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Geology and Geophysics at The University of Kansas

GHAWKER

Fall 2015



Welcome to the 2015 *G-Hawker*! We've had a busy and successful year at KU Geology, and, 2016 looks like it will be even better.

First and foremost, please accept the Department's heartfelt gratitude for your amazing financial support. The Department has always been blessed with great alumni and friends, but because of your generous donations, construction of the new Earth, Energy and Environment Center is now underway. The new Center, which includes two state-of-the-art facilities, should be completed by the end of 2017. The Center brings a multitude of new opportunities to us and to KU. To fully exploit everything we can do, we've worked with the architects to refine the Center, and we are very pleased with the results.

I also am pleased to announce that Leigh Stearns and Andreas Möller have both been given tenure and promoted to the position of Associate Professor by KU. Congratulations Leigh and Andreas!

As we prepare for the move into the new Center, we're already shifting things around in Lindley Hall. The University combined the three main offices of Geology, Geography and Atmospheric Science, and Environmental Studies and moved them into one suite, which will now be called the Lindley Hall Welcome Center. It is in Room 215. I'll remain in my current office in 120 Lindley. Our alumni relations staffer Cari Alfors will remain next door to me, but the rest of the Geology office is moving upstairs. When you visit, stop by and say hello in the new office, and do feel free to come back down to Room 120 to see Cari and me.

As happens every year, there are staff changes. This year we're saying farewell and thank you to Kelsey Bitting, who is off to a new academic assignment. She joined us as a visiting assistant professor and helped revamp two of our undergraduate courses, Geol 101, The Way the Earth Works, and Geol 121, DNA to Dinosaurs: Prehistoric Life. She did a great job. We wish her well.

I'm also pleased to tell you that we're launching our new undergraduate curriculum this year. Among other changes, we're again teaching Historical Geology, a class that had been removed from the curriculum. While retaining strong core knowledge and skills courses like Mineralogy and Structure of the Earth, Sedimentology and Stratigraphy, and Structural Geology, among many others, we're also allowing undergraduates greater flexibility so that they can add more specialty courses like our new classes in Geochemistry and in Climate, or can add one of our long-time electives like Paleontology, Geobiology, Petroleum and Subsurface Geology, Geophysics and Hydrogeology, among many other courses.

And of course, we remain committed to our field courses: Geol 360 Field Investigation, Geol 560 Introductory Field Geology and Geol 561 Field Geology. We're continuing to add short field trips to diversify the field experiences available to both undergraduate and graduate students.

We're also welcoming more alumni with industry experience to teach. For example, Brad Prather, recently retired from Shell, is continuing to teach a short course in deepwater deposits, as both a classroom experience and as a field trip. Ron Wallace, Steve Hoffine, Bill Reetz and Julie Westhoff are offering a one-day site workshop for hydrogeologists.

The upcoming year will be busy as we continue to work on revamping our current courses, and oversee the construction of the new Center. All signs point toward a successful 2016. I'm particularly looking forward to my sabbatical. From January to early summer, I'll be working at The Petroleum Institute University and Research Center in Abu Dhabi, the capital of the United Arab Emirates.

Thank you for being such an important part of our success.



Luis A. González, Chair

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FIELD NOTES



Katie Graham points out a feature to Mike Taylor.

Winning the Golden Hammer

Katie Graham, a junior from Manhattan, Kan., won this year's Golden Hammer Award at Field Camp. The award goes to the Geol 561 student who does the best job with mapping projects, is excellent in dealing with new stratigraphy and understanding the map areas, is enthusiastic, and contributes to the intellectual development of the whole group. KU Geology first gave the Golden Hammer in 2006.

The Art of the Mini-Retirement

McGee Distinguished Professor Don Steeples was enjoying retirement on his western Kansas farm in January when KU Provost Jeffrey Vitter phoned him unexpectedly. The dean of the College of Science and Liberal Arts, Danny Anderson, had just been appointed president of Trinity University, and KU needed an interim dean. Vitter asked: Are you interested? "It was an opportunity to serve the University, so here I am," Steeples told a meeting of the Geology Associates Advisory Board. "But if anybody is surprised to see me up here, they're not half as surprised as I am." Steeples took over the University's broadest, and most diverse academic unit in March. He will serve until a new dean, University of Maryland Professor Carl Lejuez, begins in February 2016.

Stearns and Möller Win Tenure

Leigh Stearns and Andreas Möller have won tenure and been promoted to associate professor. Stearns studies outlet glacier dynamics in Greenland and Antarctica, and teaches geomorphology, glaciology and a number of independent studies and seminars. Möller focuses on combining radiometric ages with petrologic pressure and temperature data to reconstruct the evolution of mountain belts. He also works in provenance analysis of sediments and sedimentary rocks and new approaches to dating the depositional ages of sediments. He teaches igneous and metamorphic petrology, and geochronology, and co-teaches Field Camp, among other classes.

A Grateful Grandson

When Geol 360 hit the road in August to give students their first taste of fieldwork, there was one student who already knew about its grit and joy. Junior Connor Stotts grew up with it.

As a child, he spent a week or two at Field Camp every summer. He dug for fossils behind his house and received his first rock hammer at age 8 as a gift from his grandfather, the late Roger Kaesler, a KU Geology professor and Field Camp and Paleontological Institute director. The son of Kaesler's daughter, Jane, Stotts says he was naturally drawn to geology. He loved the lessons his grandfather gave him.

This year's Geol 360 class provided Stotts with a chance to finally emulate the students he used to watch at Field Camp. "To see what it's actually like now, to actually do it, is very exciting," he says.

Uncertain about his future, Stotts says he plans to get his geology degree and then see what's next. How-

ever, one thing he will continue to do is take good care of the leather field belt he inherited from his grandfather. Worn but still sturdy, the belt retains a place for a rock hammer, Brunton compass and other tools.

"It's cool to have that piece of him with me."



L to R, Connor Stotts, Roger Kaesler's grandson, works with Paige Englert, Brandon Tabor, Johnathan Flaherty, on a Geol 360 exercise.

The Treatise & Sponges

In the first new hard-copy edition of the *The Treatise on Invertebrate Paleontology* to be published in years, KU's Paleontological Institute has produced Part E (Revised) Volumes 4 and 5. The edition covers the hypercalcified sponges (stromatoporoids, chaetetids, and their allies), a group of major reef-forming fossils.

Though barely known as living animals, the hypercalcified sponges are important to the fossil record. They have been variously classified with corals, sponges, algae, and a variety of animal and plant crops, before recently being shown to be true sponges (Porifera). But unlike most sponges whose skeletons are largely organic with or without microscopic spicules of calcite or silica, the hypercalcified sponges build a massive calcium carbonate framework.

Bowring Elected

KU Geology sends hearty congratulations to Sam Bowring (PhD '85) on his election to the National Academy of Sciences. Bowring is the Robert R. Shrock Professor of Geology at the Massachusetts Institute of Technology.

See You There

KU Geology has set the dates for its alumni receptions at GSA and AAPG. The GSA dates are Monday, Nov. 2, 2015, in Baltimore, and Monday Sept. 26, 2016, in Denver. The AAPG dates are Monday June 20, 2016, in Alberta, Canada, and Monday, April 3, 2017, in Houston. See the convention program for the specific time and location.

Seals Named Self Fellow

First-year doctoral student Leila Joyce Seals, of Mayagüez, Puerto Rico, has joined the ranks of KU Geology students to win the prestigious Self Fellowship. Since it was established, eight KU Geology students have won the fellowship, which provides total financial support of more than \$165,000 over four years. The fellowship also provides training in communication, management and leadership. Fellows interact with nationally prominent experts and participate in an intensive public policy seminar held in Washington, D.C.



In the Family

In May the third generation of this Lindley Hall clan of graduates walked down The Hill. On the right, George Tappan (Geology BS '51); on the left, his son Gray Tappan, (Geography '78, MS '81); and in the center, grandson Taylor Tappan, (Geography '13, MS '15).

Yippee!

Below, Geol 360 student Brandon Tabor, far right, won World Champion All Around Stick Horse Cowboy, ages 19 to 40, at the Lake City, CO., Stick Horse Rodeo, a tongue-in-cheek event put on annually by the town of 400. Tabor and other Geol 360 students, left to right, Tyler Wyant, Brian Chan and Trevor Menke entered the rodeo when the geology class got a day off in Lake City – a day off that coincided with the event. The students borrowed some of the town's stick horses to compete. Tabor's enthusiasm and commitment won over the judges. "I really have to give a lot of the credit to my horse Sparkles," Tabor says. "I couldn't have asked for a better horse. She knew exactly what she was doing. I honestly didn't have to train her."



FACULTY UPDATE



Associate Professor Andreas Möller talks with Teaching Assistant Brian Sitek at the Profitt Mountain scour in Missouri.

Ross Black **Associate Professor**

Last year was again a very busy year for teaching. The introductory Geophysics class was near capacity. The Geology students are there, of course, and more engineers are enrolling in it than ever before. I also taught two more advanced geophysics classes, Geophysical Data Analysis and Seismic Exploration. The Seismic Exploration class concentrates on slightly more advanced concepts than the introductory class, and uses industry standard software to present real data examples of all the concepts. Thanks to our alumni and our other friends in industry for your help in maintaining this capability.

The Geophysical Data Analysis class rolls included several new Geophysics graduate students and some very quantitatively adept Geology graduate students. This is a good trend. In addition, the class is cross-listed as a separate course in the Physics Department. We had a record number of Physics PhD students registered for the class this year.

Research activities were concentrated on data analysis and software algorithmic development. With Jose Velez, George Tsoflias and C.J. Van der Veen, we have submitted a couple of papers on sub-glacial imaging and seismic anisotropy over portions of the Greenland ice sheet. I am also working on solving some basic imaging problems inherent in radar surveys in urban areas.

Michael D. Blum **Ritchie Distinguished Professor**

My first year at KU was busy, transitioning from ExxonMobil and Houston, completing office and lab renovations, ordering computers and field equipment, and realizing that I no longer had to spend 1.5 hours per day in white-knuckle traffic getting to and from an office. I reengaged with academic friends, and spent a lot of time developing a vision for research at KU.

I also attended a series of conferences. Beyond the usual (GSA, AGU, AAPG), these included the Geological Society of London William Smith Conference on sequence stratigraphy, an Oil Sands symposium in Calgary, an AAPG Geoscience Technology Workshop in Wellington, New Zealand, and an International Association of Sedimentologists meeting in Krakow, Poland. Most recently, I completed a short course and lecture tour for the Petroleum Exploration Society of Australia, visiting Perth, Adelaide, Brisbane, Canberra, Melbourne and Sydney. Exhausting, but awesome.

At KU last year, I taught a grad-level course in fluvial systems, whereas this year, I will teach a grad-level course in clastic sedimentology, and a more specialized seminar in source-to-sink sediment dispersal. I was also pleased to welcome a new post-doc, Bruce Frederick from the University of Texas-Austin, and three new grad students, Deserae Jennings from Iowa State (PhD), Bridget Pettit from University of Texas-Austin (MS), and Andrew Philbin from Texas A&M (MS).

Last but not least, my wife Rosemary and I studied

up on this unique bird species, called a Jayhawk, with two members that appear to be products of some sort of immaculate conception and show up all over campus in various outfits, and we obtained KU basketball season tickets.

J.F. Devlin Professor

Two new graduate students have joined my group: Trevor Osorno and Mackenzie Cremeans. Both are working on projects related to measuring water flow rates in the subsurface. Both are collaborating in the field with Danish groups; Trevor is working with Niras consultants, and Mackenzie with the Technical University of Denmark. The Danes have been very generous in funding both projects. Mackenzie's research involves the development and testing of a new device to measure groundwater flow into streams. Trevor is working on a similar device that measures groundwater flow rates using wells as access points, and he is also supported by the American Petroleum Institute, a new benefactor of our research. Both projects are advancing nicely with very encouraging preliminary datasets already generated.

On the teaching front, the fall of 2014 saw the return of Contaminant Transport and Physical Hydrogeology as separate three-hour courses. Everyone enjoyed the extra breathing space. The Contaminants in Groundwater course field trip was updated last year with an expanded tour of Tri-State mining area and involvement of the Quapaw Tribe. The tribal representatives were wonderful to work with and took us to locations on their land that showed off the problem landscape from the top of massive tailings piles to the bottom of iron-stained streams. More new wrinkles are being planned for future trips. Looking forward to reporting positively on those experiments next year!

Dave Fowle Associate Professor

The past year I had a wonderful sabbatical at the Robert B. Annis Water Resources Institute on Lake Michigan. It presented some great opportunities for field experiences, and to be blunt, quiet time to reflect on the past few years at KU and what the future holds. During that time, I learned of my appointment as a Docking Faculty Scholar at KU and as the new Interim Director of the Environmental Studies Program. Both were welcome surprises and honors, which

I am doing my best to live up to. The group had several publications last year, highlighted by work of former students Sean Crowe (Science), Karla Leslie (Applied Geochemistry and EEA) and Charity Lander (Geomicrobiology Journal), with more trickling out this year. I have spent the last year ensuring all of my PhD students finish up and will spend the next transitioning the lab through planning and funding for the new Earth, Energy and Environment Center. On the teaching front, I am designing a new undergraduate class that connects human health to geology with the intention that the students will come out with an appreciation for both toxicology and geochemistry.

Evan Franseen Professor and Senior KGS Scientist

A highlight for me in 2014 was co-leading another student field trip with Bob Goldstein to the Guadalupe and Sacramento mountains last fall. After many years of going to those localities, I am still impressed with the beauty of the areas and the lessons those famous outcrops continue to teach us.

As typical, there were several trips to Spain in 2014. I also went to Puerto Rico and The Dominican Republic for final field checks with PhD student Diana Ortega-Ariza. Publications and presentations at various venues continued in 2014 with more coming for 2015. Despite the downturn in the industry, The Kansas Interdisciplinary Carbonate Consortium remains successful, and we continue to focus on providing the sponsors with relevant research for their needs.

My term as SEPM President officially ended at the AAPG Annual Meeting in Houston, culminating with the SEPM Awards dinner. It was fun, and an honor to preside over the ceremonies and hand out awards to an esteemed list of geoscientists.

I also was an organizer and convener for an SEPM strategic planning meeting held in Boulder, Colo., in May. These are interesting times for geoscience societies, so there was much to discuss in terms of SEPM for the future. It was a good meeting, and it is clear that SEPM is a strong society and will remain so into the future with such an active and caring membership.

Another highlight was being appointed as a member of the alumni board for the Department of Geoscience at the University of Wisconsin-Madison. I attended the fall meeting, and it was great to reconnect with friends and faculty. After all of these years, Madison is still home for me. I'm glad I now have a good excuse to get back there more often.

Bob Goldstein
Haas Distinguished Professor
Associate Dean for Natural Sciences and
Mathematics

It's wonderful to be in touch through *The GHawker*. This was my 30th year as a faculty member at KU, and every year seems to introduce new opportunities for exciting research, teaching, and new projects for the Department, College and University. Much of our research output has been focusing on carbonate diagenesis these days, working towards a more fundamental understanding of predicting porosity in the subsurface. Papers published included students and former students Erin Ramaker, Zhaoqi Li, Brad King, Erik Hiemstra, and KU colleagues Evan Franseen and Lynn Watney.

One of the most rewarding efforts has been providing support for carbonates research through the Kansas Interdisciplinary Carbonates Consortium, which allows faculty members in Geology, KGS, TORP, CPE, and a large number of students to interact with our industry sponsors.

There have been major changes in the Dean's office. Dean Danny Anderson left to assume the President's position at Trinity University and Don Steeples returned from retirement to fill in as Interim Dean. I will miss Danny, who was really a great Dean, but can think of no better choice than Don as Interim Dean. As Associate Dean in the College, I really love working on the big transformative projects. Thanks to incredible support from you all, Ritchie Hall and Slawson Hall, which combine to create the Earth Energy and Environment Center, are moving forward at a rapid pace. These are going to be beautiful facilities of which you all will be proud. These landmark facilities have paved the way for planned further campus redevelopment for the sciences.

Stephen T. Hasiotis
Professor

Greetings alumni! I remain busy with teaching, research, and service to the Department and KU, furthering our national and international standing. Three students defended successfully (two committee chair, one committee member) this academic year. I'm looking forward to seeing more students complete their theses and dissertations at KU and other institutions in the U.S. and abroad.

Nationally, we presented a large number of abstracts at GSA and AAPG meetings; I served as session

chair and co-chair for several sessions. Internationally, I was a keynote speaker at the First International Congress on Continental Ichnology in El Jadida, Morocco. I received an NSF grant for research on the largest sand sea ever on Earth, the Lower Jurassic Navajo Sandstone, Colorado Plateau, working with Judy Parrish (University of Idaho and past GSA president) and Marjorie Chan (University of Utah and GSA Distinguished International Lecturer).

I have pending a NSF proposal to conduct research in the Shackleton Glacier area, Antarctica. I have conducted research and given short courses on ichnology and paleopedology with Maria Jensen at the University Centre in Longyearbyen, Svalbard; the eastern Bookcliffs in Utah and Colorado with Peter Flaig from the Bureau of Economic Geology at the University of Texas-Austin; and in the Canyonlands area near Moab, Utah with Judy Parrish and Marjorie Chan. I also worked with Australian School of Petroleum PhD candidate and KU MS grad John Counts in the Flinders Range, South Australia, in August; and presented research at AAPG ICE in Melbourne, Victoria, Australia, in September; and conducted research in the Table Mountain area of South Africa with Emese Bordy and students from Cape Town University in November.

Mary Hill
Professor

My first year at KU has been very exciting. In the fall, I taught the new hydrogeology graduate student seminar. The six grad students assigned articles for the rest of us to read, and gave presentations about their research and overviews of how their work fit into the broader agenda of their graduate advisor. We learned about probes that measure subsurface water velocity from Professor Devlin's students, about experiments in the Konza Prairie to measure CO₂ release from Professor Macpherson's students, about playas and groundwater level declines and recharge in eastern Kansas from Professor Stotler's students, and much more.

In the spring, I taught a groundwater modeling course in which we studied how the Republican River model was built using MODFLOW, and how it was used in Supreme Court deliberations. This fall I am teaching a new one-credit freshman honors seminar entitled "Water, Energy, Food, the Environment, and Public Policy – Opportunities and Tradeoffs." This is my first step toward developing a three-credit undergraduate course on this topic, for which I have received great encouragement and ideas from Department

alumni! Special thanks go to Jason Cansler for sending me some great ideas. This fall I am also teaching a course in my own research specialty: Inverse Modeling. Students will learn how to make the virtual world of computer models come alive as we identify data and parameters important to predictions.

My computer and collaboration lab was renovated into a bright, inviting space. Come visit us in Room 112 Lindley. I worked to develop collaborative relationships for the KU water and energy initiatives with faculty in departments that ranged from computer science to psychology, including mathematics and engineering. KU offers a rich intellectual environment perfect for the kind of interdisciplinary effort needed to achieve creative solutions to tough problems. Energy and water are among the most difficult problems current students will face during their lives. I am very appreciative of all that the alumni do for this Department and hope to meet more of you in the coming years.

Diane Kamola **Associate Scientist**

In the spring semester, I continued teaching sedimentology for the undergraduate majors, and a separate course for petroleum engineering majors. Both classes had large enrollments. In the fall, sequence stratigraphy, taught primarily for graduate students, had an enrollment of 18 students. Along with lecture and class assignments, the sequence stratigraphy students took a week-long trip to the Book Cliffs to learn the concepts of sequence stratigraphy in the field.

Two of my graduate students graduated last summer, and presented their research at the 2015 AAPG conference in Denver: Matt Myers and Michael Waynick. Current student Richard Bell presented at both GSA and AAPG. A new student, Ben Campanaro, started his research on fluvial systems in the Williams Fork Formation of western Colorado. These studies complement my ongoing research on stratigraphic controls in foreland basins.

In April, alum Brad Prather and I co-lead a field trip for graduate and undergraduate students to southern California to study deep water deposits of the Capistrano, Ardath and Scripps formations, among others. The outcrops were spectacular, and the students learned a great deal about deepwater systems.

Noah McLean **Assistant Professor**

I've had an exciting, stimulating, and engaging first year at KU! Last year I co-taught Geol 101, learning the ropes from Jen Roberts and learning new perspectives from the students every day. This fall I took over as lead instructor of the class in a new classroom designed for the active learning approaches we're using to keep students engaged and thinking critically until that (loud!) steam whistle goes off. Joining the legendary Isotope Geochemistry Laboratory at KU (where my undergraduate and graduate advisors both got their PhDs), I've been able to step into a well-oiled isotope analysis machine, and get several new projects underway. These include an undergraduate project testing for Milankovich periodicity in mid-continent Pennsylvanian cyclothems using high-precision TIMS U-Pb techniques to build on Andreas Möller and MS student Jason Hallman's success dating Miocene tuffs in the Ogallala formation to begin building a chronostratigraphic framework for that important part of Kansas geology. They also include a pilot project with the new experimental petrology laboratory at Washington University in St. Louis to better understand how zircon crystals incorporate the elements U and Th, and a big field trip this fall with colleagues from Stanford and the U.S. Geological Survey to refine the early eruptive history of the Columbia River Basalts. If this year is anywhere near as fun as the last, I'm in for a great time.

Gwen Macpherson **Associate Professor**

It was a busy year for me. It started with hosting a Chinese karst geochemist and his family in January. This resulted in a whirlwind one-week visit in June to the famous tower karst and cone karst regions in China, recently designated a World Heritage Site. I've also been working with a group based in Pittsburgh to look at the results of CO₂ flooding for enhanced oil production (in Texas) on formation water chemistry. This included an intensive two-week summer visit by a MS student from University of Pittsburgh to my lab, where we analyzed 80 samples for major and trace cations and anions. I also supervised a Haskell Indian Nations Bridge student over the summer. She presented the results of her work at the summer KU Undergraduate Research Symposium.

I attended the first IAGC Urban Geochemistry Workshop in Columbus, Ohio, in early August, and

presented an idea to determine the toxic metal content of urban garden soils. At the Midwest Groundwater Conference in Lawrence, I presented some interesting results about groundwater temperature at the Konza, with further development of those ideas presented at GSA in Vancouver, Canada. I served on an NSF review panel in November.

Huan Liu successfully defended his thesis and graduated. MS student Mike Rawitch has made excellent progress on his research and has coached my newest MS student who started in the fall. Both are working on Konza-related projects. I've enjoyed collaborating with new faculty in geography, as well, on some other new initiatives, so things are not slowing down. From "Prairie Waters by Night" by Carl Sandburg: "Chatter of birds two by two raises a night song joining a litany of running water—sheer waters showing the russet of old stones remembering many rains...."

