Geology News

Department of Geological Sciences ▲ University of Colorado at Boulder ▲ Summer 1994

Message from the Chair

Greetings to alumni and friends of Geological Sciences. As most of you learned in the last Newsletter, with Don Runnells' challenge of a new career in industry, John Andrews stepped in as interim Chair to guide the Department through the spring semester. Although I was looking forward to resuming my role as a regular faculty member following a year's sabbatical in Australia, I was intrigued by the range of opportunities for teaching and research in the Earth Sciences in Boulder. Knowing that Mary Kraus and Jim Muñoz were willing to help me as Associate Chairs, and with a strong and supportive Front Office, I naively assumed the Chairmanship would not be too intrusive an additional responsibility. After nearly a year on the job, the reality of modern University administration is only too clear. At the same time, however, I am more optimistic than before I assumed the Chairmanship that the Department is uniquely poised to capitalize on new opportunities for teaching and research in the Earth Sciences.

It has been an exciting year for the Department, a year in which we have witnessed the efforts put forth over many years by faculty, staff, alumni and friends finally being rewarded. After years of often frustrating delays, a new building for the Department and our library appears to be a reality. And after several years of declining enrollments in undergraduate courses, there is a clear renewed interest in all aspects of our discipline. Although the interest is most obvious in the environmental aspects of the Earth Sciences, we are experiencing growing student interest in most other areas as well. Our undergraduate majors show a steady and consistent increase for the sixth year in a row, enrollment of non-majors is rapidly expanding, and our graduate program enjoyed a bumper crop of outstanding new students.

A New Building for Geological Sciences?

Every year the Newsletter carries an article documenting the slow march of progress toward a possible new building. Despite planning that began more than 15 years ago, and a concerted fundraising effort extending back more than a decade, a new building has, at times, seemed doomed to remain forever only a possibility. By the beginning of the current year, with the assistance of the University of Colorado Foundation, we had raised just over $5 million in gifts and pledges, and the University had committed another $4 million toward the new building. Most encouraging, a new building for Geological Sciences and the Earth Science Library held the University's highest priority for new capital construction. As the State Legislature prioritized capital construction for next year, they gave architectural and engineering funds totaling about $1.7 million for our building a very high priority. The spring has been a long waiting game, to see if other priorities might displace our building, as has happened in the past. Rather remarkably, the opposite happened. In the spring, the State committed another $3.2 million toward construction and instrumentation costs, bringing the total available building funds to $14.4 million, the estimated full cost of a new building in 1994 dollars. Although the final budget still must be approved by the State, as of this writing it appears that our long-held dream of a new building with modern analytical, classroom and office space will actually become a reality.

The chance to design a building from the ground up is a rare opportunity for the Earth Sciences in academia, and a welcome challenge for the Department. The New Building Committee, consisting of myself, Lang Farmer and Suzanne Larsen, will be assisted throughout the project by Pam Topping. We had the good fortune to lure Pam away from CIRES for the duration of our project. She has overseen the construction of three other University buildings and will be invaluable in this project.

Our new location is shown on the adjacent map; the new Geological Sciences and Earth Science Library Building will be the largest of three new buildings that will complete a Science Corridor opposite Folsom Stadium. With their construction, the buildings will define a new quadrangle that will connect the Physics complex with the Engineering Center. Our new building will provide the Department with assignable space totalling more than 40,000 square feet, over 50% more than the current building, while the Earth Science Library will increase in area four-fold, to 11,000 square feet. More importantly, classrooms will be improved (no more pillars as in room 311, air conditioning throughout!) and all will be electronic-media equipped. A steeply dipping 180-seat "smart" auditorium with attached preparation room will be an improvement over GEOL 121, and we are determined to have a south-facing deck off the conference/coffee

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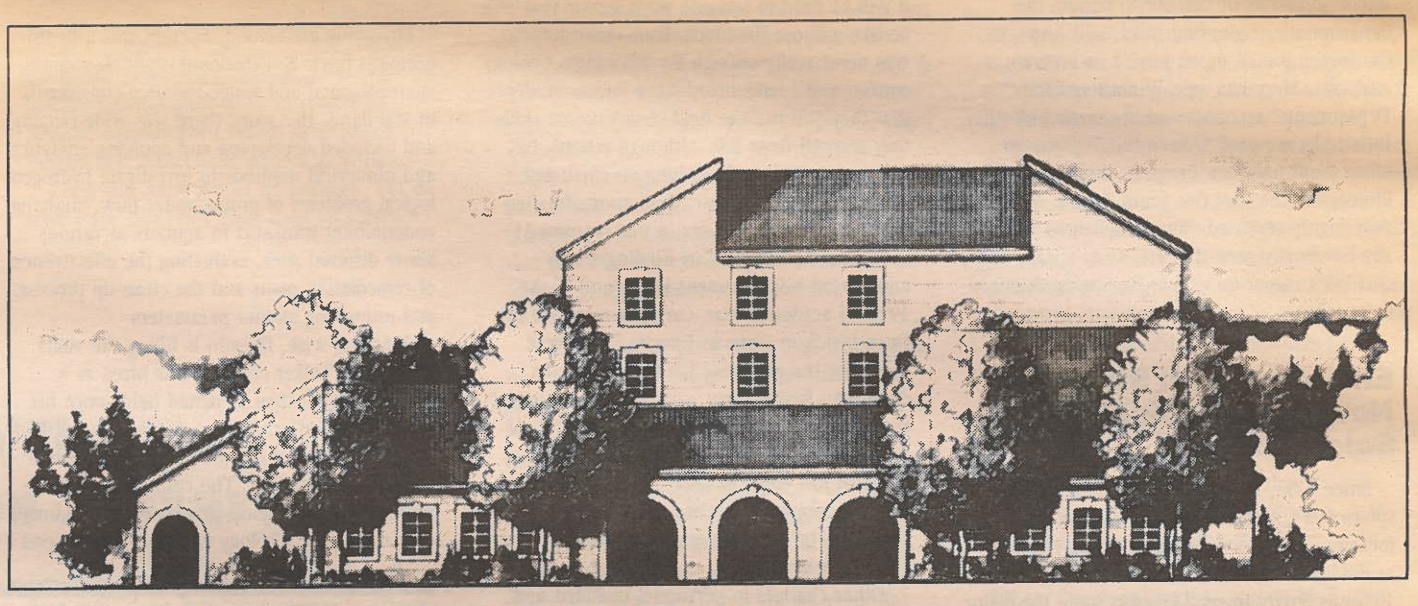

Artist's rendition of the new building, looking south from Colorado Avenue.

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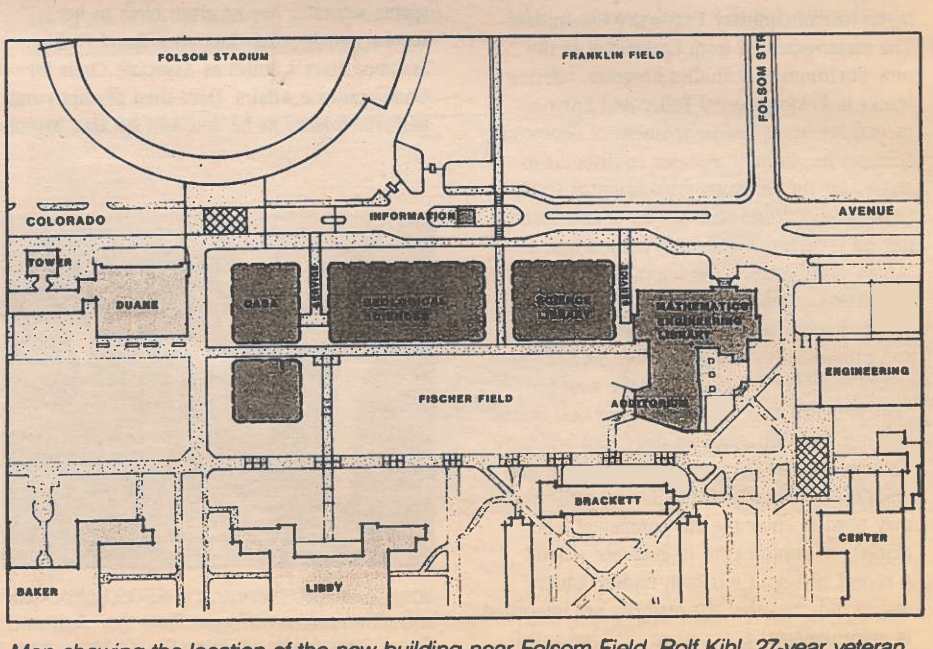


Map showing the location of the new building near Folsom Field. Rolf Kihl, 27-year veteran in the INSTAAR sedimentology laboratory and "advisor" to many football coaches, is lobbying for space with a view into the stadium.

From the Chair, *cont.*

room on the second floor to serve as a "magnet space," facilitating interaction between faculty and students. All laboratory space will be designed on a wet chemistry model, with engineered flexibility, and we have elected to place faculty and senior graduate students in office complexes enclosing dry-lab space, again to enhance interactions at all levels. Although official authorization for the building awaits the start of the new fiscal year, we have already interviewed architectural firms and a recommendation has been forwarded to the Regents. In an attempt to hit the ground running on July 1, we have already held unofficial planning meetings with the architects. A ceremonial ground-breaking ceremony will be held in mid-June; the exact date and time will be determined shortly and can be obtained from the Department office. Please join us for the ceremony if you plan to be in town. It has been a long wait and we are excited to begin at last.

A New Era in the Front Office

Like those who served before me, as a new Chair I have survived only by virtue of the talented and helpful staff in the Front Office. To my great initial dismay, this has been a year of remarkable transition in the Front Office. In the fall, Mark Bishop left to join Don Runnells in his new job with Shephard Miller, Inc., in Fort Collins. Then, in the spring, Gloria Timmons was recruited back to Human Resources. Although only with the Department for 18 months, Gloria had established a wonderful rapport with the students and made herself generally indispensable. Human Resources had to create a new job to woo her from us. To complete the loss, Edith Ellis, who has served the Department with great efficiency, grace and good humor for more than a quarter century, announced that she would be retiring at the end of the academic year. Faced with the loss of the entire collective memory of the Front Office, we feared the worst. However, I am delighted to report that we were fortunate to find remarkably talented replacements. Mary Wikoff joined us in October to handle the Department's accounting tasks, and Ann Carrington joined us on June 1 as Program Assistant. Mary has quickly mastered the Departmental accounts and the myriad of other little tasks required to keep the Department afloat. Ann has been Program Assistant in EPO Biology for the past five years, where she is very highly regarded. We are delighted that she has finally seen the dirt, so to speak, and decided a career move into Geological Sciences is in order.

Environmental Studies Now in Geological Sciences

Since 1952, the University of Colorado has sponsored a separate instructional program focusing on the environment. Initially known as Environmental Education, and since the early 1970s as Environmental Conservation, the major was greatly overhauled over the past two years by an interdisciplinary University Committee. The major emerged from Committee as the new Environmental Studies Program, offering tracks in Environmental Policy and Environmental Sciences. The Department of Geological Sciences has become a major contributor to classes for the Environmental Sciences tracks, so when a call was sent out for a new Director for the Program, it was only natural that a faculty member from Geological Sciences would be the most logical candidate. Jim White, having just cleared the tenure process and promotion to Associate Professor, has been tasked with the job of guiding the new program through its infancy. With over 600 majors, and new student enquiries daily, Jim will have his hands full shaping a rigorous science program that will provide students with the skills they need to enter the environmental job market, or continue on in graduate school. A recent survey of our own undergraduate majors indicates that the majority are interested in environmental geosciences, and we anticipate that some of the ES majors are likely to double major with Geology. We are planning to expand our offerings in the environmental aspects of the discipline to meet the needs of our majors and the expanding Environmental Studies Program.

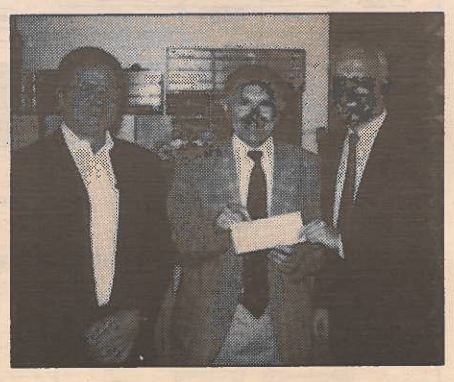
New Faculty

The heart of any department is always its human resources, and it is with some pleasure that I can inform you we have had the good fortune to welcome three excellent new faculty this fall, and we are in the final stages of a fourth recruitment. That three of these four are superb female geologists is reason to cheer doubly loud. Mary Kraus has for too long had to serve as the sole role model for the entire female student body, and she is delighted to now share that honor with Shemin Ge, our new geohydrologist, and Anne Sheehan, who complements our geophysics program and is also a member of CIRES. In addition, Research Associate Professor Jane Selverstone is currently a finalist for a new tenure-track position in chemical geodynamics. Jane uses detailed mineralogical analyses to reconstruct large-scale deformation processes. Research Assistant Professor Tammy McCormick is our other female faculty member. In addition to her research program, Tammy regularly interacts with students and has led Departmental field trips this fall and spring.

