

A black and white photograph of a gnarled, weathered tree trunk in a desert landscape. The trunk is the central focus, showing deep textures and shadows. In the background, there are more trees and a sandy, hilly terrain under a bright sky.

UCLA

1980-1981

Department of Earth and Space Sciences



ACKNOWLEDGEMENTS

The editors--Vicki Doyle-Jones and Ken Watson--thank George Lapins, Clarence Hall, Clem Nelson, Lynn Newton, Willis Popenoe IV, Spring Verity, and all who supplied news for their valuable assistance. Vicki Doyle-Jones produced the typesetting and illustrations, Julie Guenther created the cartoons, and Takeo Susuki and his ESS 297 class provided the photographic reproductions of original photographs by Ansel Adams, Helen Loeblich, Kata McCarville Weber, and David Williams.

Mr. Chuck Knox of UCLA Alumni and Development provided funding for Newsletter postage and a great deal of help with our alumni lists, which Gail Marshall, E&SS departmental secretary, has worked overtime to update and improve. And finally, the Department greatly appreciates the support of Chevron Oil Field Research Company, La Habra, California, who reproduced the Newsletter for the fourteenth year in a row.



THE COVER

The cover photograph, a Bristlecone pine at the 11,000 foot level in the White Mountains (on the road to the University's Barcroft Laboratory, base station for the second half of the E&SS Summer Field program), is copied from one of a series of 22 pictures of White Mountain and vicinity that the University commissioned from photographer Ansel Adams for its centennial celebration.



DEPARTMENT OF EARTH AND SPACE SCIENCES
3806 GEOLOGY BUILDING
LOS ANGELES, CALIFORNIA 90024

TO: Earth and Space Science Alumni
FROM: W.G. Ernst

Here is your copy of our 1980-1981 Departmental Newsletter, organized by Ken Watson and assembled by Vicki Doyle-Jones. As you can see, we're still playing catch-up; and although we are a bit behind the times with regard to reporting the news, it is partly because so many things are happening in the Department. The emphasis this year is shifting to coverage of you, our alumni; but we've only heard from a small proportion of you on a regular basis. Clearly, *you're* on our mailing list, but many (perhaps most) UCLA geologists, geophysicists, and space physicists are not. If you know of any of our alumni who aren't receiving the Newsletter, please provide us with their names and addresses. As our coverage becomes more comprehensive, the Newsletter will improve; so please do fill out the enclosed questionnaire (last page of the Newsletter) and send us the addresses of other alumni.

On a sad note, I must inform you that Parky Popenoe died on July 25, 1981. He was active up to the last, and had the comfort of his son, Willis, during his final years.

As always, the Earth and Space Science Department is in a state of flux. Two of our Rubey Assistant Professors, Paul Davis (geophysics) and Bill Newman (applied mathematics) have been converted to regular ladder faculty, and Bill Bruner (physical geology) appointed as a new Rubey Assistant Professor. Chris Russell (space science) is just now accepting a joint appointment to both the E&SS Department and the Institute of Geophysics and Planetary Physics.

Our current instructional and research strengths span the range from space science, geophysics, geochemistry, and petrology to regional geology and plate tectonics. It's apparent when reading our faculty notes and the advanced degree topics of our graduate students. This is a scholarly group of national stature; as always, we emphasize the fundamental sciences rather than applications.

We are in the process of enhancing our strengths in sedimentology/basin analysis, petroleum geology, and in geologic remote sensing. We have just appointed Ray Ingersoll (who has worked extensively on the sedimentary processes that produced the Great Valley Sequence) as Adjunct Associate Professor, and we are considering additional strengthening in the field of petroleum exploration and nonrenewable

resource analysis. Because of financial stringencies, all of these efforts are being made without the benefit of regular faculty positions; so you can see that we are engaged in a bootstrap operation. Already a portion of our goal to augment soft-rock geology has paid off, however. In addition, we have proposals in front of three major resource corporations--for two endowed chairs and a five-year request for block funding--all to enhance scientific capabilities in regional tectonics, stratigraphy, and sedimentology. I have nothing definite to report as yet, but am optimistic. Finally, an informal group of E&SS Industrial Associates has been formed, and we hope soon to provide a proposal to inaugurate research and instructional programs of mutual interest.

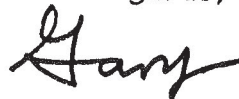
The Department holds several student-generated-and-led, three- to five-day field trips every year and an annual Careers Day, not to mention several picnics, grudge match baseball games, and a yearly--and much dreaded--visit from Santa. In addition, the Rubey Colloquium, held last fall under the direction of Margaret Kivelson, dealt with the subject "The Solar System." It was especially timely due to the recent Voyager fly-bys of Jupiter and Saturn. We all eagerly await the publication which will result (Rubey Volume IV). Rubey Volume II, *The Environment of the Deep Sea* is just out, and Prentice-Hall anticipates publishing the energy volume (Rubey Volume III) in 1983.

I urge each and every one of you to visit the Department and see how it's changed. Perhaps you'll find some aspects that are the same, such as a dedication to excellence in teaching and research and a concentration on principles. Although our sciences have evolved spectacularly over the last ten to twenty years and we have changed with them, our aim is still to be the best school in the country. Please give us your support and ideas on how to accomplish this goal.

You are aware, I'm sure, that the downturn in the economy has affected State, Federal, and private support of educational institutions. Accordingly, we are increasingly relying on our alumni for funds to help get the job done: scholarships, donations, and grants-in-aid for teaching and/or research are especially effective. Some of our most recent grads--even the most impecunious--are our staunchest supporters. We'd like to count on you, too. Checks should be made out to "UCLA Foundation, Earth and Space Sciences," and, of course, all donations are tax deductible.

Most importantly, we need your moral support and advice. Visit the Department anytime, or if you attend the AAPG or GSA meetings, be sure to be at our UCLA alumni functions.

Best regards,



Gary Ernst

PARKY

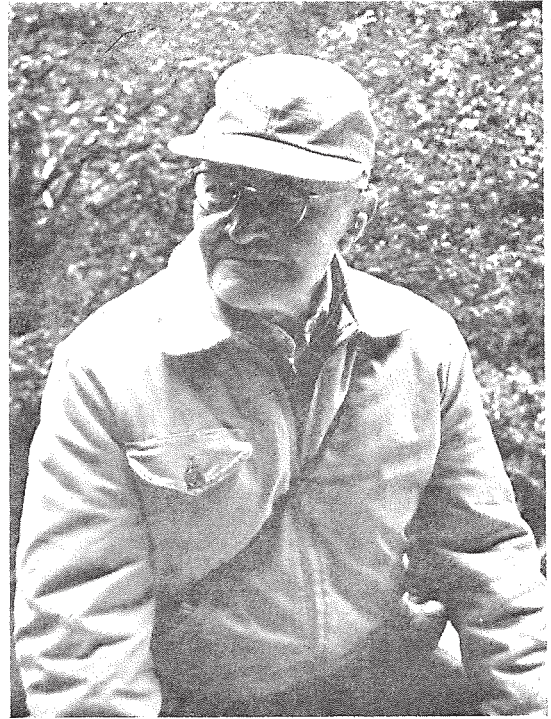
Willis Parkison Popenoe III

was born in Topeka, Kansas, on September 5, 1897. He was the fourth and youngest son of Edwin Alonso Popenoe, a firm but kind professor of entomology, and Carrie Holcomb Popenoe, a woman of endearing warmth. "Parky" grew up on Ridgeview, the family farm outside of Topeka, where he developed qualities and affinities which remained with him permanently: solid physical strength, the capacity for hard work, a broad range of practical skills, a love of literature and music, a passion for baseball (particularly for the gentleman-pitcher Christy Mathewson), and close ties with his family, both immediate and extended. The happiness of these early farm years enriched his entire life.

In 1920, he graduated as president of his class from Washburn Rural High School; he was characterized in the yearbook as a "cheerfull Mephistopheles--diabolically intelligent." Shortly thereafter, mounting economic odds and the failure of a crucial crop forced him to sell Ridgeview and to move with his mother to Silver Spring, Maryland. There he was able to provide his mother with ease and tranquility during her final years, and to foster his emerging interest in paleontology. Between 1924 and 1929, he worked as geologic aide for the U.S. Geological Survey while studying at Johns Hopkins and at George Washington University, from which he graduated with distinction in 1930.

He then moved to California to pursue his M.S. (1933) and his Ph.D. (1936) at the California Institute of Technology, Pasadena, where he remained as Curator of Invertebrate Paleontology and Instructor intermittently until 1945. (This period saw the onset of his deafness, which steadily worsened as he grew older.) Between 1937 and 1940, he worked in the Phillipines for the Far East Oil Development Company of Manila, and as Senior Petroleum Geologist in charge of molluscan paleontology for the Phillipine Commonwealth. During the early 1940's, he held positions with the Lone Star Steel Company of Texas, Daingerfield, and again with the U.S.G.S.

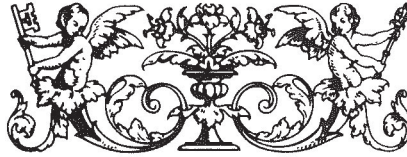
In 1945 began Parky's long and harmonious association with the University of California. During his tenure at UCLA, he built up the fossil reference and study collections, and contributed to the understanding of Pacific Cretaceous invertebrate faunas and stratigraphy. He retired as full professor in 1965, but continued his research until four months before his death.



In December, 1941 he married Kathryn Naomi Malay of Perry, Kansas, a high school classmate and a lady of much delicacy and charm. The fortunate offspring of this union, Willis Parkison Popenoe IV, was born in April, 1945. For fifteen years, the life of the family was dominated by travel. Most wonderful of all the trips was a six-month sabbatical to Europe in 1956, which included extended stays in Leiden, Grenoble, Turin and Tubingen, and enabled Parky to fulfill lifelong dreams of seeing the Alps, Carcassonne, and Pompeii.

In his leisure time, Parky cultivated a wide range of interests. He was skilled in woodcraft and made many pieces of fine furniture based on Colonial American models. He recited a large body of poetry from memory, read the encyclopedia habitually, and gave close study to astronomy, American Civil War history, chess, and baseball lore, among much else. Until loss of hearing obviated it, he was singularly devoted to music: among the composers, he loved Mozart most, and among the performers, the singers Elisabeth Schumann and Kathleen Ferrier. Late in life, he became interested in flower gardening. He had a delightful and lively sense of humor. He formed deep attachments to, and spoiled, a long succession of cats. Always most valuable to him, however, were his relatives, friends and colleagues. Those closest to him in daily life during his last years, brought him much stimulus, happiness and comfort.

On March 11, 1981, he suffered a cerebellar stroke due to renal-arterial hypertension. After a critical and uncertain period, he began a remarkably rapid recovery until July 22, when a sudden fall led to his passing on July 25, 1981, six weeks before his 84th birthday.



BENEFACTORS

1980-81 CORPORATE CONTRIBUTORS

Royalty from Rubey Colloquium, Volume I

Exxon Education Foundation
(unrestricted funds)

Global Geochemistry Corp (unrestricted funds)

Getty Oil Company (unrestricted funds and
two undergraduate scholarships)

Shell Companies Foundation (unrestricted funds
used for scholarships and other
student support)

Chevron Oil Field Research Company
(Newsletter publication)

INDIVIDUAL CONTRIBUTORS

Ram Alkaly

Wayne Dollase

W. G. Ernst

Michael O. Garcia

Liang-Chi Hsu

Diane and Tom Hunter

George Lapins

Paul Mankiewicz

Robert G. Maynard (and Sun Oil
matching gift)

Marcia L. Nelson

Floyd F. Sabins (and Chevron Oil
matching gift)

Rand Schall

Thomas A. Tucker (and Union Oil
matching gift)

K. D. Watson

Mr. and Mrs. Lionel Wm. Wiedey

David Wilson

ALUMNI CONSULTANTS SCHOLARSHIPS

In 1979, Ms. Kata McCarville, now Kata McCarville Weber, made a contribution, matched by her employer, Getty Oil, to the 1979 Summer Field Program for student scholarships. This first-of-its-kind contribution has produced further results in that in 1981 there was established the Alumni Consultants Scholarships for Summer Field students, made possible by contributions from:

Frank E. Denison
Richard F. Escandon
David J. Grover
Robert A. Hollingsworth
Kata McCarville
Steve M. Watry
and
Robert I. Zweigler

and matching funds from their employers Kovacs-Byer and Kovacs-Byer-Robertson.



Kata McCarville Weber submitted this truly unique photo of Roland Mora, herself, and S. G. Muir, all former UCLA geologists, with another geologist, Mary Bee, at Exxon's Highland Uranium Mine near Glenrock, Wyoming. The picture was taken "after an exciting underground ordeal-also known as a tour."



Department of Earth and Space Sciences
LECTURE SERIES FOR 1980-1981

Thursday, October 2, 1980, Dr. James Lawford Anderson, Assistant Professor, Department of Geological Sciences, University of Southern California, Los Angeles: "Two-Mica Granitoids and Associated Mylonitization in Cordilleran Metamorphic Core Complexes."

Thursday, October 9, 1980, Dr. Eldridge M. Moores, Professor, Geology Department, University of California, Davis: "Ophiolites."

Thursday, October 16, 1980, Dr. John M. Ferry, Assistant Professor, Department of Geology, Arizona State University, Tempe, Arizona: "Fluid Flow in the Crust during Metamorphism."

Thursday, October 23, 1980, Dr. Thomas H. Jordan, Associate Professor, Scripps Institution of Oceanography, University of California, San Diego: "Structure of the Crust and Upper Mantle Beneath the Columbia Plateau."

Thursday, October 30, 1980, Dr. Ivan Barnes, Researcher, Water Resources Division, U.S. Geological Survey, Menlo Park, California: "The Death of the Myth of the Batholith."

Friday, November 7, 1980, Dr. Stanley M. Ward, Professor, Department of Geology and Geophysics, University of Utah, Salt Lake City, Utah: "Geology and Ore Deposits."

Monday, November 10, 1980, Dr. Edward Ghent, Professor, Department of Geology, University of Calgary, Alberta, Canada: "Geobarometry of Metamorphosed Pelitic Rocks."

Thursday, November 13, 1980, Dr. Roland von Huene, Geologist, U.S. Geological Survey, Menlo Park, California: "Evidence for Sediment Subduction and Tectonic Erosion along the Japan and Mid-America Trenches."

Monday, November 17, 1980, Dr. Grant Skerlic, Researcher and College Recruiter, Exxon Production Research, Houston, Texas: "Anomalous Paleomagnetic Data and the Tectonic Evolution of the Southern Caribbean Boundary."

Thursday, December 5, 1980, Dr. George C. Dunne, Assistant Professor, Department of Geosciences, California State University, Northridge, California: "Tectonic Evolution of California East of the Sierra Nevada."

Thursday, January 8, 1981, Dr. James R. Boles Assistant Professor, Department of Geological Sciences, University of California, Santa Barbara, California: "Subsurface Porosity and Cementation, Frio Formation, South Texas."

Thursday, January 12, 1981, Dr. Warren Hamilton, Geologist, U.S. Geological Survey, Denver, Colorado: "Core Complexes of the Cordillera."

Thursday, January 15, 1981, Dr. Norman H. Sleep, Associate Professor, Department of Geophysics, School of Earth Sciences, Stanford University, Stanford, California: "Thermal History of the Earth and Geochemical Cycles."

Thursday, January 22, 1981, Dr. Tilman Spohn, Visiting Postdoctoral Scholar Institute for Meteorology and Geophysics, Johann Wolfgang Goethe University: "Convective Thinning of the Lithosphere: A Mechanism for Continental Rifting."

Thursday, January 29, 1981, Dr. Glenn A. Waychunas, Research Associate, Center for Materials Research, Stanford University, Stanford, California: "X-ray Absorption Spectroscopy of Iron Minerals, Melts and Solutions using Synchrotron Radiation."

Thursday, February 5, 1981, Dr. James C. Savage, Researcher, U.S. Geological Survey, Menlo Park, California: "Strain Accumulation in the Western United States."

Thursday, February 12, 1981, Dr. Tor H. Nilsen, Researcher, Branch of Western Environmental Geology, U.S. Geological Survey, Menlo Park, California: "Late Cretaceous to Oligocene Sedimentation and Tectonics, California."