Andreas Möller
Associate Professor

Our group in the laser ablation lab grew considerably last fall, with three international visitors staying for a whole year, three new MS students starting and several co-supervised graduate students from the KGS using the facility. All of these were trained last fall in a new hands-on course on laser ablation from hardware to data interpretation, running parallel to my Geol 717 Geochronology class.

Of the visitors, Associate Professor Semih Gürsu from Mugla University in Turkey investigated sedimentary rocks and magmatic pebbles in glacial deposits to reconstruct sediment sources for Peri-Gondwanan units. PhD students Caue Cioffi and Brenda Rocha from the University of São Paulo in Brazil dated different high-grade metamorphic rocks from the Brasília orogen. All of them were highly motivated and productive. We are excited about the manuscripts to be published.

The new MS students have their projects a little closer to home. Brittany Hendrix came from Iowa to study paleosols in the Cedar Mountain Formation of Utah, supervised by Greg Ludvigson and me. We are collaborating with Utah State Paleontologist Jim Kirkland to provide better age constraints on a spectacular find of dinosaurs caught in quicksand, and for the whole stratigraphic section down to the Morrison Formation. We had a great, productive time in the field together with Nebraska State Geologist Matt Joeckel last fall.

Brian Sitek, a recent KU graduate, decided to stay to work with Greg Ludvigson and me on the stratigraphy of the High Plains in Kansas. He was joined by Jason Hallman, who came from the University of North Carolina highly recommended by alumnus Drew Coleman, to help provide high-precision ages on ash beds within the High Plains Ogallala Formation.

Master's student Tyson Berndt is currently finishing his work on Blue Ridge, near the KU Field Camp, and will rewrite a good part of its geological history. PhD student Jeff Oalman is finishing his manuscripts and dissertation chapters. We look forward to see them both defend and graduate within the coming year.

For this very busy year I hired two new laboratory assistants. Ty Tenpenny took charge of mineral separation and then transitioned into the lab manager position after Josh Feldman left us in spring 2015. Maggie Graham (nee Sochko) has become a great support in running the laser for the collaborative work with various institutions, and I am glad that she will stay on as a new graduate student this fall. The best and most exciting news of the year for me personally was being granted tenure and being promoted. I am looking forward to more years in Lawrence at KU.

Alison Olcott Marshall
Assistant Professor

It has been another busy year around here, both with research and teaching. Over the past year my research focus has continued to drift towards Mars-related science, as I apply the lessons and techniques I honed looking for signs of life in the early rocks of Earth to helping determine the best approaches for the next generation of rovers on Mars to look for signs of life. It has been fun research, applying my skills in a practical applied way—in space!

Besides this work, my lab has been busy as my three students prepare to graduate. By the time you read this, Nick Cestari will have defended his MS looking at the reservoir potential of stromatolites and begun working at Oxy; Brenden Keel will have defended his MS looking at the organic porosity found in organic-rich carbonate units and begun working at British Gas; and Julienne Emry will have defended her PhD on analyzing the mineral structures and forms of the Archean Apex chert.

Teaching has kept me busy, too, as I have transformed (and renamed!) Geol 121. Prehistoric Life: DNA to Dinosaurs, the lecture-based class of the past, is now Life Through Time: DNA to Dinosaurs, an

active learning class where students work together in groups to explore paleontological data through time. Their ultimate goal is to examine modern extinction and climate change events through the lens of geological time. Transforming the class took a great deal of effort, but the results were well worth it: The students were involved and exciting and able to critically link ideas in a way I have never before witnessed. The class culminated with PaleoCon, a science-fair type event where student teams presented original research they had done into the lifestyle, habitat and ecology of a modern organism and an extinct relative, and then used the information about the ancient animal to create a mitigation plan to help save this modern animal. The event was amazing. The students worked very hard and presented amazing projects, and the audience of students, faculty, administrators and the general public all enjoyed themselves.

Craig P. Marshall
Associate Professor

It has been a fun year. I have shifted my research interests back to my postdoc work, and I am working on my favorite mineral – graphite. Although the Raman spectrum of graphite has been known since the 1970s, the Raman scattering process in sp^2 hybridized nanocarbonaceous materials is still not completely understood. For example, there are three fundamental normal modes in the Raman spectrum of graphite that have been a subject of debate over the last few decades. For the first time, I have calculated the depolarization ratio for these bands to elucidate the symmetry species responsible for these vibrational modes.

The two grad students I co-advised with Alison Olcott Marshall defended this July. Brenden Keel defended his master's thesis and is currently working for British Gas, and Juli Emry defended her PhD. thesis. I have been teaching Mineralogy and Ore Deposits over the last year. I changed the ore deposits class to an active learning class with activities and a final group project investigating hand samples, and geochemical data from a Paleoproterozoic Pb-Zn-Ag Sedex deposit.

Gene Rankey
Hubert H. and Kathleen M. Hall Professor
of Geology

This year was especially busy and rewarding for the Rankey group. We now number 11, and have

students working in the Bahamas (Alexa Goers, Steven Herbst, Maritha Huber, Hannah Hubert, and Jason Rush), the Yucatan Peninsula of Mexico (Jennifer Lowery and Tom Neal), and Kiribati (Michelle Mary and Caroline Patelli), to everywhere (Adrienne Duarte). Beyond these students, I have had the pleasure of working with Hassan Eltom, the Kansas Interdisciplinary Carbonates Consortium post-doc who is wonderful to have around. As you can imagine, we cover a lot of intellectual ground from hydrodynamics and deposition of grainy carbonate sediment and carbonate mud, ichnology, foraminiferal and microbial biofacies, early cementation, porosity modification and petrophysics, numerical hydrodynamic simulations, geologic modeling, and seismic modeling – collectively aimed at developing quantitative tools for understanding dynamics of carbonate systems and using these insights for predicting heterogeneity in subsurface analogs.

On the teaching front, I offered Carbonate Depositional Systems and Oceanography, and enjoy both classes. I had the pleasure of teaching Regional Geology of Florida and the Bahamas with Luis González and Paul Enos, and learned from both of them. Aside from those efforts, my time as editor of the Journal of Sedimentary Research is winding down, but I continue to write JSR PaperClips, serve on the Board of Directors for GeoscienceWorld, and help direct the Kansas Interdisciplinary Carbonates Consortium. I am looking forward to finishing a bunch of the students, gaining new students, and venturing into new intellectual fields this next year!

Jennifer Roberts
Associate Professor

Last year was a transition in my laboratory. Five students completed their theses/dissertations and moved on to gainful employment, with PREP student, Mathew Medina is moving on to a PhD at the University of Michigan. Mat Edwards began MS research in my lab, continuing research on the role of carboxylated organic matter in low temperature dolomite formation.

I also had the opportunity to participate in fieldwork with two of my colleagues. I assisted Luis González and his students in sampling beachrock in Puerto Rico to assess factors involved developing these fast-forming features. I am also involved in a project with Randy Stotler studying the genesis of carbonate sediments in alkaline lakes in Nebraska. We are using these lakes as an analogue for offshore Brazil carbonate reservoirs and are co-advising an honors thesis with

Adam Yoerg studying the textures of these sediments with depth.

I have also spent a significant amount of time redesigning Geol 101 and have achieved an active-learning environment in accordance with best teaching practices and AAU recommendations. Fall 2015 Noah McLean took the reigns teaching 101 in a new active-learning space in a new addition on Learned Hall. The space approximates the classrooms planned for the Earth, Energy and Environment Center. During Fall 2015, I will spend a sabbatical in Lawrence. In addition, to writing papers, I will be developing a TA training course in active-learning instruction and developing a course for University Scholars on energy, which I will teach Spring 2016.

Paul Selden
Director of the Paleontological Institute
Gulf-Hedberg Distinguished Professor of
Invertebrate Paleontology

In the last year, I have attended a number of meetings, including the Congress of the European Society of Arachnology in Turin, Italy; the International Paleontological Congress in Mendoza, Argentina; the BioOne Publishers and Partners meeting in Washington DC; and the American Arachnological Society meeting in South Dakota. Papers published in the last year cover a number of subjects, including fossil spiders from the Jurassic of China, proetide trilobites, unusual long-bodied Opiliones from the Carboniferous (previously erroneously identified as spiders), and a trigonotarbid arachnid from New Mexico. In my editorial role, I was very pleased to see the two-volume *Treatise on Invertebrate Paleontology, Part E, Porifera, Revised, Hypercalcified Porifera, Volumes 4 & 5* (University of Kansas Paleontological Institute) appear in print after many years of work by the authors. I also edited and contributed to a major new two-volume work on spiders: Murphy, J. A. & Roberts, M. J. *Spider families of the world and their spinnerets*. (British Arachnological Society. i-xvi + 1-553 pp.).

Matt Downen, who finished his master's thesis on the taphonomy spiders in lakes and how this relates to salinity, graduated last year and is staying in Lawrence to continue with a PhD thesis on a similar topic. Meanwhile, his master's work is being prepared for publication. I advise a number of other students, many with biology-related topics, on the soft-bodied fossils from the Cambrian of Utah, on burrowing in limbless vertebrates, on Mesozoic fish, and sabre-tooth cat phylogeny.

Leigh Stearns
Associate Professor

We've had an exciting year here in the Glaciology and Remote Sensing Lab. I currently have three PhD and two MS students, who keep me busy with interesting research questions and results. They've been submitting papers (three this year), presenting their work at conferences, and conducting fieldwork, basically doing my job for me! Our current projects involve investigating ice-ocean interactions in West Greenland (using remote sensing and field based observations), modeling the geothermal heat flux under the Greenland Ice Sheet, using numerical models to investigate the sensitivity of glaciers to different climate scenarios, and studying the formation of crevasses in Antarctica. It's really a joy to have an active and dynamic group of students to conduct research with.

On the personal side, I got married in June and was awarded tenure in March, so this was a big milestone year for me. I look forward to the adventures that the next year will bring!

Randy Stotler
Assistant Professor

The last year has been a busy one for my research group. Four MS students successfully defended their theses. All successfully found jobs with environmental consulting firms or the state of Kansas. I especially want to congratulate recent graduate Britney Katz, who was awarded the 2014-15 Haworth Award.

A continued central focus of the group has been the effort to better understand sources, ages, and amounts of recharge to the High Plains aquifer. Lessons from recent research are leading us to look more closely at focused recharge through playas and riverbeds. With funding from the Kansas Interdisciplinary Carbonate Consortium, we also continue to investigate a unique group of playa lakes in western Nebraska. These predominately alkaline lakes are a modern analogue for the depositional environment found in the Brazil and Angola off-shore pre-salt oil and gas deposits. Finally, in conjunction with the Kansas Geological Survey, we are working to develop new methods for interpreting groundwater response to barometric pressure changes to identify basic aquifer parameters such as hydraulic conductivity.

As a final note, in conjunction with other hydrologically minded faculty at KU, I am developing a Field Methods in Hydrology course for graduate and upper-

level undergraduate students, and an environmental-focused field trip for 2nd year students. The upper level course will provide students with the tools necessary for any entry level environmental career, and the inherent uncertainty associated with various measurements. The 2nd year field trip will be co-led with Jennifer Roberts and faculty from the University of Costa Rica. Students will have the opportunity to observe tropical region hydrology and environmental issues first hand as we explore aquifer recharge areas high on volcanic peaks, discharge areas (yes, potentially in hot springs!), landslides, and water management and contamination.

Mike Taylor **Associate Professor**

This academic year began with a “shaky” start with the M4.8 earthquake in south central Kansas in November 2014. My student Drew Schwab is working toward understanding the geometry of optimally oriented fault systems where we plan to study CO₂ sequestration, with implications for fluid injection practices.

The Nepal earthquake of April 2015 and its associated aftershocks has kept me busy as well, as the events occurred along-strike of an active fault system that we mapped further to the west. My incoming MS student Clay Clampbell will begin to understand in more detail the relationship between convergence between India and Nepal and what these recent earthquakes mean in terms of structure for the Himalayan orogen.

I have begun working to understand the relationships between mountain building processes and the evolution and dispersal of ancient mammals from Africa into Europe and Asia. In a NSF-funded project in central Turkey, I’ll be collaborating with the Department of Ecology and Evolutionary Biology and with new Foundation Professor, Christopher Beard. This project will try to understand the interrelationships between tectonics and climate, and how various geologic processes lead to mammalian evolution and dispersal. In other important news, Gabriel Veloza published a thesis chapter in *GSA Bulletin* (February 2015) on active mountain building in Colombia, and Erica Dalman successfully earned a MS degree. She’s now employed at Conoco-Phillips in Houston.

George Tsoflias **Associate Professor**

Another productive year has gone by, marked by the graduation of four of my students. It is rewarding

to see students complete their studies and move on to the next stage in their lives and careers. I am pleased to report that all our geophysics graduates started in industry positions despite the recent decline in hiring. Matt Baker completed his MS last fall on the development of multi-component radar methods used to investigate fluid-flow in fractured rock in groundwater aquifers, geothermal systems and hydrocarbon reservoirs. The spring semester was busy with the completion of Yousef Fadolkarem’s and Clyde Redger’s MS research, and Jose Velez’s PhD. Yousef and Clyde analyzed 3D seismic to study the Mississippian, Arbuckle and Morrow reservoirs in Kansas. Pre-stack seismic attribute analysis and inversion proved a reliable approach for predicting reservoir properties. Their work is helping enhanced oil recovery and CO₂ capture studies at Wellington and Cutter fields in Kansas. Jose completed his seismic and radar investigation of the Greenland ice sheet. His work has shown innovative ways of using geophysical methods to characterize polar environments.

Ongoing research includes work with PhD student Blair Schneider in geophysics and geochronology investigating the geophysical response of bone beds in central Kansas. A new research direction, in collaboration with the Kansas Geological Survey, is monitoring earthquake activity in Kansas that may result from the injection of CO₂. MS students Brandon Graham and Alex Nolte are using a seismic network to monitor seismicity at Wellington field.

I oversaw the submission and approval of our new geology curriculum by the College of Liberal Arts and Sciences and KU. The revised curriculum offers greater flexibility to students to pursue their interests while maintaining a strong foundation in fundamentals of geology. Another notable event this year was the centennial celebration of SGE, the geology honor society that was established at KU in March 1915. It was an honor for me to help host the event at KU and represent KU Geology, the Alpha Chapter of SGE. Reflecting on this past year, it was busy and rewarding. I look forward to the new academic year!

J. Douglas Walker **Union Pacific Resources Professor**

This has been a good year. We continue work with Jason Ash on the Geochron database and all the EarthChem activities. There was an NSF review of the whole project, and it all came out well. We are looking forward to putting in for another five years of funding.

We have also started work on a Data System for structural geology. This includes a backend database and a frontend data entry system. This is a big NSF-funded project involving folks from University of Wisconsin, Texas A&M, and the Arizona Geological Survey. Andreas Möller and I tried out the system at Field Camp this year, and it worked well. We will probably use this with the students next year.

It is great in the Geochronology lab with both Noah McLean and Andreas around. We have been doing a lot of interesting work, and hope to keep stuff moving forward.

Anthony W. Walton
Associate Professor

This has been the most exciting time I've experienced during my 40 years at KU. The impending construction of Ritchie and Slawson Halls to create The Earth, Energy and Environment Center; the expansion and excellence of the faculty, including adding three new members last year; the support of KU administrators; the excellence of the students; and the opportunities we can present to them mean that KU Geology is on a strong upward trajectory. Much of this success depended upon alumni support (Thanks guys and gals!).

I continue to have fun teaching demanding courses that involve real data whether on field trips or in exploring petroleum reservoirs. I'm also looking into Kansas oil reservoirs and altering of Idaho basalt. With all that is going on, retirement remains only a distant prospect.

Chi Zhang
Assistant Professor

Since I arrived in January, I have been busy with teaching, research, and advising students. I taught Environmental Geology in Spring 2015. I attended a conference (EGU) in April and presented my work on using novel geophysical methods (spectral induced polarization and nuclear magnetic resonance) to characterize microbial activities in the subsurface. The most exciting news is that the renovation of my lab space on the fourth floor of Lindley was done in April. Two pieces of key instrument arrived and were installed. I also have one master's student working with me on the problem of monitoring hydrocarbon contaminated sediments using geophysics. This semester I began teaching a course focusing on the topics of hydrogeophysics and will have one more master's student.

Hill Awarded International Honor

The International Association of Hydrological Sciences, World Meteorological Organization, and UNESCO have awarded KU Geology Professor Mary Hill the Dooge Medal. The award honors geoscientists who have made fundamental contributions to the science of hydrology and show universal recognition of the winner's international stature.

"Professor Hill has an international reputation as an exceptional scientist, charismatic teacher and influential leader," IAHS President Hubert Savenije said at the award ceremony in June at the International Union of Geodesy and Geophysics general assembly in Prague.

Among many other accomplishments, Savenije cited Hill's "significant and long lasting contributions to groundwater modeling, particularly in inverse modeling, sensitivity analysis, uncertainty analysis and investigating the importance of existing and new data."

In accepting the award, Hill talked about her early fascination with "what was then the brand new world of computer modeling," and how computer modeling has made it possible for the consequences of society's decisions to "become more real and immediate."

"Society loses when scientists are disengaged from policy and policy makers," she said. "When ignorant of reality, which is discoverable by science, policy often fails, and this can lead to unnecessary suffering, strife, and destruction. It is we, the scientists, who have to reach furthest across the communication divide -- to spend time figuring out how to obtain and convey compelling results."

The Dooge Medal is named for James Dooge (1922-2010) who combined a career in hydrogeology with a career in politics. He worked in mathematical modeling, tackling problems of meteorology and climate, and served in the leadership of many scientific organizations as well as in the Irish Senate and as the Foreign Minister for Ireland.



Building the Future

Earth, Energy and Environment Center Celebration Lauds Donors

In November 2014, alumni, faculty, and friends gathered at KU to celebrate Carol and A. Scott Ritchie and their family, the Don Slawson family, and Robert Beren and his family. These are the donors whose leadership gifts made the Earth, Energy and Environment Center possible. Among those present were KU Chancellor Bernadette Gray-Little, KU Endowment President Dale Seufferling, Geology Associates Advisory Board Chair Steve Dixon, and Far Above Co-Chair Kurt Watson. Far Above is a \$1.2 billion comprehensive campaign for KU. The event ended with the families signing the new Center's cornerstones, but before pens were employed, the donors provided perspective. Here are some of the highlights of what they said.

“The Ritchie family is happy to support a new generation of students and scientists by helping to create a modern facility for the training and research of these individuals. Carol and I want to thank everyone who was involved in making this happen. It was a broad and diverse group. Thank you all for everything that you’ve done. This is our dream come true.”

A. Scott Ritchie



“Don strived his whole life to make a difference whether for his family, his community of Wichita, the state of Kansas, the oil industry, or for his beloved alma mater. He indeed made a difference. Slawson Hall, Ritchie Hall and the Robert Beren Petroleum Center will make a huge difference also for many generations of fellow Jayhawks to come.”

Todd Slawson, speaking of his father Donald Slawson



“I can say with a mixture of sadness and happiness on this very special day that the Robert M Beren Petroleum Center in Slawson Hall will keep alive for generations to come the warm association that Don and I had in our lifetimes. I am pleased to be a partner in the advances for new construction and programs that will benefit KU.”

Robert Beren





The main entry to Lindley includes three bas-relief sculptures.

Let Us Now Praise Lindley

For nearly 70 years, Geology's primary home on the KU campus has been Lindley Hall. Even as the Department outgrew its space in Lindley and faculty members dispersed across central and west campuses, the L-shaped structure at the corner of Naismith Drive and Crescent Road remained the Department's headquarters. Lindley will continue standing in 2018 after the new Earth, Energy and Environment Center has been completed in what was once Lindley's two parking lots, but KU Geology will no longer make Lindley its primary home.

With the transition looming from old to new, we thought this was a good time to remember a building that has played such a huge role in so many geoscientists' lives. What most alumni might not know, however, is that Lindley Hall came within a hair's breadth of not existing.

The first person to propose erecting a building at Naismith and Crescent was Ernest H. Lindley, who

served as KU chancellor from 1920 to 1939. The year before he left KU, Lindley sought approval from state officials to construct a new building to house the departments of Geology, Chemical Engineering and Petroleum Engineering, the Kansas Geological Survey, and testing laboratories for what were then the departments of Civil Engineering and Applied Mechanics. State officials were unmoved.

But a year later, Lindley's successor, Deane W. Malott, took up the fight. This time the sales pitch worked. All was set for construction of the new facility, but World War II intervened.

The first obstacle was the Land-Lease Act, passed by Congress a month before Topeka approved building Lindley. The Act froze construction of projects deemed nonessential to defense. But KU officials leapt that hurdle when they secured a priority construction rating from the federal government.

Construction crews began work, but the US entry into the war after the attack on Pearl Harbor on Dec. 7, 1941, threw a new road block into KU's path. Lindley Hall was completed, but its purpose was transformed. In 1943, the newly constructed building opened as a barracks and mess hall for soldiers training in what was called the ASTP or Army Specialized Training Program. That year 800 soldiers made Lindley Hall their home.

Donald Cassling, who was one of the first ASTP trainees to arrive at Lindley, remembered rooming with "thirteen other guys." Their room was small, but it did have direct access to Lindley's roof.

"The roof became a recreational area," he said, "for sunbathing, playing catch, shooting the breeze and, in the evening before lights out, hopefully watching the windows of the sorority house across the street. Looking back, I don't remember a single one of us who had the smarts or the confidence to call up and ask for a date."

The ASTP program ended in 1944 but the federal government still didn't relinquish its claim on Lindley, moving in workers attending a training course at the Sunflower Ordinance Works. It wasn't until 1946 that Lindley Hall entered academia when Geology, Chemical, Petroleum, Mining and Metallurgical Engineering, Geography, and Astronomy took up residence in the building.

Today Lindley houses the departmental office of KU Geology and the offices and labs of some Geology faculty and graduate students along with the Geography Department, the Environmental Studies Program and the Paleontological Institute.

Constructed of limestone, Lindley's Art Moderne and Art Deco design includes a main entry with soaring columns and bas-relief sculptures. The sculpture on the far right uses a pickaxe to symbolize geology.

In the 1940s, no one may have questioned sculptor Bernard "Poco" Frazier's use of a pickaxe to symbolize the geosciences, but today that axe seems ridiculously outdated. We can only guess about what the future will bring to the corner of Naismith and Crescent. With the construction of the Earth, Energy and Environment Center, we know that future will be bright.