The Geophysics group was further strengthened this year by the addition of Associate Professor John Rundle, a specialist in complex non-linear systems. John, like Anne, is also a member of CIRES. Additional details on the new faculty are presented elsewhere in the Newsletter. We are delighted to welcome all of these colleagues to the University and to the Department.

The Department has also experienced retirements. Although Don Eicher formally retired from the University last year, and in the process provided the position used to recruit Shemin Ge, he remains active in the Department, teaching a full load each spring and interacting regularly with graduate students. Bill Braddock announced his intention to retire at the end of the 1993-94 academic year. For the many Geology majors who took Bill's structure course, followed by Field Geology, it will be hard to imagine what senior year will be like without Braddock. Four credit hours was never really enough for Bill's Field Geology course, and I have heard from former students that they still use the field observational skills they learned from Bill. Although retired, Bill will remain involved teaching an expanded version of his Computer Applications for Geological Sciences to majors in our renovated computer laboratory. Carl Kisslinger also announced his retirement at the end of the 1993-94 academic year. Carl was recruited by Dean Lynch to serve as Interim Director of CIRES for the past year while the Director designate, Susan Avery, completed a sabbatical in Australia. Carl easily filled the job he held for many years, and although the Geophysics Program lost some of Carl's involvement due to his increased administrative duties, it benefitted by the replacement hiring of Anne Sheehan.

Other changes in personnel included new offspring. Mary Kraus was on leave for the spring semester having given birth to her second daughter late last year. David Budd assumed Mary's duties as Associate Chair for Undergraduate Affairs. Dave then promptly outperformed Mary as he and Ann became parents of twin boys early this year. Congratulations to both families!



John Andrews receiving a $5,000 check for scholarships from Roger Stallinger (left) and Stuart Strife (right) of Union Pacific Resources. With funding down and many students taking out loans, such scholarships are much appreciated by all.

New Faculty

The department was busy last spring with recruiting on several fronts. We were given the go-ahead to hire a hydrogeologist, and we hit the jackpot in geophysics as we sought replacements for both Carl Kisslinger and Max Wyss.

Shemin Ge

Shemin Ge is the new geohydrologist (photo). Born in China, Shemin earned a B.Sc. degree in geotechnical engineering at Wuhan University of Technology. She then decided to go to Canada for graduate work at the University of British Columbia. There she worked under the direction of Charles Brawner on ground-water flow and slope stability, and her thesis covered the numerical modeling of horizontal drain drainage in an open pit slope. Her M.A.Sc. degree was in geotechnical engineering. Following that she switched over to hydrogeologic studies at Johns Hopkins and earned two degrees—an M.A. and a Ph.D. Her Ph.D. dissertation, under the direction of Grant Garven, was on the mechanics of tectonically-driven fluid flow in foreland basins.

Shemin Ge

Following graduation, Shemin was a hydrogeologist for S. S. Papadopulos and Associates, environmental and water-resource consultants in Maryland. Her work there was wide-ranging and included developing and applying analytical and numerical methods to investigate hydrogeological problems of groundwater flow, studying contaminant transport in aquifers at various waste disposal sites, evaluating the effectiveness of remediation plans and the clean-up process, and estimating aquifer parameters.

Teaching-wise, Shemin is filling the voids left by Ted Walker (yes, he was hired as a hydrogeologist, then switched fields once his job was secure!) and Bruce Curtis, whose fluids course was one of the most popular graduate courses we have had. The courses she will be responsible for include an undergraduate introduction to geohydrology course, a senior-level field module in geomorphology-hydrology, co-taught with Pete Birkeland, and a graduate course in advanced topics in groundwater which includes theory, well hydraulics, flow modeling, contaminant hydrogeology, and groundwater-tectonic interactions. During the spring '94 semester she co-taught a seminar with Dave Budd and Vijay Gupta on sedimentological controls on rock permeability. Shemin also has put together a hydrogeology computer laboratory in the old photography laboratory on the third floor (photo in Student News).

Shemin's husband, Ning, is a hydrologist with the Water Resources Division of the USGS in Denver, where he is just down the hall from former graduate student Emily Taylor (M.S., CU, '86). He is working on the unsaturated zone at the Yucca Mountain Project.

Shemin and Ning have 2 girls, ages 2 (Connie) and 5 (Vivian).

John Rundle

John Rundle (photo) is the more senior of the recent hires, having earned a B.S.E. degree in engineering physics in 1972 from Princeton University, and M.S. (1973) and Ph.D. (1976) degrees in Geophysics and Space Physics from UCLA. He then did postdoctoral work there for the next two years. From then until 1990 he was a research geophysicist at Sandia National Laboratories. He then moved on to the Earth Sciences Department of the Lawrence Livermore National Laboratory, a position he held until he came here. In addition to the above, he has been a Visiting Faculty Member of the Seismological Laboratory at the California Institute of Technology, and a Visiting Scholar at the Department of Physics, Boston University. John is well known across the country and internationally, has been chair of the Committee on Geodesy of the National Research Council, and served on various national and international committees (NSF, NASA, U.S. Department of Energy, etc.). In additional to being in the department, he is a Fellow in CIRES.

John's research interests have been broad. In

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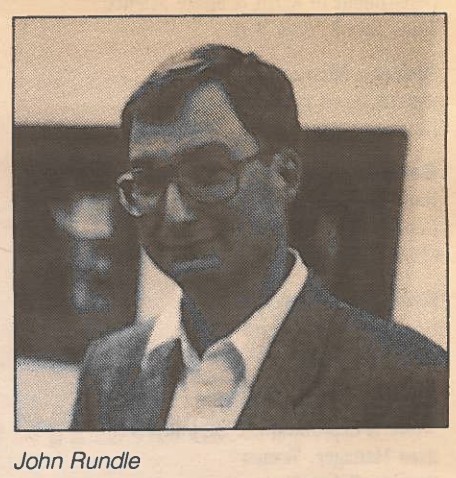

John Rundle

Earth Sciences in the Year 2000

As the major charge for the Department's Executive Committee this year, we have recently completed a major overhaul of the Department's Strategic Plan. With this document, the Department identifies its current strengths, future trends in the discipline and outlines a vision for a leading Earth Science Department at the turn of the century. Allocation of future resources will be based on this synthesis. The highest immediate needs for new faculty are in the fields of structural geology and aqueous geochemistry. Both positions are essential for our teaching and research missions. Once these positions are filled, we propose recruiting in the broad field of environmental geosciences/global change, the area of our curriculum where we anticipate the greatest increase in student demand.

With 13 probable retirements by the turn of the century, there is an unusual opportunity to attract new talent to meet the needs of the next generation of Earth scientists. We expect to recruit faculty in the most exciting areas of research while maintaining an educational program that emphasizes first principles and the essential elements of our discipline. The Strategic Plan, which has been endorsed by the Faculty and the Advisory Board, is currently being considered by the Administration, where we expect to engage Deans and Vice Chancellors in the excitement of the Earth Sciences.

As we approach the end of the spring semester and prepare for regeneration over the summer with time for field programs and laboratory research, I want to thank Dave Budd, Mary Kraus and Jim Muñoz for their great help as Associate Chairs, and add my voice to the many current and former faculty and students who thank Edith for her untallyable contributions to the Department through the years and to wish her a most enjoyable retirement.

For those of you passing through town, please stop by and say hello to old friends and catch up on the latest Departmental news.

Gifford H. Miller
27 April, 1994

New Faculty, *cont.*

earthquake geophysics he has developed a new class of inelastic deformation models for fault zones and compared these with data from the 1906 San Francisco earthquake. The models were subsequently expanded and have proven useful in interpreting regional seismic patterns and crustal motions. Recently he has worked on nonlinear dynamical models for faults and developed computer simulation techniques to provide insight into natural fault systems. Following along with the work of others at CIRES, John hopes to use some of these techniques to explore the predictability of earthquakes.

He also has interests in volcanology, especially the Long Valley Caldera of the eastern Sierra Nevada, California. He is the chief scientist of the Long Valley Exploration Well Project, a well that eventually is planned to reach 6 km depth. So far they have collected stress and thermal measurements, seismic data and fluid samples down to 2.3 km. Extending the data set to 4 km is now in the plans.

John's talents fit in well with the geophysics program. He will be teaching an undergraduate course on the physics of the solid earth, an upper division/graduate course on earthquakes, a graduate course on earth and planetary physics, and will collaborate with Vijay Gupta on graduate courses on a) fractals in the geosciences and b) continuum mechanics in geosciences.

John's wife, Marie, works in the public health field, but now has her hands full with two boys, ages 7 (Daniel) and 10 (Paul).

Anne Sheehan

Anne Sheehan

Anne Sheehan is the other newly hired geophysicist, and she also is a fellow in CIRES (photo). Being a native Kansan, she went to KU and earned her B.S. degree in geophysics in 1984. She then went to MIT for her Ph.D. degree, which was conferred in 1991. For the latter she studied the lateral variation in upper mantle temperature and composition beneath mid-ocean ridges inferred from shear-wave propagation, geoid and velocity.

Anne has been busy during and after her Ph.D. days. In 1984–1985 she was an ITT International Fellow at the Blacknest Seismological Laboratory and the University of Reading, England. Following her Ph.D. degree she was a postdoctoral fellow at the Lamont-Doherty Geological Observatory, and a research assistant professor at the Seismological Laboratory, University of Nevada, Reno.

She is going to help the geophysics teaching program immensely. In the spring she taught a seminar on the physics and history of the Rocky Mountains and Colorado Plateau, and next year she will be teaching a section of our dynamic Earth, two undergraduate courses (applied geophysics and geophysics and tectonics), and a new graduate course on geophysical data analysis. With Anne's and John's teaching contributions, we feel that the void left by Max Wyss and Carl Kisslinger is nicely filled.

Anne has many research interests. Her main one is the study of the structure and dynamics of the crust and upper mantle. She is currently analysing teleseismic data from broadband seismometers throughout Colorado, and soon will extend the project westward to include the Colorado Plateau and Basin and Range. Eventually this will provide insight into the lithospheric structure from the Basin and Range to, you guessed it, her home turf of Kansas. She also has maintained her interest in mid-ocean ridges, and has an on-going study of the East Pacific Rise that includes spreading broadband seismometers across that part of the ocean floor. A final active project involves resolution of the crustal structure in the transition from the Kazakh Shield to the Tien Shan region in the former Soviet Union.

Her husband is Craig Jones, who is currently a research associate in CIRES. His research interests are centered on understanding the tectonics of the western U.S. through geophysical and geological means. Examples of ongoing projects include seismological work in the Sierra Nevada, paleomagnetic work in southern Nevada and neotectonic studies in Nevada.

Craig and Anne report no children, but do have three cats (two more than Ed Larson)!

Faculty News

John Andrews

John and Martha Andrews returned from Cambridge University (UK) where they spent a productive and delightful sabbatical during the fall semester 1993. The reality check came the day after they landed, at which time he started to teach two courses and became acting Chair for the spring semester.

The research highlight for John this last year was a cruise on the Canadian research ship *CSS Hudson* to East Greenland. For those who remember earlier newsletters, this was a sequel and follow-up to the 1991 cruise into the same area that he had spear-headed using the Icelandic ship *Bjarni Saemundsson*. Funds for the research project were provided through a National Science Foundation and Office of Naval Research grant which included Anne Jennings and Kerstin Williams. The grant will provide support for the next three years for them to evaluate sediment transfer processes and Paleoceanography of this key area in the global ocean system, the area called Denmark Strait.

The *Hudson* picked up the scientific and technical staff in Reykjavik, Iceland. Accompanying John on this cruise were Nancy Weiner (B.A., CU) and Kerstin Williams (M.S., CU, '84; Ph.D., CU, '88). They were joined by an additional 24 staff, mainly from the Geological Survey of Canada and Bedford Institute of Oceanography, but also groups from the United Kingdom including Julian Dowsdeswell (M.S., CU Geography), who is on the faculty at the Scott Polar Research Institute, Cambridge. While they were in Iceland they visited with a former graduate student of the department, Aslaug Geirsdottir (Ph.D., CU, '88), who is a geology professor at the University of Iceland.