Thursday, February 19, 1981, Dr. Harold C. Helgeson Professor, Department of Geology and Geophysics, University of California, Berkeley, California: "Reaction Rates and Mass Transfer in Geochemical Cycles."

Thursday, February 26, 1981 Dr. William R. Evitt, Professor, Department of Geology, Stanford University, Stanford, California: "Dinoflagellate Morphology."

Wednesday, March 4, 1981, Dr. Robert M. Hazen, Researcher, Geophysical Laboratory, Carnegie Institution of Washington: "High-pressure/High-temperature Crystal Chemistry."

Thursday, March 5, 1981, Dr. Timothy P. Loomis, Associate Professor, Department of Geosciences, University of Arizona, Tucson: "Plagioclase Zoning in a Small Pluton: An Example of the Use of Compositional Zoning of Crystals to Interpret Geological History."

Wednesday, March 11, 1981, Dr. David J. Borns, Research Associate, Department of Geological Sciences, University of Washington, Seattle, Washington: "Blueschist Metamorphism of the Yreka--Fort Jones Area, Klamath Mountains, California."

Wednesday, March 11, 1981, Dr. David J. Borns, Research Associate, Department of Geological Sciences, University of Washington, Seattle, Washington: "Eastern Klamath Mountains, The Bald Hill Segment of the Dun Mountain Belt, South Island, New Zealand: The Evolution of Mélanges in Ophiolite Terranes."

Thursday, March 12, 1981, Dr. Robert G. Coleman, Fairchild Scholar, Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, California: "The Opening of the Red Sea."

Wednesday, March 18, 1981, K. A. (Kip) Hodges, Ph.D. Candidate, Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts: "Tectonic Evolution of the Aefjord-Skjomenes Area, Northern Norway."

Thursday, March 19, K. A. (Kip) Hodges, Ph.D. Candidate, Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts: "Geothermometry and Geobarometry as Indicators of the Uplift History of Metamorphic Terrains: an Example from Northern Norway."

Thursday, March 19, 1981, Dr. David Slemmons, Professor, MacKay School of Mines, University of Nevada, Reno, Nevada: "Active Faults."

Tuesday, March 24, 1981, Dr. Donald Elthon, Postdoctoral Fellow, Lamont-Doherty Geological Observatory, Columbia University, Palisades, New York: "Melting, Mixing and Crystallization in the Evolution of Oceanic Basalts."

Thursday, March 26, 1981, Dr. William Bruner, Postdoctoral Fellow, Department of Earth and Space Sciences, University of California, Los Angeles, California: "The Role of Crack Growth in the Unroofing and Unloading Behavior of Rocks."

Thursday, April 2, 1981, Dr. Mark Bukowski, Assistant Professor, Department of Geology and Geophysics, University of California, Berkeley, California: "High Pressure Geophysics in Reverse: How to Calibrate Experiments Theoretically."

Friday, April 3, 1981, Dr. Sean C. Solomon, Associate Professor, Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts: "Structure of Ocean Rises from Seismology."

Thursday, April 9, 1981, Dr. George Brimhall, Assistant Professor, Department of Geology and Geophysics, University of California, Berkeley, California: Processes of Ore Deposition in the Hydrothermal Environment."

Thursday, April 16, 1981, Dr. Gail Mahood, Professor, Department of Geology, Stanford University, Stanford, California: "Contrasting Trace-element Patterns in Magmas that Erupt as Ash Flows and Lava Flows."

Thursday, April 23, 1981, Dr. David R. Veblen, Professor, Department of Geology, Arizona State University, Tempe, Arizona: "Solid-state Reactions in Chain and Sheet Silicates: Application of High-resolution Transmission Electron Microscopy."

Thursday, April 30, 1981, Dr. Warren J. Nokleberg, Researcher, U.S. Geological Survey, Menlo Park, California: "The Wall Rocks of the Central Sierra Nevada Batholith, California: A Collage of Tectonostratigraphic Terranes Accreted in an Alaskan-type Arc Setting."

Wednesday, May 6, 1981, Dr. Mike Etheridge, Senior Lecturer, Department of Earth Sciences, Monash University, Australia: "Large Scale Fluid Flow During Metamorphism and its Implications for Rock Deformation."

Thursday, May 7, 1981, Dr. Othmar T. Tobisch, Associate Professor, Earth Sciences Board, University of California, Santa Cruz, California: "Recent Work from the Eastern Sierra Nevada: Scientific and Artistic Aspects."

Thursday, May 14, 1981, Dr. Bruce E. Taylor, Assistant Professor, Department of Geology, University of California, Davis, California: "Gold Deposits of the Mother Lode and Northern Districts: Insights Through Light, Stable Isotope Geochemistry."

Thursday, May 21, 1981, Dr. James Mattinson, Assistant Professor, Department of Geological Sciences, University of California, Santa Barbara, California: "A Geochemical Perspective on the Salinian Block--A Major Allochthonous Terrane in California."

Thursday, May 28, 1981, Dr. Mel Kuntz, Research Geologist, U.S. Geological Survey, Denver, Colorado: "Pyroclastic Flow and Associated Deposits of the 1980 Eruption of Mount Saint Helens."

Thursday, May 28, 1981, Dr. Mel Kuntz, Research Geologist, U.S. Geological Survey, Denver, Colorado: "The 1980 Eruption of Mount Saint Helens Volcano."

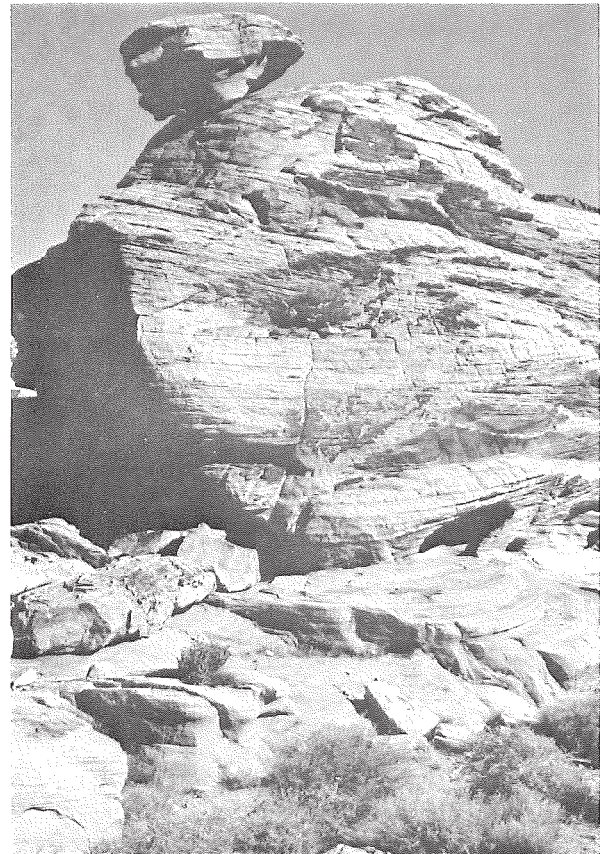
Thursday, June 4, 1981, Dr. Richard H. Sibson, Lecturer, Department of Geology, Royal

School of Mines, Imperial College, London: "Fault Structure and Shallow Earthquake Source."

Thursday, June 11, 1981, Dr. R. N. Brothers, Professor, Auckland University, New Zealand: "Recent Development in the Geology of New Zealand and New Caledonia."

Friday, June 12, 1981, Dr. Henry O. Meyer, Professor, Department of Geosciences, Purdue University, Indiana: "Diamonds."

Friday, June 19, 1981, Dr. Frank D. Stacey, Professor, Department of Physics, University of Queensland, Australia: "Non-Newtonian Gravity: Geophysical Evidence."



This shot of the Jurassic Aztec Formation from the Valley of Fire State Park, Nevada, was taken near one of the campsites on the E&SS spring field trip in early April, 1981. The trip visited the upper Paleozoic section at Arrow Canyon, Nevada, and interesting structural and stratigraphic locations in eastern California and western Nevada.

The Department generally sponsors two student-run field trips per year. The fall 1980 trip, led by faculty member Clem Nelson, featured a new guidebook with contributions by graduate students Bruce Bilodeau, Erdem Idiz, Wayne Zeck, Wayne Sawka, Steve Lipshie, and Professor John Christie. Stops for this trip included Red Rock Canyon, Pine Creek, Convict Lake, Hot Creek, McMurray Meadows, the Schulman bristlecone grove, Deep Springs Valley, Poleta folds, and Pappoose flat and other related plutons.

FACULTY NEWS



NEW FACULTY

LAWRENCE C. BONHAM, Ph.D., Washington University, Lecturer in Petroleum Geology.

Larry was appointed to teach the course in "Petroleum Geology" when Brad Johnson left McCulloh Oil in Los Angeles to become Vice President and Manager of Exploration for Highlands Energy Corporation in San Francisco. Larry has been a Research Geologist at Chevron Oil Field Research Company in La Habra since 1950 and at present is Manager of the Company's Geology Division. His work has been mainly in the areas of sedimentary and structural petrology, organic and inorganic geochemistry, hydrodynamics, and computer geology.

WILLIAM M. BRUNER, Ph.D., University of California, Los Angeles, Rubey Assistant Professor of Geology.

Bill joined the Department in July 1981 and in the present academic year is teaching courses in "Field Geology" and "Fundamentals of Earth Science" and a seminar in "Geological Physics." Bill's research interests include rock mechanics, geological physics, flow and fracture of the earth's crust, constitutive laws for brittle deformation, effects of cracks on thermoelastic behavior of rocks, and influence of geologic history on rock properties.

ORSON L. ANDERSON, Ph.D., University of Utah, Professor of Geophysics.

Orson is Director of the Institute of Geophysics and Planetary Physics Systemwide, University of California. His research interests include mineral physics, elastic properties and phase transitions in rocks and rock-forming minerals, environmental geology, energy resources, and physical properties of planet interiors. In 1980-81 his experiments on thermal expansivity and elastic constants were extended to 1300°C or up to 1.3 times the Debye temperature. These data provided the basis for extending the equation of state of minerals up to mantle temperatures of the Earth for the first time. Further, the data allowed a very simple interpretation of the thermal contribution to the equation of state, resulting in a simplification of previous theories. This new equation of state was used successfully to predict the temperature profile in the Earth, Moon, Mars, Mercury, and Venus. It was used to reconcile the thermodynamics of the Earth's lower mantle, suggesting perovskite as the lower mantle mineral structure.

Orson taught ESS 122, "Physics of the Earth;" and his travel and field work included a coal survey project in eastern Utah and western Colorado and a survey of transportation facilities between Rocky Mountain coal deposits and Asian markets. He gave an invited paper at the COSPAR Meeting in Budapest, Hungary, in June of 1980. Dr. Isao Suzuki from Nagoya University made thermal expansivity measurements on mantle minerals in Orson's mineral physics laboratories.

Among Orson's students, Bob Abelson estimated the melting temperature of iron at core pressures using Monte-Carlo methods; and John Baumgardner compiled a program that successfully computed temperature profiles of planet interiors.

G. PETER BIRD, Ph.D., Massachusetts Institute of Technology, Assistant Professor of Geophysics and Geology.

Peter's research this year was focused on the Recent tectonics of Southern California. He has used the rapidly expanding database on fault slip rates to compile a "microplate" model for ongoing deformation that could be useful in seismic risk assessment. These same data also constrain a set of "soft-plate," finite-element models, which are showing that our local faults are lined with some low-friction (0.2) material such as hydrated clay gouge(?). Peter's teaching included carrying the "new gospel" of plate tectonics beyond our walls with an Extension lecture series and some lectures at ARCO in downtown L.A. He has recently joined the far-flung editorial board of *Tectonophysics*.

ARTHUR L. BOETTCHER, Ph.D., Pennsylvania State University, Professor of Geochemistry and Geophysics.

Art and his colleagues have continued their experimental investigations of the nature of the lower continental crust and of the role of volatile components in the origin and evolution of the mantle. He has been particularly interested in the thermodynamic properties of aluminosilicate liquids at high pressures. His field study of volcanic rocks of the Mojave Desert continues.

Art gave guest lectures at the Geophysical Laboratory, Caltech, MIT, Penn State, U.C. Davis, and Stanford during the year. Visitors to his laboratory include Dr. V. N. Zyryanov, Institute of Experimental Mineralogy, USSR Academy of Sciences, Chernogolovka, USSR (four months) and Dr. Qiti Guo, Guiyang Institute of Geochemistry, Academia Sinica, People's Republic of China (one to two years).

FRIEDRICH H. BUSSE, Dr. rer. nat., University of Munich, Professor of Geophysical Fluid Dynamics.

In his work on flow in stars and their stability, Fritz has shown that the 55-year-old concept of Eddington-Sweet circulations is incorrect and that a purely zonal flow describes the basic state of a baroclinic rotating star. During the year he studied the symmetric baroclinic instability (with Wei-Lee Chen) and the preferred patterns of convection in spherical shells (with Dr. N. Riahi). Fritz spent the fall and winter quarters on sabbatical leave at the Max-Planck Institute für Astrophysik in Garching near Munich, Germany. During the year he gave lectures at an Astrophysical Workshop in Meudon (Paris); Colloque Pierre Curie in Paris; COSPAR Workshop on Stellar and Planetary Magnetic Fields in Budapest; EUROMECH Colloquium on Convection at Karlsruhe, Germany; and a workshop on non-equilibrium phenomena at the Institute of Physics, University of California, Santa Barbara.

Visitors to Professor Busse's laboratory were Professor W. Jacoby, University of Frankfurt for Spring and Summer 1981 and Professor D. Haup, Clarkson College of Technology, New York, for Spring 1981. Dr. G. Geiger returned to Munich in March; and Dr. H. Frick came from Karlsruhe, Germany, in May to spend a year at UCLA. During the year Wei-Lee Chen completed her Ph.D. in Atmospheric Sciences, and Masato Nagata studied secondary instabilities of flow in an inclined layer.

DONALD CARLISLE, Ph.D., University of Wisconsin, Professor of Geology and Mineral Resources.

Don offered an even half dozen courses and seminars in the mineral deposits area during the year. One of these, "Field Methods in Mineral Resource Evaluations," was coordinated with an applied geophysics course offered by Paul Davis. Another was the field trip seminar, organized largely by graduate student Dick Kettler, which met twice weekly and culminated in some excellent tours of gold, mercury, porphyry copper and porphyry molybdenum deposits in Nevada. They very much appreciate the hospitality of the several mining companies and individual geologists. UCLA graduate, Dr. Ted Theodore (USGS Menlo Park), conducted the Battle Mountain portion of the trip. Don's work on calcrete led to some winter field work in Pakistan under the auspices of the U.N. International Atomic Energy Agency. In March he gave an invited paper at the Geological Society of London on calcrete and gypcrete uranium and vanadium occurrences, and was lodged for several nights in old Burlington House among mementos of William Smith, Charles Darwin, and other historic figures. The trip provided his first opportunity to visit the tin, clay, and tungsten mines of Cornwall and to obtain a good suite of ore from Wheal Jane, reopened after a 200-year history.

JOHN M. CHRISTIE, Ph.D., Edinburgh, Professor of Geology.

John investigated the experimental deformation of quartzite and novaculite (determination of flow laws and quantitative analysis of microstructures) with graduate student P. Koch. He also studied flow stress from microstructures of mylonites with graduate student Alison Ord and strength and yielding mechanisms of dry quartz crystals at high temperatures with UCLA graduate Dr. Jim Blacic (B.A., 1964; Ph.D., 1971). In connection with the latter experimental study, he spent part of Summer 1980 at the Los Alamos National Laboratory, New Mexico. John taught undergraduate courses in "Structural Geology" and "Field Geology" and graduate courses in "Structural Petrology" and "Structure and Tectonics." He serves on the editorial advisory board of the journal *Texture of Crystalline Solids* and continues to be active in the Electron Microscopy Society of America and the American Geophysical Union. He was co-convenor of an Institute of Geophysics and Planetary Physics--Los Alamos National Laboratory Conference on "Properties of Materials under Extreme Conditions," held at Los Alamos in May 1981. John also gave invited lectures at Arizona State University on "Rheology and Microstructures of Quartz Aggregates," at a Geological Society of America Penrose Conference in San Diego on "Deformation Mechanisms and Flow Stresses in Mylonitic Rocks," and at the IGPP-LANL Conference on "High Temperature Flow Laws of Quartzite."

