UCLA
Earth & Space Sciences

In this issue...

1995
Alumni Newsletter

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Associate Editor: Joy F. Wurdeman

Chair's Letter

Paul Davis completed four fine years as Chairman of Earth and Space Sciences in June and is now enjoying a well-earned sabbatical year in Oxford. As the new Chair, I bring you greetings and news of the Department over the past twelve months.

It's been another exciting and productive year for faculty, staff and students. After the rounds of retirements of the past few years, we have been able to recruit new faculty on a scale not seen since the 1960s. This Fall we were joined by seismologists John Vidale and Heidi Houston and also by Gary Axen, whose interests are in continental tectonics and structural geology. Those of you who glance at *Geology* may have seen Gary's structural model for Baja California in the June issue. John and Heidi are interested in earthquake mechanisms and their skills in data analysis will greatly strengthen seismology and earthquake research at UCLA. Another new appointee, Didier Sornette of CNRS, University of Nice, France, will join E&SS and IGPP as Professor-in-Residence for several months each year. He has a novel approach to earthquake prediction as well as wider interests in other nonlinear dynamical systems.

We are going to Mars! NASA has named David Paige Principal Investigator on an unmanned mission to Mars scheduled to be launched on January 1, 1999, and arrive at Mars just before the new millenium on December 5. A Martian lander designed at UCLA will be operated from Mission Control at UCLA. Its mission? Mars Volatiles and Climate Surveyor (MVACS). The total cost is about $100 million, $20 million for the payload, and the rest for sending it to Mars. MVACS is a collaborative project with the Jet Propulsion Laboratory and the University of Arizona. The whole team is now busy gearing up for the big event.

Also on the planetary science front, the Galileo magnetometer team led by Margaret Kivelson has been holding its breath. Galileo was seriously handicapped when the main communications antenna failed to open after launch in 1993, and so the data expected from the 1995 flyby of Jupiter will need to be stored on a tape recorder added "just in case" to the spacecraft. Then, in October, engineers at JPL had trouble with the tape recorder as well! It now seems the problem has been fixed and that the decades of preparation are about to yield spectacular results.

Among other good news, Mark Harrison will receive the N.L. Bowen Award for Volcanology, Geochemistry and Petrology from the American Geophysical Union at its Fall Meeting in San Francisco. Some of you may remember Bowen's famous book, *The Evolution of the Igneous Rocks*, first published in 1928 and reprinted 40 years later as an earth sciences classic. This award is a great honor for Mark, for his research group, and for the Department.

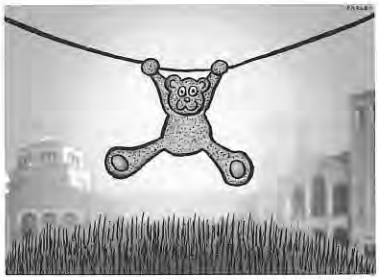
Another classic piece of geological literature is AAPG Reprint Series No. 26, *Deep Water Canyons, Fans and Facies: Models for Stratigraphic Trap Exploration*, which contains a summary of Harold H. Sullwold's Ph.D. dissertation at UCLA on the Miocene Tarzana Fan. Please note the report elsewhere in this Newsletter of Harold and Mayla Sullwold's generous donation which will provide scholarship support for Earth Sciences students in the years to come. Other recent donations to the Department include George Tunnel's collection of books on mineralogy and crystallography, the John N. Turex ranch in Tehachapi, and graduate student support from Amoco Production Company and the Mobil Foundation. These gifts will allow us to improve the quality of our graduate-level teaching and research.

It was a pleasure to meet some of you at the Class of 85's ten-year reunion held at the Sunset Canyon recreation center in September. One of the points raised was that alumni/alumnae like to know if old friends or classmates will also be attending events at UCLA. In future, we shall try to provide access to a list of people who have signed up to attend -- either through the internet or through a phone contact in the Department. And, by the way, we do have a World Wide Web page: http://www.ess.ucla.edu/.

Very best wishes for the Holiday Season,

Bruce Runnegar
Professor and Chair

The Internet



The department of Earth and Space Sciences has been keeping up with the cyberspace revolution. In addition to the electronic mail (e-mail) that has been common in the department for several years now, in the last year we have made the jump onto the"World Wide Web" (WWW or web for short). We were one of the first departments on campus to establish a web site, and it is growing with a number of innovative products. One of the most interesting is the "Venus Hypermap Project" constructed by the geodynamics group to provide interactive access to images from the Magellan probe. The Southern California Earthquake Center group has been using their web site to make their Global Positioning System data available and there is a new web site for the Mars Volatiles And Climate Surveyor. To get started, just point your browser at http://www.ess.ucla.edu.

Computing facilities are also growing. Faculty and staff members have access to the department network from their desks and graduate students have access through either of the department's computer labs or connections in their offices for their personal computers. The growth in the department network is parallelled by the growth in the campus network. Through the new Bruin Online initiative, students will have access to the campus network via connections in the dormitories and all over the campus. Now every member of the campus community can be online through a campus or department connection.

by Steve Salyards

Class of 1985 Reunion

On September 29, 1995, the Earth & Space Sciences class of 1985 held its 10-year reunion at UCLA's Sunset Canyon Recreation Center. As one of the largest classes of ESS students ever to graduate, the class of '85 reunion was likewise well attended. More than half of the approximately thirty members of the class were able to participate in the reunion. Some came from Utah and from as far away as Mississippi. The ESS Department was also well represented. Professors Wayne Dollase, Clarence Hall, Ray Ingersoll, Paul Merifield, and Department Chair Bruce Runnegar were all present.

The former students and their professors enjoyed several hours of conversation over hotdogs, hamburgers and beer. Story swapping was at its best, ranging from the rigors of mapping Tick Canyon to revealing, for the first time, the perpetrators of practical jokes at summer field camp. Amid the sharing of memories, one professor commented that he believed the class of '85 reunion to be the first ever held by an ESS class.

