THE UNIVERSITY OF ARIZONA®

GEOSCIENCES

SPRING 1996

UA Geosciences Ranks 9th in U.S. News and World Report

In the March 18th issue of *U.S. News and World Report*, the Department of Geosciences has tied at 9th place in the top-ranked geology departments around the country. The specialty programs of tectonics and structure ranked 4th. These rankings are the result of the *U.S. News* survey of department chairs and heads of graduate studies and is a direct measurement of the strength and reputation of our graduate program

INSIDE

Letter from the Chair

Joaquin Ruiz

The biggest news since our last newsletter was the excellent rankings we received as the result of the latest *U.S. News and World Report's* survey of graduate schools. We are proud of this achievement as it reflects our commitment to excellence in teaching and research in the geosciences. The Faculty Awards and Honors section listed in this newsletter is a testament to our continuing achievements.

This newsletter has a few new sections that we hope you'll enjoy. The first is a section on Alumni News. We heard from many of you and we're passing on the good news to our readers. We are particularly proud of the achievements of our alumni and our hope is that this section will grow exponentially with time as more of you write in with your own news.

The second item is a report from the chair of our Geosciences Advisory Board, Steve May (PhD '85). I'm very happy that Steve has taken on the responsibility of chairing this Board. I think Steve's hard work, and that of his fellow board members, will be rewarded by a sense of accomplishment in seeing our department progress even further.

Inside this newsletter you'll also read about Vance Haynes and PhD student Kathleen Nicoll in the Sahara, Andy Cohen and his environmental efforts with Lake Tanganyika, the very successful field trips by Mark Barton in Mexico, Géorge Gehrels, Pete DeCelles and Jay Quade in Nepal, and Suzanne Baldwin and Paul Fitzgerald in Antarctica. As Bill Dickinson once said, a good geology department must always have a few of its faculty in the air at any one time. By that measure it seems we are doing well! Here in Tucson, faculty and students were busy with the Tucson Gem and Mineral Show and in developing methodologies to teach geophysics in both large and small educational environments. We continue with the tradition of profiling some of our recently retired faculty and this time it's John Guilbert's turn. We also have sad news and we pay tribute to three of our colleagues who have recently passed away—Eloise Grijalva, Bart Nagy and Ted Smiley.

Let me finish by saying that this year's GeoDaze was an absolute success. It seems that every year the scientific and professional quality of the presentations just gets better, and the organization of GeoDaze easily surpasses that of many international meetings I have attended. Next year marks the 25th anniversary of GeoDaze and we plan a gala event. We'll be sending an invitation to all to come to Tucson and help us celebrate. Tentative plans are for GeoDaze to be held in the first week in April, so mark your calendar. Events will include a couple of alumni keynote speakers, a field trip organized by George Davis and a reception at Tumamoc Hill. I'm sure we'll have a good time and I sincerely hope that many of you can join us in this celebration. I also hope to see many of you at the national GSA meeting, where we'll have a hospitality suite with refreshments.

UA Geosciences
NEWSLETTER
Spring 1996

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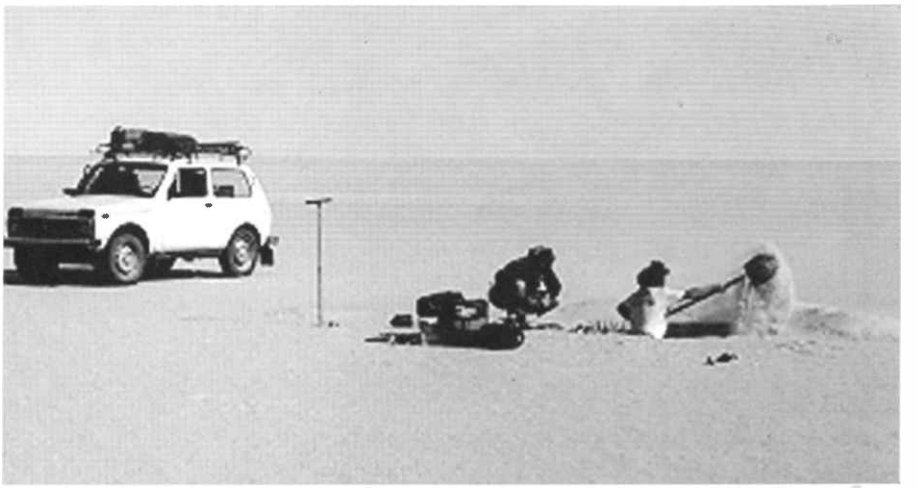
We welcome your suggestions and comments for future newsletters.

The "Jim Reynolds" Fluid Inclusion Laboratory

Much of the classic economic geology research in our department has been supported by fluid inclusion data. Mineralizing fluids in detachment faults, porphyry copper, and Pb-Zn carbonate-hosted deposits have been characterized by fluid inclusion research. As with all equipment, the fluid inclusion lab that most of you knew was reaching the end of its useful life. We are thrilled that a brand new fluid inclusion lab has been donated by Jim Reynolds (MS '80) to help us continue our tradition of fluid inclusion research.

Vance Haynes and Team Explore Buried River Channels in the Bir Kiseiba of the Egyptian Sahara



Kathleen Nicoll and Steve Stokes sample a stratigraphic pit in the selima sand sheet.

From early January to mid February, Vance Haynes, T. A. Maxwell, Kathleen Nicoll (PhD student) and Steven Stokes of Oxford Univ. returned to the Egyptian Sahara to explore buried river channels revealed by the third phase of NASA's Shuttle Imaging Radar (SIR-C).

Test excavations in the Bir Kiseiba area revealed ancient river channels filled with current-bedded sands below an absolutely featureless sand sheet. The fluvial sands correlate with similar channel sands 8 km away in which Middle Paleolithic artifacts, perhaps 100,000 years old, were found in 1978-79. On a higher surface (inverted topographically) the team discovered an Early Paleolithic site of Acheulian artifacts in alluvium perhaps 500,000 years old. Younger than both of these deposits are Holocene playa sediments representing ephemeral lakes with associated Neolithic archaeology.