PAUL J. COLEMAN, Ph.D., University of California, Los Angeles, Professor of Geophysics and Space Physics.

Paul's research interests include physics of plasmas in space; magnetic fields of stars and planetary bodies, and cosmic rays.

PAUL M. DAVIS, Ph.D., University of Queensland, Rubey Assistant Professor of Geophysics.

During the Summer of 1980, Paul and his colleagues installed four telluric/self-potential lines on Mount St. Helens, Washington, in time to record electrical signals possibly associated with the October eruption. He has since been in the process of upgrading this installation to a full electromagnetic array comprised of five proton magnetometers, a fluxgate, and accelerometers. Data from the array will be telemetered to UCLA via radio and telephone. Part of this work includes design and construction of a new proton magnetometer using microprocessors to analyze the precession frequency.

Paul's teaching involved three courses and one seminar series. The courses were "Introduction to Geophysics and Space Physics," "Geophysical Exploration," and "Fundamentals of Earth Science." The seminar treated current topics in geophysical exploration. Course field work involved trips to the Hope and Modoc Mines in joint exercises with Don Carlisle's class. During the year Paul lectured on volcanism to the Las Doñas Society at UCLA and also gave talks at Caltech and Sandia Laboratories, Albuquerque, New Mexico.

MICHAEL J. DeNIRO, Ph.D., California Institute of Technology, Assistant Professor of Geochemistry.

Mike continues to investigate the distribution of stable isotopes in biological systems with applications to problems in geochemistry (methanogenic bacteria), archaeology (determination of diets of fossil animals, including man), and climatology (paleoclimatic reconstruction using fossil wood). During the year he taught courses in Oceanography, Evolution, and Biogeochemistry, and a seminar in Geochemistry. Mike attended the annual meeting of the Geological Society of America in Atlanta, Georgia, and a "Workshop on Research into Diet and the Origin and Evolution of Man" in Baltimore, Maryland. He gave a seminar on "Dietary Reconstruction Using Stable Isotopes" at the University of Utah. Mike served on the Academic Senate Committee on Faculty Welfare. Dr. R. V. Krishnamurthy of the Physical Research Laboratory, Ahmedabad, India, was a visiting scientist in Mike's laboratory for eight months.

DONALD J. DePAOLO, Ph.D., California Institute of Technology, Assistant Professor of Geochemistry and Geology.

Don writes, "My teaching for 80-81 included a graduate course on isotopes and trace elements in igneous petrology, sharing the field course with Clarence Hall, and geochemistry. My research has been a continuation of previous studies aimed at understanding the growth of continental crust and the related changes in the structure and composition of the mantle using Nd and Sr isotopes in igneous and metamorphic rocks. In particular, regional studies were carried out on the Sierra Nevada and Peninsular Ranges batholiths and the Proterozoic basement rocks of the Colorado Front Range. I have also completed some theoretical work that helps to relate isotopic data to crust and mantle evolution through earth history, and to relate isotopic and chemical variations in igneous rocks to processes happening in magma chambers. Recently, we completed work in cooperation with Ed Grew that showed that some of the granulite facies rocks of Enderby Land, Antarctica, are about 3500 m.y. old. (Some Russian geochronologists had claimed that their age was 4000 m.y.) Work has also been initiated that uses cosmic-ray-produced neutron effects in some elements (Gd, Sm, Eu) in lunar soils as a sort of 'trace fossil.' The object is to determine an absolute time scale for lunar regolith stratigraphy. I have also completed about half of a monograph on Neodymium isotopes, which will hopefully be finished by mid-1982.

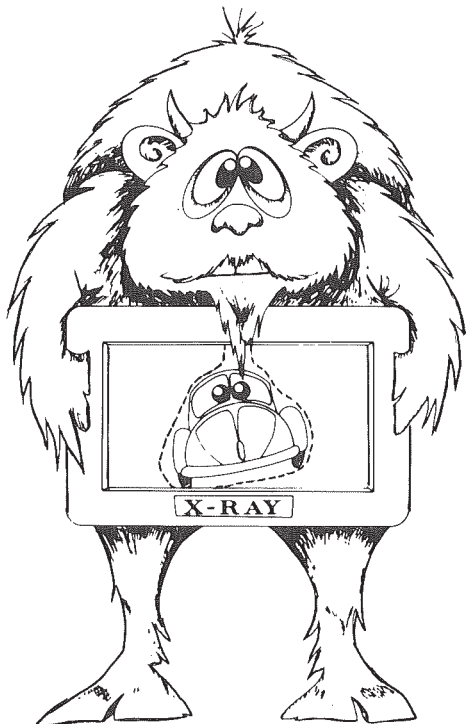
"For the graduate students, Lang Farmer has been using Nd and Sr isotopes in granitic rocks of the Northern Great Basin to understand their origin and to study the pre-Cenozoic crustal structure of the area. Brian Marshall is developing techniques for using the radioactive decay of ^{40}K to ^{40}Ca to determine the ages of rocks. He hopes to be able to date sedimentary as well as igneous and metamorphic rocks with this method. Bruce Nelson has been working to characterize the eclogites of the Franciscan terrane and date the age of metamorphism. He is also beginning to assess the value of Sm-Nd isotopic data to determine the provenance of sedimentary rocks. Vickie Bennett has been pursuing isotopic studies that bear on the tectonic history of Southern California--the Pelona-type schist in particular. She is also exploring the possibility of directly dating phosphatic fossil material using $^{138}\text{La} \rightarrow ^{138}\text{Ba}$ decay."

WAYNE A. DOLLASE, Ph.D., Massachusetts Institute of Technology, Professor of Geology.

Wayne writes, "In the Summer of 1980, Gary Ernst and I taught the Summer Field course at Barcroft Station (elevation 12,500 feet) in the White Mountains, California. After that, it's been pretty much downhill! Much of my research time was spent trying to learn why, how, and where noble gas atoms are located in minerals. I've concluded that putting noble gas atoms into most mineral structures is rather analogous to stuffing a buffalo into a



Volkswagen. This can be done in several ways: One can build the car around the buffalo (growth included); one can park in the middle of a buffalo stampede and after Avagadro's number of buffalo go thundering by, it is likely that one or more may get in (diffusion introduced, especially at high buffalo pressures); one can fire the buffalo out of a giant cannon into the car (ion implantation), which produces characteristic damage to the structure--as well as to the buffalo; or, finally, one can transform a passenger into a buffalo (nucleogenesis) such as may occur driving through Transylvania at midnight under a full moon. None of the processes is very efficient or comfortable, thereby explaining the rarity of buffalo in Volkswagens."



W. GARY ERNST, Ph.D., Johns Hopkins University, Professor of Geology and Geophysics and Chairman of the Department.

Gary taught "Evolution: Solar System, Earth, and Life" with Bill Kaula and Mike DeNiro and "Advanced Field Geology" (Summer Field) at White Mountain Peak with Wayne Dollase. During Spring Quarter he taught "Sedimentology" ("...a real education for me!"). Gary worked on the U.S. Geological Survey mapping project in the Marble Mountain Wilderness of the Klamath Mountains; finished a synthesis on orogeny, metamorphism, and inferred post-Paleozoic plate motions in Taiwan; and continued paragenetic studies of eclogites and peridotites from Liguria and the western Alps. He was editor of Rubey Volume No. 1, *The Geotectonic Development of California*, now out; co-editor of Rubey Volume No. 2, *The Environment of the Deep Sea*, in press; and co-editor of Rubey Volume No. 3, *Energy for Us and our Progeny*, in review. He says, "I intend to write another textbook, this time entirely in Chinese proverbs from old fortune cookies."

Gary made many trips to Washington on National Research Council business and attended the Geological Society of America meeting in Atlanta (where he delivered his Presidential Address to the Mineralogical Society of America), the American Geophysical Union meeting in Baltimore, and a two-week seminar on petrology and plate tectonics in Taiwan. During the year he was elected to the American Academy of Arts and Sciences, and he chaired a committee of the National Academy of Sciences which provided Secretary of the Interior Watt with potential candidates for the Directorship of the U.S. Geological Survey. Gary gave three lectures at Atlantic-Richfield Company, three at Ohio State University, and one at the University of California, San Diego.

CLARENCE A. HALL, Jr., Ph.D., Stanford University, Professor of Geology and Paleobiology; Director, White Mountain Research Station.

During the Spring and Summer of 1980, Clarence continued fieldwork on the North Pyrenean fault in southern France. The project consists of mapping a 200 km strip along the fault, in collaboration with several French geologists, and developing the geologic history of the suture between Spain and France. He presented a paper at the Section on Tectonics, International Geologic Congress, in Paris in the Summer of 1980 on "A Miocene transform fault system in western California."

As Director of the White Mountain Research Station, he spoke to the Sierra Club on the work of the Station and the change in classification of the White Mountain Scientific Research Area. Clarence served as Chairman of the UCLA Committee on the University of California

Natural Land and Water Reserve System; Member, Statewide Committee on the University of California Natural Land and Water Reserve System; Member, UCLA Academic Senate Committee on Committees; Member, President's Advisory Committee for the Institute of Geophysics and Space Physics; and Representative, appointed by the Geological Society of America, on the North American Commission on Stratigraphic Nomenclature.

Clarence writes, "It may be of interest to Geology Alumni to know that the Tick Canyon area (Tick Canyon Mine or Sterling Borax Mine) has been donated to the University of California Natural Land and Water Reserve System by United States Borax and Chemical Corp. U.S. Borax will also enter into a long-term use agreement with the University for the eastern part of its property (near Forbes Place, the "Z-fold" area). Finally, the University will obtain a long-term use agreement with the Bureau of Land Management for the property to the north of the U.S. Borax property (i.e., Long Peak, Hershey Peak, etc.). This is a unique teaching area, and the University is very fortunate to have this property for its instructional program. It may also be of interest to Alumni to know that the Department started nearly 20 years ago to obtain the Tick Canyon property as a gift or lease to the University. The champions of those early efforts were Ron Shreve and Charlie Corbató (B.A., 1954; Geophysics; Ph.D., 1960, Geology), now Professor, Department of Geology and Mineralogy, Ohio State University."

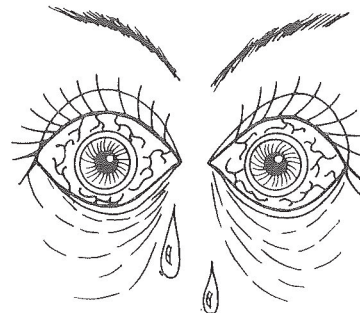
ROBERT E. HOLZER, Ph.D., University of California, Berkeley, Professor Emeritus of Geophysics.

Bob continues development of a quantitative model of geomagnetic activity and is making a comparative study of predictors for it. During the year he attended the American Geophysical Union meetings in Baltimore and San Francisco and traveled for pleasure in Arizona. He continues to serve on the Board of Directors of the Faculty Center. Bob's graduate student, James G. Slavin, is nearing completion of a study of the interaction of the solar wind with the terrestrial planets.

DAVID D. JACKSON, Ph.D. Massachusetts Institute of Technology, Associate Professor of Geophysics.

During the year Dave continued the interpretation of geodetic data to estimate fault displacements and tectonic motions, and he carried out design and testing of high-accuracy experimental methods for measuring tilt and strain. Dave taught "Geophysical Exploration," a graduate course in "Inverse Theory and Data Interpretation," and a seminar in "Time Series Analysis," which emphasized multichannel filtering.

Dave tells us that Paul Davis and he "ran a one week experiment in measuring distances accurately. With a sturdy cohort of enthusiastic students, we measured the distance between two mountain tops to an accuracy of 10^{-6} . Achievement of this accuracy required extensive measurement of temperature, pressure, and humidity (to correct the index of refraction) and nighttime operation. Never have I seen redder eyes."



Dave plans to spend the 1981-1982 academic year on leave at the Goddard Space Flight Center in Greenbelt, Maryland. There he will be analyzing data from very long baseline interferometry and satellite laser ranging to estimate tectonic displacements.

ROBERT E. JONES, B.S., San Diego State University, Lecturer in Geology.

Bob taught the electron microprobe course in the Fall Quarter and reports that both the probe and the scanning electron microscope are working well. During the summer of 1980, Bob worked as camp manager/cook for Gary Ernst and Wayne Dollase's summer field class at White Mountain Research Station for the second year in a row. Adjustment to the 12,500 foot altitude was easier this time. During that summer he also visited Frank Spear's (Ph.D., 1976) laboratory at MIT, Cambridge, Massachusetts. In Spring 1981 Roy Budnik (B.A., 1968, Ph.D., 1974) and Ken Crawford (Ph.D., 1975) came by for a few day's visit with the Joneses. Bob "would like to hear from more of you!"

ISAAC R. KAPLAN, Ph.D., University of Southern California, Professor of Geology and Geochemistry.

In the past year Ian and his group have been involved in research that has been directed toward the origin of petroleum on the one hand and the marine environment on the other. Information on the behavior of sedimentary organic matter during accumulation has led to a better understanding of the recognition of sources from which ancient kerogens have been deposited. The degradation of organic matter can lead to formation of petroleum and other fossil fuels. Studies on the environment have led to a better understanding of the processes that cause transport of organic pollutants from

land to the ocean. An inventory has been constructed on the amount and type of pollutants washed into the Southern California Bight during washout from the L.A. Basin by rain.

Ian taught courses in "Marine Geology" and in "Oceanography" during the year. He travelled to several cities to give lectures and attend meetings and workshops. The highlight was a one-week meeting in September to attend the Dahlem "Conference on Precambrian Mineral Formations" and the "Origin of Life Conference" in West Berlin. At that time he also stayed a few days in Britain and Scotland. The Kaplan family spent their summer vacation in the Caribbean.

Postdoctoral scholars working under Ian's direction were Diana Howard, Greg Rau, Indira Venkatesan, Bernd R. T. Simoneit, John F. Kerridge, and Natalie Shalteil. Professor Amitai Katz from Jerusalem spent a sabbatical year in study and research at UCLA.

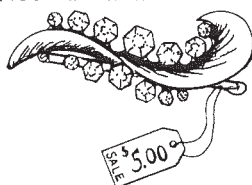
Ian was elected to membership in the American Institute of Chemists and served on a Diesel Impacts Study Committee of the National Research Council/National Academy of Sciences.

WILLIAM M. KAULA, D. Sc., Ohio State University, Professor of Geophysics.

Bill tells us that he is "enjoying a new planet--Venus--through being on the Pioneer Venus radar altimeter team. Looks like there's no plate tectonics there: no evidence of anything like ocean rises; two big plateaus; all the rest around one level. We think the surface is all continental. Still plugging away at mantle convection; returning to some dynamical problems, like the Kirkwood gaps."

Bill continues to teach geophysics and space physics graduate courses such as "Continuum Mechanics" and "Planetary and Orbital Dynamics," but he also "met the masses through E & SS 3--"Evolution: Solar System, Earth, Life." Bill reports that he did not travel much aside from the usual trips to Washington and Houston. At Arrowhead he attended an International Conference on Planetary Evolution ("really excellent") and at Aspen, Colorado, a workshop on star formation, where he was "the sole geophysicist, confused amongst many young astrophysicists."

During the year Bill spent one or two days a week serving on the UCLA Council on Academic Personnel. He also had jury duty, where he "helped convict a woman for stealing a \$5 brooch."



Among Bill's graduate students, Steve Cooperman is "settling down on a core-formation dissertation; Evan Fishbein is bouncing around (convection, dislocation, *et al.*)" Glen Stewart is nearing completion of a dissertation on planetesimal scattering; and Dave Weintraub, a new graduate student, is interested in dynamical problems."

MARGARET GALLAND KIVELSON, Ph.D., Harvard University, Professor of Space Physics (Vice Chairman of the Department).

During the year, Margy spent much effort in organizing the Rubey Colloquium on the Solar System for the Fall Quarter 1981. She comments that "The importance of Bill Rubey's contributions to the understanding of terrestrial volatiles is particularly apparent in recent applications to the problems of other planetary bodies."

ALFRED R. LOEBLICH, Jr., Ph.D., University of Chicago, Adjunct Professor Paleontology and Geology.

With Helen, Al received a National Science Foundation Grant for three years for reclassification of the Foraminifera. The grant allowed purchase of a scanning electron microscope to use in the restudy of some 4000 genera.