The class of '85 has remained in contact and up-to-date with its members due mostly to an annual newsletter they created for themselves called the "Yearly Intrusion." The "Yearly Intrusion" is a collection of letters sent in each spring from the class to one of the editors of the newsletter, Mike Hunziker or Pat Frascogna, who then copies them to form a complete set, which is then mailed to everyone. The "Yearly Intrusion" has been published each year without exception ever since graduation. Both inspired and patterned after a once-popular weekly departmental newsletter dubbed the "Weekly Intrusion," the "Yearly Intrusion" has kept the class of '85 informed on the whereabouts and activities of its members. Incidentally, the "Weekly Intrusion" ceased to be published around 1990, but its namesake lives on, and due to the success of their 10-year reunion, planning for the next one is already on the minds of the class of '85.

Summer Field class 1984

by Pat Frascogna

Earth and Space Sciences

1995 Field Trip to Northern Britain

Twenty assorted UCLA geologists varying from emeritus faculty through undergraduates participated in a two-and-a-half-week field trip to northern Britain in August/September. During the spring quarter, about half of the students had taken a regional geology course (ESS133) which discussed the geology of Britain. Jon Davidson and Peter Holden led both the class and the fieldtrip. Why study the geology of this rather small European island nation? A widely rumored reason was that Jon and Pete, as native "limeys" were looking for an excuse to visit the much-loved British pubs. But there are sound geological reasons too. Within Britain, an area about the size of the State of California, rocks representing some 3 billion years of Earth history are exposed. The oldest rocks were probably originally part of the ancient North American continent. Before the Caledonian collision, Scotland and England were separate landmasses, separated by thousands of kilometers of ocean. The geology includes evidence for continental collisions, including the Caledonian and Hercynian mountain-building events of 200-400 million years ago, which are correlative with events in North America responsible for the uplift of the Appalachian mountains. More recently, volcanic rocks of North West Scotland which have correlatives in eastern Greenland are considered evidence for the break- up of the North Atlantic some 60 million years ago. Subsequently, the effects of the last ice age have left a deep impression on the upland landscapes of the country. The early links between mankind and an understanding of geology are also exemplified in Britain. The first geological map was prepared by William Smith, a surveyor, who was responsible for laying out many of the canals used in the industrial revolution. The occurrences of coal, iron ore, limestone and water determined the locations of many of the earliest industrialized European cities in Northern Britain.

> ...we climbed hills to view the deeply glaciated peaks and valleys, and scrambled over outcrops of 400 million year-old ash layers and lava flows.

Participants met at London's Heathrow airport on a hot Thursday morning in August and were immediately whisked northward some 300 miles to the English Lake District. This scenic part of the country, which inspired the poems of William Wordsworth and the children's stories of Beatrix Potter, bears the scars of ancient volcanism and tectonic collisions. Despite the hot dry weather that marked the tail end of England's 1995 drought year, we climbed hills to view the deeply glaciated peaks and valleys, and scrambled over outcrops of 400-million-year-old ash layers and lava flows. Four days later, we continued northward into Scotland, crossing the Caledonian suture, which roughly corresponds to the England-Scotland Border. A short ferry ride took us to the Hebridean island of Mull, where van drivers became used to the etiquette of using single-track roads. For this five-day segment of the trip we were joined by colleague Dr. Dave Prior of the University of Liverpool, who has worked on the island and has an intimate knowledge of the outcrops. The geology was unanimously declared "superb"--magma mixing textures in the subvolcanic dikes and plutons, thermal overprinting of regional metamorphism in Precambrian pelites, so that andalusite and sillimanite are found pseudomorphing kyanite crystals, and spectacular sections of terrestrial Triassic sediments. The last day featured a trip to the island of Iona, home of some interesting Precambrian marbles, and of the 6th-century monastery of St. Columba, where parts of the Book of Kells were written.

The most northerly stop on the trip was in Ullapool, reached via a night in the shadow of Ben Nevis. North of Ullapool we examined the

Moine Thrust, and intensely studied Caledonian structure that transported Precambrian metamorphic rocks over shallow-water Cambrian sediments. To the west of the Moine Thrust lie the unique and desolate landscapes of the far north west of Scotland, where steep-sided monolithic mountains of Torridonian sandstone rise above the barren rocky basement of two-billion-year-old Lewisan gneiss.

Our southward return journey brought us at last to civilization in the city of Edinburgh, in the throes of its world-famous festival. We enjoyed a spectacular firework display over the castle to celebrate the end of the festival. But our objective was not the culture of the festival but rather "Arthur's Seat," a huge crag of volcanic rock that looms above the city. It was here that geological observations convinced Sir James Hutton that the rock had intruded as a molten liquid rather than a chemical precipitate, thus supporting the Plutonist model of the Earth as opposed to Neptunist theories. Hutton's influence on geology was further emphasized the following day when we stopped at "Hutton's Unconformity" at Siccar point en route from Edinburgh to Durham. It was here that Hutton began to appreciate the vast expanse of geological time necessary to deposit, deform and uplift rocks.

The highlight of Durham was arguably the accommodations in Durham, Castle, which now serves as a college (dormitory) for the University of Durham. The small city of Durham, with its castle and cathedral, is built on a peninsula formed from an incised meander of the River Wear. The cathedral, founded in the 11th century, is a massive Norman structure which dominates the horizon for miles around. After a visit to some of the fossil-bearing sedimentary rocks of the Yorkshire Moors, we headed southwest into the heart of the Pennines, for a final stop in the Carboniferous limestone country of the Yorkshire Dales. Here we were treated to limestone pavements, cliffs and gorges, all in the context of a "working landscape" of farmland divided up by drystone walls. A final couple of pints of ale that last night were followed the next day by a dash south to the airport, where we managed to catch our planes.

We wish to express our gratitude to the Office of Instructional Development, which generously subsidized the work, and our many friends and colleagues in England who helped smooth the way by enlightening us on things geological and more.

