**, September 25-28, 1989, Houston, Texas. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999.

***U.S. Arctic Marine Geology and Geophysics Workshop**, September 26-27, 1989, Woods Hole, Massachusetts. Information: Janet M. Johnson, Woods Hole Oceanographic Institution, Woods Hole, MA 02543; (508) 548-1400, ext. 2623; telex 951679.

***SIAM Workshop on Geophysical Inversion**, September 27-29, 1989, Houston, Texas. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999.

***Carbonate Facies Seminar—Florida and the Bahamas**, sponsored by the Comparative Sedimentology Laboratory, September 30-October 3, 1989, Miami, Florida. Information: Karen Neher, (305) 672-1840; fax 305-361-4106.

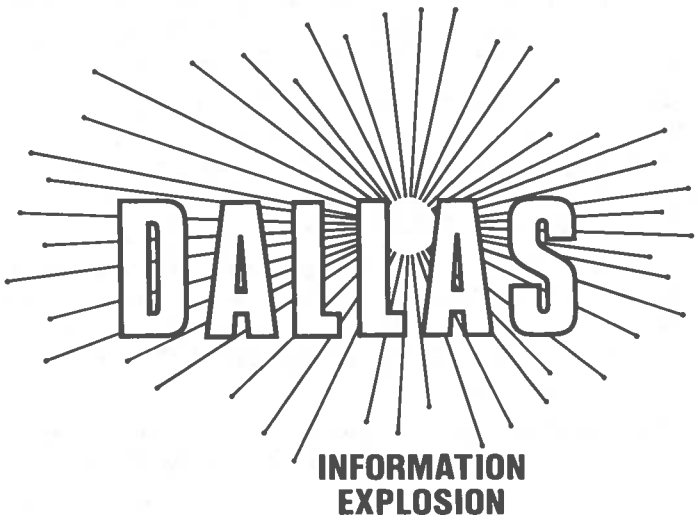
3rd Multidisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst, October 1-4, 1989, St. Petersburg, Florida. Information: 3rd Multidisciplinary

(*continued on p. 268*)

1990 GSA Annual Meeting—Dallas, Texas

October 29–November 1
Dallas Convention Center

General Chairman: David E. Dunn, University of Texas at Dallas



Short Course Deadline ..... **December 15, 1989**
Proposals are encouraged from members and nonmembers. Proposals will be reviewed by GSA's Short Course Committee no later than January 31, 1990.

For short course proposal guidelines contact:
Short Course Coordinator
Edna Collis, GSA, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020

Theme Session and Symposia Deadline ... **January 2, 1990**

For 1990 program specifics contact:
Technical Program Chairman
Richard M. Mitterer, Program in Geosciences, University of Texas at Dallas, Richardson, TX 75083-6088, (214) 690-2401 (dept.), (214) 690-2462 (direct)

For general information on program participation (1990 and future years) contact:
GSA Meetings Manager
Sue Beggs, GSA, P.O. Box 9140, Boulder, CO 80301, (303) 447-2020

MEETINGS (*continued from p. 267*)

Conference, Florida Sinkhole Research Institute, University of Central Florida, Orlando, FL 32816.

20th Underwater Mining Institute, October 1-4, 1989, Madison, Wisconsin. Information: Allen H. Miller, UW Sea Grant Advisory Services, 1800 University Ave., Madison, WI 53705; (608) 262-0644.

Association of Engineering Geologists 32nd Annual Meeting, October 1-6, 1989, Vail, Colorado. Information: Michael W. West, Michael W. West & Associates, Inc., 290 Bank Western Bldg., 8906 West Bowles Ave., Littleton, CO 80123; (303) 972-1537.

XIII International Geochemical Exploration Symposium and II Brazilian Geochemical Congress, October 1-6, 1989, Rio de Janeiro, Brazil. Information: RIO '89 (XIII IGES-II CBGq), A/C CPRM-LAMIN, Av. Pasteur, 404 - Urca, CEP 22292 - Rio de Janeiro, RJ, Brazil; phone (55-21) 295-5297; telex (55-21) 22685.

7th Thematic Conference on Remote Sensing for Exploration Geology, October 2-6, 1989, Calgary, Alberta, Canada. Information: Robert H. Rogers, ERIM, P.O. Box 8618, Ann Arbor, MI 48107-8618; (313) 994-1200, ext. 3382.