Al directed the research of Carl Mendelson, who completed his Ph.D., and served on the committees for three other students. A joint publication with Helen (Tappan Loeblich) on "Suprageneric revisions of some calcareous Foraminiferida" appeared in April 1981.

HELEN TAPPAN LOEBLICH, Ph.D., University of Chicago, Professor of Paleontology and Geology.

The highlight of the year for Helen was publication of *The Paleobiology of Plant Protists* (W. H. Freeman, 1980, 1028 pages)--the final result of a dozen years or so of work. Her present research, with Al Loeblich, is on foraminiferal reclassification.

Helen served on the external committee for review of the Geology Department at California State University, Northridge; she is in her final year as Councilor of the Geological Society of America; and was President of the UCLA Association of Academic Women. She directed the research of four students who completed their degrees this year and was on the committees of two other students who also finished.

Visitors to the Loeblich laboratories during the year included: Dr. Ron Schmidt (Utrecht, Netherlands), Dr. William Evitt (Stanford), Dr. David Bottjer (U.S.C.), Dr. G. Vidal (Lund, Sweden), Dr. Iwona Rek (Warsaw, Poland), Peter Geroch (Como, Italy), D. L. Protzman (Diablo Valley College), and Dr. Molly Miller (Vanderbilt University).

ROBERT L. McPHERRON, Ph.D., University of California, Berkeley, Professor of Space Physics and Geophysics.

During the year Bob carried out research on the application of linear prediction filters to prediction of geomagnetic activity and to the calculation of magnetic precursors in earthquake monitoring; on remnant field lines; and on sub-storm effects in geomagnetic tail. In the course of his teaching he developed a microcomputer data acquisition and display system for field geophysics; a microcomputer signal-enhancement induced-polarization system; and a microcomputer base-station magnetometer controller. He also set up an exploration geophysics laboratory. He continued his geophysical studies of Ivanpah Valley and published two papers on its geological structure.

Bob presented seminars on prediction of geomagnetic activity at UCLA, the University of California, Riverside, and Jet Propulsion Laboratory. He continued to serve as exploration geophysical equipment curator and intramural computing coordinator. He also served on the Academic Senate Computing Committee and completed a report for the National Academy of Sciences Committee on Computing and Data Management.

Visitors to Bob's laboratory included: from Japan--Drs. T. Saito, A. Nishida, and S. Kokubun; from the U.S.S.R.--Drs. V. Troitskaya, M. Gochberg, and D. Baher; and from Australia--Dr. B. Fraser.

PAUL M. MERIFIELD, Ph.D., University of Colorado, Lecturer in Engineering and Environmental Geology.

Paul continued research on hydrological and geochemical monitoring of water wells for earthquake prediction--a project supported by the U.S. Geological Survey, Office of Earthquake Studies, since 1976. Some recent results of this study were reported in Geophysical Research Letters. He is also investigating applications of improved Landsat imagery to major engineering projects, with NASA support.

Paul taught "Engineering and Environmental Geology" in the Fall Quarter 1980 and participated in Environmental Science and Engineering problems courses each quarter. The latter courses were concerned with disposal of radioactive waste in desert environments and siting of non-fossil-fuel power plants in the Salton trough.

Paul did field work in the Vidal Junction area of the Mojave Desert during the spring in conjunction with development of a method for mapping desert pavement using computer-enhanced Landsat imagery. He continues to serve as Chairman, Los Angeles County Engineering Geology Review and Appeals Board.

CLEMENS A. NELSON, Ph.D., University of Minnesota, Professor of Geology.

Clem was engaged in research in Early Cambrian trilobites of the western Basin and Range and in a reevaluation of the geologic structure of the western portion of the Inyo Range. He reports that he is struggling, together with James Zumberge, who is now President of U.S.C., with a revision of their textbook *Elements of Physical Geology*.

During the year Clem taught part of the Summer Field course in the Inyo Mountains, "Fundamentals of Physical Geology," "Earth History," and "Geology of California." His travel and field work was confined to the Basin and Range area, except for a largely, although not completely, nongeologic trip to Yucatan--Mayan ruins and calcite beaches at Cancun. He continues to serve on the Committee on Undergraduate Courses and Curricula.

WILLIAM I. NEWMAN, Ph.D., Cornell University, Rubey Assistant Professor of Planetary Physics.

Bill's research this year focused on three problem areas: the application of nonlinear mathematical techniques to solid earth geophysics, the development of some new methods of geophysical inverse theory, and the analysis of data obtained by spacecraft during investigations of the sun and the planets (especially Venus, Mars, and Jupiter). Much of his research effort in collaboration with Leon Knopoff has been directed toward modeling earthquake events. In particular, they have been looking at how the fusion of small cracks into larger ones subject to anelastic creep can produce bursts of seismicity.

Bill has commenced a research project on solar flares in collaboration with space scientists at the Naval Research Laboratory in Washington, D.C. NRL scientists have discovered a class of solar flares that occurs at 18 million degrees. Bill tells us, "I have developed a radiative instability model for these events that we are now in the process of testing. By studying these flare events, we will better understand the sun's influence on communications on Earth."

Bill writes, "Teaching this year has been oriented toward solid earth geophysics, planetary atmospheres, and space physics. The course I gave in planetary atmospheres was especially challenging since it involved integrating what we have learned in the past few years from spacecraft investigations of the solar system."

During the year, Bill gave seminars at California Institute of Technology, University of California, San Diego, and to the Mathematical

Geophysics Working Group of the IUGG on "Instability Theory in Continuous Media and Statistics of Earthquake Prediction."

Among Bill's graduate students, Rick Ditteon is completing his Ph.D. thesis on Viking infrared studies of the surface of Mars; Dana Kerola is beginning his Ph.D. research on the atmosphere of Jupiter using Voyager spacecraft data; and, as an early outgrowth of the planetary atmospheres course, Lee Bargatze has shown that the Pioneer Venus orbiter has not detected gravity waves (which had been expected to occur) in the atmosphere.

GERHARD OERTEL, Dr. rer. nat., University of Bonn, Professor of Geology.

Gerhard continues to unravel strain in rocks. He is investigating deformed rocks from western New York, West Virginia, Vermont, Yorkshire in England, and Israel and is searching for suitable ones in California. Gerhard was on sabbatical leave during Fall and Winter Quarters and spent part of that time doing field work in Israel. While there, he gave lectures at the Hebrew University, Jerusalem; Weizmann Institute of Science, Rehovot; and Ben Gurion University, Beer Sheva.

Gerhard taught "Advanced Structural Geology" in the spring. His group made a survey of world literature on quantitative methods of structural geology and found that "very interesting work is being done presently, even in places at some distance from Westwood." Gerhard's graduate student, Wayne Zeck, gave a talk on his dissertation, "Analysis of Strain in a Large Fold," at the American Geophysical Union meeting in Baltimore, and Steve Lipshie is still incorporating more results from experimentally deformed rock specimens into his growing thesis.

WALTER E. REED, Ph.D., University of California, Berkeley, Associate Professor of Geology.

Ted spent the academic year on sabbatical leave at Indiana University. His research interests include sedimentology, geochemistry of sediments and organic matter, origin of petroleum, and environmental geochemistry.

JOHN L. ROSENFELD, Ph.D., Harvard University, Professor of Geology.

John tells us, "I'm writing up my work on the relationship of the development of schistosity in the central Alps to the major metamorphism that accompanied the famous 'backfolding' event in the Alps. Field season in 1980 saw me chasing contacts and unscrambling nappes along the Connecticut Valley in southern Vermont. (The old legs still get me up the hills!) Other research had to do with the mechanism of metamorphic recrystallization (e.g., evidence that a

force of crystallization' really exists in metamorphic rocks but that it's probably not a very important mechanism with respect to replacement by cation exchange). Bill Carlson's and my paper on aragonite-calcite kinetics was published in the *Journal of Geology*."

During the year, John taught courses related to metamorphic petrology and in October lectured on his Alpine research at Dartmouth College.

FLOYD E. SABINS, Jr., Ph.D., Yale University, Lecturer in Geology and Remote Sensing.

At Chevron Oil Field Research Company, Floyd is now project leader for research on mineral deposits--a group which lends support to the exploration efforts of Chevron Resources, Inc. (the mineral exploration subsidiary of Standard Oil of California). He continues his remote sensing research with emphasis on digital processing of image data. Floyd's course, "Remote Sensing for Earth Scientists," attracts growing numbers of students. In Fall 1980, he taught a remote sensing workshop in London for the American Association of Petroleum Geologists--"a pleasant trip and vacation." Floyd spent an interesting two weeks in Nevada and Colorado examining Chevron mineral prospects. In collaboration with the U.S. Geological Survey, they acquired some shallow seismic data across the lineament on Bristol Dry Lake in the Mojave Desert.

He continues to serve on the NASA Space and Terrestrial Applications Advisory Committee and on the American Association of Petroleum Geologists Publication Committee. His "Remote Sensing Laboratory Manual" was published during the year.

J. WILLIAM SCHOPF, Ph.D., Harvard University, Professor of Paleobiology.

Bill tells us that, "The summer of 1980 was devoted largely to P.P.R.G. (Precambrian Paleobiology Research Group) activities, a rather frenzied attempt to finish the numerous research projects on which this group of 20 or so geologists, biologists, and chemists had been working during the previous year. The venture culminated in a P.P.R.G. symposium on the early history of life, attended by some 150 North American, Australian, and European Precambrian workers, that was held at UCLA in mid-August. Soon thereafter, I headed off to Europe--first to Berlin to attend a Dahlem Conference on Precambrian metaliferous deposits and then to The Netherlands to begin my tenure as a Visiting Professor at the University of Nijmegen--the first portion of my sabbatical leave. Much of the following six months of our Nijmegen visit was spent working on manuscripts to be included in a P.P.R.G. monograph, a magnus opus to be published by

Princeton University Press; but I also found time to visit and lecture at various universities in France, Germany, Belgium, Denmark, Sweden, and elsewhere in Holland. Following a brief visit to UCLA in March, we started off on the second portion of the sabbatical leave--first to England to attend a NATO Conference on the early history of the atmosphere and then to China, where I spent three months as a Visiting Scientist under the auspices of Academia Sinica. We spent five weeks each in Beijing and Nanjing, where I lectured, did field work, and began a series of collaborative research projects with Chinese colleagues; but we also managed to visit Shanghai, Guilin (well known for its remarkable karst topography) and Xian (and the tomb of Qin Shi Huang Di, the first emperor of China, with its army of 6000 life-size, terracotta soldiers--certainly among the most impressive works of man that I've ever seen). Clearly, this past year has been busy and interesting!"

GERALD SCHUBERT, Ph.D., University of California, Berkeley, Professor of Geophysics and Planetary Physics.

Gerry writes: "The period summer 1980 - summer 1981, saw the completion of the book *Geodynamics* that I have been writing with Don Turcotte of Cornell University. The writing absorbed much of my energy, and it is exhilarating to have it done. The book will be published by Wiley in early 1982.

"I had a postdoc for this period--Tilman Spohn from Frankfurt. We had a productive collaboration and published papers on lithospheric thinning and continental rifting and the distribution of heat sources in the mantle. Tilman has now left for home, but I look forward to his return for extended visits in the future.

"My participation in the Pioneer Venus project was heavy during this time, and I wrote several papers on the structure and circulation of the Venus atmosphere including a *Scientific American* article co-authored by my student, Curt Covey."

RONALD L. SHREVE, Ph.D., California Institute of Technology, Professor of Geology and Geophysics.

Ron continued to work on his monograph on theoretical fluvial geomorphology. He spent most of the year looking into transport of sediment by water in flumes and rivers with a view of getting an appropriate transport law for river-profile calculations. Ron taught "Elements of Field Geology," as usual, and a seminar on glaciology and geomorphology.

GERHARD STUMMER, B.S., University of Luetzkendorf, Lecturer in Geology.

Gerry continued to participate with many other laboratories the world over in establishing the elemental compositions of certain rock samples. During the year he carried out XRF analyses of twelve new samples received from the U.S. Geological Survey and the Association of Exploration Geochemists of Denver, Colorado. When preferred values are finally established, portions of these samples are made available to universities and other institutions as primary standards.

In Fall of 1980 Gerry taught "Advanced Techniques in Geological Research" and the XRF-spectrometry section of Chemistry Course 184. He also gave a lecture on X-ray diffractometry to students of the ESS sedimentology class and instructed and supervised other ESS students and postdocs in X-ray diffraction and spectrometry.

In Spring 1981 a new wide optic X-ray diffractometer was installed in the X-ray lab. It is completely radiation safe, improves the lower limit of detection of mineral phases by one order of magnitude, and has a backreflection intensity three times stronger than a standard diffractometer. This improves cell dimension studies to a great extent. One X-ray spectrometer, two standard diffractometers, one wide optic diffractometer, one single crystal diffractometer, and one X-ray generator with a variety of X-ray cameras are now in operation in the X-ray lab.

TAKEO SUSUKI, D. Sc., Tohoku University, Lecturer in Geology, Senior Museum Scientist.

Takeo completed a monograph on the fauna of the Type Topanga Formation which will be published in the bulletin series of the Los Angeles County Museum of Natural History. He taught a course in "Advanced Techniques in Geological Research" and began preparation of a graduate course in advanced paleontology and stratigraphy to be offered in Winter Quarter 1982.

JOHN T. WASSON, Ph.D., Massachusetts Institute of Technology, Professor Geochemistry and Chemistry.

John writes: "More than half our effort is spent on meteorite research. Our most interesting discoveries in this area were concerned with the enigmatic chondrules, mm-sized grains common in the primitive, chondritic meteorites. Compositional studies by Jeff Grossman showed the presence of distinct chemical components in chondrules, and petrographic studies by Ermanno Rimbaldi showed that chondrules contain relict grains. These discoveries indicate that chondrules formed by the melting of preexisting materials present in the solar nebula.

"Greg Kallemyrn published new compositional evidence showing for the first time that each of

the four groups of carbonaceous chondrites is homogeneous and well resolved from the other groups. Kim Esbensen and Dan Malvin discovered a large compositional variation in a single iron meteorite, the large Cape York iron from northern Greenland.

"Some of our most exciting research was the discovery by Frank Kyte and Zhiming Zhou of high noble-metal concentrations in a 2.3-MY-old Pliocene sediment from the South Pacific. This indicates that a body ≥ 20 m in radius hit the Earth at that time. We will study additional cores to determine the size of the geographic area covered by this event.

Our lunar research contributions included a modeling study by Dave Shirley indicating the rare-earth-rich lunar magma called KREEP was extruded because its density dropped as a result of ilmenite precipitation. Paul Warren continued to discover and characterize pristine (endogenously igneous) lunar rocks, this year from the *Fra Mauro* landing site."