The material for this piece came from John H. McCool's article, "Priority Won," at KUHistory.com.

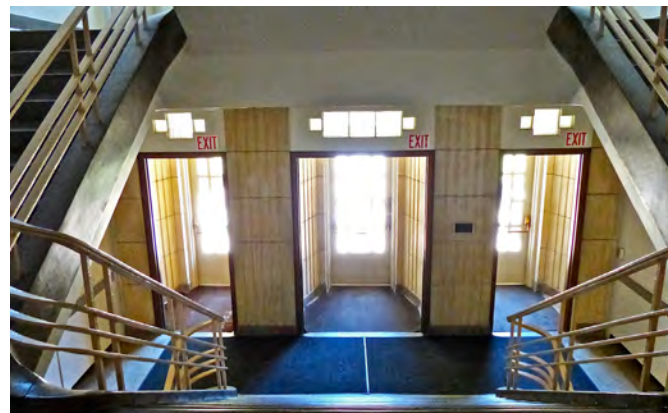
Watch construction of the Earth, Energy and Environment Center live at eeec.ku.edu.



This view on October 2, looks at Lindley Hall through the newly erected fence, which now surrounds both parking lots.



That pile of cement is all that remained in early October of the sidewalk and steps that once led from the Art and Design Building.



Lindley Hall will remain in use after the Earth, Energy and Environment Center opens. Here is an inside view of the main entry.

Construction on the Earth, Energy and Environment Center has begun, but we still need your help to complete the funding. Contact Nancy Jackson, njackson@kuendowment.org. (785) 832-7357.

Conquering Field Camp

Students Battle Terrain, Weather, and Cactus in 2015

Neither record rain nor a bumper crop of cholla cactus could keep KU Geology's students and professors from completing Geol 560 and 561 this past summer. Every obstacle was overcome, and all assignments were turned in. This year 20 students finished Geol 560, otherwise known as Introductory Field Geology, while 16 students completed Geol 561, Field Geology. But it wasn't easy.

In Geol 560, students spend their first two weeks working in and around Capitol Reef National Park in southeastern Utah. A lack of ground cover makes the Utah location a perfect place for beginning students to learn the basics of mapping. Capitol Reef also provides students experience with different structural relationships than they see in Colorado. During the last week of Geol 560, students and faculty return to KU Geology's permanent Field Camp facility 13 miles outside Cañon City, Colo., and complete field exercises in that area. All three weeks of Geol 561 are run out of Field Camp, beginning the Monday after Geol 560 ends.

Conquering the terrain and the many hikes that take students and faculty far from tourist trails was a challenge as always in 2015, but this year rain presented a bigger problem. Even in the desert in Utah, precipitation became an issue.

While students and professors were in Utah, the state saw its 2nd wettest May in the 121 years the U.S. National Oceanic and Atmospheric Administration has been keeping record. Utah recorded 3.03 inches of precipitation for the month, which is 1.88 inches higher than Utah's 20th century average of 1.15 inches. Colorado got even more rain, registering its wettest May on record with 5.27 inches of precipitation. That is 3.25 inches more than the 20th century average of 2.02 inches.

Although the rain in Utah and Colorado didn't cause the dangerous flooding seen in Oklahoma and Texas, it did add a few bumps to the road, some of them literal. For example, a slide full of rain-loosened rocks slammed into one of KU Geology's vans in Colorado in May while students and faculty were driving to Utah. No one was injured, but the car in front of the van was totaled, students report. Luckily, that car's occupants escaped injury. KU Geology, however, had to repair a broken window in the van. The landslide also

put even more dents into the van's already pockmarked side.

The rain forced the professors teaching Geol 560 to scramble to find new locations for some of their mapping exercises. Associate Professor Mike Taylor had to substitute Twin Mountain for work on Red Ridge because the rain made the Red Ridge site inaccessible in early June. Associate Scientist Diane Kamola also had to find different locations for some of the student's mapping exercises in Utah. To add insult to injury, the rain nurtured a big crop of cholla cactus in and around Field Camp, providing students and faculty with opportunities to employ tweezers to pull out the cactus spines.

As always, though, professors kept students focused on their mission in Geol 560 and 561 to learn to observe, describe and interpret. In both courses, students are tasked to organize rocks in space and use structural measurements as they learn how to create geologic maps.

The courses are designed to give students the experience with geologic mapping that they need to understand maps. Even though few geologists work in the field these days, having field experience measuring stratigraphic section, field mapping, compiling structural information, and synthesizing large data sets makes all the difference when students graduate and work with data that someone else has observed through a drill hole, a seismic section, ground penetrating radar, or in some other way.

"If they don't have some experience of what things should look like or could look like in the field, then they're not going to do a very good job with that data," Union Pacific Resources Professor and Field Camp Director Doug Walker says. "The only way to get that kind of experience is to go into the field."

KU Geology maintains one of the oldest field camps in the country. The Department has operated a field camp near Cañon City since 1922.

Story and Photos by Diane Silver



The sun shone uncharacteristically bright on Geol 560's second day in Colorado. Students climbed Twin Mountain without battling the rain that marked most of their time in the field. Associate Professor Mike Taylor, standing and wearing a white hat, answers students' questions.



Students measure stratigraphic section in the sun on Shelf Road on the way to Cripple Creek as dark clouds roll in from the west bringing yet more rain.



Students continue their work on measuring stratigraphic section on Shelf Road.



Mike Taylor looks on as students Andrew Hoxey, left, and Courtney Jarvis, right, carrying Jacob's staffs and Brunton compasses, prepare to measure stratigraphic section on Shelf Road.



Brian Rooney, left, and Aaron Hess, right, take a closer look. Note the snow on the mountains in the background. This year was particularly snowy.



Standing in the Recreation Hall on the Geol 560 students' first Monday at Field Camp in Colorado, Mike Taylor briefs them on their assignment.



Students, Abraham Nieto, left, and Steven Finch, right, head onto an outcrop on north Twin.



Mike Taylor checks that a student has begun his map correctly.



Hannah Hubert, left, and Caroline Patelli, right, work on their maps near the top of north Twin.



Students Spencer Setka, left, Linghao Chen, center, and Teaching Assistant Jeff Ross, right, examine an outcrop.



Rain complicates the hike as students return from their first day on Twin Mountain. This normally dry wash, which marks the approach to north Twin, had become a swamp. Note the pond at top right and the trees and bushes buried with sand. None of which has been present in past years.

A Robust Future

SGE Journeys to Its Birthplace at KU to Celebrate a Century



Associate Professor Tony Walton, back to camera, led the SGE field trip this year.

Three years before the American Association of Petroleum Geologists was founded, 12 years before the Society for Sedimentary Geology came into existence, and sixteen years before the Society of Exploration Geophysicists was born, four KU students sought out their geology professor, W.H. Twenhofel, to complain about a lack of morale. It was October 1914.

“One of the fellows stated that the students in mining engineering were handicapped in not having a strong national student organization back of the student body in the Department,” Twenhofel wrote in a history of the organization he penned in 1965.

Twenhofel added that he suggested that a professional fraternity might do the trick. “I made the suggestion, then thought no more of it. However, the suggestion had fallen on ground ready for its reception.”

The four students enlisted four other students, and after much discussion and planning, Clark Carpenter, Walter Rohrer, Charles (Shorty) Brown, Glenn Allen, George B. Sammons, Harry E. (Ted) Crum, Sherwin F. Kelly, and Roy A. Reynolds founded the Alpha Chapter of Sigma Gamma Epsilon, The National Honor Society for the Earth Sciences. The students had the blessing of Erasmus Haworth, the chair of KU’s departments of mining engineering and geology. Twenhofel proposed

the name, which is composed of the first letters of the Greek words meaning companions searching the Earth. SGE’s hand-written charter bore the date March 31, 1915.

Fast-forward 100 years to March 2015. The scene is the Kansas Room in the KU Union. About 100 student delegates, a smattering of past SGE presidents, and professors from universities that host SGE chapters pass papers back and forth and peer intently at their laptops. The conversation is animated. They’re planning the future of the organization as it begins its second century in a world the founders of SGE could never have imagined.

In its first century of existence, SGE has prospered, growing from only eight members and one chapter at KU to 1,400 members and 91 active chapters throughout the United States. Every year SGE’s undergraduate research symposium at the Geological Society of America’s draws nearly 100 poster entries.

Launched as an organization for those in mining, metallurgy and geology, today SGE is open to any person in any branch of the Earth sciences who has completed at least 10 semester hours or 15 quarter hours in Earth science courses and has maintained a minimum 3.0 G.P.A. (on a 4.0 system) in all Earth science courses together with an overall G.P.A. of 2.67

in all college courses.

Speaking to the convention banquet in March, Rick Ford (SGE President from 2005 – 2010) declared the organization to be healthy.

“We’re very robust,” Ford said.

Ford detailed the history of SGE, noting that KU’s founding of SGE’s Alpha Chapter was followed in only a few months by the founding of the Beta Chapter at the University of Pittsburgh in Pennsylvania. The University of Oklahoma claimed the Gamma Chapter in 1916.

SGE began as a male-only organization, Ford said. Although there is some evidence that a few chapters used false names to induct women, female geoscientists were not allowed to officially become members until 1966. The proposal to include women sparked controversy when it was proposed at SGE’s 50th anniversary convention at KU. The delegates even voted it down, 12-14, Ford said. However, SGE President H.C. Skinner then proposed a national referendum, and 85 percent of SGE’s national membership voted in favor of allowing women into the organization.

“It’s a little embarrassing that it took that long,” Ford said.

SGE’s membership has grown steadily, he added, although like many Greek organizations, SGE suffered downturns during the Depression in the 1930s and the

period of campus unrest of the 1960s.

Ford also talked about many of the key figures in SGE’s past, noting that Charlie Mankin, the former National Secretary-Treasurer who died in 2012, and Betty Bellis-Mankin, past Secretary to the National Council, did a terrific job serving as the professional face of SGE from 1967-2009.

Ford also noted that SGE’s work is far from finished. The organization still needs to promote the geosciences and increase membership diversity within SGE and the geoscience community in general.

“We have so many important issues facing us in the 21st century that we need access to all the brain power on the planet,” Ford said.

SGE’s 21st century agenda also includes an emphasis on professional development, service to campus and community, and last but certainly not least, Ford said, “to have fun along the way.”

At the banquet, SGE honored Ford and other past presidents, F.D. “Bud” Holland, Jr., (president from 1970-1975), George R. McCormick (1978-1982), Daniel Merriam (1990-1995), James C. Walters (1995-2000), Donald W. Neal (2000-2005), and Erika R. Eswick, whose tenure as president began in 2010 and ended during the March meeting. Betty Bellis-Mankin was also honored. She entertained the banquet with stories from the organization’s past.

Continuing the Field Trip Tradition

SGE has a long tradition of holding field trips at its biennial meetings. This year KU Associate Professor Tony Walton led SGE on a tour of Pennsylvanian stratigraphy south and east of the KU campus. Decked out in day-glow orange safety vests, the SGE delegates, officers and past presidents climbed onto two school buses for the tour.

The first stop was Wells Overlook County Park, south of Lawrence. After hiking up the observation tower for an overview of the Kansas River and Wakarusa River valleys, the group ate lunch and then headed to private property to visit its first stop off of US-59.

Walton’s field guide describes the stop as featuring a small waterfall over a ledge of cross-bedded sandstone. “The exposed rock unit is a sandstone bed, generally called the Ireland Sandstone Member, part of the Lawrence Shale, which is of the Lake Pennsylvanian age,” Walton writes.

The next stop along US-59 features outcrops of the upper Lawrence Shale and the Oread Limestone. The outcrops were uncovered by construction of the highway.

In the final stop, SGE members visited an exposure along K-10 east of Lawrence that reveals the upper part of the Lansing Group, including the top of the Spring Hill Member of the Plattsburg Limestone, the Vilas Shale, the Captain Creek Limestone, Eudora Shale, and Stoner Limestone members of the Stanton Formation. Faculty and students had a great time examining the exposure and collecting snail fossils.



SGE members examine the outcrops on the 2015 field trip.

A World of Opportunities

KU Sedimentology Makes Solutions Possible



Learning about Entrada Sandstone at Delicate Arch in Utah is thirsty work for Geol 360 student Aaron Goldstein.



Juli Emry and Jacob Fastner examine one of southern California's exposed sea fans.



Alumnus Brad Prather, far right, teaches a short course at Lindley Hall on deepwater deposits.

Type the word “opportunity” into a search engine, and the Internet immediately pops up this definition: An opportunity is “a set of circumstances that makes it possible to do something.”

For students seeking a future and geoscientists tackling the challenges of the 21st century, KU Sedimentology turns “opportunity” from a mere word into the circumstances that make a multitude of solutions possible. With a history that includes many of the pioneers who created modern sedimentary geology, KU Sedimentology today pursues leading-edge research, employs a diverse faculty with a breadth and depth of experience, and offers students connections and training that are available at few other universities.

“We have the best program in the country in terms of depth, breadth, and diversity in sedimentology and carbonates,” says Hall Professor Gene Rankey. “Students who come here have the opportunity to work with

the leaders in the field, to be exposed to the companies that can employ them. At the same time, the companies get to know who our students are and what they’re doing. When they get out of school, our students are well prepared and well positioned for success.”

The program’s reputation is well known. So many great students apply for graduate school that the faculty has to turn many away. This year more than 80 students applied for only 6 graduate positions.

“It hurts to have to turn down qualified applicants,” says Associate Scientist Diane Kamola.

Professor and Chair Luis González feels the same. “Sometimes it’s hard for us to say no to a student you would take without hesitation if you were in a different program. We say no because we have to, and that is why industry recruits from us. They know we get good students.”

A Strong Foundation

“One of the things that makes our program so strong is its history.”

- Gene Rankey, Hall Professor of Geology

KU Sedimentology’s history stretches back to the founding of the modern discipline of sedimentary geology. The key figures from KU are too numerous to list, but here are a few.

The man known as the Patriarch of the field, William H. Twenhofel (1875-1957), had his roots at KU. Twenhofel served on the KU Geology faculty from 1910 to 1915 and spent one year as the Kansas State Geologist. Trained as a paleontologist, Twenhofel led in research by observing that the sediments in which a fossil was discovered played an important role in its interpretation. He authored one of the foundational textbooks for the field, *Principles of Sedimentation*, and helped shape sedimentary geology’s future by leading the Paleontological Society, chairing the Committee on Sedimentation for the National Research Council, and cofounding the *Journal of Sedimentary Petrology* and serving as its editor for 13 years.

Today the Twenhofel Medal, named in his honor, is the highest award that can be given to a sedimentologist by the Society for Sedimentary Geology, SEPM. Six geoscientists with ties to KU, including emeritus professor Paul Enos, who is still active in the Department, have been awarded the medal.

KU alumni like Wallace Pratt (1886-1981) (BS

1908, MA 1909, Engineer of Mines in Geology 1914) have also shaped sedimentology. Known as the “geologist’s geologist” and “the greatest oil-finder of them all,” Pratt was the first geologist hired by Humble Oil and Refining Co, which would later become ExxonMobil. Pratt developed the application of scientific principles to explore for oil, and among many other successes, predicted enormous reserves at the King Ranch and Prudhoe Bay. He was a founding member of the American Association of Petroleum Geologists. In 1945, he became the first person to receive AAPG’s most distinguished award, the Powers Medal.

KU’s R.C. Moore (1892-1974) took sedimentology to a new level. A world-class stratigrapher and paleontologist renowned for his work in Paleozoic crinoids, bryozoans and corals, Moore taught at KU for decades, served as Department chair, state geologist and director of the Kansas Geological Survey, and founded *Treatise on Invertebrate Paleontology*.

Another key figure was Curt Teichert (1905-1996), who served on the KU faculty from 1963 to 1977. When Teichert retired from active teaching, more than 50 of his former associates wrote letters of praise. GSA’s 1997 memorial to Teichert quoted one from acclaimed colleague, Robert J. Weimer, a member of the National Academy of Engineering and the recipient of the American Geological Institute’s Legendary Geoscience Award. Weimer put Teichert’s accomplishments

into perspective.

“Besides sharing the enormous results of your research efforts, you have given to students of stratigraphy the classic summary papers on geosynclines, biostratigraphic concepts, facies and others,” the Colorado School of Mines professor wrote.

“By these efforts you have influenced stratigraphy and paleontology as few other men in the modern history of the science.”

More recently, faculty members like Paul Enos helped transform the discipline. Enos is a pioneer in the study of modern carbonate systems.

An Exciting Present

“Today’s faculty is more focused on high-quality research, and a little bit better funded. The quality of the students we get now is better, too, and you have to realize that the students we got before were amazing.”

*-Associate Professor Tony Walton,
Looking back on his 40 years at KU Geology*

With a world-class carbonates program, a thriving carbonates consortium, a newly enhanced siliciclastics program, a multitude of field opportunities for students, close ties to the state geological survey, and affiliated faculty that bring key perspectives to sedimentary geology, KU Sedimentology is a busy place these days.

Carbonates

“We are a go-to school in carbonates,” says Professor Evan Franseen. “We’re one of the top, if not the top, programs in the world.”

One thing that sets KU apart is the size and the diversity of its carbonates faculty, Luis González says. “We have a very strong program with a very strong faculty. We have a balanced program.”

The core members of the carbonates faculty are Merrill Haas Distinguished Professor Bob Goldstein, Luis González, Evan Franseen, and Gene Rankey. Each brings a different expertise. Goldstein, for example, is a leader in the use of fluid inclusions to explore the chemical history of rocks.

“How do they go from being loose sediment to being cemented rocks? That is half the story in carbonates,” Enos says. Fluid inclusions provide samples of the water in which the rocks formed. Google Scholar lists 3,076 citations for Goldstein’s work, including 1,438 since 2010.

González is a low-temperature geochemist who uses stable-isotopes as his primary tool, along with a smattering of elemental chemistry.

“I do most of my research on carbonate rocks and minerals or carbonate minerals that are cemented in

clastic sequences,” he says. Google Scholar lists 3,164 citations for González’ work, including 1,468 since 2010.

Franseen has a dual appointment with the KU Department of Geology and the Kansas Geological Survey. He is an expert in carbonate sedimentology and sequence stratigraphy. He has worked extensively on Paleozoic rocks in the midcontinent, the Cenozoic in Spain (30+ years), and Cenozoic systems in the Caribbean.

Rankey is bringing new approaches and new tools to the study of carbonates. “Gene brings the use of quantitative approaches to modern carbonates and the use of remote sensing techniques,” González says.

Other researchers add to KU’s carbonates expertise. They include Associate Professor George Tsoflias who pursues the use of ground penetrating radar and high-resolution seismic imaging of carbonates; Associate Professor Jennifer Roberts who studies the geobiology of fractures in carbonates, dolomitization, diagenesis, and microbial CO₂ sequestration; and Associate Professor David Fowle, who explores the geobiology of carbonates and microbial CO₂ sequestration. Professor Steve Hasiotis studies trace fossils in carbonates. Assistant Professor Alison Olcott Marshall explores the organic geochemistry of carbonates and oil shales and microbial carbonates. Associate Professor Craig Marshall uses geospectroscopy to explore carbonate systems. Assistant Professor Randy Stotler works with fluid flow, water-rock interactions, stable isotopes, and carbonates that form at the bottom and along the shore of lakes. Post-doctoral researcher Hassan Eltom joined the Department this year. His work focuses on characterizing and 3D modeling of hydrocarbon reservoirs using outcrop analogs.



Students learn about sediments in salt marshes by sloggng through a marsh on Sapelo Island, Georgia.



Marathon Senior Technical Consultant Kirt Campion, far left, guides KU students through California's sea fan exposures.

KICC

The Kansas Interdisciplinary Carbonates Consortium also strengthens KU's carbonates program. Led by co-principal investigators Goldstein, Franseen and Rankey, the consortium is a public-private partnership where corporations pay annual membership dues and receive a first look at research results prior to the work being presented at conferences or published. Corporate representatives meet at least once a year with KU faculty and students to discuss projects and look at results. To date the sponsors include Chesapeake Energy, ConocoPhillips, BHP Billiton, Pioneer Natural Resources, Repsol YPF, Devon, Anadarko, Saudi Aramco, Statoil, Total, Shell, and Pemex.

Rankey values the rapid response he can get from KICC. It can take years to get funding from the National Science Foundation, while KICC can respond in only weeks. KICC can also provide funding for students that might not be covered by a traditional grant. The consortium can also provide seed money for riskier, cutting edge projects.

"KICC gives us the flexibility to do projects that are needed to advance the discipline," says González. "It provides us with an opportunity to pursue new ideas."

KICC also opens doors for students. "It provides us with an automatic doorway into a lot of companies," Rankey says. "They send their folks here for our reviews. They're interested in what we do, and they get into the work we're doing, which is cutting edge stuff. More importantly, they have direct access to our students, and that allows our students to develop relationships with them."

Siliciclastics

In 2014, KU Sedimentology enhanced its siliciclastics program by hiring Mike Blum as Ritchie Distinguished Professor. Blum left ExxonMobil's Upstream Research Co., to take the KU post. Blum's research focuses on fluvial and coastal sedimentology, sequence stratigraphy of continental and shallow-marine successions, global to regional sea-level change, geologic responses to global change, and source-to-sink sediment dispersal. Google Scholar lists 3,855 citations for him, including 2,175 since 2010.

The hire is a milestone, says Enos. "We picked up Mike Blum, and now that program is going to really take off," Enos says.

Blum is interested in applying a quantitative modeling approach to sedimentology. He dreams of creating a research program that sets the standard for modeling deep ocean settings.

When asked if that would be something like closing your eyes and guessing about what is in front of you, Blum laughs. "A little bit," he says, "but that's the thing. If you have a fundamental framework of understanding of how you build and erode topography and how you transfer mass from elevated topography to depositional basins, then you can make predictions."

Blum says he wants to advance sedimentology to the point where it will be able to quantitatively measure an environment and predict where resources lie and what might happen to a spot on the Earth in the future. "You could predict how a certain part of the surface is going to react to climate change, for example," he says.

Joining Walton and Kamola in siliciclastics, Blum envisions bringing two to three new siliciclastics faculty members to KU. “We should have a comprehensive, integrated program in surface processes and the production of the geologic record,” Blum says.

González agrees with Blum about the need to expand KU’s siliciclastics faculty. “The very first step in doing that was hiring Mike Blum. We want to add to the siliciclastics program to make it as strong as the carbonates program, and to make this the very best sedimentary program in the country, if not the world.”