In early September 1993, reports indicated that this was one of the heaviest ice years on record. They left Reykjavik and proceeded to stream their high resolution deep-towed seismic gear, as their first objective was to obtain a long piston core from the western Icelandic shelf. The *Hudson* employs the BIO Long Core, a massive 11-centimeter-diameter piston core that is driven into the sediment with a 5,000 lb. driving head. At the site off west Iceland they retrieved a 16m-long section through the Upper Quaternary. This core will be worked on at INSTAAR/Geological Sciences and they anticipate it will provide a high-resolution record of changes in the Irminger Current, that current that flows northward along the west coast of Iceland bringing warm Atlantic water up to northern Iceland.

The next leg of the journey was in the area of Denmark Strait where they continued the seismic investigations and coring, as well as taking measurements of temperature, salinity, and conductivity of the water column. As they sailed westward they reached the edge of the East Greenland shelf and proceeded to survey a major trough, the Kangerdlugssuag Trough, which cuts across the shelf for ca. 250 km. Water depths in the trough are between 400 and 600 m, whereas on the shelf proper they are in the range of 200–300 m. The ice conditions continued to get worse the closer they came to the East Greenland coast. But they were able to enter the fjord and over the next four days worked their way through extremely heavy sea ice and icebergs to within a few kilometers of the calving front of the glacier. Estimates, based on the mass balance of the areas, suggested that Kangerdlugssuag Glacier, with a drainage area of 50,000 km^2, had a calving rate of about 15 km^3 of ice per year. To put this in perspective, this flux is about 5% of the total iceberg production of the Greenland Ice Sheet.

So there they were surrounded by large lumps of ice, and it was nearly inevitable that at some point a major collision would occur. It did, and they spent a brief but hectic period while the ship took on 1000 gallons of water a minute through a 5m crack in the hull below the water line.

After that it was a case of waiting, but eventually a Royal Danish Navy ship sent a diving crew via helicopter to inspect the damage. *Hudson* then worked her way back through the ice and crossed Denmark Strait with the naval ship escort. The scientific crew disembarked in Iceland while *Hudson* went to St. Johns, Newfoundland, for hauling up and repair. Two weeks later two graduate students from the department, Mike Kerwin and Bill Manley, were aboard for another cruise, this time to the Canadian Arctic, specifically Hudson Strait.

Roger Bilham

This article appeared in a recent issue of *Science News*:

Residents of Calcutta should sleep easier, thanks to seismologist Roger Bilham, who is rewriting the history of their city. Contrary to what most quake scientists learn in school, *Bilham reports, Calcutta did not suffer a* devastating tremor in 1737 that killed 300,000 people. In seismic listings, this shock often appears among the five deadliest.

A researcher at the University of Colorado at Boulder, Bilham has compiled a string of facts suggesting that the quake either never occurred or killed far fewer people. It supposedly struck on Oct. 11, the same night a strong storm pummelled Calcutta with heavy rain, gale-force winds, and flood waters. When Bilham checked the records of British residents in Calcutta at that time—including those of Oliver Cromwell's grandson—he found many references to the storm but no mention of the quake. The British East India Company reported 3,000 deaths that night in Calcutta and two dozen damaged colonial structures close to the river, where the flooding would have been most severe.

Because he could find no eyewitness accounts of a quake that night, Bilham attributes those deaths to the storm. He notes that records from the city of Dacca, 150 kilometers away, make no note of any earthquake that night.

The earliest reference to the quake that Bilham found appeared in reports by British merchants six months after the supposed disaster. A century later, a British seismologist

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What's New in the Earth Sciences Library?

Whats new? Lots! Last fall, the long awaited Local Area Network (LAN) was installed. This allows the various databases to be selected from a menu instead of manually switching discs in and out, and also lets both of our CD-ROM workstations access the same disc at the same time. The network uses Novell software, and the discs are mounted in a Meridian tower that has the capability to hold up to fourteen discs. The LAN uses Ethernet communications technology and can be used to access the on-line library catalog that is in the planning stage. It would not have been possible without the generosity of the Crail-Johnson Foundation.

Electronic information access is definitely expanding and changing the world of libraries. Through the Internet, the LAN also provides access to a collection of on-line bibliographic databases called FIRSTSEARCH, a subscription subsidized by the University Libraries. FIRSTSEARCH accesses 40 different subject indexes covering everything from engineering to biology to general science to art and humanities. Currently, only the Earth Sciences Library and Central Reference in Norlin have access to this system. FIRSTSEARCH has been especially helpful in finding citations for information in interdisciplinary areas.

With the world of information relying more and more on electronic sources, it became evident that giving library instruction to classes should go electronic as well. With funding from the Associate Vice Chancellor for Academic Affairs, a laptop computer, portable CD-ROM reader, and LCD projection screen were purchased for the ES Library. With only an overhead projector, this equipment allows CD-ROMs to be taken into the classroom for instruction in their use. If there is a communications hookup in the classroom, a modem in the computer will allow access to the on-line library catalog and the Internet as well. No need to bring the students to the library; we can bring the library to the students!

Our Earth Sciences Library is gaining the reputation of being on the cutting edge of information technology. Handicapped as we are by a cramped, antiquated facility, we anxiously look forward to the new Earth Sciences Library in the new Geological Sciences building. Planning is currently underway. The ES Library will expand from the current 2,400 sq. ft. to about 11,000 sq. ft. and will include the Map Library now housed in Norlin. This will enable us to support the information needs in the expanding field of earth sciences at the onset of the 21st century (which is only six years away) and many years beyond. It is an exciting time.

Day on the slopes honoring emeritus professors. Somebody had to do it and these folks did. From left to right, Pete Birkeland, Wes LeMasurier (CU grad and long-time professor at the Denver campus), Bill Bradley, Suzanne Birkeland, Louise Bradley, and Barbara and Ted Walker. Bill and Ted still average 2-3 days/week on the slopes each winter. We will not tell you Ted's age, but he skis free at most Colorado ski resorts. Ted and Barb switch to bikes for the summer, and this summer they will follow the Danube River downstream. Bill has kept up his interest in rivers, and commonly he and Louise are floating various western rivers while Bill gives the geological commentary.

Faculty News, *cont.*

included it in a catalog of Indian earthquakes, and from there it filtered into the seismological literature. Bilham finds the 300,000 deaths improbable, in part because the population of Calcutta at the time numbered less than 20,000.

Whether the quake occurred or not has important implications for the 10 million residents of modern Calcutta, Bilham says. The city has no record of other major quakes, and the population is expected to swell another 50 percent in the next decade.

Bill Hay

Bill Hay was in residence at CU from the beginning of January through late May, and taught courses in Oceanography and Marine Geology. From June through mid-September he was *Gastwissenschaftler* (Visiting Scientist) at the new Institute for Baltic Sea Research in Warnemnde, on the coast just north of Rostock, in the new state of Mecklenburg-Vorpommern, formerly part of East Germany. He says that living in an area that was strictly closed to Westerners (Warnemnde was the home port of the Navy of the German Democratic Republic) only a few years ago was a fascinating and exciting experience. East Germany is undoubtedly the largest urban renewal project in history. Deferred maintenance was the rule during the more than 40 years of Communist rule, and now everything is being renovated. In Warnemnde the renovation is already about one third complete, with many magnificent buildings from the early days of the seashore resort restored to their former splendor. Taking advantage of European unification, a restaurant in Warnemnde was opened by Italian emigrants.

The science was very exciting. The Institute for Baltic Sea Research was formerly the Institute of Oceanography of the GDR, and in the old days all of the research done there was highly secret. Since the reunification, communication is the watchword, and the Institute is becoming a major center for numerical modelling of ocean processes. Jan Harff, the new head of Marine Geology, and Bill's group had agreed to work on modelling the isostatic response of the Baltic region to the melting of the Scandinavian ice sheet. Bill had thought that the history was well known and all that would be required was to develop a simple isostatic model and relate the uplift of the Baltic to the rise in sea level. The first thing he saw after arriving in Warnemnde were maps of present day uplift and subsidence of Europe compiled by geophysicists in Potsdam during GDR days and not seen before in the west. It immediately became apparent that there was more to the story than just the postglacial uplift of Scandinavia, because the maps showed a broad belt of uneven subsidence, much of it in eastern Europe. With CU graduate Chris Wold in Kiel, they modeled the ice sheet's peripheral bulge, finding that it might have been more than 500m high. Then, with Werner von Blow of the Geological Survey of Mecklenburg-Vorpommern, they looked at seismic data showing the base of the Quaternary. Many years ago Werner had suggested that there had been an uplift of about 500m in front of the Elster ice sheet, and the seismic data provided spectacular confirmation of that. The model and data were presented at the AGU meeting in San Francisco in December (C.N. Wold, W.W. Hay, W. von Blow, and J. Harff, 1993). Maximum elevation of western Eurasia during the Weichsel Glaciation. EOS, 74, suppl., p. 264). The former East Germany had the most extensive seismic surveys and coring programs of any land area on Earth, and is a unique area for basin modelling.

From mid-September through mid-December Bill was F.C. Donders Visiting Professor at the Institute of Earth Sciences of the University of Utrecht, The Netherlands, where he taught a course, Atmosphere, Oceans, Continents and Climate, open to students and faculty throughout the Netherlands. He says he was unprepared for the attendance, which was more than 50, with some participants travelling more than three hours each way by train and boat! Bill also gave lectures in Leiden and Amsterdam. In Utrecht the science was once again very stimulating. The students and faculty there are using the geologic record to calibrate Milankovich cycles rather than vice versa. They are also very active in research on the paleoceanography of the Mediterranean and on Cretaceous paleclimatology, so there was much to talk about.

In mid-October Bill attended the 25th anniversary meeting of the International Association for Mathematical Geology in Prague, Czech Republic. He had a great time renewing old friendships at the conference and visiting Prague, which, like the major cities of East Germany, is being restored to its former splendor. It has already become a center of music, theater and art.

Bill left Utrecht in December and made a quick pre-Christmas trip to the Christkindl Market in Nürnberg. The market is deservedly famous, with an incredible selection of handmade ornaments, toys, and special cakes, cookies and Gluhwein. To finish out the overseas part of his year, he celebrated Christmas with the Wolds and other friends in Kiel and returned to Colorado.

Hartmut Spetzler

Hartmut Spetzler and Ivan Getting, together with several post-docs and graduate and undergraduate students, are developing new instrumentation and making measurements on Earth materials to better understand the composition and dynamics of Earth's interior. Recently they received some very exciting data which cannot be understood in terms of physical processes. It appears that chemical reactions are dominating the physical behavior of rocks under certain circumstances. They are now exploring joint research funding with chemists to pursue the implications of their measurements.

During the spring semester, Hartmut taught a critical thinking course, which involved many exciting discussions and several field trips. One of the trips took them to Nevada's Yucca Mountain. The Department of Energy has been mandated by Congress to study this area for possible nuclear waste disposal. It was a fascinating trip, not only from scientific and teaching points of view, but also due to the human interaction of a group of people together in close quarters for an extended period of time. This prompted Ixchtel N. Whitcher, a student in the course, to write the following poem:

Dedicated to the
Yucca Mountain Field Trippers

Like a single short symphony
the notes of our lives
mingled
and wove music.
(the group of us
almost randomly plucked
to share the experience)

A symphony only borrows its notes,
does not own them
or change them
of force them into permanent
chords.
(our lives shall not shift
direction
nor our friendships last
forever)

The chords will echo ever more quietly
and the notes
shall scatter
to be part of new
symphonies.
(in fifty years
we will not remember each other's
faces or names)

Yet, never to be lost is
the resonance
imparted
to each of us
by the others
during this brief
symphony.

Hartmut still has the annual Trail Ridge bike ride, usually in June. Everyone is invited, even a sag wagon driver.

News from the Centers

EMARC

A fundraising luncheon for EMARC (Energy and Minerals Applied Research Center) was held at the Houston Petroleum Club on October 8, 1993. It was attended by 29 representatives from the following 14 companies:

- Amoco Production Co.
- Anadarko
- BP Exploration
- Cabot Oil & Gas
- Conoco
- Exxon Production Research Co.
- Marathon Oil Co.
- Nippon Oil Exploration USA, Ltd.
- North Central Oil Co.
- Oman Oil Co.
- Pennzoil
- Petrobras America
- Preston Oil Co.
- Shell Oil Co.
- Independents

EMARC personnel discussed seven of their 21 petroleum research projects emphasizing the Northern Gulf of Mexico Deep Water Consortium stratigraphic and structural studies in the Green Canyon Area.

The presentations were well received, as indicated by the questions and discussions following the presentations. Several company representatives indicated the possibility of 1994 summer internships in geology with their companies. We are following up on contacts made at the Houston meeting with requests for EMARC project support and summer internships. We have sent letters to 43 companies requesting EMARC funding.