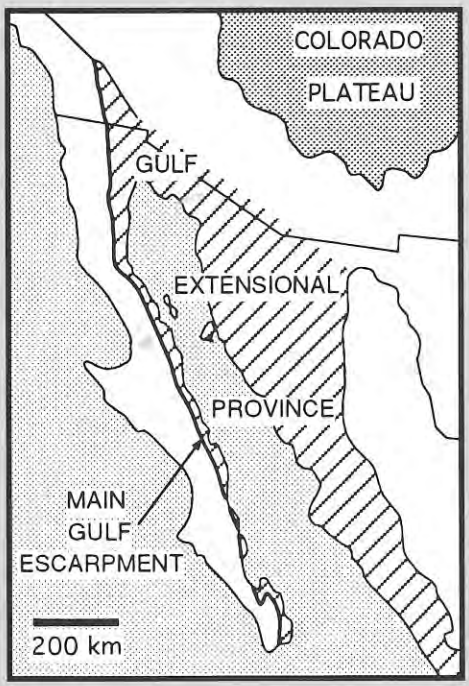
by Professor Jon Davidson

Extensional Tectonics

The View from Baja California

by Professor Gary Axen

The Gulf of California stretches over a thousand kilometers from just south of the U.S. border to central Mexico, with rugged desert topography meeting the warm Gulf waters along the beautiful east coast of the Baja California peninsula. It is the only place in the North American Cordillera, about half of which was affected by widespread, large-magnitude Tertiary continental extension, that has "arrived" at continental separation and formation of new oceanic crust. As such, it represents one of the best places in the world to study the processes of continental rifting. From 1992 to 1995 I lived in Ensenada, Baja California, and studied extensional tectonics along the west side of the Gulf. I plan to continue to work in this scenic and fascinating region while at UCLA.



Laguna Salada, a sub-sea-level basin remarkably similar to Death Valley, lies southwest of Calexico/Mexicali. It is flanked by the Sierras Cucapa and El Mayor on the east, ranges that are separated from the Laguna by west-dipping dextral, normal, and oblique-slip faults of the San Andreas system. Slightly older low-angle normal ("detachment") faults with top-to-the-west slip crop out within the Sierra El Mayor and attest to an earlier history of rapid extension.

West of the Laguna stands the imposing Main Gulf Escarpment -- a rugged 2000m scarp cut into plutons and wall rocks of the Peninsular Ranges -- that rises to the crest of the Sierra Juárez. The Escarpment there has always been interpreted as due to listric east-down normal faulting. That interpretation is probably correct along the Main Gulf Escarpment a hundred kilometers farther south in the Sierra San Pedro Mártir. However, our work suggests that the west-directed detachment faults of the Sierra El Mayor root west under Laguna Salada and the Sierra Juárez, and that the Escarpment there is actually a complicated hanging-wall roll-over or reverse-drag feature much like the Panamint Mountains west of Death Valley.

Thus, the transport direction of the master fault systems of the Main Gulf Escarpment apparently reverses along strike, a feature that is common to the border-fault systems of most continental rifts. This led me to evaluate the entire Main Gulf Escarpment and to reach the conclusion that such reversals probably occurred every 50-200 kilometers along its entire length, from the Salton Sea, California, to La Paz, Baja California Sur.

Although still tentative, this idea suggests many new ways to think about formation of the Escarpment, integration of the San Andreas transform system into the region, and the transition from continental extension to seafloor spreading. These and many other exciting topics will be the subject of a Penrose Research Conference, "Tectonic evolution of the Gulf of California and its margins," in April 1996 in the quiet fishing village of Loreto, Baja California Sur. Hasta entonces, amigos!

Fossil Ammonites and the Suddenness of the End-Cretaceous Extinctions

With mounting evidence of an enormous meteorite impact at the end of the Cretaceous in Yucatan, Mexico, there has been increased interest in assessing the rapidity of the extinctions of late Cretaceous lineages, including dinosaurs. However, because the fossil record is incomplete, the stratigraphic distribution of the last appearances of a group of species is expected to be distributed over a broad stratigraphic interval, giving the impression of a gradual extinction, even if the species became extinct simultaneously (called the Signor-Lipps effect). However, statistical methods may be used to determine whether a pattern of gradual disappearances in the fossil record is consistent with a sudden extinction scenario (Marshall 1995).

Ammonites are one of the most important groups to become extinct at the end of the Cretaceous, and their fossil record is particularly well recorded on Seymour Island, Antarctica. It has been hypothesized, based largely on observed gradual declines of groups such as the Seymour Island ammonites, that high latitudes may have been somewhat protected from the consequences of the end Cretaceous impact. However, when the stratigraphic ranges of the 10 uppermost Cretaceous ammonite species on Seymour island were treated statistically (Marshall 1995), it was found that their pattern of disappearances is consistent with the sudden extinction of all species at the Cretaceous/Tertiary (K/T) boundary, even though they disappear from the fossil record over a 60 meter stratigraphic interval below the K/T boundary (identified by the concentration of iridium derived from the meteorite impact) (see Figure). There is a caveat: computer simulations show that the ammonite disappearances are also consistent with a gradual extinction that may have occurred over as much as a 20-meter interval below the K/T boundary. Thus, while the use of statistical methods shows that the ammonite fossil record is consistent with a mass extinction (despite appearances to the contrary!) their use is unable to actually prove they became extinct suddenly.

by Professor Charles Marshall

Reference. Marshall, C.R. 1995. Distinguishing between sudden and gradual extinctions in the fossil record: Predicting the position of the Cretaceous-Tertiary iridium anomaly using the ammonite fossil record on Seymour Island, Antarctica, *Geology* 23(8):731-734.