As the new kid on the KU block, Blum brings an outside perspective to the sedimentology program. Blum says he is pleased with the high quality of students applying to the program. His first group of graduate students arrived on campus this fall.

KGS

Another factor strengthening KU Sedimentology is its close relationship to the Kansas Geological Survey. Unlike some states where the geologic survey is a separate organization, KGS is part of KU, and it is located on the KU campus. Some faculty members like Evan Franseen split their time between the Department of Geology and KGS, while KGS scientists often teach geology classes.

“A big part of the story is the relationship between the Department and the Survey,” says Walton.

Taking into account only its Energy Research and Stratigraphic Research sections, KGS adds 13 more geoscientists to KU Sedimentology. Among the KGS researchers who frequently collaborate with KU Sedimentology are John Doveton, a senior scientific fellow; Dave Newell, an associate scientist in petroleum geology and stratigraphy; Lynn Watney, senior scientific fellow in petroleum geology; Greg Ludvigson, a senior scientist, section chief, and stratigrapher; and Jon J. Smith, assistant scientist in stratigraphic research.

“With the Survey, it’s not just the people that add to our program, however, it’s the resources,” says Walton. “They have cores from oil wells. They have lots of logs from oil wells. They have lots of other production data.”

González says KGS plays an important role in the success of KU Sedimentology. “They bring strength to our program.”

A KU Sedimentology Education

For students, the program maintains a full load of sedimentology courses, including Geol 331 Sedimen-

tology and Surface Processes, Geol 532 Stratigraphy, Geol 535 Petroleum and Subsurface Geology, Geol 536 Geological Log Analysis, Geol 537 Petroleum Reservoir Characterization, Geol 731 Terrigenous Depositional Systems, Geol 732 Carbonate Depositional Systems, Geol 932 Carbonate Petrology, and Geol 933 Sandstone Petrology. Alumni like Brad Prather (BS ’79), a recently retired chief regional geologist for Shell Exploration and Production Co., have also begun offering short courses on campus. Prather teaches a two-day course on deepwater deposits.

Perhaps the most interesting – not to mention adventurous – aspects of a KU Sedimentology education are the many trips it offers students. These include excursions to Chesapeake Energy in Oklahoma City for a core workshop and to the University of Minnesota’s St. Anthony Falls Laboratory to watch their work on experimental stratigraphy.

But other trips take students far away from any classroom or lab. These include explorations of the Book Cliffs in Utah; exposed deepwater sea fans in southern California; the Miocene-Pliocene carbonates of southeastern Spain; the modern sediments of Sapelo Island, Georgia; Paleozoic carbonates in New Mexico and west Texas; the modern carbonates of Florida and the Bahamas; the “Capitan reef” and Sacramento Mountains, an exploration of volcanic rocks in the Valles Caldera area of New Mexico and how they are identical or analogous to sedimentary rocks; and the geology of Puerto Rico and the Dominican Republic.

“We’re one of the few Departments that offers so many field trips,” says Kamola.

Student’s experiences range from the trip to the coast of Georgia where they are allowed to freely explore the sediments of a barrier island to their exploration of the geology of Puerto Rico where they are constantly at work on field projects.

“It is a sobering experience for students when they first look at rocks in the field and try to apply what they’ve learned in the classroom and from textbooks,” says Franseen, who teams with Goldstein to lead trips to Spain, and New Mexico and west Texas. “That’s why it is important to give them as much experience with rocks in the field as possible, which is a strength at KU with the many field trips that are offered.”

On the trip to Spain, for example, students get to study outcrops and learn about a wide variety of carbonate systems. “The outcrops are valuable for our understanding of how these different systems work, determining what the controls were on their deposition, and what diagenetic processes affected them after deposition,” Franseen says.

Another aspect Franseen emphasizes is that the systems are analogs for important petroleum reservoirs. Where the reservoir rocks are locked in the subsurface, and therefore untouchable, the exposures in Spain are easily examined, and the lessons learned can then be applied to the subsurface reservoirs.

“The trip that we lead for students is essentially the same trip we lead annually for AAPG, which is attended by petroleum industry geoscientists, and the trips that we lead for individual petroleum companies,” Franseen says. “Students learn how the various carbonate systems work, and at the same time, we teach them

about the important aspects and applications to reservoir systems.”

Exciting field experiences, strong classes, and a top-notch faculty are important, but none of those things would exist without the support of the alumni, says Walton.

“The history of why we are strong has to do with very good hires that have been made over the years, and that has been facilitated by contributions from the alumni,” says Walton. “It’s how we got Paul Enos to come here, and how we got Mike Blum, and it’s how we got a new building. We are forever grateful.”

A Strong Future for KU Sedimentology

“KU is a very congenial place. It’s got a good base level of people, a good base level of infrastructure, and a very solid foundation of alumni support. It’s a Department and a college, and even more importantly, a University with a vision.”

- Mike Blum, Ritchie Distinguished Professor

With a historic legacy, growing faculty, supportive alumni, and an abundance of new ideas, KU Sedimentology is poised for an exciting future, but there is one other component that will make a difference – the soon-to-be-built Earth, Energy and Environment Center. Standing in the location of the current Lindley Hall parking lot, the new center should be completed by 2018. The new facility will add space and state-of-the-art laboratories and equipment, but even the look of the new facility will make a difference in recruiting great students and faculty and in retaining top-notch faculty, says Franseen.

“I think that’s really important,” he says. “An analogy would be with athletic programs. You may have a well-established, top program, but when you’re competing for the coveted blue chip recruits, and you can show them state-of-the-art practice facilities and stadiums, it can’t help but enhance your chances of signing them. You send a clear message that the program is important, and the University, donors and alumni want to do what they can to help continue and improve the success of the program.”

All those aspects of the building are vital, but the new center will perform another important mission.

“It will bring the Department closer together,” Walton says. “We have offices in four different buildings right now, and that makes it hard for us to get to know each other and hard for us to have the kind of casual conversations that lead to collaboration.”

Arriving at KU only a year ago, Blum already sees the difference the new building will make. “You can gradually get better, or you can make a step change.

That building is a huge step up.”

Blum says he’s optimistic about the future at KU and has been since he came to Lawrence in 2008 as a distinguished lecturer for AAPG. In that role, Blum toured 20 different geology schools. The tour was exhausting, but also eye opening, he says.

“Most geoscience departments seemed to be on the defensive, defending their budgets and positions within the university, but there were a select few that were forward looking. They had a vision of where they wanted to go, and KU was one of them. That’s what first impressed about this place. It’s why I was interested when KU called.”

KU Leads

KU faculty members have long served as leaders of the 3,500-member SEPM. Professor Evan Franseen was President from 2012 to 2014 and Councilor for Sedimentology from 2009 to 2011. Associate Scientist Diane Kamola served as Secretary-Treasurer from 2010 to 2012. Hall Professor Gene Rankey was co-editor of Journal of Sedimentary Research (JSR) from 2008 to 2014 and still edits the JSR Paperclips web page. Professor Steve Hasiotis was co-editor of PALAIOS from 2006 to 2012. Today KGS’ Greg Ludvigson serves as a Councilor for Sedimentology on SEPM’s governing council. Distinguished Professor Emeritus Paul Enos served as an associate editor of JSR from 1976-1980 and 1984-1987 and on the editorial board of Sedimentology 1983-1987.



Geology & Friendship

Geol 360 Cements Bonds & Teaches Students to See the Rocks

*Text and Photos By Diane Silver
With an additional photo by Brandon Graham*

Long after memories of the sweltering hikes and the thunderstorm that rattled the sides of my tent have faded, I suspect that what I will remember about Geol 360 are the smiles. Unrestrained and filled with delight, these smiles didn't appear on the first, the second, or even the third day. But somewhere in the middle of the 4th day of this 3,800-mile introduction to geology in the real world, pretenses and shyness dropped away and students began to grin. They joked with their professor, and the professor joked back. Students and the student instructors bent their heads together to share observations and beam.

Between Aug. 3 and Aug. 17, 2015, Associate Professor Tony Walton led 28 students, five student instructors, and one journalist (that's me) on a geologic journey through Kansas, Colorado, Wyoming and back again. We stopped to either discuss, measure or map locations in northeastern Kansas and along I-70 in western Kansas, at the Great Sand Dunes National Park, the Black Canyon of the Gunnison, Delicate Arch, the Grand Teton National Park and Yellowstone National Park, and many stops in between.

It was the 18th year Walton has led the two-credit course. He designed the class to not only provide a

first taste of field geology to students, but also to enable them to get to know each other. Most are geology majors and will spend the next two to three years in classes together. The connections they forge can also last beyond graduation and help them throughout their careers. To cement those bonds, Walton requires students to ride in a different van every day to give them an opportunity to get to know each other. Students also work in two-person teams, partnering daily with a different person according to a schedule that Walton created.

"I thought it was pretty awesome," says one student, who like all the students quoted in this story was assured that names would not be used. "One big reason was that we got to know so many people in our major."

Another student adds, "I made a lot of new friends."

"Bonding with new friends and colleagues is a vital part of the college experience," Walton says. "Working in teams forces the students to come to agreement on the subject matter, and in the process, come to know each other a little better. Friendship may follow."

For some students, the class and its strenuous hikes like the trek up Death Canyon in the Grand Teton

On the Facing Page

Top Left, Trevor Menke and Tony Walton indulge in a bit of mutual ribbing as the class studies the remnant of Summer Coon volcano in the San Juan Mountains of Colorado. Top Right, L to R and facing the camera, Amy Peacock, Caleb Campbell and Carson Ruffedt enjoy the tram ride down from the top of Snowbird Resort in Utah. From the top of the resort, students could see the relationships among several Proterozoic units, Paleozoic units, and the Oligocene Little Cottonwood Stock. Middle Left, Megan Adamson smiles back at her classmates as they begin the hike up the Great Sand Dunes. The student's route took them across the flats of Medano Creek, in front of them, and up and down the dunes until they reached the top. The tallest in North America, the dunes provided students with an opportunity to talk about the features of eolian deposition that indicate the origin of ancient deposits. Middle Right, L to R and facing the camera, Tyler Wyant and Amy Olson share the moment with Tony Walton during a stop at the Sand Gulch area of Colorado. The area provided students with the chance to examine exposures of the Sangre de Cristo Formation and the Echo Park Tuff. Bottom Left, Kendri Salmans, right, smiles during a bit of bantering with Tony Walton during a stop in Colorado. Bottom Right, L to R, Brian Chan, Tess Lydick, Robert Wargo, Tyler Wyant, Joe Wade (bending) and Megan Adamson seek to answer one of Tony Walton's frequent requests to identify a particular group of rocks. Here the class is working in the San Juan Mountains in Colorado.

National Park and the walk up 10,243-foot-high Mount Washburn in Yellowstone National Park were physical challenges. While some students were long-time hikers and climbers, others had rarely ventured into the outdoors, and never into mountains.

Other students had never camped before. In Geol 360, you take your tent down every morning and set it up in a different place every night as the class travels, hundreds of miles on some days. Often the class doesn't arrive at a campground until 9 pm, and sometimes not until 11:30 p.m. The students' only break from camping came nearly a week into the trip when they spent two nights in an old tourist court in Lake City, CO. That provided them with an opportunity to shower, do laundry, and complete yet another exercise.

No matter how much they loved the outdoors, however, every student faced technical and academic challenges in Geol 360. Every day they had to complete one or more exercises in mapping or stratigraphy and write and submit an essay. Most students had never used a Brunton compass in the field before. None had used a Jacob's staff. They had only taken a strike and

dip in a classroom setting. Learning to identify a contact – learning to see geologically – may have been the most difficult problem they faced.

“If I were to plot a trip like this by myself, I wouldn't know what I was looking at,” a third student says. “It was nice to have a teacher walk you through it, talk you through it, and answer questions. For a while, my partner and I might veer off in the wrong direction, but the teachers would always bring us back on course.”

Even on a day that didn't include difficult hikes, academic trials were plentiful. On the tenth day of the trip, for example, the class' travels included a trip up a tramway to the top of Snowbird Resort in Utah. In their two-person teams, the students settled onto the side of the mountain to create a geological map, showing the relationship of intrusive stock to the associated country rock. They used photographs and made their maps on Mylar overlays.

By the next morning, the students were also required to turn in an essay, answering one of three possible questions on such topics as intrusive contacts vs.

On the last working day of the trip, students map the glacial features of Fremont Lake near Pinedale, Wyoming, paying particular attention to the moraines.



fault contacts, Oligocene plutons, or basin and range geology.

“It was academically strenuous,” a fourth student says, “but the teachers really pushed me and motivated me to learn.”

The only real downside to Geol 360 may be what can only be called the grunge factor. At one point, the class went for nearly a week without showers – a drought that was only broken when they arrived at the inn at Old Faithful in Yellowstone National Park and each person forked over \$5 to buy soap, shampoo, a clean towel and access to a shower in a building behind the inn.

“It got uncomfortable at times, but that was almost the best part,” says a fifth student. “It felt so good when you could get clean. That shower at Yellowstone was the best shower I’ve ever taken!”

“I hope the students come out of this class with some knowledge of geology in the field,” Walton says, “with an understanding of geological education, with a

group of friends, and with a feeling of belonging to the fraternity of geology.”

This photo essay is dedicated to the Geol 360 class of 2015, which includes some of the warmest, funniest and kindest souls I’ve ever met. They are: Lead instructor Tony Walton; student instructors Andy Banks, Alexa Goers, Brandon Graham, Jason Jones and Danielle Woodring; and students Megan Adamson, Connor Armstrong, Kristine Birkelo, Caleb Campbell, Brian Chan, Brandon Criss, Paige Englert, Johnathan Flaherty, Chris Girardi, Aaron Goldstein, Kylie Luther, Tess Lydick, Trevor Menke, Amy Olson, Amy Peacock, Anna Peters, Trevor Potty, Carson Ruffledt, Kendri Salmans, Connor Stotts, Brandon Tabor, Nicholas Thurber, Eli Turner, Connor Umbrell, Joe Wade, Robert Wargo, Niall Whalen and Tyler Wyant.

As tourists wander, far left, across the top of Snowbird Resort in Utah, students work on maps with an eye toward the faults.





Tony Walton leads students to Delicate Arch in Arches National Park in Utah.



Photo by Brandon Graham

A climb up Mount Washburn allowed students to view features of the Yellowstone Caldera.

On Facing Page

Top Left, Kristine Birkelo climbs up to get a close look at roadside exposures as the class studies a fault near Moab, Utah. Top Right, Kylie Luther and Eli Turner discuss their map of dipping beds along Colorado Highway 115 south of Colorado Springs. Middle Left, Student Instructor Danielle Woodring works with Niall Whalen and Connor Armstrong as they take one of their first strike and dip measurements near Parkdale, Colorado. Middle Right, on the first stop on the first day of Geol 360, Trevor Potty sights along a Jacob's staff using Kristine Birkelo as a reference point as they measure a section near Oskaloosa, Kansas. Bottom Left, Connor Armstrong solves the challenge of lunch-on-the-go with pita bread and peanut butter. Other students made extensive use of tuna in pouches, salami, string cheese, apples, peaches, bananas, cherry tomatoes, trail bars, trail mix, and the ever-popular peanut butter and jelly sandwich. Bottom Right, Kendri Salmans uses the entrance to red van as a chair as he strips off his hiking boots and socks after completing the hike to and from Death Canyon in the Grand Teton National Park. Required equipment for every Geol 360 student includes not only a tent and daypack, but also flip-flops, tennis shoes or sandals. The casual footwear is happily employed at the end of each day's hike.



Untangling Complex Issues Takes Collaboration

Sedimentology and stratigraphy. Tectonics and geomicrobiology. Geochemistry and hydrogeology. Geophysics, geochronology, glaciology and paleontology. These are the specializations that make up 21st century geology, but what about also including engineering and geography, or even anthropology, English and social psychology?

As geoscience problems have grown increasingly complex, KU geoscientists have turned a knack for teamwork into a winning strategy. These days collaboration between KU Geology researchers and engineers, and researchers in such seemingly un-geologic fields as anthropology, English, and social psychology are increasingly common. KU geoscientists also frequently find collaborators at the Kansas Geological Survey and KU's Tertiary Oil Recovery Program, among many other places, and the teamwork within the Department is stronger than ever. Today researchers work together to do more than each could do alone.

"The easy problems have been solved," Chair Luis González says. "The problems that you can solve by yourself have been solved. What remains to be solved are the big, complex problems that no single scientist can do alone. We need people from multiple disciplines to come together to move forward."

Hall Professor Gene Rankey likes to note that collaboration is so important because "1 plus 1 always equals 3."

"We all have our biases and our assumptions," Rankey says. "Whenever you work with someone else, those are challenged, and when you challenge assumptions you can grow."

Collaboration within the Department is particularly strong. Among the most recent examples are KU sedimentologists who teamed with geophysicists on projects in Spain and Puerto Rico. Geophysicists worked with hydrogeologists to map contaminants in groundwater elsewhere. Geochemists, tectonics experts and geomicrobiologists worked with sedimentologists to understand porosity and flow in fossil fuel reservoirs throughout the world.

"All of that is the kind of collaboration that is making a mark on our Department," González says. "It's putting us on the cutting edge of research."

Collaboration has become so important that KU has made it a cornerstone of its University-wide strategic plan. The University is hiring what administrators have dubbed "clusters" of faculty members from different disciplines to tackle single issues.

"University Cluster hires are all about collaboration – in which the whole is much greater than the sum of its parts," the KU Provost website notes. The College of Liberal Arts and Sciences, the involved schools, and the Provost's Office fund the positions jointly. So far, KU administrators have identified three clusters. Two of those were championed by KU Geology and include KU Geology faculty members.

One of those clusters is called "Water Resources: Integrating Science, Technology, Culture and Management." The idea is to bring in new faculty members to build on the existing strengths of KU Geology and the Kansas Geological Survey as well as add to the expertise in the Kansas Biological Survey, Geography, Sociology, Public Affairs and Administration, History and other departments within the College of Liberal

Arts and Sciences. These faculty members have been given the task of building a workforce with the ability to resolve conflicts concerning water across multiple stakeholders and diverse sectors in society, and to build a multidisciplinary research program.

The second cluster is called “Energizing Energy: Producing the Energy Resources, Solving Associated Challenges with Water, Understanding Public Perception.” This effort pulls together faculty from various disciplines to focus on technology and social questions related to the extraction of fossil fuels from unconventional reservoirs.

This cluster seeks to build on KU’s strengths in Geology and Chemical and Petroleum Engineering to understand energy, grow industry partnerships, and to produce more graduates who can fill projected workplace shortages. A social psychologist will explore issues concerning the public’s perception of energy and the environment.

Among the KU Geology faculty members involved in these clusters is Mike Blum, who left ExxonMobil to become KU Geology’s Ritchie Distinguished Professor. Also included is Professor Mary Hill, who left the most senior position a scientist can attain at the U.S. Geological Service to join the KU Geology faculty. Other KU Geology faculty members involved include Assistant Professor Randy Stotler and Assistant Professor Noah McLean.

The work of the faculty members in these clusters is only beginning. Early efforts, for example, include discussions of how English faculty members can help geoscientists learn to communicate more effectively with the public, Hill says. Discussions have also focused on how the psychological issue of proximity might affect public debate about water resources, Hill says. Proximity involves the idea that we tend to ignore problems that are far away from us and focus on problems that are close at hand – a tendency that may explain why people often discount the impact of climate change. Because the problem doesn’t appear to be immediate, it isn’t perceived to be as pressing as other issues, she says.

From the clusters of faculty members focused on issues of water and energy to ongoing partnerships between geologists within the Department and with KGS and other universities, every KU Geology faculty member collaborates. For example, geophysicists Ross Black and George Tsoflias are working with C.J. van der Veen from the KU Geography Department on sub-glacial imaging in Greenland. Hydrogeologist J.F. Devlin has partnered with researchers in Denmark to improve the measurement of water flow in the subsurface. Hydroge-

ologist and geochemist Gwen Macpherson has joined with researchers from the University of Pittsburgh to study the impact of enhanced oil production on water chemistry. Paleontologist Paul Selden has worked with colleagues from institutions in London, Berlin, Manchester, Turkey and China to reinterpret Carboniferous fossil araneomorph spiders and study new Ordovician eurypterid. Tectonics expert Mike Taylor is collaborating with the KU’s Ecology and Evolutionary Biology Department in central Turkey, while his recent publications include papers written with geoscientists from Columbia and Dalhousie University in Halifax, Canada. Structural geologist J. Douglas Walker enlisted the aid of geoscientists from the University of Wisconsin, Texas A & M and the Arizona Geological Survey to work on a new data system for structural geology.

Here are highlights of just a few of KU Geology’s other partnerships.

The Next Level

KU Geology Associate Professor Jen Roberts, a geomicrobiologist, has joined forces with Civil Engineering Associate Professor Belinda Sturm and faculty members from Ecology and Evolutionary Biology, and Molecular Biosciences to create a center for metagenomic microbial community analysis. Metagenomics is the study of genetic material recovered from environmental samples.

The \$300,000 project is applying next-generation DNA sequencing and computing infrastructure to advance knowledge of microbial communities in diverse environments. Given that microorganisms are abundant in soils and water as well as people, understanding the structure and function of microbial communities promises to provide revolutionary insights for energy generation, environmental sustainability and human health.

“The development of this center puts KU at the leading edge of metagenomics research in microbiology,” Roberts says. “The applications range from medical microbiology, such as gut microbiome research, to applications in environmental microbiology that range from soils and aquifers to wastewater.”

In one of their first projects, the group studied the Arbuckle Aquifer in central Kansas, which is about 1.5 kilometers below ground.

“Our results show to date that the aquifer is more diverse than wastewater,” Roberts says. “The high diversity is surprising because this is a very salty, dark environment that is scarce in nutrients and oxygen, and

we typically see a correlation between diversity and resources in most ecosystems. Compare the biodiversity in (the resource-poor) Arctic with an equatorial rainforest. In contrast, wastewater has very high nutrients and lots of oxygen.

“Not only is this technique unlocking the secrets of life in previously unreachable locations, it is giving us a roadmap to the function of these organisms. Once we know function, we model scenarios and can even engineer reactions that may aid in activities such as oil recovery and CO₂ sequestration.”

Finding Solutions

Four KU Geology professors and numerous graduate students have joined forces with KGS, geology faculty from Kansas State University, and staff from Berexco, the Lawrence Berkeley National Laboratory and Birdie Consulting to test the safety and efficacy of injecting carbon dioxide from industrial sources into the ground. The CO₂ injection is supposed to produce hard-to-reach oil and permanently store the greenhouse gas deep underground.