Katheleen Nicoll's dissertation will focus on this period using an unstudied playa the team found in 1994 and trenched extensively this year. Geochronological studies of the Selima Sand Sheet include OSL (optically stimulated luminescence) dating by Steve Stokes, the only way to directly date these major deposits representing the hyperarid periods of the Sahara.

Andy Cohen Travels to Dar Es Salaam to Advise UN's Global Environment Facility

In March, Andy Cohen traveled to Dar Es Salaam, Tanzania to advise the United Nations Development Programme-Global Environmental Facility (GEF) with the establishment of the GEF work program for Lake Tanganyika. The GEF is a multi-billion dollar program of the United Nations which is searching for methods of mitigating environmental degradation and human impacts in underdeveloped countries.

The Lake Tanganyika project arose out of a conference that Andy organized five years ago on conservation issues facing the lake. The $10 million U.S. program for Lake Tanganyika involves research components (impacts of sedimentation from deforested watersheds on the lake's ecology, plus biodiversity, water pollution and socioeconomic research on fisheries impacts), education components (village-based environmental education, assistance to national universities in aquatic sciences and post-graduate fellowships) and conservation components (underwater reserve design for several proposed reserves involving local village control and development of a lake-basin management plan).

Andy's lab will be involved in several aspects of the project, including carrying out the paleolimnological work, studying the history of human impacts and lake ecosystem responses from sediment core records, as well as be involved in some aspects of biodiversity research. Andy will continue to serve as the senior project advisor on the lake basin management plan. Simone Alin (PhD student) and Dave Dettman (post doc) will be involved in the project, as well as former students Lisa Park (PhD '95), Kelly West (MS '91) and Ellinor Michel (PhD '95)

News Around the Department

2,500 Kids Get Free Mineral Collection from SESS

Collecting minerals, rocks and fossils is fun and educational for children of all ages. To help kids start their collection, the Society of Earth Science Students (SESS), our undergraduate geology club, teams up with the Tucson Gem and Mineral Society (TGMS) each year to sponsor the Junior Education Program ·Gem and Mineral Show. Kids who visit . Education are assisted by UA geology ıts in picking out a free collection of ; and minerals while learning more about specimens they collect. About 260 UA lents volunteered their services this February. ımost 2,500 kids received free mineral ollections and, counting family members, about 4,500 people visited the program.

SESS's planning and preparation of specimens began months earlier. SESS members produced a fine collection of exhibits displaying fluorescence minerals, calcite (the show mineral), mineral properties, 3D maps of Arizona, trilobite eyes, dinosaurs, Basin and Range geology, plus various posters, videos and computer software. Large dinosaur tracks were pasted to the floor throughout the mineral show to lead kids to the Junior Education Program. About 1,000 children participated in the Treasure Hunt, which involved them with the various displays in the Gem and Mineral Show. Once the hunt was completed, the children returned with their answers to the Junior Education Program for scoring and a prize.

TGMS makes a generous donation to SESS for their help with the program which goes a long way in supporting SESS activities and field trips.

UA - Mexico Consortium Leads Field Trip to Sonora

In January, 25 mining industry geologists participated in a week-long field trip from northern Sonora to deep in the heart of the Sierra Madre on the Chihuahua border. The trip was planned and led by the UA Mexico Consortium (Mark Barton and ten UA graduate students) to showcase recent and ongoing MS and PhD studies in northwestern Mexico.

Beginning in Tucson, the trip highlighted studies by Damian Hodkinson (MS) and Martin Valencia (MS '95, PhD) on granitoids and mineralization in SE Arizona and central Sonora, Wojtek Wodzicki's (PhD '95) and Keith Woodburne's (MS) work on the Cananean, Sonora porphyry Cu district, Lukas Zurcher's (MS '94, PhD) studies of porphyry mineralizaiton in southern Sonora and Sinaloa, and most notably John-Mark Staude's (PhD '95) studies of the metallogeny of NW Mexico and the structure and mineralization of the Mulatos gold district.

Despite various vehicle problems, 20 hours on dirt roads, and several nights sleeping on concrete slabs, a good time was had by all. The visit to Mulatos was the highlight of the trip due to John-Mark's enthusiasm and fine geologic work, and because it was the first general field trip allowed to the area. The Mulatos visit was made possible by permission and support from CanMex (Placer Dome) who among other things provided a memorable evening of carne asada under the stars.

Future Mexico Consortium trips are being planned in north-central Mexico, Sinaloa and southern Sonora, and Baja, CA.

Workshop to Focus on Copper Mining History

Arizona teachers will attend a week-long workshop focusing on Arizona's copper mining history. Michelle Hall-Wallace and the Arizona Mining Association will offer the workshop to more than 130 K-12 educators who will learn about the uses of copper in society, the geology of copper deposits, and mine development and reclamation. Taught by faculty and industry experts, the workshop will include field trips to local mines and will discuss the impact of copper mining on Arizona's economy and environment.

UA/Keck Foundation Brings in Geophysics Teachers from around the Country

The UA College of Science and the Keck Geology Consortium recently brought geophysicists from the UA and several small liberal arts colleges around the nation together for a workshop intended to synergize geophysics teaching in both large and small educational environments. The goal was to better prepare undergraduate geophysics majors for jobs in the profession or graduate school.

Randy Richardson (UA) and Robert Sternberg (Franklin and Marshall College) developed the idea for the workshop and won funding from the W. M. Keck Foundation and the UA College of Science.

Teachers talked about some of the new and successful educational approaches they are using and were given tours in the Gould-Simpson Building of the seismology, computing and other geophysics research labs important in UA teaching. Other topics focused on how teachers can acquire equipment for teaching and how to base classwork on field projects.