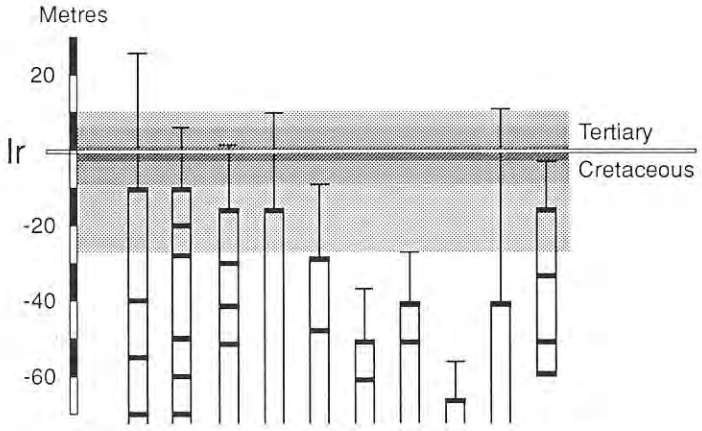


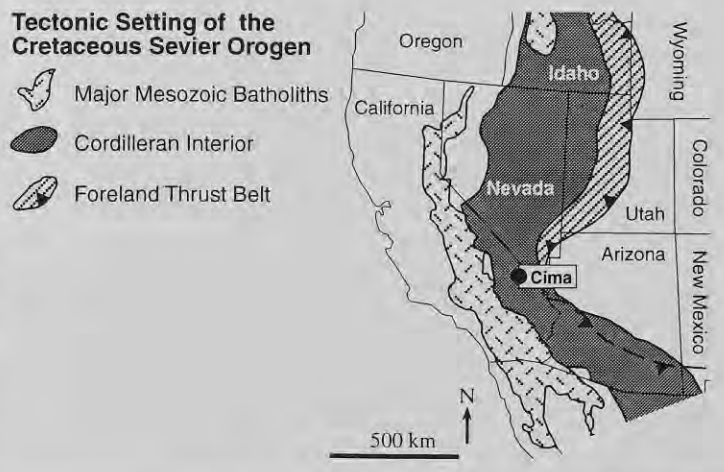
Figure legend:

Distribution of the end points of 50% confidence intervals added to the tops of the stratigraphic ranges of the Seymour Island ammonites. Only the stratigraphic positions (horizontal bars) of ammonites found in the last 70 meters are shown. The stippling shows the region predicted by the confidence intervals to contain the K/T boundary under the assumption that the 10 ammonite species became extinct simultaneously at the end of the Cretaceous. Note that the iridium (Ir) anomaly that marks the K/T boundary falls in the middle of this interval. The stippling, from darkest to lightest, indicates the stratigraphic interval bracketed by five end points above and five below, (probability true extinction horizon falls in this interval is 0.25), by four end points above and four below (probability extinction horizon falls enclosed by this interval is 0.66), and by three end points above and three below (probability extinction horizon enclosed in this interval is 0.89). Modified from Marshall (1995).

Invasion of the Magma Batches...

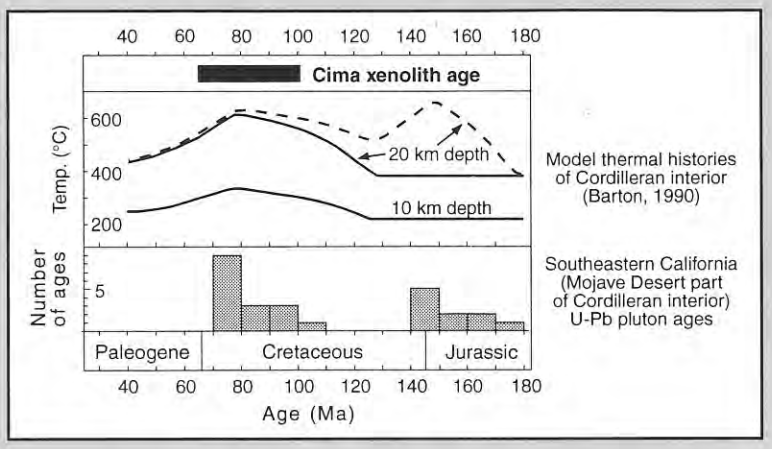
by Janet Leventhal

The above words were featured on the cover of the May 1995 issue of *Geology*, in reference to a paper by graduate student Janet Leventhal and coauthors Mary Reid, Art Montana and Peter Holden. It is generally accepted that major Mesozoic batholiths such as the Sierra Nevada and Peninsular Ranges were produced by Andean-type magmatism related to subduction of oceanic lithosphere. Greater mystery, however, has been associated with the area east of these batholiths--the Cordilleran interior--a region that roughly overlaps most of the modern Basin and Range



province. Cretaceous plutons in the Cordilleran interior are melted crust, and along with extensive regional metamorphism they show that the crust of this region underwent heating during the Cretaceous. What caused this heating? Numerous studies over the past couple of decades have failed to resolve this question.

New geochemical data of Leventhal and coworkers suggest an answer: heating via asthenospheric upwelling and intrusion into the lithosphere. Gabbroic and ultramafic xenoliths from the Cima volcanic field, located in the eastern Mojave Desert, have Nd and Sr isotopic compositions indicating a magma source similar to that of mid-ocean ridge basalt. Sm-Nd and Rb-Sr dates for a gabbroic xenolith demonstrate a Late Cretaceous intrusion age. From these results, it appears that the crust of this region was invaded by asthenosphere-derived magma during the Late Cretaceous. The asthenospheric upwelling that produced this magmatism may have been caused by subduction-induced convection in the mantle behind the Andean-type arc, and might also have been promoted by other subduction-related processes. Whatever the exact mechanism of the intrusion represented by the xenoliths, these rocks provide the first prima facie evidence for depleted-mantle magmatism in the Basin and Range province prior to late Cenozoic volcanism, a result that has broad implications for the history of lithosphere in the western United States.



UCLA Geologists Hold Rocks From the Surface of *Mars!*

Departmental graduate Roberta (Robbie) Score and Professor Bill Schopf are shown in January 1995, in the Antarctic Meteorite Laboratory at the Johnson Space Center (JSC) in Houston, Texas. Robbie received her B.S. degree from the department in 1978; although she took (and he says, did "very well in") a paleontology course from Bill, she was far more interested in hard-rock geology, working as an undergraduate in former UCLA Professor Art Montana's lab. Since graduation, she has put her strong geologic background to good use as a Lockheed-employed scientist in charge of the meteorite and interplanetary dust particle collections at NASA's JSC. Bill is holding rock specimen Allan Hills (ALH) 84001, a meteorite collected in the Antarctic in 1985 and recognized in 1994 as being a member of a suite of meteorites — members of the so-called SNC (Shergotty-Nakhla-Chassigny) clan — that for numerous reasons are regarded as rock samples of the surface of Mars. The specimen, dated at ~4.5 billion years, is evidently the oldest martian meteorite known and was apparently blasted off the Martian surface by an impacting meteorite some 13 to 16 million years ago. Members of the SNC clan contain 0.04 to 0.4% water by weight, shown by oxygen isotopes to be of extraterrestrial (seemingly Martian) origin (1992, Science 255: 1409-1411). Moreover, the meteorite shown contains abundant calcium, iron and magnesium-rich carbonate minerals that are enriched in ^{13}C relative to terrestrial carbonates ($\delta^{13}C \cong +41$ ‰), consistent with Martian atmospheric CO_2 as the carbon source (1994, Nature 372: 655-657). Clearly, long before astronauts are able to collect and return to Earth samples collected on Mars, studies of SNC meteorites may hold clues to understanding near-surface processes on that planet and the evolution of the Martian atmosphere. If so, UCLA and Robbie Score, will be there!