KGS Senior Scientific Fellow W. Lynn Watney is serving as lead investigator on the \$22.7 million project, while five KGS researchers are co-principal investigators. KU Geology professors and sedimentologists Evan Franseen and Bob Goldstein serve as co-principal investigators. Associate professors and geomicrobiologists Jen Roberts and David Fowle also are working on the project.

Begun in 2009, the project entered a new phase in November 2014 when the U.S. Department of Energy gave the green light for researchers to proceed with plans that include drilling wells for oil recovery and sequestration in the Wellington oil and gas field southwest of Wichita.

“An extensive suite of state-of-the-art equipment is being deployed at the Wellington site, including instrumentation to sample and test water quality and pressures in the injection and monitoring wells,” Watney says. “In addition, we will use seismic techniques to obtain snapshots of CO₂ plume movement, satellite-based tracking of land-surface deformation to monitor pressures, and thermal sensors to monitor the movement of the injected CO₂.”

Sequestering CO₂ underground stops the byproduct of fossil fuel emissions from vehicles and electric, cement, ethanol and fertilizer plants from adding to the problem of climate change. The CO₂ will be injected

into the Arbuckle aquifer at a depth of about 5,000 feet. The aquifer is a porous rock group that contains highly saline water. The Arbuckle is separated from shallower, freshwater aquifers by thousands of feet of impermeable rock. The injection test will be used to determine whether the aquifer can contain the CO₂ over a long period of time.

But CO₂ can also be used to release oil that conventional methods of extraction can't touch. Without the use of enhanced oil recovery methods, the Wellington field is nearly depleted.

“The Mississippian and other oil-bearing formations in Kansas offer the potential to produce millions of barrels of additional oil if the CO₂ injection methods prove to be effective and safe,” Watney says.

Understanding Glaciers

KU Geology Associate Professor Leigh Stearns is working with Geography Professor Cornelis “Kees” van der Veen and two faculty members from KU's Aerospace Engineering Department to improve KU's ability to use high-fidelity numerical modeling for glacier science.

The professors are developing a numerical model to simulate all aspects of glacier motion and incorporate measured data from KU's Center for Remote Sensing of Ice Sheets (CREGIS). The group is focusing on boundary conditions correlated with the higher resolution data CREGIS collects. The impact of climate change can be seen in the formation and motion of glaciers.

Stearns has also joined with van der Veen and a University of Maine researcher to study one of the largest and fastest-flowing glaciers in Antarctica, Byrd Glacier. Stearns was among the geoscientists who showed in *Nature Geoscience* that Byrd Glacier undergoes short-lived but significant changes in the speed at which it flows when two lakes underneath the glacier drain. In their work, the researchers deploy a dense network of GPS instruments, which provide continuous data on the glacier's movements.

Unlocking Secrets

A collaboration among researchers from different geologic disciplines enabled KU Geology to synthesize the mineral dolomite at a low temperature and without the aid of microorganisms – a feat that scientists have

been trying to accomplish for almost a century.

Among those who worked on the project are geomicrobiologist Jen Roberts and her doctoral student, Paul Kenward, teamed with fellow geomicrobiologist David Fowle, and sedimentologist Bob Goldstein, Merrill W. Haas Distinguished Professor, and sedimentologist and geochemist Luis González.

The team was able to grow dolomite at a temperature of 25 degrees Celsius (77 degrees Fahrenheit) in their laboratory in an abiotic environment. While organic material was present, it was not actively reproducing. By working with geoscientists from different disciplines, the team was able to show that a certain kind of coating on organic matter, known as a carboxylated surface, acts as a catalyst to create dolomite.

Previously, researchers had only been able to produce dolomite at temperatures of 80 to 250 degrees Celsius (176 to 482 degrees Fahrenheit), or had used live microorganisms to help synthesize the mineral.

“Understanding where and how dolomite forms allows petroleum geologists to create predictive models so they can better locate hydrocarbon reservoirs,” Roberts says. “Better understanding the formation of dolomite also enables us to calibrate models that will help us figure out climate change in the future.”

Understanding the formation of dolomite will also solve a mystery that has long baffled geologists. Researchers have been able to determine that while the mineral formed abundantly in the geologic past, it seldom is discovered to be forming today, and then only at temperatures above 50 degrees Celsius (122 degrees Fahrenheit).

“There was a whole lot of dolomite formed in the ancient, and not much of it formed in the modern,” Roberts says. “That flies in the face of one of the basic tenets of how we operate as geologists, which is that the present is the key to the past. In other words, we believe that the geologic processes that work in the present also worked in the past.”

This research has helped solve one of the major aspects of the dolomite problem by unlocking the mechanism that allows dolomite to form in open spaces in rocks at a low temperature.

Pure Water

In a wide-ranging collaboration, Associate Professor and hydrogeologist Gwen Macpherson worked with researchers from the KGS and departments of anthropology, geography and classics to better understand and

find a way to safeguard Afghanistan’s ancient system of moving water for drinking and irrigation. The group studied what are called karez.

“A karez is an underground tunnel that transports water from the mountainous regions where there’s more abundant water,” says Rolfe Mandel, a senior scientist at the KGS and KU professor of anthropology. “The karez then transports the water underground, which is efficient because it’s an arid environment with lots of evaporation. It distributes that water to villages and communities further down slope, where they bring that water to surface into canals.”

The problem, though, is that neglect, war, climate change and plummeting water levels have created issues for the system. KU’s interdisciplinary team worked to understand the culture and the hydrogeology of the karez system.

Revisiting Beachrock

Humble beachrock can be more than an impediment to swimmers suffering stubbed toes and scraped feet on high-energy tropical and subtropical beaches. Understanding the process of cementation that creates the rock could also have applications to the study of reservoir and aquifer properties, especially to understanding porosity and permeability distribution. As KU researchers note in a prospectus posted online by the Kansas Interdisciplinary Carbonate Consortium, “beachrock deposits retard erosion; it allows preservation of sand deposits that can become future reservoirs. Beachrock also provides a relatively impervious layer of protection from cementation for underlying units. These layers limit cementation to proximal sand units and preserve primary porosity and permeability.”

To come to a better understanding of the formation of beachrock, KU Geology has formed an interdisciplinary team within the Department, including sedimentologist and geochemist Luis Gonzalez, geomicrobiologist Jen Roberts, two geophysicists, George Tsoflias and Chi Zhang, and KU Geology master’s student Isabel Villaneda Van Vloten. The team is study-



ing four beachrock areas in Puerto Rico.

Among many other things, the researchers are examining the relative role of physical factors such as wave energy, wind velocity and persistence, and the beach/coast line geometry on beachrock distribution, the possible interplay of water from precipitation and seawater, microbial processes and their possible impact on the cementation of beachrock, and geochemical analysis of fluids associated with beachrock and adjacent non-cemented sands. The researchers are also undertaking a rigorous mapping of the beachrock system.

Set the Date

Associate Professor, geochronologist and petrologist Andreas Möller says that sometimes collaboration can be “like throwing a pebble in a lake.”

“It creates ever-widening circles as you find out that it’s not just one person who’s interested in your project, but that it has implications for all kinds of different things,” he says.

For example, the impact of one idea being tested in Kansas has already sent ripples in a multitude of directions as an increasing number of collaborators seek a better method for dating samples from the midcontinent.

At issue is determining the ages of sediments – a process that is notoriously difficult unless geologists can find distinct layers of volcanic ash. While using volcanic ashes has been accepted as one of the “gold standards” for dating, ash beds can be eroded by precipitation, flooding and the flow of rivers through continental sedimentary environments.

Möller has teamed with sedimentologist Mike Blum; geochronologist Noah McLean, an assistant professor of KU Geology; Greg Ludvigson, the chief of Stratigraphic Research for KGS; and Jon Smith, an assistant scientist at KGS, to work on a new dating approach in western Kansas in sediments that have eroded from the Rocky Mountains.

“These are mostly fluvial deposits, and usually it’s very difficult to get a handle on how long it takes to produce the whole stack of sediments,” Möller says.

The new method uses a technology that Möller helped develop that employs zircons. In the future, the team hopes to expand their work to other sites.

Analyzing the Process

Geomicrobiologist Jen Roberts and sedimentologist Gene Rankey have teamed to study the geochemistry

and microbiology of carbonate sediments and associate fluids on the Crooked-Acklins Platform in the Bahamas. The goal of the project is to help understand operative biogeochemical processes that may influence carbonate sedimentation.

Bahamian carbonate platforms are modern analogs for many carbonate petroleum reservoirs, a fact that makes this work relevant for understanding how and where different types of sediments form and their occurrence in the subsurface.

In this project, Roberts and Rankey are studying sediments and fluids collected from a variety of environments, including tidal flat, reef, platform interior, shoals and upwelling zones.

The researchers note that it is important to include geomicrobiology in this kind of project because carbonate sediments often occur in seawaters that are supersaturated with carbonate minerals, which may be influenced by microbial activity.

“The presence of microorganisms is ubiquitous in surface and shallow-subsurface sediments and many studies have documented their participation in carbonate mineral precipitation,” according to a prospectus posted online by the Kansas Interdisciplinary Carbonate Consortium.

Microorganisms drive carbonate mineral supersaturation through a number of metabolic processes, and facilitate mineral nucleation (the spontaneous formation of crystal nuclei) through the interaction of cell walls and other microbial materials with dissolved ions.

In the project, the researchers sampled water, sediments and microbial mats at sites around Crooked Island. They have preliminary results, but are seeking to go farther. Their goal is to find linkages between specific sedimentary environments and microbial metabolisms and to complete characterization to observe microbe-mineral interactions that may be important for interpreting mineral textures.

The Future

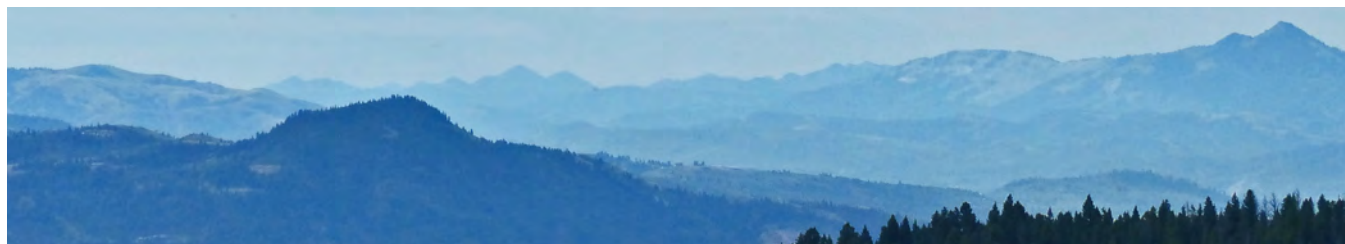
KU Geology faculty members are always seeking new collaborations, but the recent arrival of three new geoscientists is offering even more possibilities for the future.

Newly arrived Assistant Professor and geophysicist Chi Zhang seeks to expand her collaborations in a variety of ways, including teaming with researchers from KGS like Jim Butler and Greg Bohling, and faculty members from the Department of Civil, Environmental and Architectural Engineering like Jie Han and Robert Parsons to improve direct-push technology for hydro-

logical and geotechnical applications. The applications of this technology range from helping geohydrologists create remediation strategies for polluted groundwater to designing better foundations for roads, buildings and other infrastructure. Another emphasis of this collaboration will be to assess the additional insights and information acquired from the new developed sensors based on electrical and nuclear magnetic resonance processes.

From her tenure at the U.S. Geological Survey, new KU Geology hydrogeologist and Professor Mary Hill brings a greater expertise and understanding of the interaction between government and geoscience. This means that not only is she interested in continuing her work on the computer modeling of environmental systems, but she is also seeking closer collaboration with the School of Law, School of Engineering and departments of geography and political science, among many others, to help find solutions to environmental problems.

“I want to look at how the science of water, energy and agriculture is affected by and affects all those concerns,” Hill says.



NSF Supports Course

KU Geology has received a SENCER-NSF Award in support of a new freshman seminar. Designed to improve education in the sciences, technology, engineering and mathematics, SENCER-NSF awards support innovative educational offerings. The course is being taught by Assistant Professor Alison Olcott Marshall and will use the rover missions that are seeking life on Mars to teach the scientific process of geologic investigation. Among other activities, students will visit Mars analog field sites on Earth, collect and analyze geochemical and biological evidence, and communicate their questions, and findings in writing for the public. The class will also include a strong emphasis on the societal questions of whether, when, and how governments should invest taxpayer funds in the extraterrestrial search for life and the science of understanding other planets.

Sedimentologist and Ritchie Professor Mike Blum has been enjoying the early stages of his work with Möller’s team and is seeking to expand it.

“Time in rocks is one of the biggest challenges we have, and you cannot understand rates of Earth processes without dating the formation of the rocks themselves,” Blum says. “We’ve been doing some things already in Utah from my heritage work with Exxon that shows that the ages for rocks that people have been using need significant revision.”

Since coming to KU, Blum says “I’ve found myself in this pool of geochronologists, and it’s absolutely fantastic.”

Blum says he is also excited to work with tectonics expert and Associate Professor Mike Taylor, geochemist Luis González, and carbonates specialists like Gene Rankey, among many others in the Department.

“I love working with different people,” Blum says. “I get to learn a lot.”

McCollums Find New Homes

Portraits of geophysicist and oil pioneer Burton McCollum (1880-1964) and his brother Elmer McCollum (1879-1967) have been given new homes. The paintings once adorned the lobby of the McCollum Residence Hall, but the 50-year-old dorm is scheduled for demolition on Nov. 25. Two new dorms are taking its place.

Burton’s pioneering work in geophysics led to breakthroughs in oil exploration. His portrait was moved to the Kansas Geological Survey. Elmer is credited with discovering vitamins A and D. His portrait found a new home in the KU School of Pharmacy. The portraits were painted in 1966 by artist Daniel MacMorris, who is also known for his murals at the Liberty Memorial and The Public Library in Kansas City, MO.

Burton earned a bachelor’s degree in electrical engineering from KU, while Elmer received his bachelor’s and master’s degrees in chemistry from KU.

Class is in Session

Geol 512 Explores Petrology in the St. Francois Mountains



Associate Professor Andreas Möller answered a question from Danielle Woodring as the group stopped to examine an exposure on their way up the Profit Mountain Scour. In the background, Teaching Assistant Tyson Berndt worked with two other students. They were on a ridge overlooking the scour.



Because of high water in the stream that cuts down the middle of the Profit Mountain Scour, the class had to climb up a ridge and take a path. Here Jesse Saegert enjoys the walk.



Allison Grady listens to Teaching Assistant Tyson Berndt as they explore the rocks of one of the shut-ins. At the stop, students had to create petrographic descriptions of the volcanic rocks, volcanoclastic lithologies and discuss the evidence for periods of non-eruption/erosion vs. periods of volcanic activity.



Kendri Salmas works on his field notes on the top of Knob Lick Mountain. Rhyolite ash-flow tuffs are exposed here. Behind him Associate Professor Andreas Möller works with other students.

As he had throughout the trip, Associate Professor Andreas Möller looked intently at the students who clustered around him on a wooded hillside in the low, rounded mountains of southeastern Missouri and once again reminded them to “first observe, then think, and then draw.”

Some of the students nodded, others chewed their lips and looked thoughtful, others seemed to barely pay attention as they bent over their field notebooks to draw hasty diagrams, while still other students seemed to think about his comment and then slowly examined the exposure before making careful drawings.

Field experience is at the heart of *Geol 512, Igneous and Metamorphic Petrology*. After weeks of class-

parking lot. Only after the storm ended could they pitch their tents in the damp darkness. That night and particularly the next night when the temperature dropped into the 30s, all involved shuddered through the cold in their sleeping bags before crawling out into the morning coolness to grab a quick breakfast where they could pick from cereal, oatmeal, bagels and cream cheese, or yogurt and granola. After breakfast, they boarded the vans to head to their first work site of the day.

On this trip, the group hiked, climbed and got onto their hands and knees to study 11 different field sites in and around Missouri’s Johnson Shut-Ins State Park. The word “shut-in,” by the way, is a local term that describes a geologic feature where the hard volcanic



The closer the group got to the top of the mountain and the upper reservoir of the Ameren-UE Taum Sauk Power Plant, the starker the landscape and the clearer the geology became. The reservoir failed in 2005.

room and lab work, the students had finally made it to the field. While students in other majors sat in classrooms, studied or relaxed Thursday through Sunday, April 9-12, 2015, Möller’s students climbed into KU Geology’s well-used vans, and drove five hours to the St. Francois Mountains 90 miles south of St. Louis.

Like every other KU Geology field trip, this one had its share of unexpected happenings and adventures. In the first 24 hours, for example, the 23 students, three teaching assistants and Möller were forced to wait out a sudden thunderstorm under the roof over a motel

rock has shut-in the waters of a river. Cracks in the hard bedrock create channels for water to gush through.

As the KU catalog notes, Geol 512 presents:

The study of minerals, rocks and fluids within the earth’s crust and mantle to elucidate their mechanisms of formation and the pressure-temperature-composition conditions within the earth. The course emphasizes equilibrium thermodynamics, phase equilibria, fractionation mechanisms, tectonic control of petrogenesis,



Sitting on the edge of an abandoned granite quarry on Knob Lick Mountain, Abraham Nieto works on his field notes. The quarry shows the relationship between intrusive Knob Lick granite and the adjacent rhyolite tuffs.



Danielle Woodring, foreground, and other students from the class expand their field notes at a stop examining outcrops on a road outside of Pilot Knob, Missouri. Their tasks, among other things, were to sketch and describe an unconformity, observe weathering patterns, and look for unusual minerals.

and quantitative analysis of mineral parageneses.

“Most of the class takes place on KU’s Lawrence campus, but the only way to truly teach petrology is to take students out of that sanitized setting,” Möller says.

“In the classroom, everything is presented to you,” he says. “You don’t have to look for it. A hand sample shows something in the best possible way. That doesn’t reflect what it looks like when you’re out in the field. In the classroom, you don’t have to look around an outcrop and find what you’re missing. In the classroom, you don’t need to figure out what you need to see and what you need to ignore, and you can’t walk around and look at an exposure from different angles. You also can’t see the multi-mile scale of an ancient caldera complex.”

Möller says he takes his class to the St. Francois Mountains because it has one of the only sizeable exposures of Precambrian rocks in the central mid-continent region. For students who also take Geol 534, Volcanology, which is taught by Associate Professor Anthony Walton, Möller’s St. Francois trip also enables them to compare the 1,500-million-year-old caldera they see in Missouri with the less than two million-year-old Valles Caldera Walton shows them in New Mexico.

“It allows the students to make a comparison between something that is almost modern with something that is very old,” Möller says.

The field guide for the trip describes the St. Fran-

cois Mountains as a “classic example” of anorogenic magmatism, which means the mountains were created by magma—not formed during the folding and faulting of the Earth’s crust during a continent to continent collision like the Himalayas or the European Alps.

The students began their trip by hiking up the Profitt Mountain Scour, a 1.5-mile-long swath of mountainside that was gouged clean of vegetation by 1.5 billion gallons of water gushing down the mountain when a reservoir at a higher elevation failed. The torrent washed trucks off a road and slammed into the house of the superintendent of the state park, erasing his home, washing his wife and three children almost 500 yards away and stranding him in a tree, according to news reports from the time. Although traumatized, everyone survived.

But Profitt Mountain was forever changed. The flood exposed bedrock with features ranging from Mesoproterozoic rhyolites and granites to Cambrian conglomerates and dolomites.

“Flood deposits are unique examples of deposition under extreme flash flood conditions,” the field guide notes. “The site provides an extraordinary opportunity to see a landscape-scale outcrop with bedrock relationships clearly exposed and traceable for hundreds of feet.”

But the Profitt Mountain Scour was only the first stop on the trip. The students also had an opportunity to study an abandoned quarry that showed the relationship between granite intrusives and rhyolite tuffs. Among



Students turn an outcrop in the St. Francis River into a seat as they create petrographic descriptions of the intrusive rocks and sketch the feature. Teaching Assistant Brian Sitek stands and watches for questions as the students work.



Taha Ansari, heads down, while Chase Breckwoldt heads up as the class studies the Silvermine granite exposed along the St. Francis River.



Cassidy Nelson leads students over the rocks and back from the work site on St. Francis River. True to KU Geology tradition, the Petrology students clambered over many obstacles on their way to the best outcrops.



The students head down to the St. Francis River. In another 20 feet, the easy-to-walk meadow turned into a jumble of rocks.



Chase Breckwolfdt takes Assistant Professor Andreas Möller's instructions about observing carefully to heart as he uses a hands lens to examine the Silvermine granite.



At the same location, Andreas Möller uses his hands to illustrate columnar jointing in basaltic dikes perpendicular to strike.

other stops, they were able to closely examine mafic dikes surrounded by rushing river waters.

In each location, students were required to describe and sketch features in their field notebooks, which would later be graded. At first, students worked in near silence, and many rushed through their sketches. Few students talked to each other. Even fewer asked questions of Möller or the teaching assistants. But as the

days passed, more and more questions began to find voice. Hand lenses appeared. Rock hammers were put to good use, and the students began to slow down. They started to really see what was in front of them.

Story and Photos by Diane Silver



Andreas Möller notes Steven Finch's question while Cassidy Nelson listens in.



Katie Graham, left, glances up as she and Sally Dickson complete their assignment.



After finishing work on the St. Francis River, the group poses in front of an unusual tree. From left to right, ROW 1 (at the bottom): Aaron Hess, Brian Rooney, Jesse Saegert. ROW 2: Shawn Dunaway, Wade Welton, Scott Moore, Kendri Salmas, Sally Dickson, Danielle Woodring, Allison Grady. ROW 3: Chase Breckwoldt, Associate Professor Andreas Möller, Marquise Paige, Lauren Haga, Lauren Linehan, Teaching Assistant Brittany Hendrix. ROW 4: Teaching Assistant Brian Sitek, Abraham Nieto, Steven Finch, Katie Graham, Spencer Setka, Keith "Alex" Nolte, Teaching Assistant Tyson Berndt, Taha Ansari, Adam Yoerg, Reed Waldon, Cassidy Nelson.

On the Health of the Dakota

The Kansas Geological Survey has published the most comprehensive description yet of the Dakota aquifer's water quality and the distribution of its major chemical characteristics.

In *Water Resources of the Dakota Aquifer in Kansas*, Senior Scientific Fellow Don Whittemore, Assistant Scientist Al Macfarlane, and Geohydrology Support Services Manager Brownie Wilson compiled data about water use, water quality, and potential contaminants in the aquifer. They also report on current guidelines for development of the aquifer, water-level declines since development began, and the potential for future development.