John taught ESS9, "Origin of the Solar System;" ESS 235B, the "Geocheminar;" and Chemistry 184, "Instrumental Analysis." He attended the International Geological Congress in Paris in July 1980, for which he organized a

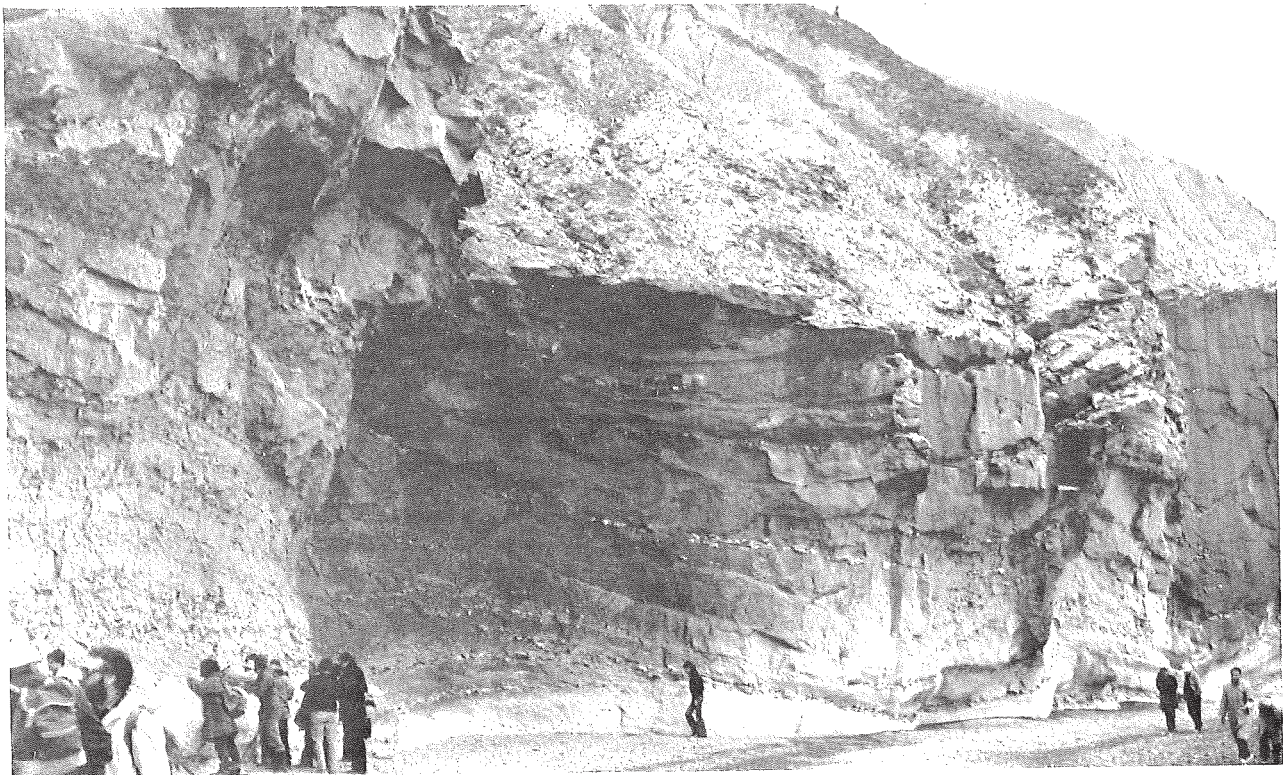
symposium and where he gave a plenary session lecture. He also attended the Meteoritical Society Meeting in San Diego in September 1980 and the Twelfth Lunar and Planetary Science Conference in Houston in March. John helped "in a modest way" to obtain support for the West Los Angeles Veloway.

Visitors to the laboratory included Kim Esbensen from the Technical University of Denmark; Alfred Kracher from the Naturhistorisches Museum, Vienna; Zhou Zhiming from the Institute for Atomic Energy, Beijing, China; and Zhang Zhanxia from Zhongshan University, Canton, China.

KENNETH D. WATSON, Ph.D., Princeton University, Professor of Geology.

Ken taught undergraduate courses in petrology and participated in courses in exploration and mining geology and in field geology.

During the summer he worked on a volcanogenic gold deposit associated with banded iron formation in northwestern Ontario; an alkalic model porphyry gold-copper deposit in the Quesnel Trough, British Columbia; and a contact metasomatic tin deposit in the Cassiar Mountains, Yukon Territory.



Professor Helen Tappan Loeblich took this picture of a sea cliff facing the North Sea at Bjulberg, Jutland, Denmark, while participating in a field trip for the Cretaceous/Tertiary boundary Conference in Copenhagen in 1979. Field trip participants are examining the contact of the Paleocene (early Danian) bryozoan bioherm above latest Cretaceous (Maastrichtian) white coccolith chalk (a fossilized pelagic ooze).



**DEGREES AWARDED 1980-81
DEPARTMENT OF EARTH AND SPACE
SCIENCES**

DOCTOR OF PHILOSOPHY

Abelson, Robert Stephen

"Monte Carlo Calculations of the Melting Point of Iron at Core Pressures" (Spring 1981, Professor Anderson).

Anderhalt, Robert Walter

"Beach Foreshore Sedimentation by Organic and Inorganic Processes" (Spring 1981, Professor Reed).

Bruner, William Michael

"Effects of Time-Dependent Crack Growth on the Unroofing and Unloading Behavior of Rocks" (Summer 1980, Professor Shreve).

Carlson, William Douglas

"Experimental Studies of Metamorphic Petrogenesis: Part I: The Calcite-Aragonite Equilibrium; Part II Aragonite-Calcite Transformation Kinetics; Part III One-Atmosphere Subsolvus Equilibria in Model Peridotite" (Summer 1980, Professor Ernst).

Crews, Anita Lucille

"Sedimentology of a Lower Cambrian Marine Shelf Sequence: Zabriskie Quartzite, Saline Valley Formation, and Related Strata, Southern Great Basin, U.S.A." (Summer 1980, Professor Nelson).

Delany, Joan Marie

"A Spectral and Thermodynamic Study of Pyrope-Grossular Garnets" (Spring 1981, Professors Boettcher and S. W. Kieffer).

Doose, Paul Robin

"The Bacterial Production of Methane in Marine Sediments" (Summer 1980, Professor Kaplan).

Ergas, Raymond Andrew

"Local Earthquake Travel Times and Spatial Variations of Crustal Velocity in Southern California" (Spring 1981, Professor Jackson).

Jacobson, Carl Ernest

"Deformation and Metamorphism of the Pelona Schist Beneath the Vincent Thrust, San Gabriel Mountains, California" (Summer 1980, Professor Rosenfeld).

Liao, Amy Huey mei

"Anisotropy in the Upper Mantle of Eurasia" (Winter 1981, Professor Knopoff).

Pleskot, Larry Kenneth

"The Opposition Effect of Particulate Mineral Surfaces and Condensates: Applications to Saturn's Rings" (Winter 1981, Professors Kaula and H. Kieffer).

Searls, Craig Allen

"The Piezomagnetic Effect: Limits on Detectability Using a Combined Vector and Scalar Magnetometer Array" (Winter 1981, Professor Jackson).



MASTER OF SCIENCE

Anderson, Donna Schmidt

"Provenance and Tectonic Implications of Mid-Tertiary Nonmarine Deposits, Santa Maria Basin and Vicinity, California" (Fall 1980, Professor Hall).

Bilodeau, Bruce Joseph

"Structure and Emplacement of the Sage Hen Flat Pluton, White Mountains, California" (Spring 1981, Professor Nelson).

Idiz, Erdem

"Geology of the Marble Canyon Plutonic Complex, Inyo Mountains, California" (Spring 1981, Professor Watson).

Ingwell, Tim Harvey

"Stratigraphy and Structural Geology of the Merrian Lake Area, Lost River Range, Idaho" (Summer 1980, Professor Nelson).

Polovina, Joseph Stanley

"Geology and Mineral Deposits of the Bagdad Chase Mine and Vicinity, Stedman District, San Bernardino County, California" (Fall 1980, Professors Boettcher and Carlisle).

Rojas, Gloria G.

"Foraminifera from the Vicke Formation, Early-middle Miocene, Northwestern Ecuador" (Fall 1980, Professor Helen Loeblich).

Swain, Patricia Breckenridge

"Upper Triassic Radiolarians from the Brooks Range, Alaska" (Winter 1981, Professor Helen Loeblich).

Tabachnick, Rachel Ann

"Morphologic Variation in Miocene *Globigerina bulloides* d'Orbigny, Newport Bay, California" (Spring 1981, Professor Helen Loeblich).

MASTERS BY COMPREHENSIVE EXAMINATION

Baumgardner, John Rudolph (Winter 1981).

Hayward, Kirk Wesley (Winter 1981)



BACHELOR OF SCIENCE

WINTER 1981

Shoemaker, Susan Watkins (Geology)

FALL 1980

Douglass, David Neil (Geology)
Olson, Mark Gregory (Applied Geophysics)
Schow, Robert Blake (Geology)
Smith, Roberta Marie (Geophysics and Space Physics)
Surany, Andrew Philip (Geophysics and Space Physics)
Tippie, Mark William (Applied Geophysics)
Williams, Kathleen R. (Engineering Geology)

SUMMER 1980

Kingston, John Dryden (Geology)
McDonald, Roderick Bruce (Geology)
Nielsen, Jeanette Louise (Geology)
Smith, Linda Victoria (Geology)
Williams, Marc Bryan (Geology)
Winter, Michael Bradley (Geology)

SPRING 1981

Arce, Gary Norman (Geology)
Bame, Dorthe Ann (Geology)
Konishi, Jean Yukiko (Geology)
Kopania, Andrew Alvin (Geology)
Lamb, Richard Vincent (Paleontology)
Neuman, Jeffrey Craig (Geology)
Okuda, Ronald Dean (Geology)
Orr, Richard Leigh (Geochemistry)



1981-1982 GETTY UNDERGRADUATE SCHOLARSHIPS

Jan Hirsch
Ian Moxon

1981 SUMMER FIELD SCHOLARSHIPS
Alumni-Consultants Scholarships
(Kovacs-Byers, Inc.)

Andy Kopania
Jan Hirsch
Dorothe Bame

NAGT Summer Field Scholarship

Andy Kopania



ALUMNI NEWS

MICK APTED (Ph.D., 1980) is now employed by Rockwell at their Hanford, Washington, operation.

C. W. ARTHUR (Ph.D., 1976) is engaged in program development for digital terrain models in land use management at Intergraf Corporation, Huntsville, Alabama.

E. AZMON (B.A., 1955; M.S., 1956) is Chairman of the Department of Geology and Mineralogy at Ben Gurion University of the Negev, Beer Sheva, Israel. Gerhard Oertel reports that "his symptoms of suffering under the burdens of chairmanship are less pronounced than those of Yeshu Kolodny."

STEVEN B. BACHMAN (M.S., 1974) is now Assistant Professor in the Department of Geological Sciences, Cornell University, Ithaca, New York. He is investigating evolution of island arc basins in the Philippines, subduction processes

in northern California, seismic stratigraphy of the Atlantic margin, and the Argentine Andes. A daughter, Karen, was born in July, 1981; she joins Jennifer, now three years old.

MORRIS BALDERMAN (B.S., 1969; M.S., 1972) is now a Consulting Geologist in San Juan Capistrano, working on engineering geology, nuclear waste isolation, and marine geology. He recently completed projects involving information needs for a nuclear waste repository in bedded salt; reviews and analyses of proposed U.S. Nuclear Regulatory Commission regulations for geologic repositories of high-level waste; and geohazards study of a lease tract offshore central California. Morris and J. L. Smith prepared "Natural Geologic Processes as Sources of Uncertainty in Repository Modeling" for a USNRC and ORNL symposium on uncertainties associated with the regulation of the geologic disposal of high-level radioactive waste.

DOROTHE BAME (B.S., 1981), who was elected to Phi Beta Kappa, is now a graduate student in the Department of Geophysics, University of Washington, Seattle, Washington.

J. N. BARFIELD (Ph.D., 1972) has returned to the field of space physics and is now employed by Southwest Research Institute, San Antonio, Texas.

JAMES M. BARKER (B.S., 1969) is a Land and Acquisition Analyst with Phillips Petroleum Company, Strategic Minerals, Albuquerque, New Mexico. He has a wife, Shari, and two children, Jenna and Andy.

JOHN BARRON (B.S., 1969; Ph.D., 1974) is with the U.S. Geological Survey in Menlo Park, California.

ED BATES (M.A., 1965) is now Staff Development Geologist for Champlin Petroleum Company (a subsidiary of Union Pacific Corporation) in Englewood, Colorado. After five years or so doing petroleum geology on California prospects, including evaluations for Outer Continental Shelf Sales 35 and 48, Ed was assigned to a detailed study of a large gas field in northeastern Colorado's D-J Basin. Now he supervises Champlin Petroleum Company's development interests in most of the Basin. In response to the Newsletter questionnaire's "Recently Transferred?" section, Ed writes: "Nope, more like a sabre-tooth cat mired in the tar pits."



CHRISTINE L. BATHKER (B.S., 1981) is now working in the Ventura District of Getty Oil Company as an Associate Geologist.

RICHARD L. BEH (B.A., 1951) resigned from Cities Service Company in February, 1981, to become Chief Geologist--Offshore for American Petrofina Company of Texas, Houston, Texas.

PHILIP G. BEHRMAN (B.S., 1973) is now a geologist with Union Oil Company of California and makes his home in Benicia, California.

STANLEY S. BEUS (Ph.D., 1973), who is a Professor of Geology at Northern Arizona University, Flagstaff, Arizona, is now Secretary of the Rocky Mountain Section of the Geological Society of America.

LILA BHUTA (B.S., 1980) is working fulltime for TRW in technical Engineering and has enrolled at U.S.C. in Petroleum Engineering.

BRUCE BILODEAU (M.S., 1981) is employed in Chevron's San Francisco operations.

NURENDRA BISWAS (Ph.D., 1970) is at the Geophysical Institute, University of Alaska, Fairbanks, Alaska.

BONNIE BLOESER Cooper (Ph.D., 1980) is employed by Texaco in Los Angeles, where BOB HORODYSKI (Ph.D., 1973) reports she is "soon to become Vice-President." The Coopers have a new young son, Alexander.

HAROLD F. BONHAM, JR. (B.A., 1955) is a Mining and Research Geologist in the Nevada Bureau of Mines and Geology, Mackay School of Mines, University of Nevada, Reno. He was convenor of a conference, held in October 1981, on "Zoning and Volcanic and Subvolcanic Mineral Deposits: Implications for Exploration." Harold was the leader of the First Annual University of Toronto--Amex Mineral Deposits Field Trip, held in October, 1980. Participating were sixteen graduate students and three faculty members from the University of Toronto and seven geologists from Amex, Cominco, St. Joseph Exploration, Falconbridge Copper, and Falconbridge Nickel. They spent eight days in the field examining various mineral deposits in Nevada.

CARL J. BOWSER (Ph.D., 1965) is Professor of Geology in the Department of Geology and Geophysics, University of Wisconsin, Madison, Wisconsin. His special field of interest is low-temperature geochemistry, including, among other topics, the geochemistry of deep-sea nickel-copper-cobalt-bearing manganese nodules.

MICHAEL CAAN (Ph.D., 1976) is now President of Childsafe in Pacific Palisades, California. His company designs, imports, and manufactures specialized products and aids for handicapped children. In 1980 he received a certificate from the UCLA Graduate School of Management in the "Ph.D.'s in Business Program."

JERI LYNN CAMERON (M.S., 1980) continues her work as an exploration geologist in the Frontier Division of ARCO in Dallas, Texas. She is now Jeri Lynn Rodgers, having married a medical student, George Rodgers, who is a graduate in geology from Harvard University.

DWIGHT L. CAREY (M.S., 1976) is Manager of Environmental Affairs for Republic Geothermal, Inc., Santa Fe Springs, California. Dwight recently travelled to Japan and Washington, D.C. (two very different environments) for work. Dwight comments: "I have to agree with Mike Garcia: why aren't more alumni donating?"

WILLIAM D. CARLSON (Ph.D., 1981) is now an Assistant Professor in the Department of Geological Sciences, University of Texas at Austin. Bill is the 1981 recipient of the prestigious Biennial Award in Mineralogy and Petrology of The Mineralogical Society of America.

PAUL E. CARLTON (B.A., 1950) was promoted from Vice President and General Manager, International Exploration and Production Division of Getty Oil Company in May 1980 to Group Vice President, International Exploration, Production and Minerals. He is based in Los Angeles.

C. R. CLAUER (Ph.D., 1980) was at the Institute for Plasma Research, Stanford University, where he was combining work on geomagnetic activity with study of the effects of solar wind on weather. As of February 1982 he will begin a new position in Stanford's Radioscience Laboratory.

GEORGE CLAYPOOL (Ph.D., 1974; Geochemistry) is now a Research Chemist in the Branch of Oil and Gas Resources, U.S. Geological Survey, Denver, Colorado. He has recently been investigating the geochemistry of oil fields in northern Alaska.

JOEL CLINE (Ph.D., 1973) writes from Seattle: "I am an oceanographer at the Pacific Marine Environmental Laboratory/NOAA. This is a research and development laboratory involved primarily in two national program areas: climate and environmental quality. I currently supervise research activities in both program areas. The first involves the use of chemical tracers to study ocean circulation processes, the second program addresses the fate of toxic organic compounds that have been introduced by man into coastal and estuarine waters. My total research group consists of eight people. In addition to my NOAA responsibilities, I also have an affiliate faculty position in the Department of Oceanography of the University of Washington and am a member of the Joint Institute for the Study of Atmospheres and Oceans (UW), a cooperative research element between NOAA and UW.