Financial support for 1994 has been obtained for EMARC from Tenneco and Union Pacific that totals $36,000. Over $30,000 has been committed by Chevron and Amoco to support Cretaceous stratigraphic studies in Colombia, and stratigraphy of the Southern Carpathians, Romania. We also expect Anadarko and Mobil to join the Gulf of Mexico Consortium. Summer geological internships are being sought for 14 graduate and undergraduate students. Student resumes have been sent to 15 petroleum, 14 mining and several environmental consultant companies seeking summer employment. Meridian Resources has already been on campus for interviews.

Paul Weimer organized lectures and short courses for EMARC. Some titles are:

Art Donovan, Exxon Production Research, Parasequences in Reservoir Analysis.

John Anderson, Rice University, Sequence Stratigraphy of the Late Quaternary Texas Continental Shelf.

Mike Mahaffie, Shell Offshore, Reservoir Geology of Recent Giant Discoveries in the Deep Gulf of Mexico: Mars, Augur, and Bullwinkle Fields.

Mark Hempton, Pecten, AAPG Distinguished Lecture, Regional Paleogeographic Evolution of West Africa: Implications for Hydrocarbon Exploration.

Tom Mazza, Marathon, Integrated 3-D Seismic Interpretation of the Brae Field, Viking Graben, North Sea.

Bob Graebner, Future Uses of 3-D Seismic Data.

Svern Treitel, AAPG Distinguished Lecture, The Use of Cross Well Tomography.

Paul Weimer

During the fall of 1993, Paul taught a new graduate class with Roger Slatt of CSM entitled "Petroleum Geology of Turbidite Systems." As part of the course, they took a one-week field trip to the Ouachita Mountains in Arkansas to study the Pennsylvanian Jackfork Group (photo). Although not productive, the Jackfork is a good reservoir analog to many turbdite reservoirs around the world, especially the Neogene strata of the deep the Gulf of Mexico. The course will be taught as an AAPG field course next fall, and taught again at CU/CSM during the fall of 1995.

Paul has lots happening on the research end of things. The second meeting for the Gulf of Mexico Research Consortium was held on August 9 and 10, 1993. Forty-five people attended the consortium meeting. Twenty companies are sponsors for the consortium, which focuses on the integrated sequence stratigraphic and structural studies in the upper slope region of the Gulf of Mexico. A third meeting will be held in May. The amount that has been raised for the consortium meeting totals $480,000. Mark Rowan and Tomas Villamil are working as research scientists on this project, as well as two PhD students, Peter Varnai and Barry McBride, and five MS students, Zurlima Acosta, Fadjar Budhijanto, Rafael Martinez, Alonso Navarro and Barrett Dixon.

A second research project is the DOE/Global Basins Research Network drilling project on Eugene Island 330 field, offshore Louisiana. A special well was drilled to test hypotheses of actively migrating fluids in the subsurface. Paul and Mark Rowan did regional stratigraphic and structural restorations across the area to help constrain the timing of fluid migration into the field. Results of this research will be featured at the Denver AAPG Meeting in June 1994.

Other students' research includes sequence stratigraphic studies in the Upper Cretaceous of western Colorado and 3-D seismic interpretation in the East China Sea and the Rocky Flats aquifers.

Paul and Arnold Bouma (LSU) are organizing the 1994 Gulf Coast Section-SEPM Research Conference to be held in Houston. The program title is "Submarine Fans and Turbidite Systems Sequence Stratigraphy, Reservoir Architecture, and Production Characteristics—Gulf of Mexico and International."

Paul has also been busy publishing. He is co-editor of "Siliciclastic Sequence Stratigraphy: Recent Developments and Applications" (AAPG Memoir 58), published in spring 1994. He is also working with Tom Davis (CSM) on compiling an AAPG 3-D Seismic Interpretation Atlas. Publication is expected sometime in late 1995.

Finally, he is Poster Chairman for the 1994 Denver AAPG Convention and will chair four sessions. He and his students will present eight posters based on their joint research. We hope he will then take a rest!

CU and CSM students on Paul Weimer's trip to Arkansas, this stop being at the outskirts of Hollywood.

Fall Meeting of the Geological Sciences Advisory Board

The Fall meeting of the Department of Geological Sciences Advisory Board was held in the Norlin Library Conference Room on November 12–13, 1993. Following are the brief minutes taken by Colleen Velie on recommendations set forth by the Advisory Board:

1. Proposed Environmental Geosciences Option:

The Department proposed offering an expanded undergraduate curriculum and asked for advice from the Board on whether the Department should offer an Environmental Geosciences Option, either as a revision of the Geoscience Option or as a new track.

The Board endorsed the Department's efforts to expand the flexibility of the options for students entering the field of Earth Sciences. These efforts may include variations on the Geosciences Option such as Environmental Geosciences and the development of BA and BS degrees. The Board also advised that it must be recognized that essential to the Department's mission is the maintenance of the strong core geological sciences education that has been the traditional strength of the University.

2. Environmental Sciences Major:

The Board was asked for their advice on to what degree the Department might become involved in an Environmental Sciences Major.

The Board believes that it is in the best interest of the Department and the students for Geosciences to take a major role in the development and support of the Environmental Science major. Because a thorough understanding of earth sciences, including field measurements and methods, is essential to any environmental effort, the Board agreed that it behooves the Department to take a lead in this major.

3. Aqueous Geochemistry and Structure:

The Department contends that faculty in both Aqueous Geochemistry and Structure are essential to the health of the program and should be recruited next year. The Board was asked if they support this.

The Board strongly supports the addition of faculty in both Aqueous Geochemistry and Structural Geology, and agreed that these disciplines are essential to the health of the core program and the positions should be filled as soon as possible.

4. Proposed modules in Field Geology:

The Board believes an approach to teaching Field Geology in modules is both creative and allows the flexibility to cover more than the traditional structural geology. Members noted that it must be recognized that teaching the field course is labor intensive and that it will be necessary to provide full teaching credit for the instructors.

5. Revision of the Strategic Plan:

The Board was asked to comment on whether the Department is moving in the right direction with the revision of the Strategic Plan. The Board was also asked to comment on whether the guidelines are appropriate, if the expanded mission statement is appropriate, and whether the Department has correctly identified the strengths.

The Board endorsed the updating and issuance of the Department's Strategic Plan. The Board also supported the effort to expand the Department's mission and vision of providing leading earth scientists and the education of non-specialists.

Visitors to the Department

Over the years we have had geologists visit the Department for long terms during their sabbaticals. These people are important resources for both the faculty and students.

In 1993 we had Marc Floquet from Dijon, France, and Christian Meyer from Bern, Switzerland. Both are faculty who came here to work with Erle Kaufman. Marc studied sequence stratigraphy of the Cretaceous in the U.S. so that he could compare it with that of France and Spain. Meyer worked on the paleoecology of marine Cretaceous rocks. When time permitted he also worked on dinosaur footprints with Martin Lockley of the Denver campus.

Presently in the Department is Jordi Corominas (photo) from Barcelona. His area of expertise is landslides across the Pyrennes. Although nobody in the Department is working on such features, Boulder was a good base for Jordi. He had just finished up a stint in university administration, so coming here allowed him the opportunity to catch up on some writing, sit in on some courses and contribute a lot, and see what the USGS is doing in the field of landslides. The Colorado Department of Transportation even set off a landslide when he was here when they constructed the Highway 93 bypass through the western part of Golden. The slide occurred close to the USGS National Landslide Information Center, and although movement was noticed about the time the cut was finished in 1991, it increased significantly in 1993. In 1994 the slide is being stabilized, as houses are being built on the surface nearby! This was a perfect laboratory for all the locals. The Department has many foreign students from Spanish-speaking countries, so Jordi and they had a lot in common.

Jordi Corominas (right) with graduate student Lupe Espinosa (Mexico).

Full Retirement

Carl Kisslinger

Carl Kisslinger (photo) is retiring from CU in May 1994. In contrast to many recent retirees, he chose not to return on a half-time teaching appointment. Let's begin a description of his many contributions to the Department with Larry Warner's write-up of Carl from Larry's book, *Profile of a Department: Geological Sciences* (1986, still available from the Department):

"The search for a director for CIRES ended with the appointment of Carl Kisslinger in 1972, who retained the position until 1979. Carl's academic training was at St. Louis University, where he completed a Ph.D. in geophysics in 1952. He taught at his alma mater prior to joining the Boulder Department. His field of interest is Seismology, and his teaching includes general courses in solid earth physics and planetary physics and advanced courses in seismology.

Kisslinger is a true citizen of the planet, having served in a variety of important assignments both at home and abroad. His appointments on the domestic scene include: President, American Geophysical Union (1971–1972); President, Seismological Society of America (1972–1973); Colorado Governor's Scientific Advisory Council (1973–1977); NSF Advisory Group on Earthquake Prediction and Hazard Mitigation (1976); USGS Earthquake Studies Advisory Panel (1977); NAS-NRC U.S. Geodynamics Committee (1975–1978); NAS-NRC Committee on Scholarly Communications with the People's Republic of China (1977–1981); and NAS-NRC Committee on Opportunities for Research in the Geological Sciences (1982).

Carl's foreign assignments began in 1966–67 with service as a UNESCO expert in seismology and chief technical advisor for the International Institute of Seismology and Earthquake Engineering, Tokyo. Since then, he has served as a member of a technical exchange delegation in earthquake engineering to the USSR (1969), as consultant on seismology to the government of the Marche Region, Italy (1972), and as a member of a seismological exchange delegation to the People's Republic of China (1974). Carl was the recipient of an Alexander von Humboldt Foundation Senior U.S. Scientist Award, given by the Federal Republic of Germany, and served as a guest professor at the University of Karlsruhe in 1979–1980. Over the years, he has been an invited speaker at international symposia and scientific meetings in the USSR, Chile, Austria, Romania, France and Sweden.

Kisslinger's research in seismology has dealt mainly with refinements in seismic techniques and model studies of phenomena associated with natural and induced seismic activity, including underground nuclear explosions. In recent years, he has devoted attention to developing criteria for earthquake prediction, a project he championed as Director of CIRES.

Carl accepted the CIRES directorship in 1972 with the understanding that the University would provide support to build a strong program in seismology as a part of the Institute. He also obtained from the Department tacit approval to house new personnel, including himself, on its faculty. Carl's first recruit, who joined the Department in late 1972, was Max Wyss, a native of Switzerland, who now is on the faculty at the University of Alaska, Fairbanks."

In the years since Warner's book was written, Carl has continued to serve the Department and the profession. Last year we reported that he received the 1992 John Wesley Powell Award of the USGS. In 1993, CU honored him with a Distinguished Service Award. In the same year, he accepted the Chair of the National Academy of Sciences-National Research Council Panel on Seismic Hazard Asessment. This panel will investigate earthquake hazards of nuclear power plants. He is also chair of the Colorado Host Committee for the summer 1995 meeting of the International Union of Geodesy and Geophysics that will be on the Boulder campus. Finally, right now he is ending a term as interim director of CIRES.

Although Chris Harrison started the teaching program in geophysics, it expanded greatly when Carl and Max joined the Department. One legacy they are leaving is the two-semester course, Dynamic Earth, pitched to non-majors. All of the faculty in geophysics have contributed to this popular course.

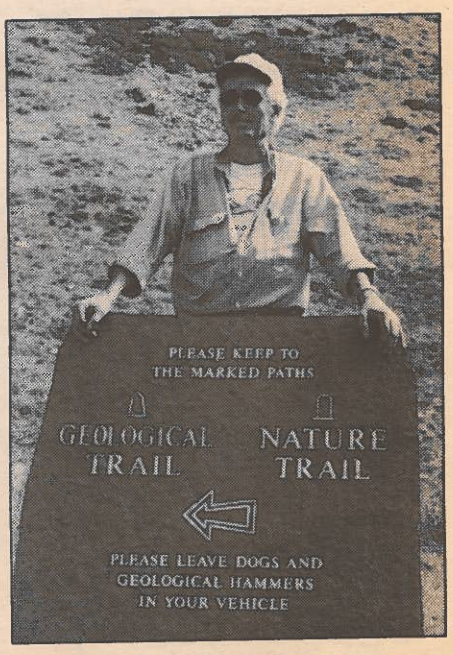
Carl will not be leaving the University upon retirement. He will keep an office in CIRES and catch up on some writing, no doubt on earthquakes and their prediction.

Penny and Carl Kisslinger

Almost Retirement

Bill Braddock

Bill Braddock (photo) is retiring this year—almost! Bill has been the mainstay of the undergraduate program for years, but decided that this was a good time to reduce his work load. Like several other recent retirees (Bradley, Eicher and Walker), Bill will continue some teaching. Although he has retired from the University, he has a contract to teach half time. His teaching will be in computer applications courses for the undergraduates. As many of you know, Bill has done an excellent job in introducing many of us, especially students, to computers. Fortunately, he will continue to do so. Because he will still be around and involved with students, we will not write up his career and accomplishments yet—that comes when he completes his distinguished career in the Department.