“We are providing an overview of the location of supply wells with water-right permits in the aquifer and the amount of use from the aquifer,” Whittemore says. “Particularly notable are the new data on wells that draw from more than one aquifer, such as the Dakota and the High Plains aquifers.”

So far, the Dakota aquifer has been used as a water resource only in areas where the groundwater is known to be fresh or slightly saline and where more easily obtained groundwater is not available. Just a small percentage of the groundwater used for irrigation, industry, and municipalities in western Kansas comes from the Dakota aquifer, but more users may look to it in the future as other water resources dwindle, the KGS researchers report.

Most of the water supply in western Kansas comes from the High Plains aquifer, an underground water-bearing formation that includes the expansive Ogallala aquifer. Because the Dakota aquifer mainly underlies the High Plains aquifer and is less commonly tapped,

its potential as a source of fresh water is unclear.

“An improved understanding of the movement, distribution, and quality of water in the Dakota aquifer is essential for determining where it could be further developed, how currently developed areas could best be managed, and how to protect the water from contamination,” says Whittemore.

The Dakota aquifer system underlies most of the western two-thirds of Kansas and includes sandstone units in the Cretaceous Dakota, Kiowa, and Cheyenne Sandstone formations. The underlying Jurassic Morrison Formation in southwest Kansas is also considered by state statute to be part of the Dakota system.

All or parts of 60 Kansas counties contain the Dakota, but only 36 counties have wells with rights to pump from the aquifer. In the other 24 counties the groundwater is too saline or the aquifer is too tight or thin to produce large quantities of water.

There is potential for additional development in southwest, west-central, central, and north-central Kansas in areas where water quality in the Dakota is good and the High Plains aquifer or shallow aquifers adjacent to streams are not present, Whittemore says.

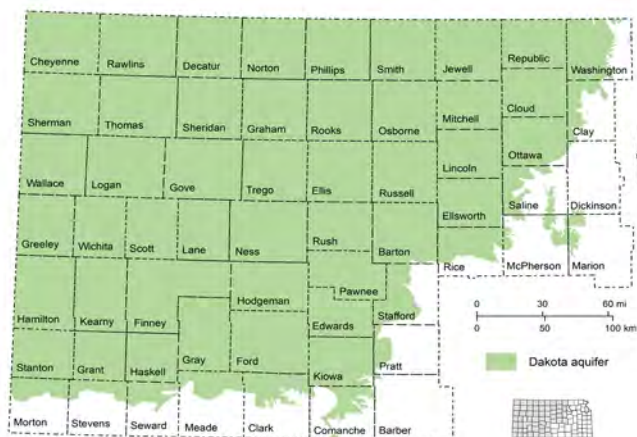
In southwest Kansas, where the High Plains aquifer has dropped an average of 34 feet just since 1996, some wells in the High Plains aquifer are being deepened into the Dakota aquifer. Most of the water from the Dakota is used for irrigation.

“One of the most important pieces of information we need is water-level data for the Dakota where it is directly overlain by the High Plains aquifer and wells produce from both aquifers,” Whittemore says. “Very few wells are completed only in the Dakota aquifer in that area, and the water-level change in the Dakota aquifer relative to that in the overlying High Plains aquifer is largely unknown.”

Continuous monitoring of a select group of wells that extend into the Dakota aquifer will be needed to provide a better understanding of the relationship between it and the High Plains aquifer, he says.

The new book – including an appendix that only appears online – is available free of charge for download at: www.kgs.ku.edu/Publications/.

Printed copies cost \$20 plus shipping and handling and are available from the KGS offices in Lawrence and Wichita.



A Note from the Chair

It has been an amazing couple of years for KU Geology. The Earth, Energy and Environment Center, once considered an impossible project, is under construction. When finished, the facility will enable KU Geology and the University to jump to a new level of excellence.

We owe our success to the incredible alumni and friends of this Department. The members of the Geology Associates Advisory Board diligently gave of their time and energy to raise millions of dollars for the new Center. KU Geology alumni and friends made generous donations to turn the new facility from dream to reality. The KU administration, the Provost's Office, and KU Geology faculty provided financial support and many hours of fundraising help.

To all of you, thanks so much for your devotion to this project!

No one should be surprised by these results. Did you know that KU Geology alumni are among the most generous donors in the entire University? In the past 35 years, more than 900 KU Geology graduates have donated to the Department and/or the University.

That represents more than 47 percent of the total number of geology graduates for the same period and is an amazing number of donors for a single department. As Jenna Goodman, team leader of KU Endowment's fundraisers for the College of Liberal Arts and Sciences, put it in an email, "This is PHENOMENAL!"

As you can see from this issue of *The GHawker*, it is a busy time at KU Geology. The Department has upgraded its undergraduate curriculum and rewritten some courses, an effort that is ongoing. KU Geology's research programs remain innovative, collaborative and ever-growing, pushing into new areas of research, and continuing to make scientific breakthroughs. Our field activities range widely and new field trips for students are being added all the time.

Industry needs the kind of well-trained geoscientists that KU Geology produces. If students don't have the financial support they need, it will ultimately be industry's loss. That is why fundraising for scholarships and fellowships never ends, and why we still need your support for financial aid.

While the Geology Associates Advisory Board is thrilled with the success of the campaign for the new



Center, we also know there is more to be done for the new facility. We've funded construction and some of the equipment, but there are still unmet needs. A beautiful building won't mean much if we can't also furnish it with state-of-the-art labs and the most up-to-date scientific instruments.

As KU Geology picks up momentum with construction of the new Center, we are inclined to pause for a breath and feel good about our accomplishment. But we also have to remember that the Department still has financial needs. Consider giving for student financial aid and to help furnish the new Center. Any amount will make a difference. To talk about making a donation, Contact Chair Luis González (785-864-2743 or lgonzalez@ku.edu) or Nancy Jackson (785-832-7357 or njackson@kuendowment.org)

Thank you for all you've done for KU and KU Geology. While other geoscience departments struggle, KU Geology soars. That wouldn't have happened without you.

Steve Dixon

Geology Associates Advisory Board 2015-2016



The Board discusses a point during its October 2014 meeting

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All alumni and friends of the Department of Geology at the University of Kansas become Geology Associates when they make a donation to the Department. Many of these individuals have contributed to funds established by the University of Kansas Endowment Association to provide support for various special purposes and activities of the Department. The category of Geology Life Associate has been established to provide special recognition in gratitude to those Associates who have donated \$5,000 or more since the Geology Associates organization was formed in 1968. This list will be published in each issue of *The GHawker* in order to repeatedly convey our thanks for the generosity of these men and women.

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To Honor Zeller



Edward Zeller & Gisela Dreschhoff

For Gisela A.M. Dreschhoff donating annually to the Edward J. Zeller Geology Fund is about far more than fulfilling the fund's purpose, which is financing research equipment. Each donation honors her late husband.

"I donate to the fund to honor Edward Zeller and his work," Dreschhoff says. "The sciences were tremendously important to him."

Dreschhoff is an adjunct associate professor of geology and a research associate in the Department of Physics and Astronomy at KU. For decades she was both wife and research associate to Zeller, who died in 1996 at age 70.

Dreschhoff and Zeller worked extensively in Antarctica producing research that was so prominent they each have land features named after them on the continent. Dreschhoff Peak is in Victoria Land, which is bounded by the Ross Ice Shelf and Ross Sea. Zeller Glacier is a 10-mile long glacier that flows into the south side of Byrd Glacier just north of Mount Fries. The two also worked in Greenland and Spitsbergen, an island on the Svalbard archipelago in northern Norway.

Zeller earned a bachelor's degree from the University of Illinois in 1946, his master's from KU in 1948, and a doctorate from the University of Wisconsin in 1951. He joined the KU faculty in 1956 and became a full professor of geology in 1963. He added the title professor of physics in 1969 and became director of KU's Radiation Physics Laboratory in 1971.

His early work centered on the thermoluminescence of geological materials and geochronology. Zeller was one of the first to introduce electron-spin resonance for geologic dating. Most of his research, however, focused on solid-state physics and the effects of radiation on matter. One of the couple's biggest polar projects was mapping the planet's record of solar activity by studying the effects of energetic solar protons on the nitrate content of ice cores. The two were also involved with studies of the disposal of radioactive waste, atmospheric pollution, sunspot cycles, climate change, faulting in the U.S. Midcontinent, and natural hydrogen production.

Dreschhoff earned a BS degree in 1961, a master's degree in 1965, and a PhD in physics in 1972 all from Technical University of Braunschweig in Germany. She came to KU in 1967. After Zeller's death, she carried on their work, maintaining a laboratory on campus until 2005 when, with KU's permission, she moved most of the equipment from her lab into the basement of her home in Lawrence. She also donates regularly to KU's Department of Physics and Astronomy.

"For me it was the most natural thing to do to continue," she says, "to keep the lab up and also to contribute to both departments in Edward Zeller's honor."

She continues to research and to write, publishing in such journals as *Advances in Space Research*, *Solar Physics*, *The Journal of Geophysical Research*. Among many other honors and memberships, Dreschhoff is a Fellow of the 111-year-old Explorers Club, and she has served as president of the American Polar Society.

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Graduate student Adam Jackson discusses his research with Geology Associates Advisory Board Chair Steve Dixon at the 2015 G-Hawk Student Symposium.



L to R, Brandon Graham, Geology Associates Board Member Andrew Sparks and Alex Nolte discuss Graham and Nolte's poster at the student symposium.

The Joy of a KU Education

Don Hattin isn't shy when it comes to talking about his financial support of KU Geology. The Indiana University Professor Emeritus says he gives because his experience at KU was "one of the finest episodes of my life."

"I had great professors and great colleagues in the student body," says Hattin (PhD '54, MS '52). "We did great field trips together. It was a wonderful experience."

Hattin's mentor was Professor R.C. Moore. "That was special," Hattin says. "He was an awesome man." Hattin remembers with pride the day the two disagreed about a fossil. Moore – the world-renowned expert – said it was a brachiopod. Hattin – the humble student – said it was a fish scale.

"After considerable argument, I finally convinced him that it was a fish scale," Hattin says. "He got red in the face and finally said that yes that was a fish scale. You didn't challenge Ray Moore unless you knew what you were talking about."

Today Hattin memorializes Moore by donating to one of the funds established in Moore's name. He also donates to the Merriam Graduate Student Research Award that was set up by one of Hattin's close friend and college classmate Dan Merriam, and to the H.A. and Elsie Ireland Scholarship that memorializes another one of Hattin's professors, Andy Ireland. Hattin says he donates to all three funds to honor the people who were most important to him when he was at KU.

"Dan is one of my long-term best friends," Hattin says. "We were very close all the time we were at KU together, and we kept in good contact all these years. Andy Ireland was a special kind of professor. He was a student's professor. He always had a great interest in working closely with students."

Hattin's research focus is paleoecological and taxonomic studies of Upper Cretaceous benthic organisms, especially bivalves. He has made major contributions to Cretaceous stratigraphy of the Western Interior Basin with an emphasis on depositional environments, cyclicity, basin-wide correlation of carbonate-rock intervals, and stratigraphic manifestations of contemporaneous tectonic uplift.

Today he also leads an occasional field trip including one this year in Colorado, manages about 20 display cases in Indiana University's geology building, and with his wife Marge hosts a fossil exhibit for the annual Dinosaur Trains on the French Lick Scenic Railway in southern Indiana. Hattin has published three books of general non-fiction, one about his early years, one on the first seven years of his college and university life, and a biography of his wife's grandfather, W. Ferdinand Macy, who was known for his paintings of New England landscapes. The couple have three children: Sandy, a naturalist; Ronnie, an anesthesiologist; and Donna, a production designer for films and TV.

Hattin says the biggest challenge he faces today is moving to a new office, a task that has forced him to sort through 60 years worth of material.

"I never realized it would be such a huge job," he says.



Marge and Don Hattin

Ferry Pays It Forward

A 1942 KU graduate says his donation for KU Geology has fulfilled his lifelong desire to "pay forward" the education he received from the University.

Neil Ferry's gift will increase the scholarship fund for students studying geochemistry that Emeritus Professor Ernest Angino and his wife Margaret established. With Angino's permission, the name of the scholarship has been changed to the Angino-Ferry Geochemistry Scholarship, and it is being expanded to provide aid to undergraduate as well as graduate students.

Ferry, 95, lives in San Angelo, Texas, with his wife Terry. A member of the ROTC at KU, Ferry was called to service in February 1942 as a lieutenant in the Army Corps of Engineers. He did not receive his BS in metallurgy and mining engineering from KU until June 1942.

During World War II, he worked on engineering and construction of the Alcan Highway in Alaska and Canada. He later served in Europe during the Invasion of Normandy and the Battle of the Bulge.

After the war, Ferry worked for several engineering companies. He was with the Ralph M. Parsons Co. in Pasadena, Calif., for over 20 years as a Senior Process Engineer. There were many interesting projects, he says. One he particularly enjoyed was a project with the Arab Potash Co., in Amman, Jordan, to harvest potash from the Dead Sea.

Calling himself a "true Jayhawker," Ferry says he will always be grateful to KU for providing him with a sound education.

In Appreciation

William Randall van Schmus

William “Randy” Van Schmus was born in Aurora, Ill., on Oct. 4, 1938, to William George and Laura Jean (McKinstry) van Schmus. He is the oldest of three children. He grew up in Aurora and graduated from Naperville High School in 1956 where geology first became an interest. In 1961, he married Edna J. Edison, and they have three children, two sons and a daughter.

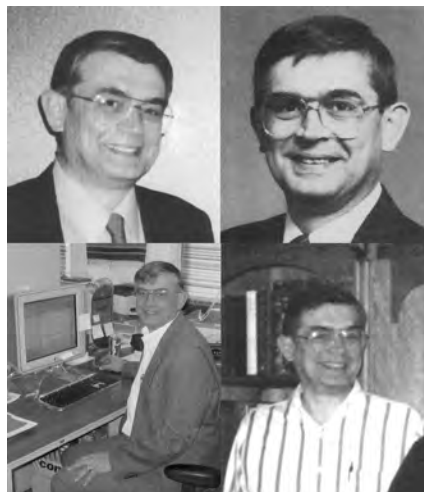
In 1956, Van Schmus enrolled in the California Institute of Technology. A year later, his interest in geology deepened when he took Bob Sharp’s introductory geology courses. In 1960, Van Schmus received his BS in geology. From Cal Tech, he went to the University of California, Los Angeles (UCLA) and received his doctorate in geology. His dissertation was concerned with the geochronological relationships in the Precambrian units along the north shore of Lake Huron in Ontario, Canada. His major advisor in this research was George Wetherill.

Upon completion of his university education in 1964, Van Schmus served in the U.S. Air Force as a research officer in the Lunar-Planetary Research Branch at the Air Force Cambridge Research Laboratories in Bedford, Mass. While in the Air Force, he conducted studies of mineralogic, petrologic, and geochemical features of meteorites. An article he wrote with J.A. Wood during that period, “A chemical-petrologic classification for the chondritic meteorites,” has been cited nearly a thousand times. In the Air Force, he rose to the rank of 1st lieutenant. Upon his discharge in 1967, he received the Air Force Commendation medal.

After leaving the service, Van Schmus accepted a position as an Assistant Professor of Geology at KU. In the summer of 1969, he started teaching at the KU Geology Field Camp near Cañon City, Colo. He advanced in rank quickly, becoming an Associate Professor in 1970 and a Professor in 1975.

In 2001, Van Schmus accepted the position of chair of KU Geology, a position he held until 2004. While chair, he had to deal with the lack of space for the Department and the remodeling of Lindley Hall. In 2001, he received the Best Undergraduate Geology Teacher Award from the Center for Teaching Excellence. In 1987, he accepted the honor of being the first Union Pacific Resources Distinguished Professor. All told, he supervised 26 graduate students and their research for masters or doctorate degrees.

Van Schmus received support from KU, NASA, and the National Science Foundation for his studies



of the geology and chronology of Precambrian rocks in the Lake Superior region of Wisconsin and upper Michigan. His work focused on deciphering the growth history of North America during Precambrian times. In 1979, he and Pat Bickford, who was with KU Geology at the time, received funding for studies of Proterozoic rocks of the western United States, particularly in Colorado. The work expanded to other parts of the world, including Brazil. In 2003, the Brazilian Academy of Sciences elected Van Schmus a member in honor of his work in South America.

He has had a life-long collaboration with Bickford. Their friendship and work relationship started when they both learned geochronology from Wetherill at UCLA. They played poker together, and when Bickford left KU to teach at Syracuse University, the two kept their connection and started a friendly rivalry. In 2003, when Syracuse beat KU 81-78 for the NCAA championship, Randy and Edna van Schmus paid off their bet to Pat and his wife by buying them dinner on the Seattle waterfront. In turn, Bickford hosted a retirement party for Van Schmus that featured roasts and recollections from colleagues, former students and family.

After a lifetime of accomplishment, Van Schmus says that he ranks his students as his most important success. “My biggest achievements are the students I’ve left behind,” he told the G-Hawker in 2007 when he retired. “I’ve been fortunate to be able to do some pioneering work, too. That’s something that time will judge, though.”

*Dan Merriam
Department Historian*

References

Silver, Diane. Randy Van Schmus retires: Ghawker, Fall 2007, p. 18-19.

Textbooks by KU Geologists

What do professors do in their free time? Some go into the field, others serve on committees, and some write textbooks. Through the years, geoscience professors and scientists at KU Geology have written textbooks in their specialties, and some have been widely adopted. Perhaps you used one or more of these texts in your classes at KU or elsewhere.

Faculty members have acknowledged the value of investing their time in these book-writing projects. Each book has produced tangible intellectual and reputational dividends for KU, the geosciences and the authors.

Some of the books were not used as texts, but as supplemental reading in courses, or for background material. Books such as *Land of the Post Rock* by Grace Muilenburg and Ada Swineford, *Roadside Kansas: A Traveler's Guide to Its Geology and Landmarks* by Rex Buchanan and James McCauley, and *Kansas Geology*, which was edited by Buchanan, and the series by Dan Merriam on the history of the KU Geology, the Kansas Geological Survey, Field Camp, and biographies of Erasmus Haworth and Raymond C. Moore are just a few of the many examples.

Here is a listing of some of the books written by KU geoscientists. The names associated with KU Geology are in bold.

Raymond C. Moore wrote the first edition of his *Historical Geology* in 1933, which he later revised and updated in 1949 with a new title. **Moore** with coauthors **Cecil G. Lalicker**, and **Alfred G. Fischer** wrote a widely used paleontology text. *Invertebrate Fossils*, published in 1952, was a standard for several decades as an introduction to the subject. Moore also wrote an *Introduction to Historical Geology*, which was published in 1949 with a second edition in 1958.

Late Paleozoic Pelecypods: Pectinacea and Mytilacea was written by **Norman D. Newell** in 1937. It was a specialized book, mostly based on his paleontological studies at KU.

Carl O. Dunbar was an author with Charles Schuchert of a text on *Historical Geology* published in 1932. Through the years, he with other authors, mainly Karl M. Waage, continued the subject with the same book title, but by 1965 Dunbar was the single author.

The "Patriarch of Sedimentary Geology," **William H. Twenhofel**, made many contributions, but most came after he left KU in 1916. In 1935, he co-authored a popular textbook with W.H. Shrock - *Principles of Invertebrate Paleontology*. In 1939 he published

Principles of Sedimentation, the first North American textbook on that subject. In 1941 he co-authored *Methods of Study of Sediments* with Stanley A. Tyler.

H.T.U. Smith published his *Aerial Photographs and Their Applications* in 1943. It was one of the first, if not the first book to describe the use of aerial photographs in mapping and noting geological features in the third dimension. It was based on his work in southwestern Kansas.

In 1951 **Kenneth K. Landes**, while at the University of Michigan, published his *Petroleum Geology of the United States*.

Carl O. Dunbar and John Rodgers published *Principles of Stratigraphy* in 1957.

John W. Harbaugh and **Daniel F. Merriam** published *Computer Applications in Stratigraphic Analysis* in 1968. Containing many examples of their work in Kansas, the book was used as a text in introductory courses on application of computer methods in geology. Merriam later wrote *Computer Fundamentals for Geologists* in 1975.

John C. Davis wrote his bestseller *Statistics and Data Analysis in Geology* in 1973 with a updated and revised second edition in 1996 and a third edition in 2002. This text was widely adopted for courses in the introduction of computing to geologists.

John W. Harbaugh wrote a paperback book on *Stratigraphy and Geologic Time* that could be used as a text. Next, *Probability Methods in Oil Exploration* was the subject of a book by **Harbaugh, John Doveton**, and **John Davis** published in 1977. This book was followed in 1995 by *Computing Risk for Oil Prospects; Principles and Programs* by **Harbaugh, Davis**, and **Johannes Wendebourg**.

A text on *Geologic Trend Analysis, a Primer* in 1985 was written by **Peter G. Sutterlin** and **Merriam** as an introduction to the subject.

John H. Doveton published a series of books on log analysis. One good example is his *Log Analysis of Subsurface Geology; Concepts and Computer Methods*, which came out in 1986. Doveton has written log-analysis books for his university classes and short courses.

A book on *The Design, Performance, and Analysis of Slug Tests* was written by **James J. Butler, Jr.** and published in 1998. The book is a first to provide detailed information on the practical aspects of the slug-test methodology.

In 1999 **Ricardo A. Olea** wrote his text on *Geostatistics for Engineers and Earth Scientists*, which was used for a graduate-level course for engineering students.

Bruce S. Lieberman's book, *Paleobiogeography: Using Fossils to Study Global Change, Plate Tectonics, and Evolution* published in 2000 is used widely by researchers and students in paleontology and plate tectonics. *Phylogenetics: Theory and Practice of Phylogenetic Systematics* by E. O. Wiley and **Lieberman**, published in 2011, is a revision of the industry standard on phylogenetics. **Lieberman** and **Roger L. Kaesler** are authors on *Prehistoric Life: Evolution and the Fossil Record*, an introductory textbook published in 2010. It is on paleontology and prehistoric life for those not planning to major in geology.

Continental Trace Fossils, a book by **Steve Hasiotis**, was published in 2002 and has garnered

him wide recognition as one of the important figures in the study of continental trace fossils. The study of trace fossils has been viewed as “mature” by some, but Hasiotis’ work on the continental realm is inspiring a new generation of trace fossil workers to delve into the opportunities presented by paleoenvironmental work in the continental realm.