ROY COPP? (M.A., never!) has been elected to membership in the prestigious Bombay Bicycle Club under the aegis of Nigel Smythe-Teddington. He continues his research on beryllium-10 compounds in zodiacal dust and Alaskan permafrost and writes that his busy schedule has precluded his resignation as financial adviser for the Montreal Gazette. Whatever happened to Mr. Chomondeley St. John?

MARK CLOOS (Ph.D., 1981) has accepted a position as Assistant Professor in the Department of Geological Sciences at the University of Texas at Austin. He will be teaching and doing research in the field of structural geology-tectonics.

BRUCE M. CORDELL (M.S., 1973) received a Ph.D. degree from the University of Arizona in 1977. He is now Assistant Professor of Geophysics at California State College, Bakersfield, California.

WILLIAM C. CORNELL (Ph.D., 1972) is Associate Professor in the Department of Geological Sciences and also Assistant Dean of the College of Sciences, University of Texas at El Paso. Currently, he is studying Lower Cretaceous dinoflagellate cysts and Permian radiolarians. Bill tells us: "Now that the youngsters are both in school, wife Terrie has taken a job at the El Paso Centennial Museum. She is designing, from the bare walls and floors, fossil and modern shell exhibits."

ANITA CREWS (Ph.D., 1980) completed her dissertation on the sedimentology of the Zabriske Quartzite under the supervision of Professor Nelson and is now an Assistant Professor in the Department of Geology and Geophysics, University of Minnesota, Minneapolis, Minnesota.

JOHN C. CROWELL (Ph.D., 1947), who is a Professor of Geology in the Department of Geological Sciences, University of California, Santa Barbara, has been elected a Member of the National Academy of Sciences and a Fellow of the American Academy of Arts and Sciences. At present he is Chairman, Office of Earth Sciences, National Research Council. John writes: "I now have a reduced teaching load as I enter a 'phased retirement' program. I am trying to finish up a multitude of research projects before I investigate at first hand a patch of turf about six feet under. Tell Clem Nelson he has lost out on the 'travel competition.' In February I was in India, Hong Kong, and Thailand; in March, Norway and the U.K.; many trips to Washington; and I'm off to two months in China in September."

PHAM GIEM CUONG (Ph.D., 1980) completed a dissertation on "Thermal Convection and Magnetic Field Generation in Rotating Spherical Shells" under Professor Busse's guidance and then accepted a position with Hughes Corporation in Canoga Park, California.

SARAH P. DAMASSA (Ph.D., 1979), who is a consultant in palynology in Winchester, Massachusetts, is currently working on a project on California early Tertiary dinoflagellates for the U. S. Geological Survey in Reston, Virginia.

JOAN M. DELANY (Ph.D., 1981) is now at the Lawrence Berkeley Laboratory of the University of California, Berkeley.

FRANK DENISON (B.S., 1973) is employed as an engineering geologist by Kovacs-Byer and Associates, based in Studio City, California.

PHIL DOBBS (B.A., 1955) is Senior Geologist with U. S. Borax and Chemical Corporation, Los Angeles. Recently, he has been spending much time in Mexico working on a major borate deposit which he discovered.

HAROLD G. DOHLEN (B.A., 1950) is Logging Supervisor for Don Padick Geological Well Logging Service, Simi Valley, California. He lives in Mar Vista, California.

BRUCE DOUGLAS (M.S., 1967) is now Chief of Geodetic Research and Development in National Ocean Survey, NOAA, Washington, D.C.

PAUL H. DUDLEY, Jr. (B.A., 1953; M.A., 1954) has left his position with Exxon Co., U.S.A. in Houston, Texas, to become Executive Vice President of Mosbacher Production Co. in Houston.

STEVAN P. DUMAS (B.S., 1976) writes: "After receiving my B.S. in Geology, I switched gears and entered the UCLA School of Dentistry. In June 1980, I graduated with a D.D.S. degree and entered the Hospital Dentistry Program at Martin Luther King Hospital in Los Angeles. This June, I received my certificate for completing the one year program and have entered the real world of fast cars, wild women, and a condo on the 'marina.' Presently, I am resisting temptation and practicing general dentistry in Los Angeles. Another 'traitor,' KEN SHAY (B.S., 1974), is now a senior in the UCLA School of Dentistry Class of 1982."

STEPHEN EHRENBERG (Ph.D., 1978) has resigned from an Assistant Professorship at Northern Illinois University in DeKalb, Illinois, and has accepted a position with Shell Development Company at their Bellaire Research Center in Houston, Texas. Steve was married in May 1981 in Fredrikstad, Norway, to a girl he met while he was a postdoctoral scholar there.

JAMES J. EIDEL (M.S., 1963) is Exploration Manager, Eastern North America, for Hanna Mining Company and lives in Maryland Heights, Missouri. Jim is Chairman of the Panel on Mineral Resources and a Member of the Continental Scientific Drilling Committee NAS/NRC; Chairman of the Public Lands Committee, Mining Industry Council of Missouri; and Chairman of the Research Committee and a Member of the Program Policy Committee of the Society of Economic Geologists. He presented the results of the Society of Economic Geologists' survey of research at the Geological Society of America Annual Meeting in Atlanta in 1980. Jim is convener of the Cameron Symposium on Unconventional Mineral Resources to be held at an American Institute of Mining, Metallurgical, and Petroleum Engineers meeting in Dallas in 1982.

RAY ERGAS (Ph.D., 1981) is, according to Dave Jackson, "still testing the capacity of the computers at Chevron Oil Field Research Corporation in La Habra, California."

BRADLEY G. ERSKINE (B.S., 1976) completed his M.S. degree at San Diego State University ("A Paleomagnetic, Rock Magnetic, and Magnetic Mineralogic Investigation of the Northern Peninsular Ranges Batholith, Southern California"). He is currently a graduate student at the Department of Geology and Geophysics, University of California, Berkeley, where he is working on mylonitic deformation in the Santa Rosa Mylonite Belt, Southern California. He has published two abstracts in *EOS* (AGU meetings, San Francisco, Erskine and Marshall, 1980 and 1981). He reports that the 1976 Class was reunited at a very successful Christmas gathering, an event which he feels should be repeated on a yearly basis. MIKE GJERDE (also B.S., 1976) collected current names and addresses for the group at that party--with luck they will appear in next year's Newsletter.

RICHARD ESCANDON (B.S., 1978) is employed as a geologist with Kovacs-Byer-Robertson--a Southern California geotechnical consulting group.

THOMAS R. FAIRCHILD (Ph.D., 1975) is University Professor in the Department of Paleontology and Stratigraphy, Instituto de Geosciências, Universidade de São Paulo, Brazil. He was formerly in the General Geology Department there. He is mostly involved in teaching, in Portuguese, at both the undergraduate and graduate levels, while continuing his studies of fossils from the Precambrian of Brazil. Tom writes that he has "become involved in the Administrative Support Committee of the Sociedade Brasileira de Geologia (volunteer position) and trying to become disengaged on the other hand, from several time-consuming, hair-whitening administrative obligations at the Institute. Went through a truly nerve-wracking second semester in 1980 (Aug.-Dec.) having to confront striking students determined to keep me (as well as other members of my former department) from giving class. This lasted from August through mid-November, culminating in the two and one-half week full-time occupation of our building and the student's barring us professors access to our offices. And I won't even start to tell you about my having to leave the country in order to get a new visa during this same period!! Other than that, things're pretty uneventful. Wish you were here...."

ALFRED P. FERNANDEZ (B.A., 1957; M.A., 1959) (Geology major/Social Science minor) has become President of Los Angeles Mission College, San Fernando, California. Alfred received a Junior College Administration and Teaching Credential for study during the years 1966-1969. Subsequently, he was awarded a

Ph.D. degree in Higher Education and Administration by the University of Southern California for graduate work carried on during the period 1969-1976. Alfred conducted a workshop on Placement of Latin American Students, Puerto Rico, and a Hope for Education Program (G.I. Project Memo) in Vietnam and Washington. He was awarded an NSF grant for work in Wyoming, Montana, and Idaho. Alfred has published a book on physical geology and articles on various aspects of higher education.

LEONARD FORD (Ph.D., 1981) is employed as a palynologist at the Union Oil Company Research Laboratory in Brea, California.

W. PHELPS FREEBORN (Ph.D., 1976) is now at Pennsylvania State University, where he is doing research on the geochemistry of aqueous solutions and wallrock alteration in the context of radioactive waste disposal.

DAVID FRISHMAN (Ph.D., 1980) who is with the Uranium-Thorium Division of the U.S. Geological Survey in Golden, Colorado, writes that he is mainly working on specimens he collected at the Ranger Uranium Mine last summer. Intense magnesium metasomatism has converted garnet muscovite schist to a fine-grained aggregate of mixed-layer phyllosilicates. Dave became leader of the Uranium and Thorium in Igneous and Metamorphic Environments Team when Dick Grauch (a former UCLA post-doctoral fellow with Gary Ernst) left that position to become Branch Chief.

EUGENE FRITSCH (B.A., 1958; Ph.D., 1969) is now Professor of Geology and Chairman, Department of Geological Sciences, California State University, Northridge, California. Gene has completed six paleogeographic maps for different time periods in the Miocene for the central Transverse Ranges and is now presenting these at meetings in Southern California. He is a member of the S.E.P.M. Honorary Member Selection Committee, the A.A.P.G. Academic Liaison Committee, and a delegate to the A.A.P.G. House of Society Delegates.

M. CHARLES GILBERT (Ph.D., 1965), Professor in the Department of Geological Sciences at Virginia Polytechnic Institute and State University, Blacksburg, Virginia, "has finally succeeded in unloading the departmental chairmanship on an unsuspecting friend." He continues to serve as Secretary of the Mineralogical Society of America.

ALLEN GLAZNER (Ph.D., 1981) has accepted a position as Assistant Professor at the University of North Carolina, Chapel Hill, where he will teach and do research in petrology. Six of the seven finalists considered for the position were from UCLA.

DAVID J. GROVER (B.S., 1975), formerly Chief Geologist for Kovacs-Byer and Associates,

Studio City, California, recently became President of Kovacs-Byer-Grover, Inc., Consulting Engineers and Geologists, of Westlake Village, California. The firm provides complete service in the closely related fields of soils and foundation engineering and engineering geology; their projects range in size from single lot hillside homes to residential subdivisions. Dave recently passed the examinations for California Registered Geologist and California Certified Engineering Geologist; he also was advanced to membership status in the Association of Engineering Geologists. Dave was married in May 1981 and honeymooned in Tahiti.

DONALD W. HAGEN (B.A., 1953; M.A., 1957) is Special Projects Geologist with Texaco Canada Resources, Ltd., in Calgary, Alberta, Canada. He continues "to look for evermore elusive oil in Alberta."

WARREN HAMILTON (Ph.D., 1951) is a geologist with the Branch of Regional Geophysics of the U.S.G.S. in Denver. He took time out to accept a visiting professorship at Yale in the fall of 1980 and another at the University of Amsterdam in the spring of 1981, teaching at each a graduate lecture course on the tectonics of modern and ancient convergent plate margins. (He had previously been a visiting professor once at Caltech and twice at Scripps). His recent book *Tectonics of the Indonesian Region* (U.S.G.S. Professional Paper 1078), integrating marine geophysics and onshore geology into a synthesis of modern plate-tectonic processes and past evolution, is, by Survey standards, a best seller. His current research is focused on identifying the processes and products of arc magmatism at all depths in the crust and upper mantle and on defining the mode of extension of the middle and lower continental crust beneath normal-fault terrains.

PAUL E. HAMMOND (M.S., 1958), who is Professor in the Department of Earth Science of Portland State University, Portland, Oregon, has recently published "Reconnaissance Geologic Map and Cross-Sections of Southern Washington Cascade Range."

AL HARRIS (Ph.D., 1975) is at Jet Propulsion Laboratory, Pasadena, California.

WALTER S. HARRIS (B.A., 1956; M.A., 1958) is a Consulting Geologist in the oil and gas industry and is based in Walnut Creek, California.

EARL W. HART (B.A., 1950) is Senior Geologist in the California Division of Mines and Geology in San Francisco. He received the M.A. degree from the University of California, Berkeley, in 1971. Earl is Supervisor of the State's Fault Zoning and Evaluation Program. They map recently active faults and historic ground rupture; prepare regulatory zone maps; and advise cities, counties, and state agencies

on implementation of regulatory zones under the Alquist-Priolo Act. He has just completed a two-year study of faults in the south San Francisco Bay region and is currently evaluating faults of the northern Coast Ranges and Klamath Mountains. Earl authored or coauthored several reports in 1980-81 on the Green-ville, Imperial, Calaveras, San Andreas, Sargent, and other faults in the State's Fault Evaluation/Zoning Program.

ALLEN W. HATHEWAY (B.A., 1961) has resigned from his position as Vice President and Chief Geologist of Haley and Aldrich, Inc., Cambridge, Massachusetts, to become Professor of Geological Engineering, University of Missouri at Rolla, Missouri. Allen, who received a Ph.D. in Geological Engineering from the University of Arizona in 1971, was the 1981 recipient (along with Cole R. McClure, University of California, Berkeley, 1950) of the E. B. Burwell, Jr., Memorial Award, Engineering Geology Division, Geological Society of America. In 1980 he graduated from the U.S. Army War College, Carlisle Barracks, Pennsylvania, and in 1981 was promoted to Colonel, Corps of Engineers, U.S. Army Reserve. Allen served as Chairman of the Engineering Geology Division, Geological Society of America in 1980 and as Adjunct Associate Professor of Geology at Boston University, 1979-1981. He was a member in 1980 of the Organizing Committee, U.S. National Group for Engineering Geology, U.S. National Academy of Sciences.

ROBERT HILL (B.S., 1968; M.S., 1972) left his position with the California Division of Mines and Geology about two years ago to join Exploration Research Associates, Inc., of Los Angeles. His work as a consultant has been mainly on precious metal and industrial mineral deposits in the western United States.

BOB HOLLINGSWORTH (B.S., 1979) is one of several UCLA graduates on the engineering geology staff of Kovacs-Byer and Associates.

LONNIE L. HOOD (Ph.D., 1979) is a Research Associate at the Lunar and Planetary Laboratory, University of Arizona, Tucson, Arizona. Lonnie is working with C. P. Sonett and Floyd Herbert on synthesis of lunar electromagnetic data and Voyager/Pioneer II data analysis. The Hoods recently had their third child, a son.

RICHARD H. HOPPER (B.A., 1935; M.A., 1936) became an employee of American Overseas Petroleum Ltd. in 1939, after receiving his Ph.D. from California Institute of Technology, and became a Vice-President of that company in 1964. He retired in 1979 after 40 years service--20 in Indonesia and 20 in New York--and now lives in Easton, Connecticut. Richard comments that the old Geology Department of W. J. Miller, A. R. Whitman, E. K. Soper, Joe Murdoch, U. S. Grant IV, and Willis Parkison

Popenoe that he knew has changed a lot. He corresponds with such classmates as HARRY WHALEY of Ventura California; TOM DONOLON of Somis, California; and JUAN BARRETO of Guadalajara, Mexico; and he wonders "Whatever happened to PAT QUALE, DAVE REDMOND, BOB WEBB, KENNY EDWARDS, BERT ELLISON, RUSS SIMONSON, and the rest of the crowd?"

RICHARD W. HURST (Ph.D., 1975), Department of Geology, California State University, Los Angeles, was married in November 1981. He is doing research in the Old Woman Mountains, California, with CALVIN MILLER; on uranium and lead migration in the vicinity of uranium ore bodies; on distribution of heavy metals in the Los Angeles basin and its bearing on water quality; on photointerpretation of the Galilean satellites and Mars with TONY FINNERTY of Jet Propulsion Laboratory; and on petrogenesis of the Miocene volcanics in the Southern California borderland. Rick wishes he "could return to UCLA where you needed to work only seven days per week to keep on top of things."

TIM INGWELL (M.S., 1980) is now a geologist with Shell Oil Company in Houston, Texas. He will be doing field work on the North Slope of the Brooks Range, Alaska, during summer 1981.

CARL JACOBSON (Ph.D., 1981) who is an Assistant Professor in the Department of Earth Sciences, Iowa State University of Science and Technology, Ames, Iowa, has been honored with a Cottrell Grant from the Research Corporation. This grant will assist him in his research on the Pelona Schist and related units.