Faculty Awards and Honors

Owen Davis
President of the International Federation of Palynological Societies

Michael Drake
Vice President and President-elect of the Geochemical Society and the Meteoritical Society

DeVerle Harris
Krumbein Medal, International Association for Mathematical Geology; Charles L. Hosler Alumni Scholar Medal, Earth and Mineral Science College, Penn State

Peter Kresan
College of Science Distinguished Teaching Award

Austin Long
College of Science Outstanding Advisor

Jay Melosh
Guggenheim Fellowship for sabbatical study in Europe

Joaquin Ruiz
Secretary to Volcanology Petrology Geochemistry Section, AGU

Unroofing the Himalayas:
UA Geoscientists at Work in Nepal

On the starboard side of the Airbus on a clear day, the flight from Dakka, India, to Kathmandu, Nepal, presents a stunning panorama that includes four of the five highest mountains on Earth. Himalayan giants stalk the horizon to the north, with Kanchenjunga (8,586 m), Makalu (8,463 m), Everest (8,848 m), Lhotse (8,501 m), Cho Oyu (8,201 m), and Manaslu (8,163 m) marching in single file from east to west. Countless lesser peaks in the 6,000-7,500 m elevation range flank the famed 8,000-ers. At one point the astounding view sweeps from the Indo-Gangetic alluvial plain directly below, at an elevation of approximately 200 m, all the way to the plumed summit of Everest, piercing the jet stream on this winter day.

Soon the plane plummets through a tear in the clouds into the emerald valley of Kathmandu, nestled in the rugged but much lower mountains of the Lesser Himalayas. The brief flight makes for a breathless introduction to Himalayan geology and adventure, and the passengers, including six UA geoscientists, are pasted to the windows with cameras clattering.

Jay Quade, George Gehrels, and Peter DeCelles were joined by postdoc Dave Richards, graduate student Tank Ojha, and undergraduate Paul Kapp in the field in far western Nepal for the month of January. The team spent most of the month measuring a single, 3.3 km-thick stratigraphic section through the Miocene-Pliocene Siwalik Group and collecting a variety of samples for geochemical, paleomagnetic and petrographic study.

The work is part of a two-year NSF funded project under the supervision of Quade and DeCelles, entitled "Erosional unroofing of the Nepal Himalayas over the past 12 m.y.: $^{87}Sr/^{86}Sr$ and sedimentary petrological indicators from Siwalik foreland deposits." Their great height and close association with the vast Tibetan Plateau have placed the Himalayas on international center-stage in the geological, geochemical, and geophysical communities, as scientists seek to unravel a complex web of environmental and tectonic interactions that may have been driven by uplift of the great range during Cenozoic time. The Arizona team is taking a multidisciplinary approach, with a focus on basic field documentation followed up by laboratory analyses targeting several key problems in Himalayan geoscience.

The UA-Nepali team ready to head for the wilds of western Nepal. UA participants included Jay Quade (kneeling, foreground), Pete DeCelles (top right, rear), Tank Ojha (far right), George Gehrels (far left), Dave Richards (standing, plaid shirt), and Paul Kapp (standing, white shirt). Nepali participants included Bischal Upreti, professor at Tribuvan University in Kathmandu (dark jacket, far right), and various drivers, porters and camp helpers.

The complex logistics of working in remote western Nepal are handled by Tank Ojha, a geologist for the Nepalese government. A solid three-day drive in a pair of rented Land Rovers brought the UA party and five hired camp hands from Kathmandu to Khutia Khola (Nepali for stream), only about 40 km from the western border of the country. The first camp was established at the end of the road, and the lower half of the section was worked until the approach walk began to exceed one hour.

Fifteen local porters were hired to relocate the camp to a higher locality, deep in the frontal foothills of the Himalayas. Vague foot trails in these rugged mountains provide the only means of travel, and many of the locals are employed routinely in the tasks of carrying supplies and goods from one isolated village to another. The tedium of measuring section and collecting samples was mitigated by the lovely setting and spectacular exposure of the rocks. Khutia Khola flows down a deep, forested canyon over waterfalls and in and out of deep pools. The monsoon torrent scours the stream bed annually, producing remarkably complete exposure over thousands of meters of section.

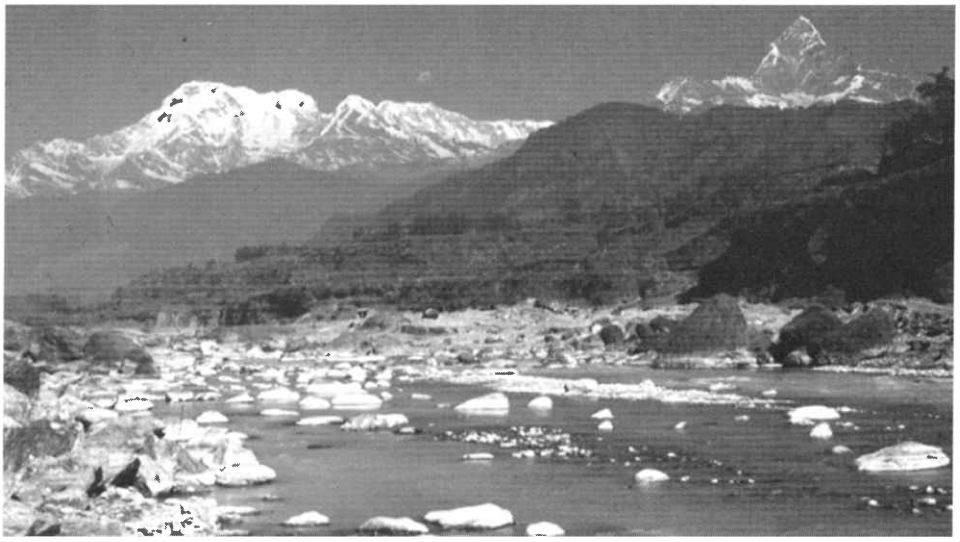
The daily routine began with a 6:30 a.m. wake-up call from the camp cook, who proferred cups of sweet "bed tea." Hot lunches were carried up canyon by a pair of camp hands, allowing the work to continue uninterrupted until 5:00 p.m., when individual parties would retreat to camp for dinner. Generator-powered overhead lights allowed more work to be done after dark.