Photo: Left to right: David McKay (NASA, JSC); Roberta "Robbie" Score (Lockheed: UCLA 1978 B.S.); Everett Gibson (NASA, JSC); Bill Schopf (UCLA).

HISTORY OF UCLA

Our history of summer field is a little like the fossil record—abundant information in places, spotty in others, and a few hiatuses here and there. Although summer field was held before, the collective memory becomes reliable only after, the Second World War—it is our Precambrian-Cambrian boundary. As this history project continues, we welcome information about those earlier years as well as from any other period.

PAP

The first post-WWII UCLA summer field camp was held in 1948 under John Crowell, newly hired the previous Fall, and Cordell Durrell. The field area was in the Santa Ana Mountains, and camp was pitched in Trabuco Canyon on the Irvine Ranch. In those distant days, the few women geology students did not attend the regular camp, but instead took a 199 (independent research project) and mapped unsupervised in the Santa Monica Mountains behind the campus.

Clem Nelson first taught summer field in 1949, along with John Crowell and Jim Gilluly. This camp, held in Cortez, Nevada, began a ten-year association with the Silver State. The next year, UCLA moved to Mt. Hope, NV, for a combined course with Pomona College and a class of around 90 students. Riding herd on this, well, herd were Crowell, Nelson, Axelrod, and Don Carlisle. The next year, camp moved again and stayed put, for 1951 through 1955, in Mineral Hill, NV. Nelson, Carlisle and Axelrod were assisted by Bill "Shorty" Daly, departmental illustrator and able camp helper. 1952 and 1953 saw the team of Nelson and Carlisle with assists from Daly and, in 1952, graduate student Max Carman. Assistant Professor Jerry Winterer, now at UCSD, joined up in 1954, and the following year Nelson began an 11-year hiatus from summer field duties.

It was in either 1954 or 1955 that the incident of the swimming tank occurred. The men were accustomed to skinny dipping in a hot-spring-fed water tank at camp. Although it was now the progressive mid-1950s and women were allowed to attend camp, the men refused to give up their swimming habits. This apparently upset the Dean of Women back in Westwood more than it did the women in camp at Mineral Hill. Well, it probably seemed like a big deal at the time.

The years 1956 through 1958 found UCLA summer field at Roberts Mountain, NV, under the charge of Jerry Winterer. 1958 was particularly noteworthy in that Clarence Hall first put in an appearance. Other instructors from that year were John Christie, Perry Ehlig and Jim Richmond (both latter now at CSULA). Jerry remembers establishing a large expedition-style camp at Kelly Creek with a huge circus-like mess tent. Whole sides of beef were purchased at a slaughter house in Elko and hung in a screen house covered with burlap bags kept wet with water from the creek. The camp bought barrels of gasoline locally to resell to the students, inasmuch as students provided their own transportation. No University vehicles were used except for hauling supplies, and there seems to have been a lot of that. In those heroic days, a graduate student served as camp manager, with Gary Lane putting in a stint in that exalted position.

A special thanks to Charles Corbato an

SUMMER FIELD

RT I

All things change, and in 1959 UCLA summer field left Nevada forever. In that watershed year, Chairman Crowell informed Clarence Hall that he would be in charge of summer field. This was to be the beginning of a long history of work in the central Coast Ranges of California. The instructors that year were Hall, John Christie, Charles Corbato (now of Ohio State), Barry Raleigh (now at U. Hawaii) and Jim Richmond. Eugene Fritsche (now at CSUN) was camp manager. A few of the 36 students included Dave Anderson, Ed Asihene, Bob Douglas (now at USC), Gordon Jones (brother of longtime, and now retired, staff member Bob Jones), Jay Smith and Wayne Zeck. The campsite, located in what is now Pismo Beach State Park, offered welcome temperatures in the 50s and 60s to students whose field area got as hot as the 120s.

Maybe it was those unbearable temperatures, but the next year, 1960, saw a startling drop in the summer geology enrollments. Only 17 students braved the summer conditions in the Coast Ranges and were rewarded with residential facilities at Cal Poly San Luis Obispo. Work continued in the Nipomo and Arroyo Grande quadrangles, with instructors Christie, Corbato and Hall (in charge). Some of the students who went on to become leading figures in geology and paleontology were Len Ettinger, Allen Hatheway, Irv Neder (now at CSULA), Warren Nokelberg (USGS Menlo Park), Gordon Pine, Ron Surdam (U Wyoming) and Ted Theodore (USGS Menlo Park).

By 1961, enrollments had dropped to 9 students, instructed by Corbato and Hall (in charge). A few of the students in that class were Ted Julian (whose daughter, no doubt thrilled by the tales of summer field, was a geology major many years later) Ariane Julian ('88), and Jere Lipps (UC Berkeley). 1962 and 1963 are lost years in our collective memory, but 1964 finds Hall back in the central Coast Ranges, with Ron Surdam as the other instructor. There were only 7 students that year: Stephen Adams, Larry Crippen, James Dawson, Frank Denison, Bruce Helstrom, Joe Ritchey and John Scott.

In 1965 the summer field class moved into the Pismo Beach and San Luis Obispo area, with instructors Hall Corbato, Surdam and graduate student Steve Calvert. A few of the 11 students that year were Rick Cameron, John Connor, Tom Helm, Patrick McGonigley, and Louise Marincovich (now USGS).

With 1965, we leave our narrative for this year. In the next newsletter we will follow camp as its moves eastward again for its stay at legendary Poleta Folds and in the White and Inyo Mountains. And remember, we welcome more information and recollections, even of the years already discussed.

by Warren Thomas

l Robert Farina for sending in these photos.