SARA JACOBSON (M.S., 1978) changed jobs in 1981 for work in the U.S.G.S. Headquarters in Reston, Virginia, and claims that "we are still trying to figure out how the new administration's budget cuts will affect us. She crosses paths with MARGARET SAUNDERS (M.S., 1977), who is working in oil and gas exploration in the D.C. area.

GORDON S. JONES (B.S., 1959) has retired from the U.S. Navy to become a gentleman farmer in the Carmel Valley, California. He and his wife, Sally, have a plant store, "The Secret Garden," in the town of Carmel.

BRADFORD JOHNSON (B.A., 1950; M.A., 1951; Ph.D., 1954) resigned as Chief Geologist of McCulloch Oil Corp. in Los Angeles in 1980 to become Vice President and Manager of Exploration of Highlands Energy Corp. in San Francisco. Brad spends weekdays in the financial district of San Francisco or travelling and weekends at his home in Santa Monica with his wife, Carole. Brad, who taught the course in Petroleum Geology (ESS 137) for several years, says that he misses contact with students, but that the work in his new position is great.

MARVIN M. KATZ (M.S., 1981) is a Project Geologist with Getty Oil in Ventura, California, responsible for the eastern Ventura Basin.

STAN KAYE (Ph.D., 1979) is now at the Plasma Physics Laboratory of Princeton University, Princeton, New Jersey, where he is working on plasma fusion studies. He continues to do some space physics theory in his spare time. Stan was married in October 1981.

GOTTFRIED O. KESSE (B.A., 1960) is Director of the Geological Survey Department of Ghana.

MIKE KOBRICK (Ph.D., 1977) is at the Jet Propulsion Laboratory, Pasadena, California.

YEHOASHUA KOLODNY (Ph.D., 1969) is suffering under the burdens of the chairmanship of the Institute of Earth Sciences, The Hebrew University of Jerusalem, Israel. Since returning from his sabbatical leave spent at UCLA, he has been working mainly on oxygen isotopes in phosphates such as teeth, bones, etc., trying to determine something about climates of the past from the data. He spent much effort organizing a European isotope meeting that was held in Jerusalem in September. Yeshu writes that his son, Noam, who may be remembered as a baby when Yeshu was a graduate at UCLA, has just enlisted in the Israeli Army and that they now have two more children from post-UCLA times.

T. K. KRISHNAN (Ph.D., 1976) resigned from his position in the Earth Resources Section of the Northern Alberta Institute of Technology in Edmonton, Alberta, where he taught structural geology, photogeology, exploration methods, and mine operations. He has joined the Coal Division of Denison Mines Limited in Vancouver, British Columbia, and is working on their Quintette metallurgical coal project in northeastern B.C. During the next three years approximately 700 million will be spent to bring Quintette onstream at a production rate of 6,000,000 tons of cleaned, washed coal per year.

ANDREW A. KOPANIA (B.S., 1981) is now a graduate student in the Department of Geological Sciences at the University of Michigan, Ann Arbor, Michigan. He was elected to Phi Beta Kappa upon graduation and was awarded a Phi Eta Sigma Graduate Scholarship.

SHINGI KUNIYOSHI (M.A., 1966; Ph.D., 1972) is a Geologist, Conservation Division, U.S. Geological Survey, Menlo Park, California. At present he is evaluating saline mineral resources of playas in California and Nevada, particularly Searles Lake and Clayton Valley. He is preparing a paper with Dr. Hitoshi Sakai (a former post-doctoral scholar at UCLA) on "Sulfur and carbon isotopes in phosphorites of the Phosphoria Formation, Idaho." Shingi writes that he had a good visit with Dr. Yotaro

Seki and Dr. Hitoshi Sakai at Louie Liou's home last summer.

WILLIE LEE (Ph.D., 1967) is still with the U.S. Geological Survey in Menlo Park, California.

ALAN LEEDS (Ph.D., 1973) is with Gulf Research Laboratories in Pittsburgh, Pennsylvania.

HAROLD M. LIAN (Ph.D., 1952) is now President, International Oil Division, Union Oil Company of California, Los Angeles.

BETH LINCOLN (Ph.D., soon) and TIM LINCOLN (Ph.D., 1978) have left the University of Wisconsin, Superior, Wisconsin, to accept a shared academic position at Albion College at Albion, Michigan.

DONALD R. LINDSAY (M.S., 1952) retired from Shell a few years ago in Houston and is now with Occidental Geothermal, Inc., in Bakersfield, California. He is development geologist for Occidental's geothermal project in The Geysers Field, "conveniently located in northern California's prime wine country." Don is co-author of a chapter on tidal deposits in a forthcoming American Association of Petroleum Geologists memoir on sandstone depositional environments.

J. G. (LOUIE) LIOU (Ph.D., 1970), Associate Professor of Geology at Stanford University, has continued an investigation with Gary Ernst and John Suppe (Princeton University) of the petrologic evolution and large-scale structural relationships of Taiwan.

KON-KEE LIU (Ph.D., 1979) is an Associate Research Fellow in the Institute of Earth Sciences, Academia Sinica, Taipei, Taiwan, Republic of China. He moved from Caltech in February 1981. He has been engaged in research in stable isotope geochemistry of geothermal systems in Taiwan and next year will be teaching courses in environmental chemistry and geochemistry at National Tsinghua University. He recently published a paper with Professor Kaplan on "Nitrous Oxides in the Sea off Southern California."

GLENN LOCKE (B.S., 1981) is now a graduate student at San Diego State University, California.

CONRAD J. McCARTHY (B.S., 1975) is a Research Engineer, Bellaire Research Center, Shell Development Company, Houston, Texas, where he is doing research in production geophysics.

KATA McCARVILLE (B.S., 1978) is employed by Camp Dresser and McKee, a group of environmental consultants, in Wheatridge, Colorado. At present she is Geologist/Programmer in charge of data-base applications for the Water

Resources Division. Kata was married recently to Mr. Weber, "a wonderful non-geologist." She has almost completed her M.Sc. at Colorado School of Mines with a thesis on a uranium related topic and has been consulting for a small lead-zinc-silver mine west of Denver. Kata has also been consulting and teaching in the Colorado School of Mines Computing Center and has assisted JOHN WARME (Ph.D., 1966), now teaching at Colorado School of Mines, in editing a Society of Economic Paleontologists and Mineralogists volume on a Deep Sea Drilling Project.

GREG McNEW (B.S., 1974) received the M.S. degree from the University of Arizona with a thesis on the relationship between "retrograde" alteration and sulfide deposition in skarn in the Rosemont, Arizona, porphyry copper deposit. He is now a Metals Exploration Geologist for Conoco, Inc., in Reno, Nevada, having transferred there at the beginning of 1981 from Tucson, Arizona, when Conoco joined the group of companies closing their Arizona offices.

JOHN E. MARZOLF (Ph.D., 1970), is an Associate Professor of Geology at the University of Nevada, Las Vegas, Nevada, and is working on Aztec and Navajo Sandstone and related rocks in southern Utah, southern Nevada, and the Mojave Desert in California.

KRISTIAN E. MEISLING (B.S., 1978), who is now a graduate student in the Division of Geological and Planetary Sciences, California Institute of Technology, Pasadena, was a recipient of a 1980 Harold T. Stearns Fellowship Award of the Geological Society of America for his research on "Neotectonics of the North Frontal Fault System of the San Bernardino Mountains, Southern California."

CARL MENDELSON (Ph.D., 1981) is now teaching at Beloit College, Beloit, Wisconsin.

GARY P. MESSEROTES (B.S., 1977) is a Geophysicist in the Exploration Department of Conoco, Inc., in Ventura, California. At present he is developing oil and gas prospects in the San Joaquin Basin. At the end of 1980, he returned from Brazil after spending 27 months on seismic crews interpreting virgin data from the Amazon Basin. Gary will be transferred to Houston at the end of 1981.

DAVID MILLER (Ph.D., 1978) is with the U.S. Geological Survey at Menlo Park, California. Dave is continuing studies of Mesozoic tectonics and metamorphism in northeastern Nevada and northwestern Utah. His expanding studies in the Mojave include Mesozoic tectonics and plutonism and Tertiary volcanic, sedimentary, and tectonic history. Dave writes, "I am producing geologic maps as fast as I can, while enjoying outdoor life in wild and scenic mountains and deserts." He recently co-edited a volume on

the tectonics of the Mojave and Sonoran Deserts.

ARTHUR MIRSKY (B.A., 1950) received the M.S. degree from the University of Arizona, Tucson, in 1955 and the Ph.D. from Ohio State University in 1960. At present he is Professor and Chairman, Department of Geology, Indiana University-Purdue University, Indianapolis, Indiana. He is studying the influence of geologic factors on the course of human history. Arthur is the General Chairman for the Annual Meeting of the Geological Society of America to be held in Indianapolis in 1983.

ROBERT MITCHELL (Ph.D., 1977) is with Gulf Research in Bakersfield, California.

DAVE MITTFELDELDT (Ph.D., 1978) now has a "tenure-track" position at Ben Gurion University of the Negev, Beer Sheva, Israel. "Duck" and NURIT HILDEBRAND-MITTFELDELDT (Ph.D., 1978) had a son, Yonatan, in November 1980.

JOHNNIE N. MOORE (M.S., 1973; Ph.D., 1976) is enjoying his geologic research in Montana and his teaching in the Department of Geology, University of Montana, Missoula, Montana.

ROBERT R. MORRISON (B.A., 1951; M.A., 1957) is Exploration Manager, Occidental Petroleum Argentine, Mendoza, Argentina.

TONY MOSCATI (M.S., 1973; Planetary Physics), who received his D.Env. degree in 1975, has recently been appointed Division Manager in charge of Teknekron Research, Inc.'s Washington D.C. office. He formerly was Manager of Teknekron's Applied Research and Engineering Division in McLean, Virginia. He is working in the areas of water pollution control and hazardous waste management and is involved in remediation of hazardous waste dump sites through innovative approaches employing microbial detoxification, trace metal catalysis, and photo-assisted catalysis. Tony writes that he is "enjoying Washington (except for July and August), doing some sailing on Chesapeake Bay, although it's not the equal of past expeditions with former P&SS colleagues, 'drifting drunkenly under sail' with Captain John 'Distinct List' Rundle. What's become of SCOTT DAVIS, LARRY SHARP, BOB MITCHELL, JERRY TREIMAN, and others of the early to mid-'70 vintage?"

MICHAEL A. MURPHY (B.A., 1950; Ph.D., 1954), who is a Professor of Geology in the Department of Earth Sciences, University of California, Riverside, is serving as a Commissioner appointed by the Geological Society of America, on the North American Commission on Stratigraphic Nomenclature.

NATHAN P. MYHRVOLD (B.A., 1979, Mathematics; M.S., 1979, E&SS) received the M.A.

degree in Mathematical Physics in 1980 from Princeton University, Princeton, New Jersey. At present he is a Hertz Fellow in the Department of Physics (Program in Applied Mathematics) there and is completing his Ph.D. research on topics in curved space quantum field theory and quantum theories of gravitation. He is, however, still interested in solid earth geophysics and planetology. Nathan writes, "Moving to the East Coast has been a big shock! The weather is *awful*, the people talk funny, and everyone has a view of California based on Doonesbury--they think all Californians are wild, crazy, and weird. I've done my best not to disillusion them."

JOE J. NAGEL (B.S., 1972) received his M.Sc. degree from the University of British Columbia, Vancouver, British Columbia in 1979 with a thesis on the Shulaps ultramafite in southwestern B.C. Since 1974, Joe has been Curator of the M. Y. Williams Geological Museum, Department of Geological Sciences, U.B.C. He has published recently on the Rock Candy fluorspar mine, British Columbia, and on mandarinoite (a hydrated ferric-iron selenite) from the De Lamar silver mine, Owyhee County, Idaho. Joe writes that his "major interest is to remain a geological generalist, which, fortunately, the Museum position allows and even requires."

KEITH K. NAKANISHI (M.S., 1971; Ph.D., 1978) is a Seismologist at the Lawrence Livermore National Laboratory, University of California, Livermore, California. He is conducting seismic studies related to nuclear test ban treaty studies.

MANLEY NATLAND (Ph.D., 1952) was honored in January 1981 when *natlandite* --a rock that had previously been named after him--was designated by City Council as the official gemstone of Los Angeles. Thus, *natlandite* joined the official flower (the Bird-of-Paradise, *Strelitzia reginae*) and the official tree (the coral tree, *Erythrina caffra*) as the symbols of Los Angeles. *Natlandite* is a very hard, siliceous rock containing abundant marine fossils of Pliocene age. More than 350 species have been identified. A small amount of the rock was first found in 1954 during test drilling for foundations for an annex to the old Richfield Building, and it was brought to Manley's attention. Subsequently, during excavation for the Arco Towers in 1970, Manley obtained some 500 tons of the rock, part of which he and his eldest son, James, have had cut and polished in Querceta and Florence, Italy.

BRADFORD S. NEWMAN (B.S., 1972; M.S., 1975) is now District Development Geologist for Getty Oil Company at Ventura, California. In his current position he is managing Getty's West Coast geological operations-- developing existing and new oil and gas reserves. Brad received the M.B.A. degree from California State University, Bakersfield, in June 1980, following which his job responsibilities were risk analysis of exploration ventures and long-term planning in the Finance Department of the Western Division of Getty. He was Treasurer of the San Joaquin Geological Society in 1980-81. Brad was married to Sharon in July 1980.

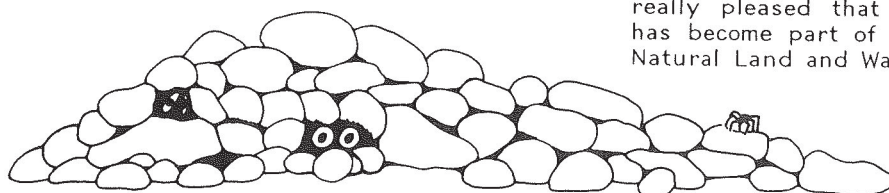
ROBERT C. NEWTON (Ph.D., 1965), University of Chicago, has edited a volume on *Thermodynamics of Minerals and Melts*, part of a new series, *Advances in Physical Geochemistry*, published by Springer-Verlag.

ARIE NISSENBAUM (Ph.D., 1969) is now Academic Secretary of the Weizmann Institute of Science, Rehovot, Israel. He is continuing his research on humic acids, isotope biogeochemistry, and the biogeochemistry of the Dead Sea. Arie is on the editorial boards of *Marine Chemistry* and *Organic Geochemistry* and last year edited a book on *Hypersaline Brines and Evaporitic Environments*, which was published by Elsevier.

WARREN J. NOKELBERG (B.S., 1961) is now with the U.S. Geological Survey in Menlo Park, California. He has published a paper recently in *Economic Geology* on the "Geologic Setting, Petrology, and Geochemistry of Zoned Tungsten-bearing Skarns at the Strawberry Mine, Central Sierra Nevada, California."

JAMES C. NORMAN (B.S., 1974) resigned as Manager of the Exploration Department of American Borate Company and is now Project Geologist, Industrial Minerals Exploration, Anaconda Copper Company, Denver, Colorado. He is investigating titanium deposits including some ilmenite bodies in anorthosite in Wyoming.

ROBERT M. NORRIS (A.B., 1943; M.A., 1949) is Professor of Geology in the Department of Geological Sciences at the University of California, Santa Barbara. Last year he received the Robert Wallace Webb Award for teaching performance and service to the Far-Western Section, National Association of Geology Teachers. He serves on the National Council of NAGT. Bob writes, "Like Clarence Hall, I have, for about the 20th time, taught field geology at Tick Canyon, and like Clarence, am really pleased that this superb teaching area has become part of the University of California Natural Land and Water Reserve System."



EDO NYLAND (Ph.D., 1967) is a member of the Department of Physics, University of Alberta, Edmonton, Alberta, Canada.

DUGAN O'KEEFE (Ph.D., 1977) is with TRW in Redondo Beach, California.

JERRY C. OLSON (B.A., 1939; Ph.D., 1953) retired from the U.S. Geological Survey in 1979 after about 40 years of service, mostly with headquarters in Denver, Colorado. He continues to work on papers on areas in Gunnison and Saquache Counties, Colorado.