When Bill Braddock arrived at the Knockan Cliffs, northern Scotland, to look at an exposure of the Moine Thrust, he found this sign. Did somebody know he was coming?

Teaching

University Adds Hydrology to Geophysics Ph.D. Program

The University of Colorado at Boulder has added a program that provides an innovative, rigorous interdisciplinary curriculum and research framework in the hydrologic sciences, leading to a Ph.D. degree in geophysics. The goal is to graduate a new generation of researchers with a broad background in the basic sciences and a strong interdisciplinary education in the hydrologic sciences.

Hydrology is widely known as one of the geophysical sciences. This was recognized formally by AGU in 1931, when the Hydrology Section was formed. Also, the International Association of Hydrological Sciences is one of the largest and most active components of IUGG. In view of this, it is unfortunate that graduate studies in hydrology are not a traditional part of the geophysics programs in our universities. Instead the subject is usually spread through departments of geology, geography and civil engineering.

In January 1993, the Graduate School of the University of Colorado at Boulder approved an option in hydrological science under its interdepartmental Geophysics Graduate Program, in which eight departments participate. A new option was required because the specialized course requirements in the existing geophysics graduate program were directed toward solid-Earth geophysics.

The program was developed in response to Opportunities in Hydrologic Sciences, a report published in 1991 by the National Research Council, which recommended that a new discipline be established with a focus on the interdisciplinary geoscience aspects of the hydrologic cycle and with greater breadth than the traditional definition and scope of hydrology.

The curriculum and graduate research programs will concentrate primarily on continental hydrologic processes. Also, to establish a framework for interaction with other interdisciplinary programs, the hydrologic sciences program will include study of the global water balance, defined by the National Research Council as the spatial and temporal characteristics of the water balance in all compartments of the global system: atmosphere, oceans and continents.

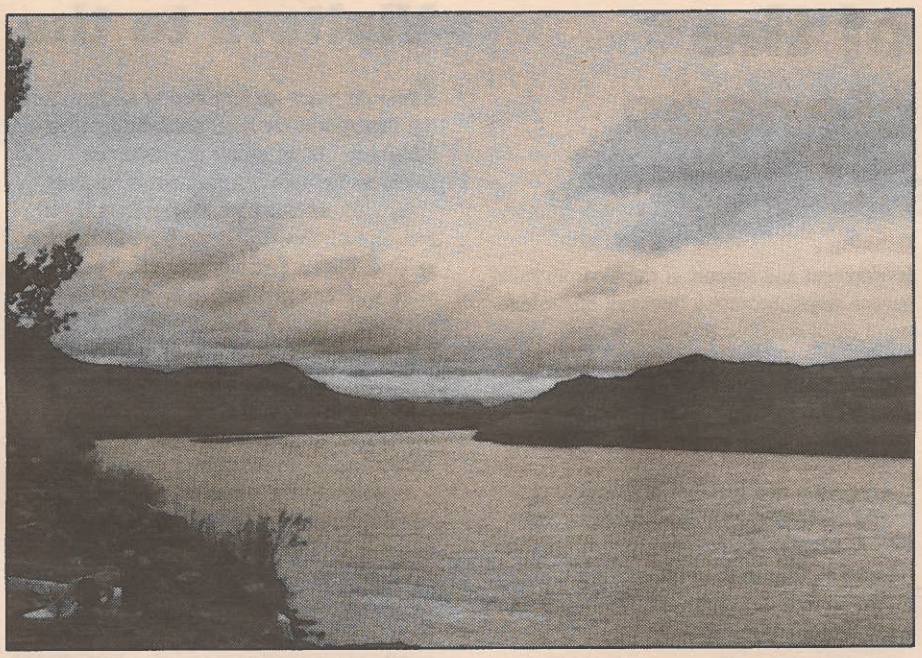
The program will consist of two broad areas of specialization: physical hydrology and chemical hydrology. Physical hydrology will bring together such diverse themes as glaciology, hydrometeorology, hydroclimatology, river basin hydrology, fluvial geomorphology, hydrogeology/groundwater hydrology, and river mechanics. Chemical hydrology will include hydrogeochemistry of ground and surface waters, isotope hydrology, alpine snow science, and some aspects of hydrobiology, such as limnology and microbial ecology. Hydrobiology may be added in the future as a third area of specialization.

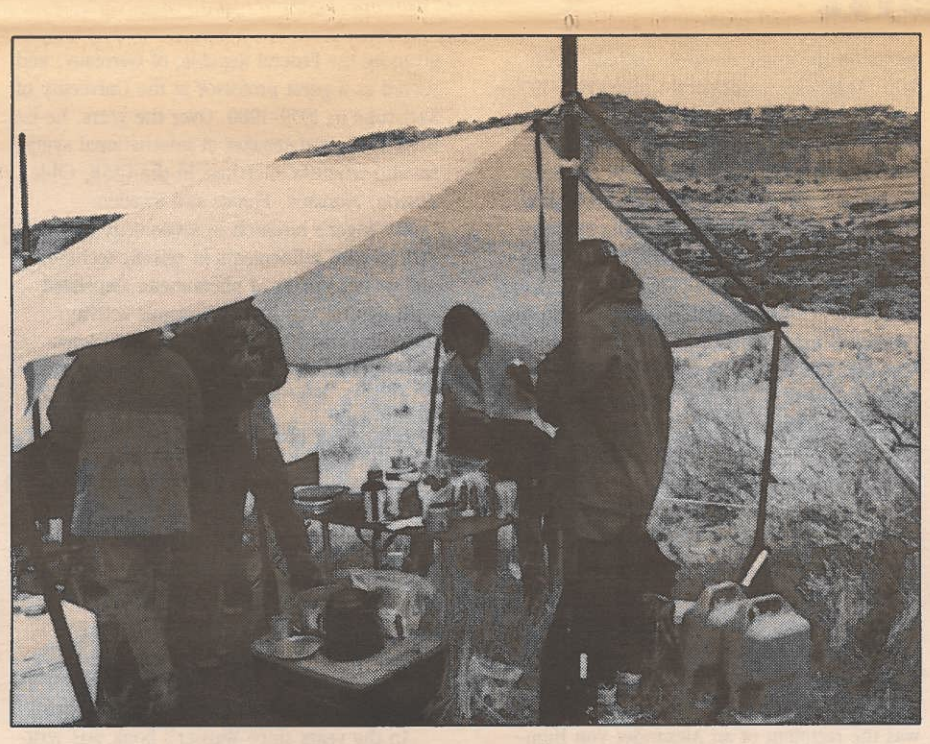
The 1991 NRC report pointed the way to a new era in hydrologic science. We hope that our new Ph.D. degree program, which attempts to approach hydrology as a true geophysical science, will help to achieve the goals developed in that report.

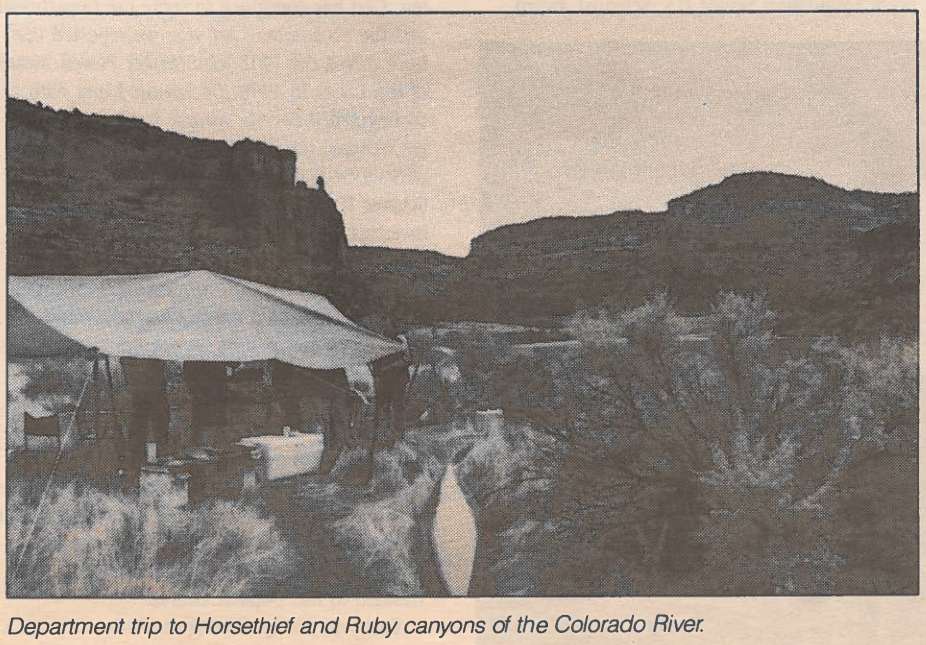
Canyonlands Course

As spring approaches, people start thinking of the Canyonlands. To take advantage of this, Joe Smyth and Tammy McCormick have a course entitled "Geology of the San Juan River." Students prepare a paper to present either in the classroom or during the field trip, and the topics are quite diverse: surface hydrology, river-bed morphology and the sand waves for which the river is famous, Quaternary geology, bedrock stratigraphy and paleontology, structure and oil, diatremes, and archeology. A mandatory field trip is included—a six-day raft trip on the river through the Goosenecks.

To get people in the mood for the class, Tammy and Joe led a departmental field trip in October to Horsethief and Ruby canyons on the Colorado River near the Colorado-Utah state line. Twelve undergraduate and graduate students joined them for the 23-mile raft trip that included one night camping on the river. Geologically, they viewed Precambrian schists and Mesozoic sediments of the Colorado Plateau near the northern end of the Uncompahgre Uplift, and they hiked up Rattlesnake Canyon to see the faulted contact between the Chinle and Wingate Formations. The weather was not the best (see photos) but all had a good time.







Department trip to Horsethief and Ruby canyons of the Colorado River.

Soil Chemistry

Iggy Litaor (Ph.D., '86) is working on the soils and geochemistry of Rocky Flats. During the fall semester he offered a well-attended (30 students) soil chemistry course in the Engineering College. Both geology and engineering students took the course. Once the course was over, Iggy, in his usual fashion, mountain biked through Patagonia with an ice axe tied to his bike, topping off the trip with an ascent of 6,960-m-high Aconcagua.

Geomorphology Field Trip Course

The geomorphology field trip course of Caine-Pitlick-Birkeland went into southern Colorado for a four-day weekend in April 1993. Topics covered by student field presentations included neotectonics of the upper Arkansas and San Luis valleys, Na-soils, the Great Sand Dunes and water use in the San Luis Valley, Slumgullion landslide, Gunnison Tillite origin, and river floodplain formation. The group ended up stranded in Dillon as a blizzard closed Vail Pass. Students are now politicking for a trip to Puerto Rico.

Earthquake Display

A great teaching aid has been added to the seismograph display on the first floor. Roger Bilham has set up a color monitor display map that shows the epicenter of the recent Northridge, California, earthquake, regional fault trace, and all the aftershocks. Within about seven minutes of their occurrence, the aftershocks were displayed on the screen, with a red arrow pointing to the latest one. Magnitude and time also are part of the display. Students gathered around to watch geology in action in the days following the earthquake. All of the data are transmitted to us via satellite from the California Institute of Technology Seismology Laboratory.

Mineral Resources Field Trip

Jack Edwards teaches a mineral resources class, and once they got through the petroleum part of the class they went to east Boulder County to see the real thing. They visited a Gerrity rig that was drilling for the Codell Sandstone at 7,900 ft. Professionals at the site explained what was happening, and while they did so a very good natural gas show was displayed on the chromatograph while penetrating the Sussex Sandstone. The well is in the Wattenberg Field, and each well may yield as much as 50,000 barrels of oil and gas equivalent over a life span of some 20 years.

New Field Course

For years our graduates have taken an excellent field course from Bill Braddock. Although he has elected to be on a reduced teaching load on retirement, that load will not include field geology. So what Bill did by himself will require no less than seven faculty.

Our proposed plan is to offer modules of field geology courses. In their sophomore year, students will take a basic field course, learning the methods and mapping the local rocks. In their junior or senior year, however, they will take two field modules, each for two credits. Sample modules are structure, igneous and metamorphic rocks, surficial geology and geohydrology, environmental geology, geophysics, and stratigraphy. One or two professors will be in charge of each module, and the courses will

continued on page 7

Teaching, *cont.*

be offered either during the school year or in a concentrated two-week period during the summer. The modular approach offers great flexibility of both content and field area.