Canadian Continental Shelf Seabed Symposium, October 2-7, 1989, Dartmouth, Nova Scotia, Canada. Information: C. L. Amos, Atlantic Geoscience Centre, Bedford Institute of Oceanography, Dartmouth, Nova Scotia, Canada B2Y 4A2; (902) 426-7739.

American Institute of Professional Geologists 26th Annual Meeting, October 4-7, 1989, Hyatt Crystal City, Virginia. Information: Stan Johnson, 1016 Holmes Ave., Charlottesville, VA 22901; (804) 293-5121.

***18th Annual Rocky Mountain Ground Water Conference**, October 5, 1989, Salt Lake City, Utah. Information: Linda Moore, 2531 Murray-Holladay Road, Salt Lake City, UT 84117; (801) 272-5062.

***Geology and Hydrology of Hazardous Waste, Mining Waste, Waste Water–Brine Disposal, and Waste Repository Sites in Utah**, October 6-7, 1989, Salt Lake City, Utah. Co-sponsored by the Utah Geological Association, the Utah section of the Association of Engineering Geologists, and the Rocky Mountain Ground Water Association. Information: Joseph Gates, USGS, 1745 W. 1700 South, Salt Lake City, UT 84104; (801) 524-4073.

18th Geochautauqua: Mineral-Resource Assessment, October 13-14, 1989, Newark, Delaware. Information: J. H. Schuenemeyer, Dept. of Mathematical Sciences, University of Delaware, Newark, DE 19716; (302) 451-1883.

Institute for Tertiary-Quaternary Studies Annual Meeting, October 13-15, 1989, Fort Collins, Colorado. Information: Frank G. Ethridge, Dept. of Earth Resources, Colorado State University, Fort Collins, CO 80323; (303) 491-6195.

New York State Geological Association 61st Annual Meeting and Field Trips, October 13-15, 1989, Middletown, New York. Information: Lawrence E. O'Brien, Orange County Community College, Middletown, NY 10940; (914) 343-6222, ext. 2570.

Conference on Sedimentary Modeling: Computer Simulation of Depositional Sequences, October 13-15, 1989, Lawrence, Kansas. Information: Lynn Watney or Evan Franseen, Kansas Geological Survey, 1930 Constant Ave., Campus West, University of Kansas, Lawrence, KS 66046-2598; (913) 864-3965.

Conference on Ground Water in the Piedmont of the Eastern United States, October 16-18, 1989, Charlotte, North Carolina. Information: Richard K. White, General Chairman, Dept. of Agricultural Engineering, 113 McAdams Hall, Clemson University, Clemson, SC 29634-0357; (803) 656-3250.

Structural and Tectonic Modelling and Its Application to Petroleum Geology, October 18-20, 1989, Stavanger, Norway. Information: Norwegian Petroleum Society, P.O. Box 1897 - Vika, 0124 Oslo 1, Norway; phone 47-2-207025; telex 77 322 nopet n.

Late Cambrian–Ordovician Geology of the Southern Midcontinent Symposium, October 18-19, 1989, Norman, Oklahoma. Information: Kenneth S. Johnson, Oklahoma Geological Survey, University of Oklahoma, Norman, OK 73019; (405) 325-3031.

Supercomputing World Conference and Exposition, October 18-20, 1989, San Francisco, California. Information: Carol Y. Hurley, Meeting Brokers International, Inc., 5 Science Park, New Haven, CT 06511; (203) 786-5132.

34th Annual Midwest Ground Water Conference, October 18-20, 1989, Western Michigan University, Kalamazoo, Michigan. Information: Alan E. Kehew, Dept. of Geology, Western Michigan University, Kalamazoo, MI 49008; (616) 387-5495.

20th Annual Geomorphology Symposium: Geomorphic Evolution of the Appalachians, October 20-22, 1989, Dickinson College, Carlisle, Pennsylvania. Information: W. D. Sevon, Pennsylvania Geological Survey, P.O. Box 2357, Harrisburg, PA 17120; (717) 787-6029.

6th Annual Meeting and Field Trip, Geological Association of New Jersey, October 20-22, 1989, Easton, Pennsylvania, and Philipsburg, New Jersey. Topic: Lower Paleozoic carbonates of New Jersey and eastern Pennsylvania. Information: Michael J. Hozik, Stockton State College, Pomona, NJ 08240; (609) 652-4277.

***Joint Power Generation Conference and Exposition**, October 22-26, 1989, Dallas, Texas (ASME, IEEE, ASCE). Information: Marisa Scalice, ASME, 345 E. 46th St., New York, NY 10017; (212) 705-7793; fax 212-705-7674.