Robert H. Goldstein and co-author T. J. Reynolds’ book *Systematics of Fluid Inclusions in Diagenetic Minerals* is used worldwide by students and researchers of fluid inclusions. Published in 2010, it has been described recently as a “classic” by SEPM and the Geochemical Society.

Paul Selden and John Nudds saw the 2nd edition of their *Evolution of Fossil Ecosystems* released in 2012.

- Dan Merriam
Department Historian

Who's Who?

Can you guess who's who in this collection of geologists who did significant work in one of four states: Missouri, Kansas, Florida and Texas? For bonus points, match the geologist with the right state. The answers are on page 69.



A Geological Detour

Earl G. Swem, one of the most significant bibliographers and librarians of the 20th century, took a detour to KU Geology on his journey to his more well-known career. Swem spent a year at KU as a “special student” working for Erasmus Haworth, who was Kansas State Geologist at the time. Swem wrote a preliminary report on his fieldwork in 1894 and 1895 on the glaciated area of northeast Kansas. He later went to work for the College of William and Mary.

Founded in 1693, the public research university located in Williamsburg, Virginia, is the second-oldest university in the United States. Swem served as the college’s librarian from 1920 to 1944, and compiled the Virginia Historical Index, a resource for genealogists and historians, which is known as “Swem’s Index.” The library at the college is named for Swem.



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|--|-----|--|----|
| Alvin Bonilla Rodriguez | PhD | Breanna Huff | MS |
| “Depositional and Paleoenvironmental Settings of Cretaceous Limestone in the Greater Antilles” | | “Microbial and Geochemical Characterization of Wellington Oil Field, Southcentral Kansas, and Potential Applications to Microbial Enhanced Oil Recovery” | |
| Christian Hager | PhD | Brett Judy | MS |
| “Integrated Tectonic and Quantitative Thermochronometric Investigation of the Xainza Rift, Tibet” | | “High Resolution Seismic Reflection to Characterize Small Scale mechanisms of Large Scale Natural Dissolution in the Hutchinson Salt Member” | |
| Charity Lander | PhD | Britney Katz | MS |
| “Quantifying the Roles of Chemical and Microbial Weathering in Acid-Sulfate Hydrothermal Systems” | | “Constrained Parameterization of the Multichannel Analysis of Surface Waves Approach with Application at Yuma Proving Ground, Arizona” | |
| Joshua Schmerge | PhD | Brant Konetchy | MS |
| “Interpretation of Euphapsine (Castoridae: Paleocastorinae) Burrowing Behaviors Based on the Functional Anatomy” | | “High-Resolution Quantification of Groundwater Flux Using a Heat Tracer: Laboratory Sandbox Tests” | |
| Jose Velez Gonzalez | PhD | Molly Long | MS |
| “Using Radar and Seismic Methods for the Determination of Ice Column Properties and Basal Conditions at Jakobshavn Isbrae and the NEEM Drill Site” | | “Characterizing the Groundwater-Surface Water Interactions in Different Subsurface geologic Environments Using Geochemical and Isotopic Analyses” | |
| Matthew Baker | MS | Luis Montalvo | MS |
| “Ground-Penetrating Radar Imaging of Fluid Flow Through a Discrete Fracture” | | “Petrography and Paragenesis of Diagenetic Mineral Phases in Cherty and Dolomitic Spiculite Strata, Mississippian, South-Central Kansas” | |
| Natalie Burris | MS | Edward Morehouse | MS |
| “The Effect of Point Velocity Probe Size on Groundwater Velocity Estimation in Noncohesive Sediments” | | “A Chemostratigraphic and Detrital Zircon Geochronological Analysis of Upper Cretaceous Strata: Applications for Dating and Correlating Strata” | |
| Erica Dalman | MS | Matthew Myers | MS |
| “Constraining Neotectonic Deformation of the Columbian Sub-Andes” | | “Implications for Large-Scale Sea Level Change in the Turonian Western Interior Seaway: Evidence from the Codell Sandstone, Colorado” | |
| Matthew Downen | MS | Clyde Redger | MS |
| “The Taxonomy and Taphonomy of Fossil Spiders from the Crato Formation of Brazil” | | “Seismic Attribute Analysis of the Upper Morrow Sandstone and Arbuckle Group from 3D-3C Seismic Data at Cutter Field, Southwest Kansas” | |
| Yousuf Fadolkarem | MS | | |
| “Pre-Stack Seismic Attribute Analysis of the Mississippian Chert and the Arbuckle Group at the Wellington Field, South-Central Kansas” | | | |

Angela Thompson MS
 “Effect of Flow Rate on Clogging Processes in Small
 Diameter Aquifer Storage and Recover (ASR) Injection
 Wells”

Ryan Voegerl MS
 “Quantifying the Carboxyl Group Density of Microbial
 Cell Surfaces as a Function of Salinity: Insights into
 Microbial Precipitation of Low-Temperature Dolomite”

Yao Wang MS
 “Suppressing Near-Surface Reverse Time Migration
 Artifacts Using a Band-Selecting Imaging Condition”

Michael Waynick MS
 “Fluvial to Shelfal Strata of the Late Cretaceous
 to Paleogene Dorotea and Tres Pasos Formations,
 Magallanes Basin, El Calafate, Argentina”

Undergraduate Degrees

Cassie Absher*	BA
Jason Jones	BA
Anna Barber	BS
Jesse Bellora	BS
Xiaoru Chen	BS
Laura Devlin	BS
Adrienne Duarte	BS
Joshua Jaimez	BS
Isaac Javier	BS
Jacquelynn Miller	BS
Karl Miller	BS
Luke Miller	BS
Keith Nolte	BS
Marquise Paige	BS
John Pistorius	BS
Kate Ruoff*	BS
Alisha Shipley	BS
Angela Unrein	BS
Reed Waldon	BS
Danielle Woodring	BS

*Graduated with Departmental Honors

2014-2015 GRANTS AND AWARDS TO STUDENTS

Keith Nolte	Kansas Geological Foundation Scholarship
Danielle Woodring	Kansas Geological Foundation Scholarship
Jason Hallman	Kansas Geological Foundation Scholarship
Blair Schneider	Doctoral Student Research Fund
Mackenzie Cremeans	Doctoral Student Research Fund
Leila Joyce Seals	Madison and Lila Self Graduate Fellowship
Adam Jackson	2015 American Association of Petroleum Geologists Foundation
Alexa Goers	Paleo Society Richard Osgood Award
Brian Sitek	GSA Research Grant
Jason Hallman	GSA Research Grant
Brittany Hendrix	GSA Research Grant
Sarah Gibson	GSA Research Grant
Robert Radar	GSA Research Grant
Drew Schwab	GSA Research Grant
Abdul Wahab	GSA Research Grant

2015 HONORS BANQUET

The Department of Geology faculty, staff, and students met for the annual Honors Banquet on May 8, 2015. The following honors, fellowships, scholarships, and awards were announced.



L to R, Joshua Schmerge and Associate Professor Jen Roberts



L to R, Associate Professor Andreas Möller and Professor Luis González

**JAN F. & MARY VAN SANT
GEOLOGY EXCELLENCE AWARD**
Andreas Möller

**LEO M. & ROBERT M. ORTH WATER
RESOURCES SCHOLARSHIP**
Brooks Bailey

ERASMUS HAWORTH HONOR AWARDS
Outstanding Senior Student
Cassie Absher Jason Jones
Outstanding Masters Student
Erica Dalman Britney Katz
Outstanding Doctoral Student
Joshua Schmerge

**ASSOCIATION FOR WOMEN GEOSCIENTISTS
SCHOLARSHIP**
Chevron Graduate Research Scholarships
Rachel Bowes Nicole Dzenowski
Aria Lineares Kathy Roccaforte
Osage Chapter Undergraduate Service Scholarships
Lauren Haga Sarah Lamm
**Osage Chapter Undergraduate Research
Scholarship**
Sydney Bolin
Sean S. Thomson Service Scholarship
Jean Eichhorst Jeffrey Ross

**SIGMA GAMMA EPSILON
W. A. TARR AWARD**
Hannah Hubert

GRADUATE SUMMER SUPPORT
Ernest Angino Geochemistry Scholarship
Brittany Hendrix Jeffrey Oalmann
Devon Energy Scholarship
Tony Pugliano Yuri Rupert
Encana Energy Scholarship
Benjamin Campanaro Jeffrey Ross
Lloyd Henbest Scholarship
Brooks Bailey
Frederick T. Holden Scholarship
Tyson Berndt Jason Hallman
**Roscoe G. Jackson II Graduate Research in Geology
Award**
Richard Bell Sean Hammersburg
Maritha Huber Jennifer Lowery
Roger L. Kaesler Memorial Award
Tabatha Gabay
Ralph C. Lamb, Jr. Scholarship
Mackenzie Cremeans
Dean A. McGee Scholarship
Trevor Osorno
Merriam Graduate Student Research Award
Tabatha Gabay Abdul Wahab
Raymond C. & Lilian B. Moore Scholarship
Rebecca Dorward Alexa Goers



L to R, Professor Luis González, Brooks Bailey, Associate Professor Jen Roberts



L to R, Jason Jones and Associate Professor Jen Roberts

August L. Selig Scholarship

Sean Fischer Sarah Gibson

Stelbar Geology Graduate Student Scholarship

Brock Norwood

UNDERGRADUATE SCHOLARSHIPS

Angino-Ferry Geochemistry Scholarship

Dillon Moran

Devon Energy Scholarship

Amy Peacock Elijah Turner

Adam Yoerg

Henbest Scholarship in Geology

Courtney Jarvis Brian Rooney

Imogene A. Herndon Scholarship

Duncan McDonald Bradley Trammel

Frederick T. Holden Scholarship

Ashley Arnold Allison Grady

Aaron Hess William Wesley

Bill D. & Carolyn A. Holland Scholarship

Steven Finch Abraham Nieto

H. A. & Elsie Ireland Scholarship

Andrew Hoxey

Ralph C. Lamb, Jr. Scholarship

Nick Thurber

Roy & Freda Lehman Scholarship

Sally Dickson Matthew Green

Dean A. McGee Scholarship

Jesse Saegert

James A. & Rowena E. Peoples Scholarship

Lauren Haga Matt Mulheran

Kendri Salmans

Alec Waggoner Memorial Scholarship

Shawn Dunaway

GEOLOGY 360 SCHOLARSHIPS

Bradley Everett L. Memorial Scholarship

Jalene Greene Amy Peacock

Ralph C. Lamb, Jr. Scholarship

Brandon Criss Elijah Turner

Ray P. Walters Scholarship

Connor Armstrong Theresa Lydick

Amy Olson Brandon Tabor

FIELD CAMP SCHOLARSHIPS

Louis F. & Bets Dellwig Field Camp Scholarship

Steven Finch Nick Lara

Duncan McDonald Matt Mulheran

Caroline Patelli Meghan Railsback

Caleb Sims

Frederick T. Holden Scholarship

Courtney Jarvis Scott Moore

Dominic Setka

H. A. & Elsie Ireland Scholarship

Katie Graham Aaron Hess

Andrew Hoxey Hannah Hubert

D. A. McGee Scholarship

Abraham Nieto

Ralph C. Lamb, Jr. Scholarship

John Intfen

Henbest Scholarship

Brian Rooney

Bradley Trammel

John Mark Jewett, *The Kansas Geologist*

John Mark Jewett was a native Kansan who spent most of his life in the state. He was born in DeSoto, Kansas, in 1897, died in Lawrence in 1970, and was buried in the family plot in DeSoto.

He earned an undergraduate degree in geology in 1921, a master's degree in 1930 and a doctorate in geology in 1943, all from KU. Most of his professional career was spent at KU where he worked at the Kansas Geological Survey and taught in the Department of Geology, attaining the rank of associate professor. He had only three experiences outside of Kansas – serving in the U.S. Army in World War I in France, working at the University of Cincinnati in Ohio, and teaching geology at North Dakota State University the year after he retired from KU.

He started his geological career in the 1930s by publishing papers in the *Kansas Academy of Science Transactions* on the Pennsylvanian Bronson Group and Permian cyclic sedimentation. He expanded his interests by working on the geology of Wyandotte County in northeastern Kansas, state water resources, shallow aquifers in eastern Kansas, asphalt rock, and oil and gas.

Jewett published summaries and general information on Kansas geology such as the “Geologic Structures in Kansas,” a *KGS Bulletin*, in 1951. He continued his work for another two decades and published more than 100 papers on Kansas geology (Merriam, 2009, 2011). In 1957, Halsey Miller, a Kansas Geological Survey geologist, named the fossil fish *Petalodus Jewetti* in honor of Jewett.

Jewett was especially good at explaining the geology of Kansas and geology in general to the layperson. He worked with KGS Publications and Records, especially with Communications Director Grace Muilenburg, in this regard. He liked to conduct field trips for schoolteachers and students explaining geology in general terms.

Between 1957 and 1965, Jewett taught courses at KU, including Field Stratigraphy (3 hours) and Introduction to Engineering Geology (4 hours).

Jewett was listed in *American Men of Science* and was a fellow of the Geological Society of America and the Paleontological Society as well as being a member of Sigma Xi and the American Association of Petroleum Geologists.

He was always available to help and assist with others' projects, and did a thorough job with everything he took on. Jewett had a good family life with his wife,

Mavis, a son and three daughters.

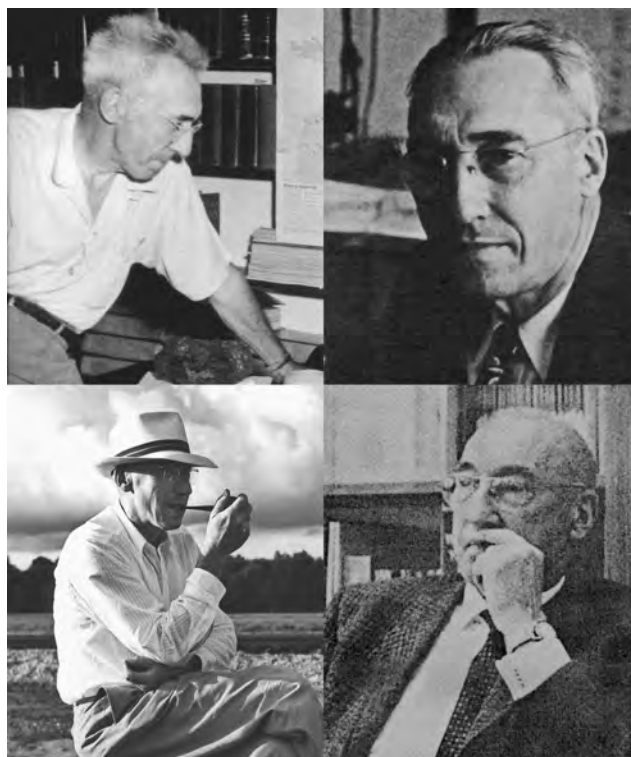
Wendell S. Johns said the following about Jewett in a news article in the September 1960 *Kansas Geological Society News Bulletin*: “Mark Jewett spent the summer at home. I think Mark has been in Kansas so long that he likes it here even in the summer.”

He retired in May of 1966 and died four years later at the age of 73 after a long fight with cancer. He was a pioneer in many respects and knew the geology of Kansas probably better than anyone at the time of his death.

References

- Merriam, D.F., 2009, *Geology at The University of Kansas, the first century (1866-1966) and a bit beyond: Univ. Kansas Dept Geology and Paleo Inst. Spec Publ. 6, 210 p.*
- Merriam, D.F., 2011, *Observations, recollections, and impression of the Kansas Geological Survey at The University of Kansas: Univ. Kansas Dept. Geology and Paleo Inst. Spec. Publ. 7, 284 p.*
- Miller, H.W., Jr., 1957, *Petalodus jewetti, a new species of fossil Bradyodont fish from Kansas: Kansas Acad. Sci., Trans., v. 60, no. 1, p. 82-85.*

Dan Merriam
Department Historian



ALUMNI NEWS

1940s

MUHLENBRUCH STUCKER, ANNA, 3817 Arroyo Rd., Fort Worth, TX 76109-3412. BS '47. Retired geologist, Gulf Oil.

MEEK, MARILYN SCHNACK-EL, 3136 S. 47th St., Kansas City, KS 66106. BS '48. Retired clerical staff for Heart of America Council and Boy Scouts of America.

MANN, RAYMOND K., 18535 Melissa Springs Drive, Tomball, TX 77375. BS '49. Retired petroleum geologist.

1950s

BURFORD, JAMES F., 123 Abel Hanger, Midland, TX 79707. BS '50. Retired exploration geologist. I still do a little consulting and exploration work.

EVANS, JANE KEITH, 6720 Century Avenue, #115, Middleton, WI 53562. BA '50. I'm one of that dying breed fortunate enough to be able to stay home to raise my children. My son is a professional teacher in an alternative high school for "at risk" young people. I have two married grandchildren and two infant great grandchildren. Life is good!

MITCHELL, PORTER, 7707 W. Britton Rd., Apt. 1605, Oklahoma City, OK 73132. BS '50. Exploration Operations Supervisor at Mobil Oil – Denver Division. No real news. Enjoying retirement after working 30 plus years as both an exploration and production geologist - that is, dealing with wildcat prospects and field development

after the first discovery well on prospect. There still seem to be plenty of job opportunities in the oil industry for students so inclined.

ZINSER, ROBERT W., 20431 N. Meadowood Dr., Sun City West, AZ 85375. BS '50. Retired geologist, Sun Oil Company.

CONROY, RICHARD L., 3523 Crow Valley Dr., Missouri City, TX 77459. BS '51. Retired. Since I last reported, several significant milestones have passed. 2011-70th High School Reunion. 2013-60th Wedding Anniversary- 62 now. 2014- 91st birthday. Betty and I have a son and daughter plus five grandchildren: two with physical therapy doctorates and three engineers (chemical, electrical, and construction). No great-children. We both enjoy good health, but have curtailed our international travel since 2008. Between work and pleasure, I have visited over 50 countries. The major thing on my bucket list is to visit the Earth, Energy, and Environment Center when completed. I first remember the original structure as the military science building during WWII, before it was named Lindley Hall. I will always be grateful to KU, especially our professors who were very generous with their time for the returning of WWII veterans. The G.I. Bill was our salvation for continuing education and careers we never imagined possible.

TAPPAN, GEORGE H., 3618 Highgreen Drive, Kingwood, TX 77339-2627. BS '51. Retired environmental exploration geology.

CARLSON, WILLIAM (BILL) A., 3091 Mill Vista Road, Apt 1502, Highlands Ranch, CO 80129. MS

'52. I have just published my second book of landscape photographs (in color) with accompanying verse/prose/poetry. I'm currently compiling data for a third book of landscape black and white photography with accompanying verse.

HAYNES, EDWARD H., 93 Oakbrush St., Pagosa Springs, CO 81147-8435. MS '52. Retired Chevron (1977), Evergreen Geophysics Association (1986). When you are the "antiquity"—when your grandfather fought in the Civil War, your Dad in W.W.I and you are a great-grandfather—you only reminisce. Fascinating "geology" I learned at KU: (1) Continents have been in the same place forever! Two "nuts" Wegener and DuToit think they move. (2) Shallow water trilobites (Cambrian) drifted on rafts to coastal Canada to Wales. (3) (Pennsylvanian) Cyclothem in North Africa and Kansas indicated "worldwide" changes in sea level. (4) Mountains rise on "elevators" called diastrophism. Fascinating "geology" learned at KU. (1) [From Cecil G. Lalicker, known to his students as "sessile benthos"] On isopachs, a "zero sand well" is not a "true" data point! (2) At the intersection of two seis lines you have a 10-mile throw on one line of the fault and 50 miles on the other – go back to "square one". (3) If "jungle" mapping streams in the mountains, the Paleocene has disappeared, somewhere in the basin is a "pinchout".

DOUGLAS, MRYL ROBERT, P.O. Box 1059 Destrehan, LA 70047. Petroleum geologist now retired. I am 86. Fair health but not as sharp as I hope I was in school. My experience at KU was a great experience I treasure. Working for

R.C. Moore made the above. He was one of the rare individuals you trusted and obeyed without question. From the report included with this notice, KU Geology today would make R.C. proud. All the Best, Myrl.

HATTIN, DONALD, 3485 S. Inverness Farm Road, Bloomington, IN 47401. PhD. '54. Retired professor, Indiana University. We commenced the 2014-2015 academic year with a 12-day trip to Alaska followed by a visit to Central Washington University (Ellensburg, WA) where our older grandson, P. Whitney Swain III, is a faculty member in the Department of Chemistry. He has recently started a research program (the department's first). In October, accompanied by our older daughter, Sandra Belth, and her husband, Jeff, we journeyed to Lewisburg, WV, for a visit with one of my college roommates, Alan Carlson, and his wife Jean. There we travelled to Cass, WV, to visit the Cass Scenic Railroad, a steam operation, and I was privileged to ride in the cab of locomotive #4, a shay geared logging engine. Sandy and Jeff are naturalists and took a side trip for birding. Son, Ron, continues his practice of anesthesia in Denver, CO, and has vacationed several times on Grand Cayman Island. Our younger daughter, Donna, continues work in L.A. as a production designer for television series. She is a volunteer crew member on square riggers of the Los Angeles Maritime Museum. In August 2014 she served as a crew member on the square rigger Lord Nelson on a 1,700-mile voyage from Southampton, England, to Grand Canary Island off the coast of Africa. Maggie and I hosted a large display of fossils (vertebrate and invertebrate) for the annual dinosaur trains at French Lick, IN. Total of three

trainloads of passengers over the course of two weekends. I continue to manage numerous displays in the Department of Geological Sciences at IU. Early in May 2015, I spotted an oreodont skull on a high shelf in a spooky antique store in Bloomington, and bought this fine specimen for our growing collection of vertebrate fossils. I cashed in the reimbursement check today (May 27, 2015)!

RITCHIE, SCOTT A., 10 E. Lynwood Blvd., Wichita, KS 67207. BS '54. Chairman, Ritchie Exploration, Inc.

RICHARDS, GLENN, 16085 E. Lehigh Circle, Aurora, CO. MS '55. Retired exploration manager. Enjoying life in beautiful Colorado! Travel when we can, photograph always!

SCHWARZ, KENNETH, P.O. Box 226, Sackets Harbor, NY 13685. MS '55. Retired petroleum exploration geologist Maryland Geological Survey (1976-200), Amoco Production Company (1958-1976). Wife, Patricia, of 59 years, passed away 31 Dec. 2014. Trying to stay active in local community activities; President of local Senior Citizen's Club; gardening, traveling, occasionally leading geology field tips for various groups. Enjoying my summer cottage on Lake Ontario as family groups visit with me.