Class of 1995

Honors and Awards

John W. & Frances R. Handin Scholarship

Presented to undergraduates for scholastic excellence, this award was endowed by Department alumnus John W. Handin (BA '42, MA '48, Ph.D. '49) and his wife, Frances.

Michael E. Winter

Eugene B. Waggoner Scholarship

Awarded for academic excellence, this scholarship honors the memory of Department alumnus Eugene B. Waggoner (BA '38, MA '39).

Kristen S. Kawakami

Michael D. Lien Scholarship

Endowed by Mr. & Mrs. Floyd L. Lien and Cities Service Oil Company in memory of Department alumnus Michael D. Lien (BS '69), this award honors a senior undergraduate for scholastic excellence.

Kimberly M. Cooper

Sabins/Chevron Summer Field Award

Through the generosity of long-time Departmental friend and Adjunct Professor Floyd Sabins, and Chevron Oil Company, this award is conferred for scholastic excellence to summer field students.

Karen E. Anderson
Craig Harran
Deborah L. Sanders

Clem Nelson Summer Field Award

Conferred for scholastic excellence, this award is generously supported by Professor Emeritus Nelson's former field students and associates.

Michael J. Pitta
Michael C. Woods

DOCTOR OF PHILOSOPHY

Julie K. Bartley — *Approaches Toward Interpreting Precambrian Environments: Actualistic Studies of Carbon Isotopes and Taphonomy in Modern Microbial Communities.* (Professor Schopf) *Geology*

Ronald J. Hill — *The Influence of Pressure on Coal Maturation and Oil Cracking and the Changes that Occur in Oil Composition with Increasing Maturity as Simulated by Confined Pyrolysis.* (Professor Kaplan) *Geology*

Xianghong Kong — *Numerical Modeling of the Neotectonics of Asia: A New Spherical Shell Finite Element Method with Faults.* (Professor Bird) *Geology*

Adrian Lenardic — *Thermal/Chemical Boundary Layer Convection with Application to the Geodynamics of TerrestrialPlanets.* (Professor Kaula) *Geophysics and Space Physics*

Earnest Dean Paylor II — *The Western Owl Creek Mountains Strike-Slip Duplex: Implications for the Role of Displacement Transfer Zones in Foreland Deformation.* (Professor Yin) *Geology*

Dingan Xu — *Low Altitude Signatures of Magnetospheric Configuration and Dynamics.* (Professor Kivelson) *Geophysics & Space Physics*

MASTER OF SCIENCE

Scott Andrew Burner — *Isotopic Preservation of Himalayan/Tibetan Uplift, Denudation and Climatic Histories of Siwalik Group Sediments, South-Central and South-Eastern Nepal.*(Professor Harrrison) *Geology*

Douglas Dwain Creel — *(By Comprehensive Examination) Geophysics and Space Physics.*

Peter Andrew Craig — *Cenozoic Development of the Kuche Forland of the Tarim Basin, Xinjiang China* (Professor Ingersoll) *Geology*

Shangxing Gao — *Seismic Evidence for Small Scale Mantle Convection under the Baikal Rift Zone, Siberia* (Professor Davis) *Geophysics & Space Physics*

Matthew David Hacker — *Arc to Back-arc Geochemical Variations in the Salar de Coipasa Region of the Andean Central Volcanic Zone at 19°S, Western Bolivia* (Professor Davidson) *Geology*

Kimberley Holland — *Protolith and Geochronology of the Hurd Peak Gneiss East-Central Sierra Nevada, California* (Professors Reed and Reid) *Geology*

Han Kuo — *(By Comprehensive Examination) Geophysics and Space Physics.*

Elizabeth Large — *Miocene and Pliocene Sandstone Petrofacies of the Northen Alburquerque Basin, New Mexico* (Professor Ingersoll) *Geology*

Gretchen Marie Lindsay — *(By Comprehensive Examination) Geophysics and Space Physics.*

William Bruce Moore — *(By Comprehensive Examination) Geophysics and Space Physics.*

David Russell Potter — *(By Comprehensive Examination) Geophysics and Space Physics.*

James Todd Ratcliff — *(By Comprehensive Examination) Geophysics and Space Physics.*

Mark Ian Richardson — *(By Comprehensive Examination) Geophysics and Space Physics.*

Ronald Schmidtling III — *Three-Dimensional Reconstruction of the Hydrospires of Pentremites* rusticus *(Echinodermata: Blastoidea)* (Professor Marshall) *Geology.*

Stephen Edward Wood — *(By Comprehensive Examination) Geophysics and Space Physics.*

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The Department of Earth & Space Sciences is pleased to announce that it has received a very generous gift from Harold and Mayla Sullwold. The Sullwolds made a gift of appreciated stock valued at $100,000 to create a charitable gift annuity. In addition to the favorable tax benefits provided by this gift, the Sullwolds will receive a set income from UCLA for life. After that time, their gift will become an endowment that the department will use to fund ***The Harold and Mayla Sullwold Scholarships****, benefitting our students in perpetuity.*

Dr. Harold Sullwold received three geology degrees from UCLA: a B.A. in 1939, an M.A. in 1940, and a Ph.D. in 1959. His professional memberships include the American Association of Petroleum Geologists, the Geological Society of America, and the American Institute of Professional Geologists. Dr. Sullwold continues to work in the field of petroleum geology as a consultant. Many readers may recall him as the talented cartoonist whose "Andy Cline" character has graced past issues of this newsletter. Mayla Sullwold is also a dedicated Bruin, holding a B.A. degree in Psychology (Class of 1940). The Sullwolds live in Santa Barbara, California.

We are very grateful to the Sullwolds for creating this scholarship.

(Alumni who are interested in learning more about how a charitable gift annuity or other planned gift could benefit both themselves and the Department of Earth & Space Sciences are encouraged to call the UCLA Office of Planned and Major Gifts at (800) 737-UCLA.)