The objective of the work is to determine the unroofing history of the Himalayas in order to assess their role in controlling regional climate and seawater strontium. Numerous recent publications have attributed everything from the Cenozoic increase in seawater $^{87}Sr/^{86}Sr$ to the onset of the ice ages to uplift of the Himalayas. Intriging as these hypotheses are, they are based on sparse data, and much of Himalayan geology remains to be documented. Issues as fundamental as the ages and protoliths of metamorphic and sedimentary rocks throughout much of the Himalayas have yet to be resolved.

Current consensus attributes the Cenozoic rise in seawater $^{87}Sr/^{86}Sr$ to weathering of Archean and Proterozoic high-grade metamorphic rocks in the higher Himalayas. Collision of India and Asia commenced around 50 Ma, but little else is known about the timing of uplift and the history

of southward thrust displacement. Knowledge of the timing and location of thrusting is critical for developing rigorous hypotheses about the nature of the relationship between Himalayan orogenesis, climate, and seawater geochemistry.

The UA group is tackling the problem by studying the erosional byproducts of Himalayan uplift, the Miocene-Pliocene foreland basin deposits of the Siwalik Group that crop out in the frontal foothills of the range from Bhutan to Pakistan. The Siwaliks were deposited in a vast alluvial basin similar to the modern Indo-Gangetic alluvial plain. Flexural subsidence of the basin was driven by southward emplacement of Himalayan thrust sheets, thus establishing the linkage between kinematic history of Himalayan thrust faulting and deposition of the Siwaliks.



One of the Annapurna Range peaks (left) and Machapuchare (right) above the Seti River in central Nepal. (photo by Pete DeCelles)

The Siwaliks are fluvial deposits that lack abundant fossils and ash beds that might be of chronostratigraphic utility. The solution to the problem of dating these thick deposits lies in careful magnetostratigraphic analysis by Dave Richards and Tank Ojha. Sites were located every 15 m or so throughout the Khutia Khola section, and preliminary work indicates that certain lithologies carry a stable detrital remnant magnetization. Sparse fossil localities provide the necessary ties to the global polarity time scale.

The Siwalik sediments of Nepal contain a rich history of paleofloral change, a record that first attracted Jay Quade to the region in 1988. Perhaps the most conspicuous evidence for these changes comes from the many fossil leaves preserved in the Siwaliks. These leaves show that the region was once entirely covered by moist, semi-tropical forest quite unlike the monsoonal forests in the region today. And it must have been quite a swampy, murky, and dangerous river world: coal is common in the section and a sizeable proportion of the sparse fossils in the Nepali Siwaliks are teeth from very large Miocene crocodiles.

As early as 1988 Quade had noticed that the leaves are absent from sediments younger than about 6 Ma. This distribution, which did not seem so important at first, turned out to provide key clues to the origin of large geochemical shifts in the Siwaliks stratigraphic record. The isotopic composition of paleosols, which are common in the Siwaliks, had been used to track the expansion of late Miocene grasslands in Pakistan and Nepal. The isotopic data indicated that the beginning of this grassland expansion was 6-7 Ma. This matched perfectly the evidence from fossil leaves for the demise of the evergreen forests, and documented a spectacular ecological blitzkreig: In a little less than a million years, the forests had been completely swept from the floodplains by the advancing tropical grasses, grasses still thick on the floodplains of modern Nepal.

The ultimate cause of these changes is still hotly debated, but one thing is clear: Miocene expansion of tropical grasses was a global event. And so the search for causes has drifted outside of the Indian sub-continent. Current geochemical studies in the Siwaliks address the role of Himalayan uplift in cooling Earth's climate over the past 40 million years. The linkage has best been articulated by geochemists at M.I.T. who have shown that weathering of Himalayan silicates has probably been an important sink for CO_2, setting in motion an "ice house effect," the opposite of a greenhouse effect. Again, the Siwaliks paleosols may provide important information about how these weathering reactions might have proceeded at different times in the past 12 Ma.

George Gehrels and undergraduate Paul Kapp spent most of their time in the field gathering samples of detrital zircons from Siwaliks sandstones for U-Pb dating. Recent studies have demonstrated the power of this technique in nailing down the provenance of clastic sediments. With help from hired hands, Gehrels and Kapp collected, crushed, sieved, and panned out eight separates of dense minerals, right at the outcrops in Khutia Khola. Preliminary dates from single grains indicate a spectrum of ages, with likely sources already identifiable. Together with conventional provenance data from light mineral point counts, these data will help to establish some ground truth regarding the distribution and composition of bedrock during erosion of the Himalayas since middle Miocene time.