1989 Joint International Waste Management Conference, October 22-28, 1989, Kyoto, Japan. Information: Leslie Friedman, ASME Meetings Dept., 345 E. 47th St., New York, NY 10017; (212) 705-7795.

MAPFRE International Meeting on Catastrophes and Society, October 24-26, 1989, Madrid, Spain. Information: Ignacio G. Peso, Paseo de Recoletos, 25. 28004, Madrid, Spain; phone (1) 581 11 00; telex 48902 MAPFRE; fax 1-419 91 95.

Society for Organic Petrology Annual Meeting, October 29-31, 1989, Urbana, Illinois; and **Workshop on Fluorescence Microscopy**, November 1-2, 1989, Carbondale, Illinois. Information: Richard Harvey, Illinois State Geological Survey, 615 E. Peabody Dr., Champaign, IL 61820; (217) 244-0836.

Annual Meeting of the Association of Ground Water Scientists and Engineers, October 31-November 1, 1989, Houston, Texas. Information: Susan Crites, National Program, AGWSE/NWWA, 6375 Riverside Dr., Dublin, OH 43017; (614) 761-1711; telex 241302.

***Society of Vertebrate Paleontology 49th Annual Meeting**, November 1-4, 1989, Austin, Texas. Information: SVP89, Vertebrate

(*continued on p. 269*)

MEETINGS (*continued from p. 268*)

Paleontology Lab., Balcones Research Center, 10100 Burnet Road, Austin, TX 78758-4497; (512) 471-6087.

Sociedad Española de Paleontología 5th Annual Meeting, November 2–3, 1989, Valencia, Spain. Information: Ana Márquez-Aliaga, Depto. Geología, Facultad de Ciencias Biológicas, 46100 Burjassot, Valencia, Spain.

World Gold '89, November 5–8, 1989, Reno, Nevada. Information: Meetings Dept., World Gold '89, Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162; (303) 973-9550; telex 881988.

Geological Society of America Annual Meeting, November 6–9, 1989, St. Louis, Missouri. Information: Meetings Department, GSA, P.O. Box 9140, Boulder, CO 80301; (303) 447-2020.

***SIAM Conference on Geometric Design**, November 6–10, 1989, Tempe, Arizona. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999.

***Supercomputing '89**, November 13–17, 1989, Reno, Nevada. Information: F. Ron Bailey, MS. 258-5, NASA Ames Research Center, Moffett Field, CA 94035; (415) 694-4500.

1989 Eastern Oil Shale Symposium, November 15–17, 1989, Lexington, Kentucky. Information: Geaunita H. Caylor, 201 Porter Building, Lexington, KY 40506-0205; (606) 257-2847.

1989 Petroleum Hydrocarbons Conference, co-sponsored by the Association of Ground Water Scientists and Engineers and the American Petroleum Institute, November 15–17, 1989, Houston, Texas. Information: National Water Well Association, P.O. Box 182039, Dept. #017, Columbus, OH 43218; (614) 761-1171; telex 241302.

***American Geophysical Union Fall Meeting**, December 4–8, San Francisco, California. Information: AGU Meetings, 2000 Florida Ave., N.W., Washington, DC 20009; (202) 462-6903.

American Society of Mechanical Engineers Winter Annual Meeting, December 10–15, 1989, San Francisco, California. Information: ASME Meetings Dept., 345 E. 47th St., New York, NY 10017; (212) 705-7795.

***4th SIAM Conference on Parallel Processing for Scientific Computing**, December 11–13, 1989, Chicago, Illinois. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999.

Penrose Conference

The Eocene Tectonic Transition: Oregon to Alaska, September 4–10, 1989, Penticton, British Columbia. Information: Ralph A. Haugerud, U.S. Geological Survey, MS 975, 345 Middlefield Rd., Menlo Park, CA 94025; (415) 329-4910.

Future GSA Annual Meeting Sites

St. Louis	November 6–9	1989
Dallas	October 29–November 1	1990
San Diego	October 21–24	1991
Cincinnati	October 26–29	1992
Boston	October 25–28	1993

1990

***ACM/SIAM Symposium on Discrete Algorithms**, January 22–24, 1990, San Francisco, California. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999.