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In Memoriam

Frank Stanton Simons ('40)
Born: November 14, 1917
Died: January 6, 1995

Frank Simons, A.B. 1940 (PhD Stanford 1951), died at age 77 at the end of a long siege by bone-marrow cancer. Frank's

distinguished career as a USGS research geologist began in 1941, slowed with retirement in 1988, and ended, after several active emeritus years, when he was struck by debilitating illness.

Frank worked first with strategic manganese deposits in Cuba, Panama and California, then served as a Navy officer late in World War II. He next worked in the Aleutian Islands and Mexico, earned a PhD at Stanford, and went to Peru for 6 years. From 1957 onward Frank was based mostly in Denver and did fieldwork in Arizona and the Rocky Mountains, but he served a tour as a Washington administrator and another as chief of the USGS mission in Saudi Arabia. His research on economic and regional geology was published in more than 50 monographs, journal articles, and geologic maps.

Mary Edwards and Frank met at UCLA and were married in 1941. Mary and their three sons and two granddaughters survive him. Frank enjoyed fieldwork in remote regions and spent much vacation time hiking, backpacking (especially with his sons), fishing and scuba diving.

[by Warren Hamilton, MS '64, US Geological Survey, Denver, CO]

James W. Sheller ('38)
Died: October 31, 1994, in Lafayette, LA.

His wife, Ruth, reported that he was in good health until the end. In fact, he was planning a geological field trip just before he died.

[by Paul McGovney, BA '38]

Phillip Henry McCary, Jr. ('52)
Born: December 21, 1927
Died: September 12, 1991

Phillip died in Los Angeles of lung cancer and radiation poisoning resulting from exposure while exploring for and mining Uranium in the 1950s. He worked for the AEC and was self employed, engaging in exploration and mining. He was the first to discover Uranium in the Marble Canyon area of Arizona.

[by Phyllis McCary Beacom]

Robert Wiley Adams ('41)
Born: December 4, 1919
Died: August 15, 1995

Mr. Adam's degree in geology led him to a job with Richfield Oil upon graduation. After service in the U.S. Navy in Photo Intelligence, he returned to Richfield after the war. After a brief time there, he decided he would rather be his own boss. His years until retirement were spent in hydraulic and electronic custom designing, including several inventions involved with early-years' production of computer parts.

Bob's interest remained with geology, and in recent years he involved himself in projects that included a detailed study of Pleistocene lakes in the Mojave desert. His work on plate tectonics and earthquakes was brought close to home, with the epicenter of the Northridge quake located approximately one-half mile northeast of his family home. Several detailed reports were computerized from his studies.

After a 1 1/2-year-long battle with cancer, he passed away on August 15, 1995. In lieu of flowers, the family requested donations to the scholarship fund for the Department of Earth & Space Sciences.

[by Mrs. Barbara Adams]

1938

Paul E. McGovney, B.A., moved to Kennewick to be closer to his daughters and closer to the golf course. One of his daughters lives on the first nine holes and he now lives on the back nine.

1939

Joseph W. Kean, B.A., Jr. Lt. Col. US Marine Corps., retired in 1980 from a teaching position at California Youth Authority. He was a Naval Aviator and in 1964 received his General Secondary Teaching Credential at Long Beach State University.

Joseph W. Kean, Jr. Lt. Col. US Marine Corps.

1941

Holly Clyde Wagner, B.A., M.A. 1947, was awarded the degree of Doctor of Philosphy at the U. of Leicester, England on July 14, 1995. She had received the B.A. and M.A. degrees at UCLA in 1941 and 1947, respectively, and had worked on the Ph.D. at the University of Kansas between 1951 and 1955. Before its completion, she was transferred to Washington, D.C. by the U.S. Geological Survey, for whom she had worked since 1942. Her 847-page dissertation was titled "The geology of Wilson County, Kansas."

1947

John C. Crowell, PhD, was awarded the Geological Society of America's highest award - the Penrose Medal - at the Annual Meeting in New Orleans in November. John was the second PhD. student awarded by the department. He was Professor and Chairman during his 20 years at UCLA, and then moved on to UC Santa Barbara in 1967. His many contributions to earth sciences include landmark studies of the tectonics and sedimentation of the San Andreas fault system and the Permo-Carboniferous glaciation of Gondwanaland. John's role as Chairman of Geology at UCLA is also mentioned on page 8. He is currently retired but active in Santa Barbara.

Max Carman, Jr. , Prof. Emeritus of Geology, Univeristy of Houston, 1990, in Big Bend, TX.

1948

Max F. Carman, Jr., BA, PhD. 1954, remembers well the 1952 and 1954 field camps at Bruffy's Ranch in Nevada. He was also an instructor, along with Clem, Don, and Jerry during those years. He finally hung it up in 1992 after 38 years of teaching at the University of Houston, and has been finishing off a couple of research projects since then. He remembers fondly teaching at the UCLA summer field camps and has told many stories about them to his students' field camps through the years. Regarding the photograph on this page, Max comments, "My headgear may look a little kinky, but I have found it to be far and away the most practical one for work in the desert, where I've done the bulk of my research. A bandana held on with a sweat band, it does not blow off, can be stuffed in your pocket when you don't need it, shades the head and neck very well, is quite cool and the flapping in the wind holds off the flies."

1950

Earl W. Hart, B.A., retired from the California Division of Mines & Geology at the end of 1994, after forty years. Twenty-two of those years were as Manager of the Fault Evaluations & Zoning Program, which established regulatory zones around active faults (under the Alquist Priolo Act). He is currently doing a bit of travelling and playing tennis when not working part-time with CDMG as a retired annuitant. Although he received an MA in Geology at UC Berkeley (1971), his allegiance is still to UCLA. (Go Bruins!!)

1952

Donald R. Lindsay, M.A,. is a member of The National Center for Science Education and Kern Alliance for Quality Schools. He took an educational tour of the Galapagos in February of this year and said that it was "a great experience!"

Neil Hamilton in the Tanamai Desert of Central Australia, 1965.

Norman V. Wagner II, A.B., is a major supporter of the Department of Earth & Space Sciences. Norman has been retired since January of 1989.