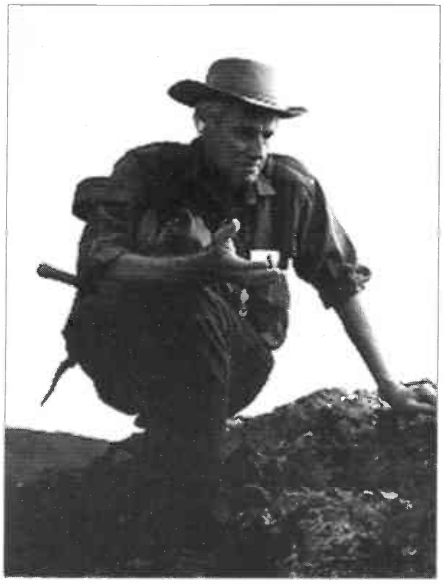
Peter DeCelles has primary responsibility for the physical sedimentology, provenance analysis, and regional structural evolution. The key questions are these: What is the kinematic history of Himalayan thrust sheets, and how did this kinematics influence regional paleodrainage, sediment provenance, and foreland basin subsidence? Without an understanding of the bulk-rock kinematic history of the range, attempts to explain the seawater strontium curve and the role of the Himalayas in changing regional climate will remain purely speculative. The documentation needed to reconstruct this history will take years to accumulate, but a large data base has already been developed by the UA team.

After about three weeks at Khutia Khola, most of the work was completed so the team made a reconnaissance trip up to the village of Dandeldhura deep in the Lesser Himalayas north of the snowy Marabharat Range, in order to sample rocks and waters in the source terrane and to scout eventual routes for regional geological transects. The team returned to Kathmandu via the town of Pokhara, which lies only 20 km south of the Annapurna Sanctuary, one of the most popular trekking and climbing areas in Nepal. After returning to Kathmandu, the group headed northeast to the Friendship Bridge at the border crossing with Tibet. In only one month the geology of the western two thirds of Nepal had been glimpsed and many plans for future expeditions had been laid.

Funding for the current project will expire in 1997, but the group plans to expand the scope of the project to include regional geotransects in far western, central and east-central Nepal as a means of documenting orogen-wide processes, structure, and geochemistry.

Emeritus Faculty Profile

John M. Guilbert



As many of you know already, John Guilbert now has the exalted title of Professor Emeritus. In John's case that means that he can work as hard as he always has. The big difference is that John can now use all his time doing what he loves most–finding ore. We have been fortunate to have had John. He, together with Spence Titley, created a program in Economic Geology that is the envy of many universities. Our tradition in Economic Geology research will continue in the able hands of Spence Titley, Mark Barton and DeVerle Harris, but we all miss John's adventures in the field!

John has had a rich blend of experiences in academia and industry. His career in geology started in Butte, Montana, where he spent eight years at the Geological Research Laboratory in the Anaconda Company. Prior to that he seems to have been an East Coast preppie with a degree from Noble and Greenough prep school in Deedham, Massachusetts. We still find it hard to believe this can be true since he seems such a westerner–bolo tie and all. After a PhD degree from Wisconsin and his stint with Anaconda, he became Assistant, then Associate, then full Professor of Economic Geology at the University of Arizona. He was here for 27 years until retiring in 1992.

John's major contributions have been in alteration-mineralization zoning studies, geologic models of porphyry copper deposits and in lithotectonic deposit classifications. A quick run-through of John's C.V. reveals what we all know–he cannot sit still. He has traveled extensively throughout the world–Germany, Czechoslovakia, France, Sweden, China, Chile, Argentina, Mexico, Portugal, Spain, and South Africa. John has led several student–industry field trips to such locations as Ontario-Quebec, South Africa and Eastern Europe.

John has contributed significantly to the field of ore deposits through the widely-read text-reference volume *The Geology of Ore Deposits*, and through his service to the Society of Economic Geology, where he served in many capacities including Vice-President.

Since his retirement from the UA, John has served as Geologic Advisor to the developers of the Bajo de la Alumbrera porphyry copper-gold deposit in northwestern Argentina and consultant to MIM Explorations (Mount Isa Mines) and Minera Alumbrera. He has recently formed, and is Chairman of the Board of, JABA Inc. to carry out exploration in southwestern North America and is working on another edition of *The Geology of Ore Deposits* with co-author Erich Petersen of the University of Utah.

In John's words, he and Mary are "unabashedly busy, happy, productive, and–we know it–lucky." So John, no point in wishing you luck, since you have it, but please how about some stock tips for the rest of us!

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- Monte Nichols
- Jim Reynolds (MS '80)
- Jean and Jackie Schlepp

In the Footsteps of Gould, the 1995-96 UA Antarctic Expedition

Scott Miller, Graeme Dingle and Suzanne Baldwin enjoy a late afternoon tea after a day's work on mountains adjacent to the Shackleton Glacier. Mt. Wade (13,400') is in the background. (Photo by Paul Fitzgerald)

While in a geographical sense we may have been following in the footsteps of Gould, logistically we were not. Rather than using dogs to pull sledges, we used snowmobiles. We didn't have to navigate the stormy southern oceans but flew from New Zealand to McMurdo, the US base, in a US Air Force C-141, and from there to the Shackleton Glacier at 85°S in a US Navy ski-equipped Hercules.

Once in the field we camped, radiating out each day to look at more outcrops, climb more mountains, and collect more samples. Chartered New Zealand helicopters from a deep field camp 80 km away would fly us across glaciers too crevassed to travel on, or occassionally we would board a chartered Canadian Twin Otter to venture farther afield. On one such trip we flew past the majestic multiple peaks of Mt Gould.

After more than a month of camping we moved to the helicopter camp for more intensive use of the helicopters (not to mention the Christmas party). The field party consisted of Paul Fitzgerald (Assoc. Research Scientist), Suzanne Baldwin (Asst. Professor), and Scott Miller (graduate student) from the Geosciences Department, and Graeme Dingle, a mountain guide from New Zealand.