Hydrology

Courses important to that program are offered through the department by Jim Smith. The two courses are Environmental Fluid Mechanics and Sediment Transport Mechanics. Jim is a hydrologist with the USGS, working in the Boulder office of the Water Resources Division and doing research on Colorado River flow and sediment transport in the Grand Canyon. He enjoys the teaching, as he was a professor for over 20 years at the University of Washington before joining the USGS. Jim is married to Mary Hill, another USGS hydrologist. Mary has given lectures in Shemin Ge's geohydrology seminar.

Miscellaneous

We are not sure where this last item goes, but it has to do with student-faculty relations and teaching. The February 1994 issue of the *Colorado Alumnus* featured a photo of Hartmut Spetzler on the cover (photo). Here is a section of the "Favorite Faculty" article:

"What stands out for some alumni in their favorite professor is how open they were about socializing outside the classroom. Dave Ellerbrook (Geology, '85) liked Hartmut Spetzler's 'Introduction to Geophysics' as well as the beer parties. Spetzler, 54, who says he loves teaching everything from his 'Dynamic Earth' course for non-science majors to advanced seminars in critical thinking, thinks Ellerbrook must be referring to the fall field trip picnics to the mountains he has organized for a number of years."

You are right, Dave, these have been very successful outings.

Hartmut Spetzler as he appeared on the cover of the Colorado Alumnus.

Student News

Graduate Awards

Ph.D. student Steve Hasiotis received the 1993 Best Paper Award of the Colorado Scientific Society. The citation follows:

"The Colorado Scientific Society honors Mr. Stephen T. Hasiotis for the outstanding presentation of his interesting paper 'Crayfish and Their Burrows—The Antiquity of Behavior' delivered to the Society on November 9, 1993. Although the title appeared at first glance to many of us as an esoteric exercise for academia, Mr. Hasiotis's well-crafted and diligently pursued research program could be a model for professional research projects. Speaking without notes or manuscript and without using the microphone, Mr. Hasiotis gave an enthusiastic and forceful explanation of his hypothesis, his research objectives and methods and his conclusions. Though still a graduate student, his excellent delivery and use of cogent, clear and well organized colored slides was of the caliber seldom achieved by more experienced professionals at national meetings."

Seven students from the Boulder Campus received Fulbright Student Grants to study abroad for a year, and two of them are geology graduate students. Lisa Campbell, a student of Lang Farmer, is investigating Precambrian geology and isotope chemistry at the Geological Museum in Copenhagen, Denmark. Meanwhile, Jared Morrow, a student of Erle Kaufman, is comparing the fossil records of Germany and the USA while at Universität Göttingen, Germany.

Two students received GSA Student Research Grants. A grant to Peter Sauer is helping with his Ph.D. research on the isotopic composition of mosses in lake cores across Arctic Canada. Peter hopes to derive a climatic signal for the Holocene. Valerie Sloan received an award to help with her study of rock glaciers in a transect across the Yukon. She is attempting to explain their distribution in terms of rock type, elevation and various climatic parameters.

Tomas Villamil was one of ten Boulder campus students to receive a Graduate Student Research and Creative Award. His project has to do with Cretaceous stratigraphy, paleoceanography and paleobiology of Colombia.

Undergraduate Awards

We traditionally honor the undergraduate students with various awards. These are:

RMAG Pick (top senior)—Barry Eakins

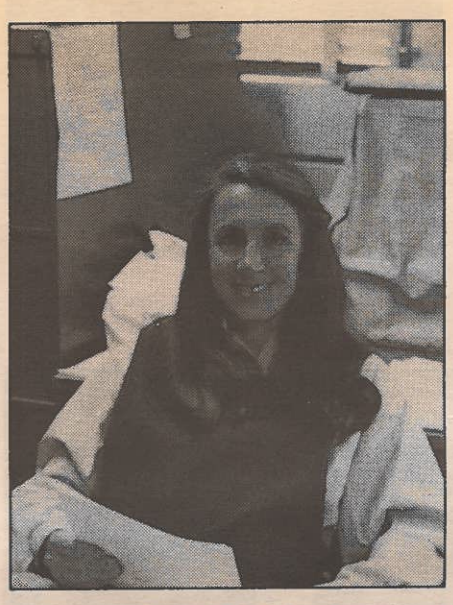
Brunton Compass (top senior)—Barry Eakins

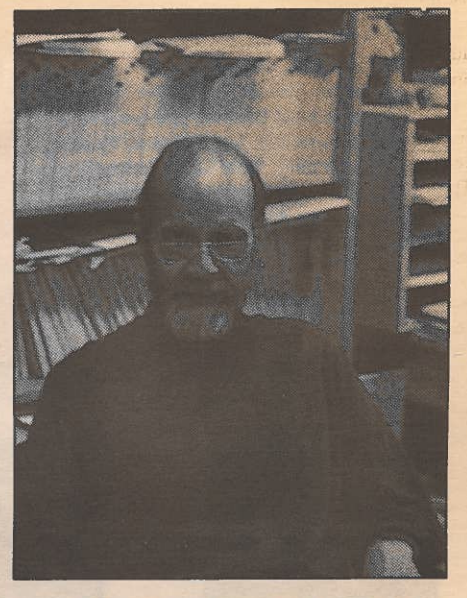
Johnston Scholarship (top senior)—Barry Eakins

Estwing Picks (top upper-division students)—William Smith & Justin Stockwell

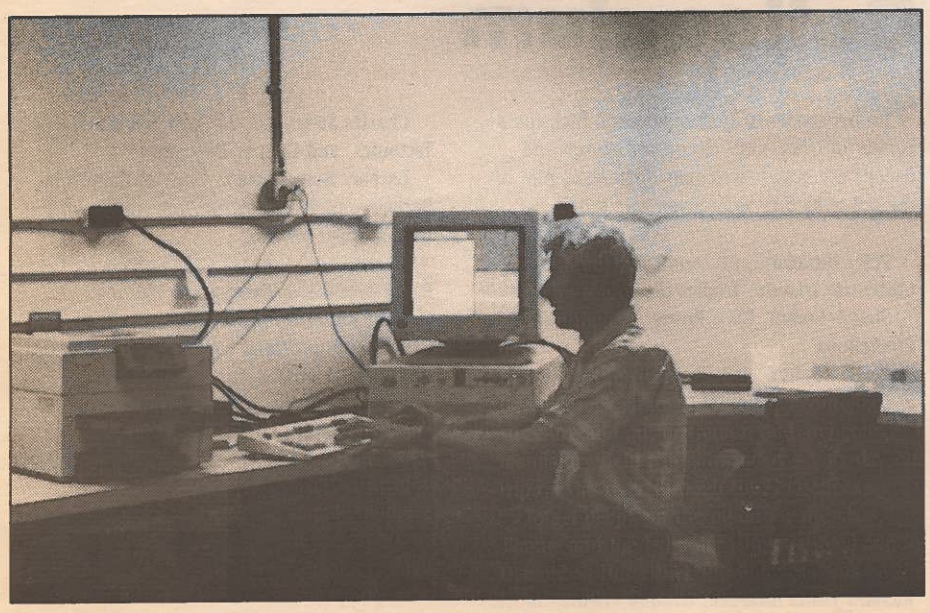
Keith Marks Scholarship—Amy Rosewater

Fred Luiszer is a graduate student who helps John Drexler in the Laboratory for Environmental and Geological Studies. Fred is unusual in that his entire dissertation project is being done totally on his own and incorporates almost everything we do in the Department. It has to do with the geologic history of caves and cave deposits in the Colorado Springs area. Here sits Fred in one of his caves. Ed Larson is Fred's advisor and does not know what Fred's doing, probably because it is so dark in those caves.





We have two Associate Chairs—Mary Kraus, in charge of undergraduates, and Jim Muñoz, in charge of graduates.



Shemin's best computer student cranking out data in her geohydrology computer lab, the old photography lab on the third floor.

Graduate students Katie Keller, Jay Moore, Valerie Sloan, and Mike Kerwin

GEOLOGY NEWS

Geology Graduates

May 14, 1993

Bachelor of Arts

Blake, Jeffrey Brian
Chamberlain, Sylvia Theodora
Demer, Geoffrey Richard
Garland, Patrick Joseph
Harris, Jerald David
Levy, Beth Michele
McLaren, John Bandini
Senn, Stephanie Louise
Straub, Arthur William

Master of Science

Cherry, Randall Hale
DeConto, Robert Michael
Gemery, Pamela Ann
Herzog, John Michael
Hill, Rebecca Leigh
Shippert, Margaret Marie
Tabor, Charles Franklin Jr.
Tedesco, Kathy Ann
Whitehead, Scott Michael

Doctor of Philosophy

Bahr, David Bennett, "Estimating the Accuracy of Englacial Stress Calculations"

Gross, Susanna J. (Geophysics), "Models of Stress Changes Induced by Earthquakes and their Relationships to Changes in the Spatial Distribution of Seismicity"

Han, Dazhong (Geophysics), "A New Analysis of Post Glacial Rebound and an Analysis of Anisotropy of the Mantle Rheology"

Harries, Peter Jürgen, "Patterns of Repopulation following the Cenomanian-Turonian (Upper Cretaceous) Mass Extinction"

Houck, Karen J., "Sedimentology and Stratigraphy of the Middle Minturn Formation (Pennsylvanian), McCoy area, Eagle and Routt Counties"

Manega, Paul Clement, "Geochronology, Geochemistry and Isotopic Study of the Plio-Pleistocene Hominid Sites and the Ngorongoro Volcanic Highland in Northern Tanzania"

August 14, 1993

Bachelor of Arts

Stanfill, Christopher Lesourd

Doctor of Philosophy

Geller, Bruce Alan, "Mineralogy and Origin of Telluride Deposits in Boulder County, Colorado"

Good, Steven Chalmer, "Molluscan Paleobiology of the Upper Triassic Chinle Formation, Arizona and Utah"

Ivy, Logan Dudley, "Systematic Revision of Early to Middle Eocene North American Hyaenodontidae (mammalia, creodonta)

Mieras, Barbara Dahnke, "Sequence Stratigraphy and Depositional Controls, Mid-Cretaceous Frontier Formation, South-Central Wyoming"

Noller, Jay Stratton, "Late Cenozoic Stratigraphy and Soil Geomorphology of the Peruvian Desert, 3 degrees—18 degrees S: A long-term record of hyperaridity and El Niño"

December 18, 1993

Bachelor of Arts

Best, David Grant
Brown, Jennifer Ann
Burch, Donald Neal
Caldwell, Andrew Charles
Clouser, Todd Martin
Hesse, Robin Christian
Heston, Gerald Stuart
Kimmi, Clayton Dean
Moore, Tracy Ilene
O'Connell, Michael Patrick
Schuller, Brian Lawrence
Southwick, Ammie Leigh
Warwick, Julia DeEtte
magna cum laude
Williams, Stephanie Jean

Master of Science

Bennett, Scott Alan
Duvall, Mathieu Lake
Dwyer, John L.
Mowers, Theodore Timothy

Doctor of Philosophy

Johnson, Claudia Cristina, "Cretaceous Biogeography of the Caribbean Region"

Natasha Vidic, who recently finished her Ph.D., has returned to Slovenia.

New foreign students Claudia Arango (Colombia), Jorunn Hardardottir (Iceland) and Juan Carlos Moya (Mexico). This photograph was taken in the conference room outside of the office. Around the walls of the room are photographs of former chairs. Here are shown former chairs—professors Curtis, Bradley and Walker (left to right).

Staff News

Mark Bishop Leaves

Accountant Mark Bishop (photo) got an offer he could not refuse last September and joined Don Runnells' company in Fort Collins. Mark has adjusted well to the move, as has dog Misha, but he says the level of athletics of his new area does not match that of Boulder. He still puts in 50 miles per week running, and returns to Boulder on winter Saturdays for skating on the Eldora Mountain Resort nordic tracks.

The hiring of Mark gave Don the label of "corporate raider" and we all wondered who was next.

Mark Bishop at the fall picnic.

Mary Wikoff Joins Staff

We were fortunate in replacing staff accountant Mark Bishop with Mary Wikoff (photo), who joined us in November. Mary transferred over from the Cashier's Office at Regent, where she was a 15-year veteran. Mary hit the ground running and has kept the financial part of the office in great order.

Zachary Spector, a CU student, wrote a letter to the *Campus Press* (April 21, 1994) regarding Mary. Lets let him tell you about the latest addition to our office staff:

So Long to the Last Friendly Cashier

Open letter to Mary Wikoff:

I drew back the heavy doors of Regent Administrative Center and brushed the linoleum to the windows marked cashier. I do this several times a semester to pay my bills like a good CU sheep. This time was different, disappointing. As I approached the attendant, I felt something was wrong. The moons of Jupiter were out of line. "Can I help you?" asked the attendant in a voice that didn't exactly give me a warm fuzzy. Then I figured out what was wrong. *Where was Mary!!!!!!!* Since I was a freshman, my marches to Regent have always been met by the kind, motherly smile and soft voice of Mary Wikoff. Mary has worked as a cashier since most students could remember, and we liked it that way. The new lady seems nice enough, but she has big shoes to fill.