***Source Rocks, Generation, and Migration of Hydrocarbons and Other Fluids in the Southern Midcontinent—Symposium/Workshop**, February 6–7, 1990, Norman, Oklahoma. Information: Kenneth S. Johnson, Oklahoma Geological Survey, 100 E. Boyd, Room N-131, Norman, OK 73019; (405) 325-3031. (*Abstracts deadline: September 15, 1989.*)

Workshop on Tertiary Stratigraphy of Highly Extended Terranes, Southern Basin and Range Province, February 9–12, 1990, Zyzzyx Springs, California. Information: Rick Hazlett, Dept. of Geology, Pomona College, 609 N. College Ave., Claremont, CA 91711-6339; (714) 621-8000, ext. 2952.

First PNG Petroleum Convention, February 12–14, 1990, Port Moresby, Papua New Guinea. Information: Mick McWalter, First PNG Petroleum Convention, c/o PNG Chamber of Mines and Petroleum, P.O. Box 7059, Boroko, Port Moresby, Papua New Guinea; phone 675-25-2836; fax 675-21-7107; telex NE 23482.

National Water Well Association/Association of Ground Water Scientists and Engineers Cluster of Conferences, "Agricultural Impacts on Ground Water Quality," "Ground Water Geochemistry," "Ground Water Management and Wellhead Protection," and "Environmental Site Assessments: Case Studies and Strategies," February 20–22, 1990, Kansas City, Missouri. Information: NWWA/AGWSE, P.O. Box 182039, Dept. #017, Columbus, OH 43218; (614) 761-1711.

Society of Mining Engineers Annual Meeting, February 26–March 1, 1990, Salt Lake City, Utah. Information: Meetings Department, Society of Mining Engineers, P.O. Box 625002, Littleton, CO 80162; (303) 973-9550; fax 303-973-3845; telex 881988.

***SIAM Conference on Applied Probability in Science and Engineering**, March 5–7, 1990, New Orleans, Louisiana. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999. (*Abstracts deadline: September 27, 1989.*)

AAPG Southwest Section Convention, March 11–13, 1990, Wichita Falls, Texas. Information: Will Tucker, Technical Program Co-Chairman, 825 MBank Building, Wichita Falls, TX 76301.

***American Institute of Hydrology: Minimizing Risk to the Hydrologic Environment**, March 12–16, 1990, Las Vegas, Nevada. Information: AIH, 3416 University Ave. S.E., Minneapolis, MN 55414; (612) 379-1030. (*Abstracts deadline: September 15, 1989.*)

Symposium on Geology and Ore Deposits of the Great Basin, April 1–5, 1990, Reno, Nevada. Information: Geological Society of Nevada, P.O. Box 12021, Reno, NV 89510.

International Conference on Mechanics of Jointed and Faulted Rock, April 18–20, 1990, Vienna University of Technology, Vienna, Austria. Information: H. P. Rossmanith, Wiedner, Jauptstrasse 8—10/325, A-1040 Wien, Austria; phone 0222-588-01.

Orogenesis in Action: Tectonics and Processes in the West Equatorial Pacific Margin, April 18–20, 1990, London, England.

(*continued on p. 270*)

MEETINGS (*continued from p. 270*)

Information: Robert Hall, Department of Geological Sciences, University College, Gower St., London, WC1E 6BT, England.

European Geophysical Society XV General Assembly, April 23–27, 1990, Copenhagen, Denmark. Information: EGS Office, Postfach 49, D-3411 Katlenburg-Lindau, Federal Republic of Germany; phone 49-5556-1140; fax 49-5556-4709; telex 965564 zil d. (*Abstracts deadline: January 31, 1990.*)

***SIAM Conference on Applications of Dynamical Systems**, May 7–10, 1990, Orlando, Florida. Information: SIAM Conference Coordinator, 3600 University City Science Center, Philadelphia, PA 19104-2688; (215) 382-9800; fax 215-386-7999. (*Abstracts deadline, November 28, 1989.*)

***West Texas Geological Society and Permian Basin Section of SEPM Field Seminar to the Marathon Area, Brewster County, Texas**, May 10–12, 1990. Information: WTGS/PBS-SEPM, P.O. Box 1595, Midland, TX 79702; (915) 683-1573.

Geological Association of Canada–Mineralogical Association of Canada Joint Annual Meeting, May 16–18, 1990, Vancouver, British Columbia. Information: R. I. Thompson, c/o GAC-MAC '90 Secretariat, 801 - 750 Jervis St., Vancouver, B.C. V6E 2A9, Canada; (604) 681-5226; fax 604-681-2503; telex 04-352848 VCR.