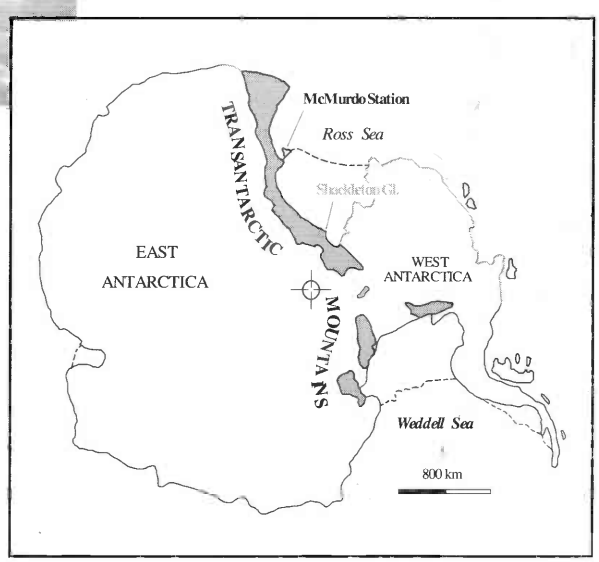
Scott had previously worked on the Juneau icefield in Alaska, and Graeme was back from his most recent adventure, a 28,000 km circum-navigation of the arctic at 80°N, a large part of it solo. Paul had been to Antarctica nine previous seasons. Although Suzanne usually works in the tropics of New Caledonia, New Guinea, the Aegean, or Baja, she found Antarctica quite warm—and it was, temperatures varying from about 0°F to 30°F. It did help that we had been partially sponsored by The North Face, so we were certainly the best dressed geologists in Antarctica.

We only had two storms, for two and five days each—a good season in comparsion to some seasons where bad weather has kept us confined to tents for up to 16 days at a stretch. The four of us were there for 7 weeks to map along the mountain front and collect samples for continuing studies on the uplift history of the Transantarctic Mountains, work supported by the Office of Polar Programs of NSF.

We spent almost 3 weeks at Cape Surprise, so named because it is the only place along the 3500 km length of the Transantarctic Mountains to have Beacon sandstone at the coast, this having been faulted into position. Our objectives were to map the structure of the range front using field observations combined with results from fission track thermochronology, as well as using thermochronology to determine the uplift and denudation history of the mountains.

The University of Arizona is an ideal place to do such thermochronology as it is one of the very few places in world to have both a state-of-the-art Noble Gas laboratory and fission track laboratory and the Transantarctic Mountains are an ideal place to apply thermochronology to such a tectonic problem.

The mountains have formed as a rift flank uplift, adjacent to the Ross Embayment, an



area of intracontinental extension the size of the entire Basin and Range province. Thus the overall structure of the mountains is relatively simple and there is ample relief (almost 14,000') from which to collect samples. The main phase of uplift of the mountains began ~55 million years ago, coincident with the onset of slow cooling of the Earth's climate which led into the present Quaternary ice age.

We will use the data collected to constrain models for the formation of these mountains, as well as the geological evolution of Antarctica, at least since the middle Mesozoic. It was a sucessful season and we returned to Arizona with full notebooks, many stories, and 2460 lbs of rocks for analysis.

by Paul Fitzgerald

ALUMNI NEWS

Brooke Clements (MS '91) writes to tell us that he's enjoying the Geosciences Newsletter. "It allows us alumni in the hinterland to keep up with what is going on in the department." Brooke is doing diamond/precious metal exploration with Exmin Corp. He and wife Juanita have a baby boy, Jeffrey.

Hamdi El-Ghonemy (MS '88) is in his last year as a PhD candidate in the School of Earth Sciences at the University of Birmingham in the UK.

Mae (PhD '87) and **Michael Gustin** (PhD '90) write from Nevada where Mae is Assistant Research Professor at the University of Nevada and Mike is Exploration Manager for Cambior Inc. They now have two children, Mariah (12), born in Tucson, and Andrew (6), a Nevadan.

Phyllis Fett Halvorson (MS '84) has returned to consulting as a geophysicist, applying her experience with potential fields to aquifer definition and mineral exploration.

Hiram S. Hanson (PhD '66), Professor Emeritus at Georgia Southern University, writes that since his retirement in 1988 he's been busy traveling (including trips with Bob DuBois), collecting and doing other "mostly legal interesting things."

E.F. "Pat" Hollyday (MS '63) is finishing up 31 years of service with the USGS, having worked as a hydrogeologist in Pennsylvania, Maryland and Nashville. While he's eligible for retirement, Pat is enjoying working in the field and office, canoeing with his son, David, and watching his kids and grandkids grow.

Paul Johnson (MS '84) e-mails us that for those interested, he's providing a network address on studies of nonlinear elasticity in earth materials (http://qvack.lanl.gov/Nonlinear/NONLINEAR.HTML).

Gregory Leonard (BS '91), is off to Indonesia where he's been employed as a geologist by PT. Puneakbaru Jayatama.

David Rea (MS '67) has been appointed Chair of the Department of Geological Sciences at the University of Michigan.

Jan (Wilt) Rasmussen (PhD '93) writes that she's had many changes in her life in the past two years—"finishing my PhD, getting a wonderful job, moving to Las Vegas, regaining my maiden name, and moving into a new home."

Rob Risley (MS '83) writes that he's returned to Thailand. His qualifications: "I was the only attorney in the U.S. with petroleum experience who was fluent in Thai." Before leaving Arizona, he got a chance to explore southern Utah and camp out in the Pinacate volcanic field, but he doubts that this geo-fix will last long enough.

Lynn (PhD '92) and **Mike Soreghan** (PhD '94) have started new jobs at the University of Oklahoma where Lynn is Assistant Professor and Mike is a Research Associate. They also have a new addition: Emily Rose, born this last August.

Pablo Yanez (MS '90) has big news: "Ximena Isabel Yanez Tandeciarz—name means gringo-tongue torture (b. 10/1/95 - currently ~10 lb and growing)." Silvia Tandeciarz, Pablo's wife, is completing her PhD in literature at Duke while Pablo works as an environmental geologist in Raleigh. "Ximena is currently conducting sleep deprivation research on at least two subjects in Durham, NC. The results of her research have not yet been published but are clearly evident on our faces."