Semester after semester we pay more money than it would take to feed a whole third world country, according to Sally Struthers. It makes it that much harder when we hand over the check—which is so heavy it is hard to carry—to some faceless, monolithic university department. That's where Mary came in.

Mary Wikoff

Mary now works in the geology department. She says it's a better job. I am happy for her. I can't think of anyone who deserves a better job more than her. Thanks for your years of service, Mary. I will get along with the new cashier just fine, and in time, I'm sure she will establish her own reputation. But every time I pay a bill, I will feel a tug at a heart string. Geology has all the luck.

Sincerely,
Zachary Spector

Fall Departmental Colloquium

The Departmental Colloquium still presents a variety of talks, and, of course, alumni and friends are always welcome. Some examples of the fall talks that were given are:

Peter Birkeland, CU, Soil Origins on Exotic Carbonate Islands, Tropics of Western Pacific

Stan Schumm, CSU, Rivers: Perceptions and Predictions

Leigh Royden, MIT, Tectonic Expression of Slab Pull in Continental Convergent Zones

Eric Erslev, CSU, Laramide Orogeny: Controversies and Conundrums

J. Michael Brown, Univ. of Washington, Elasticity of Mantle Constituents and the Composition of the Earths Mantle

Roy Shlemon, Consulting Geologist, GSA Richard Jahns Awardee, Ground Fissures in the Southwestern United States: An Increasing Geotechnical Challenge

Charles Stern, CU, Andean Volcanism, Tectonics, and Copper Deposits

Barbara Romanowicz, Univ. of California-Berkeley, Global Anelastic Tomography of the Earths Upper Mantle

Thorne Lay, Univ. of California-Santa Cruz, Rapid Analysis of Earthquake Faulting

John Anderson, Rice University, Evidence for Collapsing Glacial Ice Sheets in Antarctica: Implications for Eustasy, Past and Future

Barbara Dutrow, LSU, Fractures and Dynamic Fluids in Metamorphic Rocks

Jack Reed, USGS, Evolution of the Southern Margin of Laurentia

Tony Crone, USGS, Quaternary Tectonics of the New Madrid Seismic Zone

GEOLOGY NEWS

Edith Ellis Retires!

This past year has seen some major changes in the office. The BIG news is that Edith Ellis (photos) has retired. Her last day of work was May 27. We all wonder how the operation will go on, but she assurred us it will, especially with the pleasant staff we have.

A quarter of a century of students, staff and faculty have come to depend on Edith for countless bits of information, advise and comfort. Bill Bradley was Chair in 1968 when Edith transferred to Geology from the Budget Office, where she had been since 1966. In the early days she and Paulina Franz did all of the work, which is now shared by three full-time employees as the number of students and faculty have increased and the paperwork has exploded. Since Edith arrived every Department Chair has been forever grateful for the enormous workload she is able to handle, the long hours she puts in, her management skills in running the office, her cheerful rapport with students, and her stability and calmness when all has seemed hopeless.

It came as no surprise that she was named CU-Boulder Employee of the Month (October 1986) with this citation: "more a trusted and valued colleague, than an assistant" and "one of those rare individuals who is able to fully participate as an equal in the decision-making process and then follow through with vigor to implement the decisions."

As testimony to the respect she has earned over the years, visiting alums always pay a visit to Edith to see how things are really going.

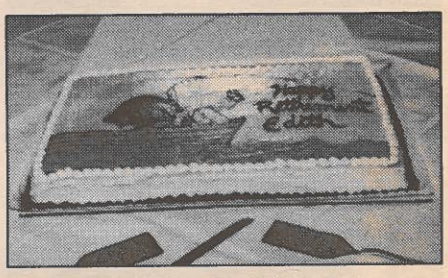
In retirement, Edith and George have moved to Longmont. We do know that travel is on their future agenda. Many thanks, Edith, for a great job and time!

More Pictures, *next page*

Many new and old friends gathered for Edith's retirement party. Bill Bradley started things off talking about hiring her and the early days.

Edith and George Ellis

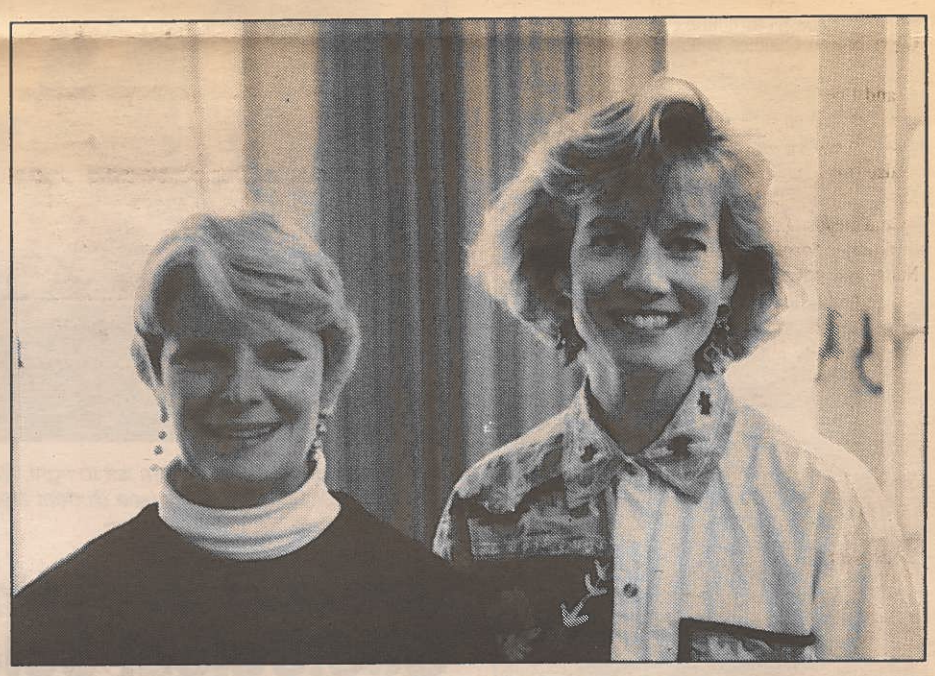
Lang Farmer, back from his sabbatical, and Jane Selverstone, former graduate student and presently a Research Associate Professor.



Edith's cake depicts her fishing during retirement.

Kay Fox, former office staff member

Three directors (l to r)—Alex Goetz (Center for the Study of Earth from Space), Mark Meier (just completing a stint at the Institute of Arctic and Alpine Research) and Carl Kisslinger (just finishing up as Interim Director of Cooperative Institute for Research in the Earth Sciences).



Everyone loves a party! Here are Heather LeMasurier and former Grad Secretary Kristen White.

Lining up at the food are a graduate student, Bill Atkinson, graduate student Sara Martinez (Spain), Jordi Corominas (Professor from Barcelona, see article), Jane Selverstone, Tammy McCormick, graduate student Chuck Patterson, technician Paul Boni, and Joe Smyth.

Almost all the chairs, past and present, in a line up with Edith. Erle Kauffman, Don Eicher, Bill Bradley, John Andrews, Ted Walker and Giff Miller (l to r). Missing from the picture are ex-chairs Don Runnells and Hartmut Spetzler, who were unable to attend Edith's party.

Edith's Party, *cont.*

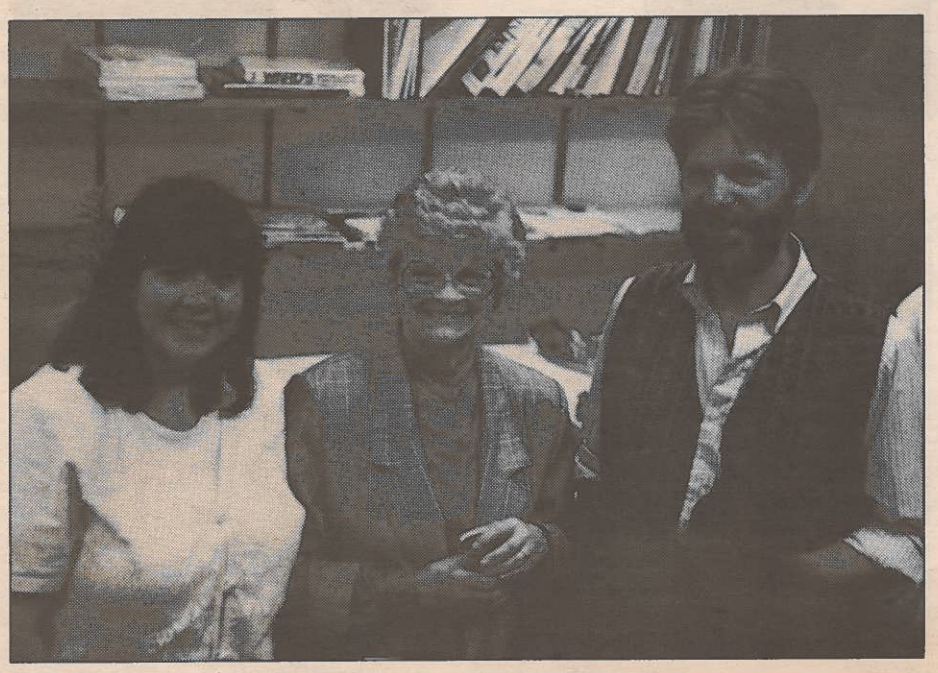
Paulina, ex-office staff member, and Art Franz.

Giff presented Edith with this Brazilian amethyst geode.

Geode with plaque

Gloria Figueroa-Timmons Leaves

Gloria Figueroa-Timmons had continued to have the main task of keeping track of all students and putting all of the graduate school applications together. However, just as the newsletter was being completed, Gloria received an offer that she could not refuse. Unfortunately for us she made an April transfer over to the Human Resources office in the Armory building on campus. We hope Gloria will send us some humans to help run the office, because with Edith leaving, accountant Mary Wikoff (see page 8) and fourth-year work-study student Jennifer Gelvin (photo) will be the only remaining office staff. Here are some photos taken at Gloria's party. (See "Message from the Chair.")

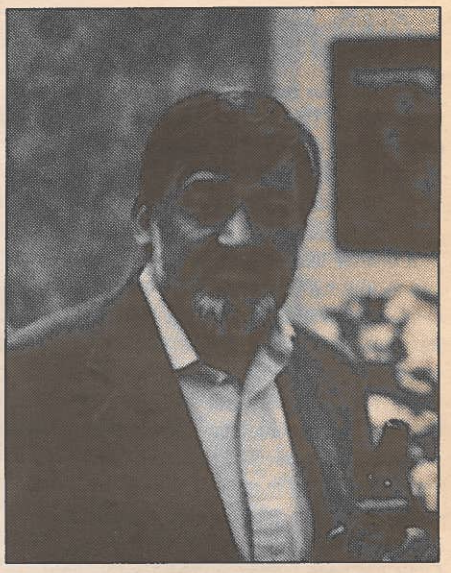


Gloria, Edith and Giff

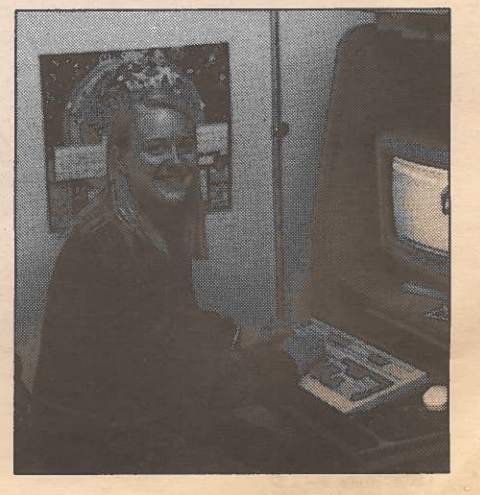
Typical graduate students, from left to right, Barrett Dixon, Brent Johnson, Rob Nobles, award winner Steve Hastiotis (see student article), and Glenn Jaecks.

Ground Broken for New Geological Sciences Building

As many of you know, we moved into our present building in 1911, nine years after the Department was created. The building has served us well, but soon we will move into a new one. We stopped the presses to include this photo of the chairs digging the new foundation in an Argiustoll (one tough soil!): John Andrews, Giff Miller, Hartmut Spetzler, Don Runnells, Erle Kauffman and Bill Bradley (l to r).



Vijay Gupta



Jennifer Gelvin seems to be taking over where Gloria left off.