***1st Joint Meeting of the Canadian Quaternary Association and American Quaternary Association**, June 4–6, 1990, Waterloo, Ontario, Canada. Information: Alan V. Morgan, Quaternary Sciences Institute, Dept. of Earth Sciences, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada.

USA/USSR Joint Conference on Global Environmental Hydrology and Hydrogeology, Leningrad, USSR, June 18–21, 1990. Information: Helen Klose, American Institute of Hydrology, 3416 University Ave., S.E., Minneapolis, MN 55414; (612) 379-1030.

4th International Conference on Geoscience Information (GeoInfo IV), June 24–29, 1990, Ottawa, Canada. Information: David Reade, Conference Secretary-Treasurer, GEOSCAN Centre, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada; (613) 992-9550; fax 613-996-9990; telex 0533117 EMAR-OTT.

***9th International Conference on Basement Tectonics**, July 2–6, 1990, Canberra, Australia. Information: M. J. Rickard, ANU, GPO Box 4, Canberra ACT 2601: phone 062-492055.

1990 Watershed Management Symposium, July 9–11, 1990, Durango, Colorado. Information: Robert Riggins, USACERL, P.O. Box 4005, Champaign, IL 61824-4005.

International Association on the Genesis of Ore Deposits 8th Symposium, August 12–18, 1990, Ottawa, Ontario. Information: L. M. Cumming, 8th IAGOD Symposium, Geological Survey of Canada, 601 Booth St., Ottawa, Ontario K1A 0E8, Canada.

International Conference on Water Resources in Mountainous Regions, August 27–September 1, 1990, Lausanne, Switzerland. Information: Aurèle Parriaux, Laboratory of Geology EPFL, 1015 Lausanne, Switzerland; phone 021-47-23-55; telex 454478 EPFV CH.

***AEG General Meeting and 14th International Geochemical Exploration Symposium**, August 29–31, 1990, Prague, Czechoslovakia. Information: Frantisek Mrna, Geological Survey of Prague, 118 21 Praha 1, Malostranske nam. 19, Czechoslovakia.

Geological Association of Canada Nuna Research Conference, Late Proterozoic Rifting, Glaciation and Eustasy, as Illustrated by the Windermere Supergroup, September 8–14, 1990, Windermere and Valemount, British Columbia. Information: J. D. Aitken, Geological Survey of Canada, 3303 33rd St. NW, Calgary, Alberta T2L 2A7, Canada.

3rd International Archaean Symposium, September 17–21, 1990, Perth, Western Australia. Information: Susan E. Ho, P.O. Box 435, Nedlands, Western Australia 6009, Australia. (*Abstracts deadline: December 31, 1989.*)

7th International Conference on Geochronology, Cosmochronology and Isotope Geology, September 24–29, 1990, Canberra, Australia. Information: Organizing Committee, ICOG 7, Research School of Earth Sciences, Australian National University, G.P.O. Box 4, Canberra, A.C.T. 2601, Australia; phone 062-49-3406; fax 062-47-4639; telex 62693.

5th Australasian Remote Sensing Conference, October 8–12, 1990, Perth, Western Australia. Information: Golden West Conventions, P.O. Box 411, West Perth, W.A. 6005, Australia; phone 619-4814029; telex AA 95380.

***Conference on Geodynamics of the Arabian Plate**, October 20–25, 1990. Information: Waris E.K. Warsi, Dept. of Geology, University of Kuwait, P.O. Box 5969, Safat 13060, Kuwait; or Muawia Barazangi, INSTOC, Snee Hall, Cornell University, Ithaca, NY 14853-1504. (*Abstracts deadline: April 1, 1990.*)

Penrose Conferences 1990

Correlation of Nonmarine Cretaceous Strata, May 9–13, 1990, Breckenridge, Colorado. Information: Niall J. Mateer, Nonmarine Cretaceous Correlations, 1467 N. 17th, Laramie, WY 82070; (307) 721-4946; or Norman O. Frederiksen, USGS, 970 National Center, Reston, VA 22092; (703) 648-5277.

Large Lakes and Their Stratigraphic Record, September 9–13, 1990, Lake Tahoe, California. Information: Andrew S. Cohen, Dept. of Geosciences, University of Arizona, Tucson, AZ 85721; (602) 621-4691 (direct), (602) 621-6024 (dept.).