We want to hear from you! Send us your news: new job, new child, fantastic trip? Or even a photo showing us who you are now.

Alumni Awards and Honors

Jim E. O'Connor

The 1995 GSA Kirk Bryan Award was presented to **Jim O'Connor** (MS '85, PhD '90) for his monograph *Hydrology, Hydraulics, and Geomorphology of the Bonneville Flood*, published in 1993 as GSA Special Paper 274. This is the highest award of the GSA Quaternary Geology and Geomorphology Division.

As Victor Baker pointed out in his citation, Jim is no stranger to honors by the GSA Quaternary Geology and Geomorphology Division. He twice received the J. Hoover Mackin Award, first in 1984 for his MS work and then in 1987 for his PhD proposal. In 1988, Jim also received the GSA's Robert K. Fahnestock Award for his PhD project, the successful culmination of which resulted in GSA Special Paper 274.

Since graduating in 1990, Jim has worked as a government scientist, first with the U.S. Geological Survey and currently with the Forest Service.

Louis L. Jacobs

Louis Jacobs (MS'73, PhD '77) was one of four professors at Southern Methodist University to be honored for their outstanding research, publications and teaching at the annual Author's Award Luncheon on April 29. Louis is an expert on dinosaurs, especially those of the American southwest and Africa. He was honored for his 1995 book, *Lone Star Dionsaurs*, which discusses dinosaurs that once roamed the Texas landscape. He also received an Author's Award in 1994 for his 1993 book, *Quest for the African Dinosaurs*.

Letter from Steve May
Chair, Geosciences Advisory Board

The second annual meeting of the Geosciences Advisory Board (alumni and friends of the department) was held on April 11-12. The general goals of the Advisory Board are to provide a vehicle for communication among departmental alumni, faculty, students, and industry; to serve as a sounding board of economic and employment trends in government and industry; to consult and advise the department on its research and instructional programs; and to assist the department in identification and solicitation of financial and other resources.

A highlight of our recent meeting was the much appreciated visit from Dr. Henry Pollack of the University of Michigan. Henry shared a number of insights from his experience with a strong departmental advisory board and alumni organization. These insights will be a great help in our attempts to develop a stronger engagement between alumni, friends, and the department at Arizona. Contributions from an advisory board and more importantly from an active alumni association can include more effective networking, a stronger interface with industry, a vehicle for political influence on behalf of the department and geoscience in general, industry internships for students, financial support, short courses, and of course social events. We believe that such activities can improve the educational experience of students as well as their post-university association with the department. Plan on hearing more about these topics in the future.

In addition to formalizing the mechanisms for maintaining an active and effective advisory board, we considered and offered suggestions on a number of specific issues presently confronting the department. Many of these "issues" reflect exciting departmental initiatives such as the opportunity to develop "Centers for Excellence" in selected technical areas through collaboration with other geoscience institutions and other departments in the University. The Board was supportive of curriculum changes that should offer more flexibility to undergraduates, and we were able to offer some suggestions for how the department can be proactive in facilitating partnerships with industry through such activities as internships and short courses.

As always, a highlight of the meeting was the opportunity to interact with faculty and students (future alumni). Our meeting this year was timed to coincide with GeoDaze and we were able to catch a few talks and posters, and of course the concluding slide show was as entertaining as I remember from a decade ago. It is a strong testimony to the commitment and effectiveness of the department to witness the high quality of student research and the energetic expression of interest in geoscience. I urge all alumni to begin thinking about a reunion at the 25th anniversary of GeoDaze next spring.

Geosciences continues to be a premier department both within the University and throughout the country and one that we can all be proud of. I believe that future strong engagement with alumni and friends can only lead to the insurance of a bright future.

Sincerely,
Steve May
Chair, Geosciences Advisory Board
Exxon Production Research

Fall 1995 Degrees Awarded

John L. Burbank (BS)
Elizabeth A. Christensen (BS)
Christopher J. Courtney (BS)
Heide K. Dwinnell (BS)
Daniel W. Evans (BS)
Gregory A. Ghidotti (BS)
Christine K. Gishey (BS)
Cheryl A. Karrer (BS)
Jalal Mohit Mahmoudi (BS)
Keith E. Olinger (BS)
Noelle E. Rudd (BS)
Todd C. Shipman (BS)
Odin A. Smith (BS)
David M. Stagg (BS)

Robin M. Bouse (PhD) Pb isotopic compositions of ore deposits and their host rocks in Arizona: Implications for the crustal inheritance of metals (250p) Joaquin Ruiz

Robert J. Brennan (MS) Fossil snail in the southern Great Basin: Evidence for reliable 14C dating of sediments and constraints on the 14C contents of paleogroundwaters (12p) Jay Quade

Timothy M. Demko (PhD) Taphonomy of fossil plants in the Upper Triassic Chinle Formation (274 p) Judith Totman Parrish

Helge M. Gonnermann (MS Prepub Manuscript) 3-D slant stack: Estimation of interval velocity and reflector orientation (17p) Roy Johnson

Peter G. Griffiths (MS Prepub Manuscript) Initiation and frequency of debris flows in Grand Canyon (56 p) Victor Baker

Henri D. Grissino-Mayer (PhD) Tree-ring reconstructions of climate and fire history at El Malpais National Monument, New Mexico (406 p) Thomas Swetnam

Michal J. Kowalewski (PhD) Quantitative taphonomy, ecology, and paleoecology of shelly invertebrates from the intertidal environments of the Colorado River delta, northeastern Baja California, Mexico (348p) Karl Flessa

Thomas E. Moutoux (MS Prepub Manuscript) Palynological and tephra correlations among deep wells in the modern Great Salt Lake, Utah, USA: Implications for a Neogene through Pleistocene climatic reconstruction (30p) Owen Davis

Lisa E. Park (PhD) Assessing diversification patterns in an ancient tropical lake: Gemphycythere (Ostracoda) in Lake Tanganyika (317p) Andrew Cohen

Pedro A. Restrepo (PhD) Late Precambrian to Early Mesozoic tectonic evolution of the Colombian Andes, based on new geochronological, geochemical and isotopic data (195p) Joaquin Ruiz

Paul R. Sheppard (PhD) Reflected-light image analysis of conifer tree rings for dendrochronological research (160p) Lisa Graumlich

Martin Valencia Moreno (MS Prepub Manuscript)) Geochemistry of granitoids of central Sonora, NW Mexico (23p) Joaquin Ruiz

In Memory of

Eloise Grijalva

Eloise Grijalva, a member of the Geosciences staff for 23 years, died on October 6, 1995, after a brief retirement. Eloise first came to the UA in 1969 to work as Dr. Laurence Gould's secretary, retiring from the Geosciences Department in 1992.