Department's Environmental Studies Program Featured

John Drexler's environmental studies were highlighted in the Spring issue of *CU-Boulder Summit* magazine. John has put together a state-of-the-art laboratory with $2 million worth of equipment that is well used by students, faculty, government agencies, and private industry. The work helps fund graduate student research. Here, he and Judy Kreps (M.S. student) are collecting data on Lower California Gulch in the Leadville area. The problem is to detect levels of lead and produce maps of risk levels. Judy is presently working for a local environmental consulting firm. This continues the tradition established by Don Runnells of placing geochemistry-geohydrology students in the environmental science field.

Photo by J. Martin Natvig

John Drexler (right) and graduate student Judy Kreps at Leadville, CO.

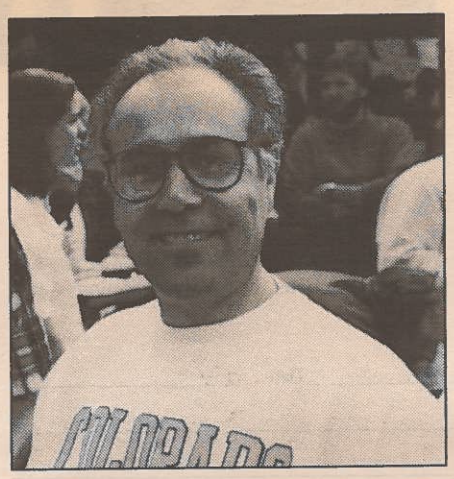
Spring picnic with the Advisory Board

Ania Blaszczynski and husband, Mark Rowan, who will teach Braddock's structure class this fall.

Advisory board member Bob Giegengack, undergraduate student Jenny Zerbe, Advisory board member Bill Downs, and alumnus Walter Duke (l to r).

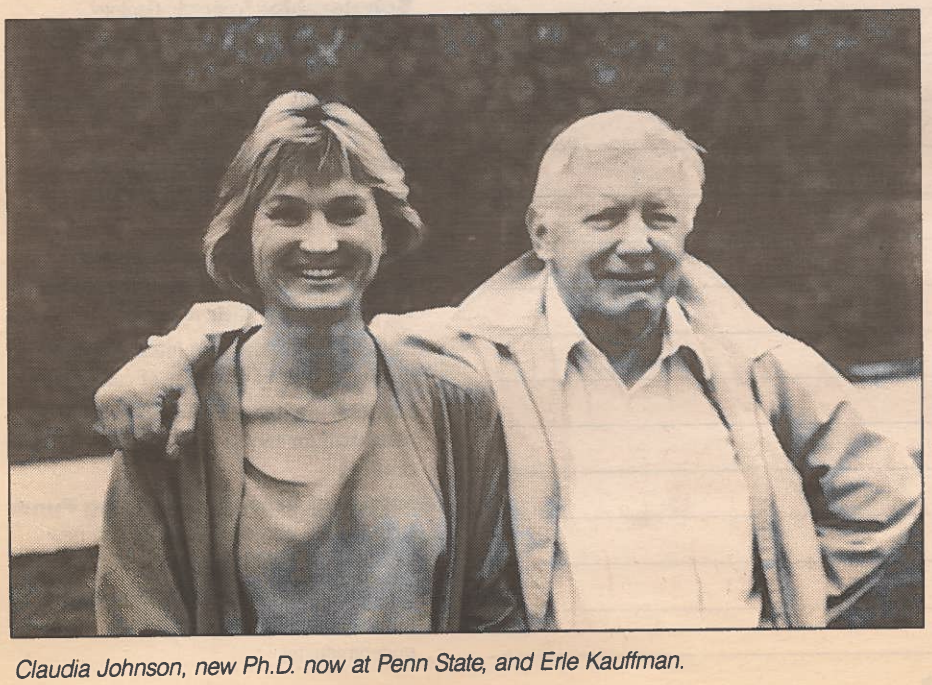
The field class presented Bill Braddock with this cake to commerate over 30 years of field geology. Not visible in the picture is a dip-slip normal fault which displaces the inscription.

Allison Conn Richards, former graduate student and artist, stopped in. Her classic T-shirt (cross-section of the hogback) will be available again soon.



Board member Essi Esmaili.

Jean and Phil Choquette with Board member Bill Meyers. Bill takes advantage of the trips to Boulder with 60-mile bike rides into the mountains.



Claudia Johnson, new Ph.D. now at Penn State, and Erle Kauffman.

Alumni Notes

1947

Ralph L. Langenheim, Jr. (B.S., Geological Engineering, Univ. of Tulsa, '43; M.S., CU, '47; Ph.D., Univ. Minnesota, '51) is a regular contributor to the newsletter. This time he reports he got married to Casey Diana in famous geological country—Pioche, Nevada.

1955

Gerald M. Richmond (Ph.D., CU,'55) has retired after an illustrious and long career at the USGS Gerry was one of the first Ph.D. degree students in Quaternary geology, and see what he started! His thesis on the Quaternary geology of the La Sal Mountains, Utah, was published as a USGS professional paper (324), and set the standard for years to come. Since then, Gerry has been involved in a wide variety of Quaternary projects around the world, and he presently is working on Quaternary maps of the U.S. and of the Wind River Mountains. He now uses the title Geologist-Emeritus. He is so well known for his Quaternary work that one colleague, when he learned of Gerry's retirement, remarked, "That must be the end of the Holocene!" Happy retirement, Gerry.

John Thrailkill (B.A., CU, '53; M.S., CU, '55; Ph.D., Princeton, '65) has retired after 27 years at the University of Kentucky, four of which were as Chair. He has moved to St. Augustine, Florida, and spends his time sailing on the east coast, Florida, The Bahamas, and beyond.

1959

Claud H. Baker, Jr. (B.A., CU, '59) is in the Water Resources Division, USGS in Lawrence, Kansas. He recently received a Department of Interior Honor Award for Superior Service.

1977

Thomas A. Noll (B.A., CU, '77; M.S. (Economics), CSU, '84; Ph.D. (Economics) University of Utah, '90) works for the Idaho Power Company in Boise, Idaho. He has fond memories of the Department, especially some graduate school advise he got from Frank Beck, his mineralogy teacher. As many alums know, Frank commonly helped out when people were on sabbatical. Although Tom did not stick with geology very long, he sees similarities on both the problems and solutions of geology and economics, and enjoys the challenges of the latter field.

1993

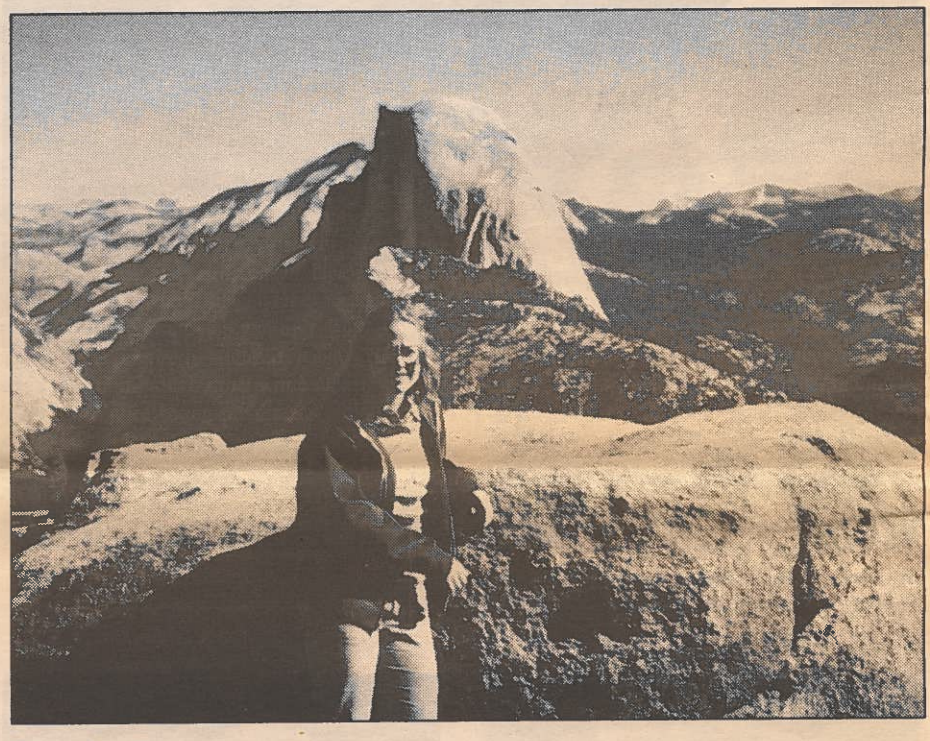
Bruce Geller (Ph.D., CU, '93) attended the national GSA meeting in Boston and presented a paper in the mineralogy section. He reports that when he turned in his Ph.D. dissertation on telluride deposits to the Graduate School, the two-volume, 731-page tome was the largest dissertation from this University in five to six years. Since graduation he has enjoyed seeing the family, done some consulting, and keeps busy as secretary for the Denver Region Exploration Geologists Society.

The above dissertation size prompted the editor to search for other large dissertations in our Department. We always thought Dick Kuchera had the largest one, but it only came to 675 pages. Unofficial honors seem to go to Jim Kirkland at 1320 pages.

MEMORIAL

Elaine Bass Parkison of Littleton, Colorado, died October 20, 1993 at age 40 after a twelve-year struggle with multiple sclerosis. She was born November 25, 1952 in Lufkin, Texas, to Ruth and Robert Bass. She received a B.S. in Geology from the University of Colorado in 1975. She then attended the University of Nevada in Reno, where she completed course work and research for a master's degree in the hydrology program. In 1978 she married Gary Parkison, and from 1980 to 1983 she was employed as a hydrogeologist with an Albuquerque, New Mexico, consulting firm. In 1983, their daughter, Kelly, was born. Elaine is survived by her husband and daughter, both of Littleton, Colorado, and her mother of Round Rock, Texas.

Interested alumni may contribute to the Elaine Bass Parkison Fund, c/o Norwest Bank, P.O. Box 227, Boulder, Colorado 80306. Proceeds from this fund will provide an annual prize for an outstanding woman student in the Department of Geological Sciences. Alternatively, contributions may be made to the Elaine Parkison Fund, Rocky Mountain Multiple Sclerosis Center, 701 East Hampden Avenue, P.O. Box 2901, Englewood, Colorado 80150.



Elaine Bass Parkison

Alumni Mentor Program

The University of Colorado has a good reputation for adequately preparing students for futures in their chosen professions. However, while on their journey to success, students still need guidance. The Alumni Mentor Program, which is sponsored by the Student Organization for Alumni Relations (SOAR), helps students answer questions and gain valuable contacts in the professional world.

Some questions commonly asked by students are:

- Is this really the right profession for me?
- What experience do I need?
- How do I get it?
- What does this profession entail?
- Should I continue on to graduate school?

As working professionals, alumni have most likely found the answers to some of these questions. Their professional expertise could greatly help CU students answer these and many other questions because they know what's what, who's who, and how things function in their part of the professional world.

The program is not a job placement or recruiting service, but is designed to benefit both students and alumni. The relationship is very open, and, while it is likely to be more than a onetime meeting, the student and alumni member determine the extent of involvement. To join this effort and to help students with any major, or just specifically geology students, please contact Heather Welty at (303) 492-2282.

Attention Alumni

By completing and mailing in this form, you can help us do a better job of keeping up with you, your whereabouts, and your career or family news. We all enjoy reading about classmates and not-so-close mates who survived Boulder in whatever era! So send us some news, or some recollections—we promise to use them.

Name _____ Date _____

Address _____

Degree(s) _____
before, during and after CU-Boulder

Current Activity/Position/Employer/Location, etc. _____

Publications/Awards/Accomplishments _____

News About Family/Kids/Friends _____

Name/Address of Potential CU Geology Student We Should Contact: _____

Comments, Critiques, Accolades, as Appropriate, About Newsletter: _____

Alumni Support

The Department of Geological Sciences has several specific accounts to which contributions may be made. Checks should be made payable to the University of Colorado Foundation with a notation indicating which of the following funds the contribution should be used for.

Scholarship Accounts: funds donated to these accounts are put in an interest-bearing account and the Department uses the yearly interest to provide scholarships to students.

Keith Marks Memorial Scholarship: includes need

Longley-Warner-Wahlstrom Scholarship: Economic Geology

General Geology Scholarships

Contributions may also be made to the following accounts:

Geology General Gifts: unrestricted funds for use at the discretion of the chairman

Warren O. Thompson Graduate Research: funds are used to assist graduate students with their research

Geology Equipment: funds specifically designated for the purchase of equipment

Alumni Relations: funds specifically designated for travel, etc. to promote alumni relations

Geological Sciences Building Fund: funds specifically designated for the new Geological Sciences building

Undergraduate Enrichment Fund: funds specifically designated for undergraduates