1954

N. W. Hamilton, B.A., M.A. 1956, retired in 1991 after 35 years in oil and gas exploration, living in Libya, Turkey, Australia, Indonesia, Spain and the U.K. for 18 of those years. He married a lovely Britisher in 1963, Celia Tanner, from Guernsey. They have two boys. Andrew is presently serving as Second Secretary to the American Embassy in Zagreb, Croatia, while Matthew works for a computer graphics company in Denver. They have lived in Evergreen since 1974, while he worked for several companies in Denver, mostly in foreign exploration but for a few years on projects in California: the Santa Maria, San Joaquin and Sacramento Valley basins and the Santa Barbara Channel. For the last nine years he was a Chief Geologist, and for a short time, Manager of Foreign Exploration for the Anschutz Overseas Corporation owned by Denver's only billonaire. "I see *John Livingston* occasionally at the post office as he lives here in Evergreen, and I keep in touch with *Bob Robinson('56)* down in Houston."

Neil has written a sort of journal based on his diaries, field notes and reports of his past experiences. "I am somewhat amazed at where I went, what I saw, how much the world has changed and how fast the time has passed."

1956

Tully M. Robison, B.A., retired from the Water Resources Division of USGS as a hydrologist and subsequent consultant. Now he is an executive director of a society debunking environmental extremism. He and his wife currently reside in Bocca Raton, FL.

1960

Charles E. Corbato, PhD., said that he particularly enjoyed looking at the Summer Field photos in last year's issue of the Newsletter. He sent us seven of the "official" group photos for the summers of ('56, '59 - '63 and '65.) During these years he was part of the instructional staff for Summer Field.

1966

John E. Warme, PhD., married Judy O'Keefe in November of 1994. They live on Evergreen Mountain in Colorado at an elevation of 8400 feet. John climbed Mt. Kilimanjaro, which is an elevation of 19,300 feet when he was on a sabbatical from the Colorado School of Mines in 1992. The climb takes 3 1/2 days up and 1 1/2 days down. He is doing field studies in Algeria, Morocco and even Nevada, where he has found evidence for a late Devonian meteor impact.

1969

Bruce Lander, B.S., has a new business called Paleo Environmental Associates, Inc., in Altadena, California. It deals with paleontologic resource management and consulting. Some major projects include the Metro Red Line and wide media coverage regarding the Hollywood tunnel fossils.

1971

Gary S. Johnson, B.S., worked as a geothermal geologist at Unocal for ten years, then went into regulating leaking underground storage tanks for the State of California, Napa County and Sonoma County. As of January 1, 1994, he became a partner in EvniroNet, a small environmental consulting company in Northern California, which specializes in leaking underground storage tanks but will tackle almost any type of environmental problem. "Given another ten to twenty years, I may actually be able to retire as well."

Jim Lowell(left) & *John Warme* ('66) on Mt. Uhuru Peak, summit of Mt. Kilimanjaro - October '92.

Stephen E. Jacobs, B.S., has a new job as Project Geologist for a geotechnical firm in Orange County called John A. Sayens & Associates. He sent us a photo of the 1971 Summer Field Camp.

1972

Edwin M. Winter, PhD., wrote in to tell us that he works at The Technical Research Association Inc., and that his son, Michael, is currently a student in our department.

1974

James C. Norman, B.S., is an Operations Manager at an environmental sciences firm, Hydro-Search, Inc., located in Huntington Beach, California. Also, he mentions another classmate, *Jim Goodrich*, who is head of the San Gabriel Valley Water Quality Authority.

1977

Kathleen Ehlig Proffer, B.S., has relocated to the "west slope" of Colorado. "Paying work is hard to find, but the geology is beautiful." She feels at home with the faults, landslides, expansive soils and groundwater problems.

1983

Scott Warner, B.S., got married in May 1994 to a wonderful former UCLA "north campus" grad, Susan Bell, after knowing her for 12 years, sharing a flat in San Francisco with her (in a platonic relationship, of course) for 2 years, then going to find her in France where she went to live with her then boyfriend! Keeping the geology theme in mind, they were married in Three Points, California, just a stone's throw from the San Andreas fault between Gorman and Lake Hughes. Still on the geology theme, while honeymooning in Costa Rica, they stayed two nights at a mountain lodge a mere 7 miles from Volcan Arenal, one of the world's most active volcanoes, and were treated to a spectacular geo-orgasmic eruption complete with lava fountains and falls, earthquakes, and steam eruptions (of course I mean the volcano!) All this and it was his wife's birthday, too!

Scott is a senior hydrogeologist with Geomatrix Consultants in San Francisco. He says that work is great and busy. Recently, he and Susan, bought a house in northern Marin County (kind of rural suburbia). They are very happy and eagerly await their next adventure.

1984

Ann Harch, B.S., has "finally" left JPL, after 10 years of gainful employment, to work at Cornell University on a small NASA project called NEAR (Near Earth Asteroid Rendezvous.) "This is definitely the wrong side of the country." She will continue to make pilgrimages to the Sierras. Also, she hopes to start graduate school in geology next year.

Tim Thompson, B.S., is working at Integrated Water Technologies, Inc., which is located in Santa Barbara. He had plans to be married this past August.

1986

Dean Delahaut, B.S., is now working for 6 months at 14,600 ft. in the Chilean Andes for the Banick Gold Co. -- TermMatrix Engineering, where he constructs tailing dams at the El Indio Mine as Resident Geotechnical Engineer.

1987

M.C. (Motlole) Moseki, B.S., is presently a manager at the Taung Education Enrichment Center in Taung, South Africa. He is encouraging high school students who intend to follow careers in Technology & Engineering. Next year he intends to continue on to a master's program in geology.

1988

Michael Higuchi, B.S., since graduation has picked up an M.S. degree in Civil Engineering at UC Irvine and is now a Certified Engineering Geologist and a Registered Environmental Assessor. He and his wife have just purchased their first home. They now have four children: Christine (8), Kevin (6), Elena (3), and Jane (1). Michael has been working as a project manager for a small environmental engineering consulting firm in Orange County since 1991.

1993

Vivian Woo, B.S., is currently in the M.A./ PhD. program at the University of Washington. Vivian is majoring in English. "I'm quite the topic of conversation, being a geology graduate and majoring in English!" She mentions that a classmate, *John Holodnik ('92)* has also moved to Washington.