JOHN V. OLSON (Ph.D., 1970) is Assistant Professor of Geophysics in the Geophysical Institute, University of Alaska, Fairbanks, Alaska. He is head of a program in pulsation research and teaches a course in time series analysis. John writes that he and Paul Davis were post-doctoral fellows concurrently at the University of Alberta in Edmonton, Alberta, Canada, and bashed squash balls regularly.

KENNETH E. PETERS (Ph.D., 1978, Geochemistry) writes: "Much of my third year as a Research Geochemist with Chevron Oil Field Research Company was devoted to courses and meetings. I took courses in analytical instrumentation at UCLA Extension and Cal State Fullerton and company courses in supervisory skills and in well logging. I attended Gordon Conferences on Isotope Geochemistry and Analytical Pyrolysis. I also participated in the annual AAPG meeting and an AAPG research meeting on the "Temperature Environment of Oil and Gas." Seven papers in the field of organic geochemistry were published this year. Some co-authors included UCLA-types: S. Brenner, R. Ikan, I. R. Kaplan, B. G. Rohrback, B. R. T. Simoneit, and R. E. Sweeny. I continue research and technical service projects dealing with oils, gases, and source rocks. Vanessa (my wife) and I spent our vacation doing chemistry on Hawaii and Maui."

BOBBY JOE PRESLEY (Ph.D., 1969) has been promoted to Professor in the Department of Oceanography, Texas A & M University, College Station, Texas. From September 1981 until September 1982, he will be at the Environmental Protection Agency Laboratory in Las Vegas, Nevada, working on methods for detecting hazardous wastes in the environment. His students at Texas A & M are involved in several sedimentary geochemistry projects with NOAA and API funding.

RICHARD J. PROCTOR (M.A., 1958) is now a consulting engineering geologist. He is associated with the firm of Lindvall, Richter and Associates, consultants in earthquake sciences and construction engineering, of Los Angeles. His recent projects have been in Quito, Ecuador; Alaska; St. Thomas, Virgin Islands; and Los Angeles in connection with the Southern California Rapid Transit District's proposed

eighteen-mile Wilshire corridor subway. Dick is Secretary-Treasurer of the American Geological Institute for the 1979-83 term.

DONALD L. PROTZMAN (M.A., 1960) is now Chairman, Department of Physical Science, Diablo Valley College, Pleasant Hill, California.

BARRY RALEIGH (Ph.D., 1963) has left his position with the Earthquake Prediction Program Office, U. S. Geological Survey, Menlo Park, California, to become Director, Lamont-Doherty Geological Observatory, Palisades, New York.

GARY RANSFORD (Ph.D., 1978) is at the Jet Propulsion Laboratory, Pasadena, California.

JERROLD A. ROBINSON (B.S., 1971) is co-founder and co-owner of Rainforest Flora, Inc., Gardena, California. His company has a wholesale and retail bromeliad and exotic plant nursery dealing in plants collected in Central and South America.

GLORIA G. ROJAS (M.S., 1980) is a micropaleontologist with Ecuadorian National Oil Company in Quito, Ecuador.

MARK SANDSTROM (M.S., 1977, Geochemistry) writes from The Australian National University in Canberra, "During the past three years, I have been working on my Ph.D. thesis, which I am now writing up and expect to submit in December. The topic--the organic geochemistry of phosphorites--expanded my geologic and geochemical awareness; and I have become involved in an international program on Precambrian-Cambrian phosphorites and interactions of the geochemical cycles of carbon and phosphorus as a result. My awareness of the diversity of life and living has also increased considerably during the past three years; and I am continually learning about new things such as 'stumps and wickets,' the difference between 'gums' and 'stringybarks,' and the importance of loamy soil for the production of Coonawarra reds.

JAMES MARSHALL SAUNDERS (B.A., 1948) is a Contract Geological Consultant for Grace Petroleum Corporation, Santa Maria, California. He is currently working on a low gravity steam recovery project at Arroyo Grande Field in San Luis Obispo County, California. He took early retirement from Getty Oil Company in 1979 after more than 30 years in the Exploration and Production Departments.

WAYNE SAWKA (M.S., 1981) completed his thesis on petrology of the Tinameha granodiorite. After spending the summer employed as a geologist by AMAX at the Climax Molybdenum Mine in Colorado, he will begin doctoral studies at The Australian National University, Canberra.

JOHN W. SCHLUE (B.S., 1965; M.S., 1969; Ph.D., 1975) is Associate Professor of Geophysics in the Department of Geoscience and

Research Geophysicist in the Geophysical Research Center of New Mexico Institute of Mining and Technology, Socorro, New Mexico. He is engaged in research in surface-wave propagation in three-dimensional structures; tectonics of rifts; and crustal and upper mantle structure.

CRAIG (CORKY) SEARLS (Ph.D., 1981) completed his dissertation under Professor Jackson's guidance and is now working at Sandia Corporation in Albuquerque, New Mexico. He is attempting to determine by remote sensing the thickness of walls in salt dome reservoirs for the U.S. Strategic Petroleum Reserve.

MICHEL P. SEMET (Ph.D., 1973), who is now at the Institute de Physique du Globe, Université de Paris, has published a paper (with W. G. Ernst) on "Experimental stability relations of the hornblende magnesiohastingsite" in the *Geological Society of America Bulletin*.

HOWARD SINGER (Ph.D., 1980) continues work on magnetic pulsations at Air Force Geophysical Laboratory and Boston University, where he is a Research Associate.

LINDA V. SMITH (B.S., 1980) is employed as a geologist by Argo Petroleum Corporation in Santa Monica, California.

PARKE D. SNAVELY, III (B.S., 1975) has completed his Ph.D. at the University of California, Santa Cruz, and has joined Exxon's Exploration and Production Research Center in Houston, Texas. He is doing basin analysis.

FRANK SPEAR (Ph.D., 1976), who is an Assistant Professor in the Department of Earth and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, Massachusetts, has published a paper in the *American Journal of Science* on "An experimental study of hornblende stability and compositional variation in amphibolite."

EDWARD F. (SKIP) STODDARD (Ph.D., 1976) has been promoted to Associate Professor of Geology in the Department of Marine, Earth, and Atmospheric Sciences*, North Carolina State University, Raleigh, North Carolina. Skip has been concentrating his research on the eastern Piedmont of North Carolina--"an exciting place for hard-rock petrology and structure." He has published on Southern Appalachian and Adirondack geology and on peraluminous granites with Calvin Miller. Skip and his wife, Nancy, had their first child, Maggie, in June 1981.

*"Anybody got a longer department name?"

STEVEN T. SUESS (Ph.D., 1969) is a Physicist at the Space Environment Laboratory of the National Oceanic and Atmospheric Administration/Environmental Research Laboratories,

Boulder, Colorado. He is also an Adjunct Professor in the Department of Astro-Geophysics at the University of Colorado. During 1980-81 Steven was a Visiting Scholar in the Institute for Plasma Research at Stanford University. He is co-investigator on the Solar Wind Plasma Physics Experiment for the European Spacecraft portion of the the Solar Polar Mission to be launched in 1985. His work involves theoretical research on the structure and dynamics of solar and stellar winds and coronae.

HAROLD H. SULLWOLD (B.A., 1939; M.A., 1940; Ph.D., 1959) is a consulting geologist with offices in Carpinteria, California. He has specialized in gas exploration in the Sacramento Valley for the past 20 years. Sully writes, "After former employer, George H. Roth, sold our files, ideas, and furniture to Dow Chemical last year, I signed up for Social Security and brought my golf handicap down to 22 from 25. But, I have now signed a contract with Ogle Petroleum and am back in the mainstream again, cursing the day I applied for Social Security."

PATRICIA B. SWAIN (M.S., 1981) is employed as a micropaleontologist by Shell Oil Company, Houston, Texas.

ARTHUR G. SYLVESTER (Ph.D., 1966), Professor of Geology, is now serving as Chairman of the Department of Geological Sciences, University of California, Santa Barbara.

RACHEL TABACHNICK (M.S., 1981) is working for ARCO in Alaska.

JAMES B. TAYLOR (M.A., 1963) is Division Geologist, Latin America, for Occidental Petroleum, Bakersfield, California.

ELIZABETH HORTON THOMAS (B.S., 1979) received her M.S. degree in the Division of Geological and Planetary Sciences at California Institute of Technology in 1980. She is now a Staff Geologist in the International Division of Atlantic Richfield in Los Angeles.

WARREN THOMAS (Ph.D., 1979) completed two years as a post-doctoral scholar with Professor Gary Ernst at UCLA, where he carried out experimental investigations of amphiboles and field studies of the Saddlebag Lake roof pendant in the Sierra Nevada. He has accepted an Assistant Professorship in the Department of Geological Sciences at the University of Southern California in Los Angeles and will be doing teaching and research in petrology and mineralogy.

JAN A. TULLIS (Ph.D., 1971) of the Department of Geological Sciences, Brown University, Providence, Rhode Island, was a convenor of a Geological Society of America Penrose Conference on "Significance and Petrogenesis of Mylonitic Rocks," held in San Diego, California, in Spring 1981. Jan was promoted two years

ago from Associate Professor (Research) to Associate Professor. She writes, "I am the departmental undergraduate advisor--and enrollments are going up. I teach the introductory course for non-science majors and also the structural geology course for majors. Research involves experimental structural geology--processes and mechanisms of deformation in the earth's crust, primarily in the ductile regime, with an attempt to understand the interactions between mechanical and chemical processes." Jan has published numerous papers and is on the Editorial Board of *Tectonophysics*.

STEVEN USDANSKY (B.S., 1976; Geology and Mathematics) is an Associate Professor in the Department of Geology, The University of Alabama, University, Alabama. He received the Ph.D. degree from the University of Minnesota in mineralogy-petrology in 1981 with a dissertation on "Topologic properties of c-component (c+4)-phase petrogenetic grids with applications to silica and metamorphic rocks in the Gold Creek area, Gunnison County, Colorado."

JOHN A. VAN COUVERING (B.A., 1956; M.A., 1962) is an Associate Editor for the Geological Society of America.

W. R. VAN SCHMUS (Ph.D., 1964) is also an Associate Editor of the Geological Society of America.

JOHN M. VOLLMER (B.A., 1951) has been promoted to Chief Development Geologist, Exploration Department, Western Region, for Chevron, U.S.A., Inc. Jack tells us that Chevron's Western Region Exploration, Production, and Land Departments recently moved to Concord, California.

ROLAND VON HUENE (B.A., 1953; Ph.D., 1960) of the U.S. Geological Survey, Menlo Park, California, has published recently in the *G.S.A. Bulletin* on "Transverse tectonic boundaries near Kodiak Island, Alaska." He served as Representative-at-Large on the Joint Technical Program Committee of the Geological Society of America for 1981.

RAYMOND WALDBAUM (B.A., 1976) is now a Senior Engineering Geologist with the geotechnical consulting firm of Medall, Aragon, Worswick and Associates, Inc. He moved to this group of consulting engineers and geologists after twelve years with Los Angeles County as an engineering geologist.

TIMOTHY J. WALSH (B.S., 1976; M.S., 1979) is a Geologist in the Division of Geology and Earth Resources, Washington Department of Natural Resources, Olympia, Washington. The Walshes had a daughter in August 1980.

STEVE WATRY (B.S., 1979) is an engineering geologist with the Southern California consulting firm of Kovacs-Byer-Robertson.

G. D. WEBSTER (Ph.D., 1966) is now Chairman of the Department of Geology, Washington State University, Pullman, Washington.

WARREN WEGNER (Ph.D., 1978) has recently moved to Chapel Hill, North Carolina, where his wife, Judy, is now a Law Professor at the University of North Carolina.

DAVID WEIDE (B.A., 1958) is taking a leave of absence from the Geoscience Department at the University of Nevada, Las Vegas, where he has been for the past seven years and has served as Chairman for the past two years. He will be working for the U.S. Geological Survey, Branch of Central Environmental Geology, in Denver. Dave will be assisting in editing the National Quaternary Atlas in what he says "will probably be ten percent field work and 90 percent squeezing the contributions out of the other participants." His initial field work will be in the high Uinta Mountains of Utah. Dave's position in Denver follows four years of W.A.E. status with the Survey doing geologic mapping in the coal deposits of the northwest San Juan Basin, New Mexico. He reports that his work in New Mexico was intellectually stimulating and challenging and would have been financially rewarding also had he not succumbed to Navajo turquoise and silver belt buckles, watch bands, rings, etc.

HOWARD WEISS (Ph.D., 1979; Geophysics and Space Physics) is a Research Associate in the Department of Physics and Astronomy, University of Maryland, College Park, Maryland. His present research is in connection with ionic composition in energetic solar particle events using data from the ULEZEQ detector on International Sun Earth Explorer 3 and ULET on Interplanetary Monitoring Platform 8. He is also involved in the development of a solar wind ionic composition experiment to be flown on the European Space Agency solar polar spacecraft.

PAUL WEISSMAN (Ph.D., 1978) is at the Jet Propulsion Laboratory, Pasadena, California.

ELBERT R. WILKINSON (B.A., 1955) is now Special Representative for the California Division of Oil and Gas, Department of Conservation, and has his office in Long Beach. Wilkie worked as a geologist in the oil industry for several years before joining the Division of Oil and Gas. He has now completed 21 years in State Service as, successively, an Oil and Gas Engineer, an Offshore Operations Engineer, and Regional Administrative Officer, before a recent promotion to his present position. Wilkie is married to Margaret and has two children: Jim and Louise.

JEROLD J. WILLIAMS (M.A., 1957) now lives in Surrey, England, where he is part owner of an oil company.

JIM WILLIAMS (Ph.D., 1969) is at the Jet Propulsion Laboratory in Pasadena, California.

KATHLEEN WILLIAMS (B.S., 1980) is now an Exploration Geophysicist with Aminoil U.S.A. in Huntington Beach, California. She is working under the supervision of CARL A. EVANS (B.S., 1969), who is Exploration Manager for Aminoil.

ROBERT A. WITTER (M.S., 1977, Geochemistry) is a Ph.D. candidate in the Department of Higher and Adult Education, Arizona State University, Tempe, Arizona. His current research interests include statistical analysis of radiometric dates; analysis of current models of cognitive learning; and general systems theory. He presented a paper on "Instrumental thermal neutron activation analysis of geologic and meteoritic material using a simplified computer data reduction process" at an American Nuclear Society Conference; and he has been elected a Member of the New York Academy of Science.

JEAN T. YOUNG (M.S., 1979), who is employed by ARCO in Houston, Texas, recently published a paper in the *Journal of Paleontology* on some California Pleistocene foraminifera.

JOSEPH I. ZIONY (B.A., 1956; M.A., 1959; Ph.D., 1966) has completed his assignment as Regional Geologist, Western Region, in the Office of Chief Geologist, U.S. Geological Survey, Menlo Park, California. He is now Research Geologist in the Office of Earthquake Studies and is preparing a Professional Paper on the earthquake hazards of the Los Angeles region.

BOB ZWIEGLER (B.S., 1978) works as a geologist for Kovacs-Byers and Associates, a geotechnical consulting firm based in Studio City, California.



Dear Alumni:

You can help us to improve the Department of Earth and Space Sciences. The questionnaire on the back side of this page has been expanded over preceding year-models: When you return this self-mailer (we pay the postage--please make sure to staple or tape it closed), your answers will be considered very carefully by the Department. Your response may be as short or as lengthy as you wish. We are interested in *anything* you feel might be relevant.

If you have questions or additional comments, you are always welcome to telephone Vicki at (213) 206-8439 or leave a message for the Newsletter editors in the Departmental Office (213) 825-3880.

We are going to attempt to have future Newsletters finished by the first each year, and next year's Newsletter will have some new features (e.g., photographs and articles about alumni activities as well as those of faculty, staff, and students). If you have anything to add in the way of interesting stories or intriguing photographs, please send them along. If next year's Newsletter is dry reading, it's partly your fault!

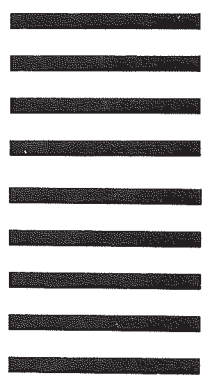


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Present position, company or institution, address:

Recently transferred? Promoted? Retired?

Professional and other activities (degrees from other schools, current work, research studies, awards, etc.):

Publications, offices in professional societies:

News of other alumni, etc.; other information:

What did you like best about the Department when you were here and/or what do you think needs improvement (including material needs, small or large):