Eloise was born on April 18, 1930, in the house her father built in Barrio Historico, an area rich in historical and cultural significance for Tucson. Eloise lived all her life in that same house, attending Carrillo Elementary, Safford Junior High, and graduating from Tucson High in 1949. Active in her parish church, St. Augustine Cathedral, and the "Cursios" church organization, Eloise was a cherished member of her community.

Eloise's fondest times following retirement were spent in spoiling her nieces and nephews of whom she was so proud. Eloise will be missed by them and by all of us in the department. Eloise was one of three children and was preceded in death by her father, Manuel, and her mother, Elena. She is survived by an older sister, Mrs. Clementina G. (Phil) Soto.

Bartholomew S. Nagy

Bartholomew S. Nagy died suddenly on November 11, 1995. Bart, who had presented a paper on his current research to the GSA meeting in New Orleans four days before his death, was widely known for pioneering work in organic geochemistry.

Bart's research ranged from analyzing lunar rock returned by Apollo astronauts, to discovery of some of the earliest biochemical compounds found in meteorites and Earth rocks, to studies of organic material that had isolated fission products made by natural nuclear reactors active in western Africa almost two billions years ago.

Born in 1927 in Budapest, Bart received his MA at Columbia Univ. in 1949 and his PhD at Pennsylvania State Univ. in 1953. After graduating from Penn State, Bart worked as a research engineer for Amoco Petroleum Co. before becoming Manager of Geophysical and Geochemical Research at Cities Service Oil and Gas Corp. in Tulsa. He joined Fordham Univ. in 1957 as Associate Professor of analytical chemistry. In 1965 he joined the research faculty in the Dept. of Chemistry at the Univ. of California at San Diego where he collaborated with Harold C. Urey in search of the earliest organic compounds that might be found in meteorites and prehistoric rocks.

As one of nine principal investigators chosen to analyze lunar samples returned by Apollo astronauts, Bart analyzed lunar soil from all of the Apollo missions. In other research, Bart and graduate student Michael Engel (MS '76, PhD '80) discovered some of the earliest evidence of life on earth in the form of biochemical compounds found in Precambrian rock in South Africa's Transvaal. Bart's latest research involved geochemical investigation of the Oklo natural fission reactors in Gabon, West Africa, and their possible use as a model for modern nuclear waste containment.

Bart organized the Organic Geochemistry Division of the Geochemical Society and served as its first chairman. He served on several prestigious national and international scientific committees, boards and programs and wrote more than 200 published scientific articles and several books.

If there was such a thing as "spare" time for Bart, he pursued his love of history. Bart took great pleasure in exploring the history, art and architecture everywhere his work took him and in sharing these experiences with others. He is survived by his wife, Lois, two daughters, two grandchildren and his mother in Budapest.

Terah L. Smiley

Quaternary Science lost a stalwart friend with the passing of Terah L. (Ted) Smiley on February 29, 1996, at the age of 82. Ted Smiley was born August 21, 1914, in Clay County, Kansas. He moved to Tucson in 1936 where he attended the UA. Before entering the Navy in WW II, Ted worked briefly as a Tucson policeman and as a ranger naturalist with the National Park Service. He won three battle stars for his service in the Navy.

In 1946, Ted received his BS and became Assistant Dendrochronologist at the UA. He then earned his MS, becoming Curator of the Tree Ring Laboratory in 1949. He served as Director of the Tree Ring Laboratory (1958-1960) and the Geochronology Laboratories (1956-1967), Head of the Geochronology Department (1967-1970) and Associate Head of the Department of Geosciences when it formed in 1970. He retired from the UA in 1984.

Ted Smiley welcomed Ernst Antevs to the program and wooed Gerhart Kremp from Penn State. During his 1970 sabbatical in Cambridge, he established lasting relationships with Richard West, Harry Godwin and other European Quaternarists. His outstanding contributions to arid land studies were recognized in 1973 with a major award from the National Committee on Desert and Arid Zone Research. Ted was also pivotal in initiating major international science conferences on palynology.

For over two decades students, faculty and visitors benefited from Ted's kind ministrations. Remembering Ted's role as Graduate Coordinator, Katie Hirschboeck (PhD '85) writes, "There's not a grad who went through at the time who wasn't somehow encouraged after pouring out some story of woe to Ted. We were calmed by his quiet listening with perhaps some classical music in the background and the palm fronds softly moving in the gentle breeze outside his window with the afternoon sun streaming in. And always—ALWAYS—whenever we left his office—there were the final oh-so-Smiley words that never failed to leave his lips: 'Good luck with it.'"

A memorial service for Ted Smiley was held on a fine spring day at the Desert Laboratory on Tumamoc Hill. Ted is survived by his wife, Winifred, four daughters, one son, a brother and sister, nine grandchildren, seven great-grandchildren and three great-great-grandchildren.

Keep us posted:

Name _____ Other degrees (institution and year) _____

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Phone _____ Phone _____

e-mail _____

Employer and Job Title _____

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