MICKEY, ROBERT J. (BOB), 6800 South Granite Ave, Apartment 452, Tulsa, OK 74136. BS '56. Retired exploration geologist. Married 52 years to Susan. Two sons, (sadly we have no grandchildren.) In 2012, we sold our home in Tulsa where we had lived since 1988 and moved to Montereau, a senior retirement center in Tulsa.

We enjoy a very comfortable maintenance free life style. There are a number of retired residents from the petroleum and energy industry, Montereau and Tulsa are the right size for retirees, not too big but with excellent medical facilities, museums and not a lot of traffic. The 2014 *G-Hawker* article on the summer camp brought back good memories. In talking to geologist from other universities over the years, I believe that KU has an excellent camp and a solid program. It was 60 years ago this summer that I attended the camp. I enjoy reading *The GHawker* and learning about the department, faculty and classmates. Thank you. I hope to visit the campus in the future and will try to stop by.

BARNES, DONALD L., 12100 Chancellor's Village Lane, Apt 3109, Fredericksburg, VA 22407. BS '57. Retired from U.S. Army Corps of Engineers, Chief of Public Development Branch, and Civil Works Director at Headquarters Office in Washington D.C.

MOYLAN, JOHN, 6220 Martway St. Apt. 309, Mission, KS 66202. BS '58. Retired geologist.

MCNELLIS, JESSE M., 3327 W. 8th St., Lawrence, KS 66049-3116. MS '59. Retired, geologist/hydrologist at USGS Water Resources Division. Fran and I are blessed by three children and 12 grandchildren, ages 18-2 (six boys and six girls). We are still going to Jayhawk basketball and football games. We hear from former USGS colleagues who are still Jayhawk fans! Rock Chalk!!

REESE, DALE O., 6816 Roundrock, Dallas, TX, 75248. MS '59. Petroleum geologist. President of Dale O. Reese, Inc.

1960s

KOSTER, WALLACE, 536 E. King Street, Chambersburg, PA 17201. BS '60. Retired consultant geologist, Wallace C. Koster, CPG, PG.

JORDAN, JOHN, 6613 E. 10th Street N., Wichita, KS 67206. BS '60. Lawyer at John W. Jordan Attorney at Law.

ROSS, DAVID A., 53 Green Pond Road, E. Falmouth, MA, 02536. MS '60 Scientist emeritus, Woods Hole Oceanographic Institute. Not much to report. Still working on Middle East seismic data.

ADAMS, LARRY W., 12080 E. Nunn Rd., Athol, ID 83801. BS '60, MS '61. Retired principal engineer, Kendall/Adams Group, LLC. Larry and wife (Alice) have lived in Northern Idaho since retirement in 2002. Subsequently three daughters and nine grandchildren have relocated to the Central, ID area. Larry still consults with his former firm and for other clients in the Southern California area. The family keeps busy maintaining a 12-acre "mini ranch" with two horses, four dogs, two cats, chickens and a potbellied pig. Retirement life is good in this beautiful area (about 80 miles south of the US/Canada border).

ANDSAGER, RICHARD L., 14210 W. Via Manana, Sun City West, AZ 85375. BS '61. Retired vice president and chief engineer, Northern Natural Gas Co.

ANGINO, ERNEST E., 4605 Grove Dr., Lawrence, KS 66049. PhD '61, MS '58. Retired emeritus professor from the University of Kansas. Now retired from all city political and university activities.

Having fun doing volunteer work with Audio Reader (reading for the blind) and Rotary activities. Had great lunch with Eric & Lisa Vogl! Anyone in area, give me a call. Treat will be on me. Keep busy with lunches and breakfasts with other retired folks swapping old stories. Interested in hearing from any old friends, students, and adversaries! Life is good!

GROSSMAN, STUART, 5627 Jackwood, Houston, TX 77096. PhD '61. Retired geologic associate from Exxon Exploration. I am now 87 years old, and I have breakfast with a bunch of old geezers like myself but none of them are geologists, but that doesn't stop them from talking about it. My wife Harriet says let them talk just don't get involved, which is hard not to. However, I have lunch the first Monday of every month with paleontologists and some plain geologists. Jan Van Sant comes to it. He is the only other Kansan in the group, which is getting smaller, like the coffee group. Give my regards to anyone who remembers me. – Regards Stuart "Duffy" Grossman.

HABIB, DANIEL, 24 Toni Court, Plainview, NY 11803-3022. MA '61. Retired professor emeritus, executive officer at Queens College & Graduate School. Moving forward at 78 years. All's well. New grandson -- Andrew Jason. Still publishing.

LINEBACK, JERRY A., PO Box 1220, Grantham, NH 03753. MS '61, BS '60. Retired professional geologist. Retired in New Hampshire but planning on moving to California in 2015 so that we are closer to Carol's children. No new address yet.

SACKETT, DUANE H., 3507 Valley Chase Dr., Kingwood, TX 77345. MS '61. I've spent the winter rehabbing a broken wrist, so haven't accomplished much else.

SIEGEL, FREDERIC R., 4353 Yuma St. NW, Washington D.C., PhD '61. Retired-professor emeritus of geochemistry, George Washington University. As I write this, all is well. The family is fine with our five grandchildren (23, 19, 15, 9, and 3) doing well at work and in school. I am reasonably active and presented papers at the MED-GEO in 2013 and at SEGH in July 2014. I wrote a book that came out last month in the series Springer Briefs in Environmental Science with the long title "Countering 21st Century Social-Environmental Threats To Growing Global Populations" – Soft cover and as e-book. Felisa and I continue to travel – to Provence last summer, to Great Britain this summer, and we'll be in Milan for a week this fall. I hope that all who read this are doing well and enjoying their families and the work they are doing or retirement they have earned.

SCHRODER, MARVIN, 1471 SO. Valentine Way, Lakewood, CO 80228. MS '61. Retired geologist. My health continues to be well after major open-heart surgery. My self-published book, *GEOLOGY ODYSSEY: A Journey Through Earth Science*, is now starting to be available in a number of public libraries in the western U.S. In Europe, Amazon is advertising the book in four foreign languages, and in Japanese in the Far East. Overall, the book is now available in over 30 foreign countries, including India and Australia. Currently, 45 geologic libraries in the U.S. now hold 1,910 of my geologic maps that cover the northern part of the Idaho-Wyoming

Overthrust Belt- out of the 25,000 copies of that were published by the U.S. Geological Survey in the 1960s and 1970s. These maps are now available in the digital form from the USGS.

EMERY, PHILIP, 4475 County Road 25, Mt. Home, AR 72653. MS '62, BS '60. Retired from U.S.G.S and consulting. Janet, former KU Geology Department secretary, and I have been married 55 years.

KEIM, JACK D., 3804 Stockade Ct., Lawrence, KS 66049-2144. BS '62. Retired Paleontologist Assistant, KU Paleontological Institute. Retired from the PI at KU 13 years ago, still enjoy retirement even though it is a full time job. Happy Trails!

LUCKEN, JOHN E., 13657 Hwy #3, P.O. Box 345, Akron, IA 51001. MS '62. I was inspired to reminisce by reading the fall 2014 comments by Lee Gerhard. We have continued in friendship for 50 years with Lee and Darcy. I am currently (mostly) retired from the oil and gas business, but very busy. I began my career with Mobil Oil Company in June 1962 in Casper, WY. I married my college sweetheart Aug. 1 that same year, and she taught Spanish at the high school until our daughter Helen was born in 1967. In late 1969, we moved to Denver, CO, where I worked for independent companies until 1975 when I decided to become a consulting geologist. Life in the oil patch was very exciting. I do not believe any other career would have given me the satisfaction I got from exploration and development of prospects ranging from South Texas to Northern Alberta and most of the basins in between. My experiences at KU were wonderful. The Department was strong with exceptionally

friendly and dedicated staff. Doctors Ireland, Dellwig and visiting Professor Carl O. Dunbar left life-long lasting impressions. I am grateful for them and many mentors who helped me be a better geologist. Many of us had teaching assistantships in Historical and Physical geology labs. We were given office space in a WWII type Quonset building just east of Lindley Hall. Great friendships were developed and a lot of fun happened when Rudy Lippert and Wally Wahlstadt published a monthly department news (mimeographed) paper, which poked fun at our professors, fellow students, etc. Wish I had saved those, but one of the monthly pokes had to do with the ugliest necktie award. Just about the end of my last semester, on a Sunday afternoon, I was feverishly working to finish my thesis when the sirens wailed and a tornado approached west campus. I hurriedly tossed all my work into a briefcase and headed to the basement at Lindley Hall. Several of us opened a west door and watched the tornado and debris it was carrying circle the funnel as it headed northeast missing Mt. Oread. In an effort to de-clutter, I found photos of the KU Field Camp taken in the summer of 1963. Lee Gerhard was the field director. I assisted during the camp and stayed after camp was over to do field work for my thesis with a study of the Pre- Pennsylvanian Tectonics of Phantom Canyon. (I don't know if I did it right, but it worked for my MS). Mary and I relocated from Denver in 2000 to my hometown of Akron. We built our house on a hill just a half mile south of town and have an incredible view of the Missouri River bluffs of Nebraska. We have purchased several pieces of nearby farm land and we enjoy our JD tractors and Gators. We also have planted several conservation areas with wild

native prairie plants, grasses and flowers. Life is sweet here. We keep very busy and are actively involved with our community. We planted our orchard in 2007 and now have 600+ apple trees and 2,800 Aronia (chokeberry) bushes.

OWEN, DONALD E., 2610 Evalor St, Beaumont, TX 77702. MS '59, PhD '63. Retired professor, Lamar University. I retired during January 2015 as Professor of Geology at Lamar after 30 years of service. Lamar was my undergraduate alma mater. KU prepared me well for a 50-year career with varied academic positions at Bowling Green State University, Macquarie University (Australia), & Lamar University. I also worked as a Research Scientist for the University of Texas Bureau of Economic Geology before & after I received my PhD. I spent several years as a research geologist and in management with Cities Service Co. I make research trips to the San Juan Basin in New Mexico, where I also visit my son, Don Jr.

REAMS, MAX, 6 Castle Coombe Drive, Bourbonnais, IL 60914. MS '63, BS '61. Professor at Olivet Nazarene University Department of Chemistry. Science building in the near future will be remodeled and new addition to give department more room. Enjoyed working with honors student on creative project about assessing state park natural hazards. Now that my *Geology of Illinois State Parks* book is out, I'm writing novels about a geologist-detective. Lots of fun.

SIESSER, BILL, 2009 Overhill Dr., Nashville, TN 37215. BS '62. Retired professor, Vanderbilt University. Spent the last 25 years of my career at Vanderbilt; now enjoying retirement. The Department kindly gave me a little office space,

so I still go in once a week. Geology is just too interesting to give up completely!

NIVEN, DAVID, 99 Raptor Point Rd, Golden, CO 80403. BS '65. Retired senior geology engineer, Shell. Experiencing an accelerating rate of decay. Otherwise, O.K. Running rivers, annoying a few trout, wobbling around the golf course, and gaping with ever-increasing awe at what remains of our natural world.

BUCHWALD, EDWARD, 13192 Cannon City Boulevard, Northfield, MN 55057. PhD '66. Retired professor, Carleton College.

FARMER, KENNETH K., P.O. Box 2885, Casper, WY 82602. BS '67. Petroleum geologist, Farmer Minerals, LLC. Enjoying activities of four daughters and 13 grandchildren.

TURNER, BRIAN B., 536 River Road, Woodstock, VA 22664. PhD '67. Semi-retired, part-time Anglican Priest. I finally retired from working as an embedded contractor at a federal agency a year and a half ago at age 72. My wife, Martha, and I bought a house with much history and a few acres of land in the northern Shenandoah Valley of Virginia. The different parts of the house were built in 1781, 1881, and 1995. We have quite a bit of frontage of the North Fork of the Shenandoah River. I left the field of geology in 1985 due to the poor pay for professors at a northern Virginia university. Although geology is my "first love," I had to be practical. Leaving academia meant leaving my Adirondack research behind as well. I ultimately began to specialize in electromagnetic propagation and also in antenna theory, design, and testing, partially because I had

some exposure to such esoteric subjects in Jim People's geophysics classes that I took at KU. On retiring, it soon became clear that I needed some intellectual stimulation, so I started pulling my old research notes and geological maps together and thinking about getting back into research. I contacted Pat Bickford, who had been lured away from KU by Syracuse University, and Pat e-mailed a batch of recent papers regarding Adirondack geology, especially several with breakthrough geochronology revelation. I felt like Rip van Winkle, finally awake after a 25-year absence, and blown away by what modern techniques had shown. I joined Pat in a field trip with several other academics to collect samples last summer. I also did a few days of mapping in one of my old field areas. Through the winter of 2014-2015 I worked assiduously on drafting the geology of some seven 7.5 minute quadrangles into a legible collection of maps and also wrote the bulk of three manuscripts that I would like to see published. At the NE GSA meeting, a friend was impressed sufficiently with a sample of the maps to say that he thought he knew where there was money to get the maps published. I am nonetheless stymied about getting the manuscripts published since I have no corporate, governmental, or academic sponsor to handle the costs. I would also like to get an informal review of a technique paper by a structural geologist who has Excel programming skill. I've completed about seven days of fieldwork this summer and plan on doing some six more weeks' worth. It is a challenge to keep up chores on the home front and go 500 miles away to do field geology at my own cost, but it will work out. I'll see some of you at Baltimore this November. BTW, I choose not to participate in

any social media, so please don't ask.

SCOTT, ROBERT W., 149 West Ridge Road, Cleveland, OK 74020. PhD '67. Adjunct professor, University of Tulsa and consulting at Precision Stratigraphy Associates. Continue research on Cretaceous carbonates and stratigraphy. A Cretaceous chronostratigraphic database is available at Precision-stratigraphy.com.

1970s

HONDERICH, JEFF. 10784 Keller Rd, Centerton, AR 72719. MS '70. Retired family practice physician. I retired on my 70th birthday two years ago but continue to work one day per week. My 20+ year career as a physician came after 20 years as a petroleum geologist. I enjoy local 5k races and pickleball, am learning golf and have a large vegetable garden, orchard, grape arbor and berry bushes. Lou and I celebrated our 41st anniversary. Our daughter Andi died of breast cancer this year. I would be very happy to hear from any former Lindley occupants of the late 1960's.

POLLARD, WILLIAM D., 411 Hazewood Drive, Fort Worth, TX 761074. MS '70. Past president-advisor exploration/production, Burnett Oil Co., Inc. After 17 years as president of Burnett, I stepped down in September. It's a break to be relieved of budgets and performance appraisals. I now can focus more time on project endowment and generation, which is always challenging and usually enjoyable. Kathy and I are also enjoying more travel and times with family and grandkids. This year, we've gone to Rome, a cruise of the Eastern Mediterranean, Tuscany (to Gem

and Mineral show) and just returned from a trip across Pennsylvania (beautiful). More travels planned for this summer and fall.

ELLIOTT, MARY ANN, 301 Grant Street, Salida, CO 81201. BA '71. Retired in upper Arkansas Valley, Salida, CO. Enjoying mountains, river, biking, hiking, fishing, etc. Bob rode Ride the Rockies this June.

PODREBARACK, THOMAS J., 1100 West 10th St., #522, Fort Worth, TX 76102. BS '72. Division geologist, XTO Energy. Working the Midland Basin, approaching retirement.

ELLIOTT, ROBERT (BOB), 301 Grant Street, Salida, CO 81201. MS '73. Retired in upper Arkansas Valley. Enjoying mountains, river, biking, hiking, fishing, etc. Bob rode Ride the Rockies this June.

KNOLL, KENNETH M., 4016 Park Ridge Road, Sedalia, CO 80135. PhD '73. Retired owner/operator at Metal Rehab, Inc.

SPENCER (SOULE), MARY ALICE, 1001 Senora Ave., Billings, MT 59105. MS '74. Retired Supervisory Geologist. We are still traveling by train and enjoying it. We can relax to read or watch the scenery or nap. As I tell people "someone else drives, someone cooks our meals, and someone makes our beds." I have been very active as a volunteer at Zoo Montana in Billings. I do a lot of weeding to remove some noxious weeds. This has involved going into the gray wolves' enclosure to remove hounds tongue and burdocks which get caught in their fur. Volunteers and keepers go in while the wolves are in the enclosure. The wolves watch us and keep their distance as

we work. I also maintain a small bamboo garden, which keepers use to supplement the bamboo they must purchase from commercial growers to feed the zoo's four red pandas. Calligraphy also takes some of my time. I do some lettering for two local frame shops, plus an occasional commission for individuals. I keep current by attending workshops on a regular basis. My husband John (Iowa State Geology, MS '74) is part of an organization that works with greenway parks along the Yellowstone River. He is also now volunteering at Zoo Montana with me.

TARKINGTON, DANIEL, 3125 Hollow Oak Dr., Toano, VA 23168. MS '74. Retired Project Advisor Geologist, Anadarko Petroleum Corp. After 37 years in the oil industry, I am enjoying retired life in the countryside near Williamsburg, VA and my three grandchildren.

LEWIS, DR. RICHARD D., 97 Betts Rd., Stafford, VA 22554. BS '74. U.S. Governmental Research Scientist and Program Manager, US Government. Another great year. I was able to visit my alma mater twice to award research grants. The campus has changed in 40 years, but many things are the same, such as the stairway chips in Lindley Hall when a beer keg accidentally rolled down the steps inside from the entrance. Finished up the boathouse, docks and stables which were long-term projects. Been enjoying yachting, rowing, and taking the float plane to do some fly fishing in the higher country. Hope all of the old classmates are doing terrific and recollect the great times in class, trips, and of course Field Camp! Best to all of you!

SIMMS, JOHN J., 30441 Old Highway 112, Poteau, OK 74953.

MS '75. Retired assistant professor of Geology. John and Fay have moved to Grove, OK (on Grand Lake—fishing, boating, hiking, swimming are popular in this area). We miss the beauty of Poteau, however. Son Alex and wife Annie are still in Santa Barbara, CA. Four boys ages 11-4; one daughter age 2. Alex now associate professor in Earth Science (Geology). He teaches sedimentology and sequence stratigraphy. Research topics include prediction of the effects of sea level rise and dating/stratigraphy of beach and lake deposits of the last 50,000 years. Son James (Jim) involved in legal research and title/contract law in Dallas, TX. Enjoys fishing, culture and opportunity of the area.

BALDWIN- (DEHART) SIEMSEN, JOANN, 940 W. 133rd Circle Units, Westminster, CO 80234. BA '77. Retired Science/English teacher. Three kids, three grandkids. Interests include travel, hiking, biking.

STANLEY, GEORGE D, 1900 Alvin Dr. Missoula, MT 59802. PhD 77. Professor, University of Montana. Still enjoying life in Missoula, Montana. Teaching half-time and directing The Paleontology Center at the University of Montana. Active in paleontology research with two graduate students, attending international meetings and active in professional work. Was elected Fellow of the American Association for Advancement of Science AAAS (2014) and continue as a Smithsonian Research Associate in the Natural History Museum. New research centers on the evolution of corals across the Triassic-Jurassic boundary.

BILITHO, MASON, 1231 E. Gemini Drive, Tempe, AZ 85283.

BS '78. Senior Technical Specialist, Haley & Aldrich.

SMITH, JERRY A., 401 S. Ninear, Wichita, KS 67235. BS '78. Independent consultant. Petroleum geologist. Self-employed.

ENGLEMAN, MARY, 18 S. Lakeside Blvd., Eastborough, KS 67207. BA '76, MS '79. Consulting geologist, Chaco Resources, LLC. I still do some geology... Work with Andy and his company and manage my small concerns. Also work with high school students preparing for SAT and ACT exams. Oldest son Dodge is professional golfer in Europe, daughter Callie works in D.C. and younger son Riley will be playing basketball for Wichita State this year after two hip surgeries. My mother just turned 95—One of KU's oldest alums, and has more energy than I do! Hello to all...
ROCK CHALK!

WALLACE, RONALD J., 3650 Garrards Crossing, Roswell, GA 30075. MS '79. Advanced Geologist, State of Georgia. Holly and I are doing well. After all these years I was promoted to a program manager within the EPD. It's a busy time at work. We are just starting to go to a risk-based system within the UST program. This past fall and spring I gave talks at GSA in Vancouver and in Chattanooga. Holly and I really enjoyed Vancouver. Starting to plan for retirement. We don't know where we will go but for sure will leave the Atlanta area and escape the traffic.

1980s

COX, LYNN BERNEY, 1574 Sycamore Meadows Dr. Ballwin, MO 63021. BS '84. 7th Grade Earth Science teacher, Rockwood School District.

PREMO, WAYNE, 2342 Braun Ct., Golden, CO 80402. MS '84. Isotope geologist/ isotope geochemist, U.S. Geological Survey. Working with the U.S. Geological Survey now for 31 years. Initially working on radiogenic isotopes of lunar and meteoritic samples, my work has evolved to include isotopic research on rocks from southern California, the Great Basin and Colorado. Current projects include work on Mountain Pass REE ore deposit; crustal evolution of the Colorado Province (Paleoproterozoic); young volcanic rocks of the Rio Grande Rift environment, and Sr isotopic variations of global seawater through the Paleozoic. Married in 1979 to Valerie Williams, we have three children and now four grandchildren; one recently graduating from Colorado School of Mines in chemistry and geology.

CONNELLY, BRUCE, BS '85. Retired from Nike, Inc. in 2013 after 26 years with the company. Started Undergardener Consulting, LLC in 2014 specializing in product and brand management. Still residing in Portland and Mosier, Oregon.

HARRIS, JOHN W., 7330 Dogwood Falls Rd., Houston, TX 77095. BS '82, MS '85. Retired senior staff geologist, Shell Exploration & Production Co. I retired from Shell Exploration & Production, Co. on March 1, 2015, after 30 years of service.

HOGAN, PATRICK, 70 Doubloon Dr., Slidell, LA 70461. BS '85. Oceanographer, Naval Research Laboratory.

WRIGHT, JOHN, 135 Arrow Shores Ct., Chapin, SC 29036. BS '85. Retired hydrogeologist, SCD-HEC. Retired three years ago and

still live on Lake Murray. Worked for the State of South Carolina as a hydrogeologist/soil scientist helping design innovated disposal systems for both communities and municipalities. Now I enjoy cruising the lake and all the associated water activities. Life is good.

KILLEN, DAVID, 11611 Melody Garden, Cypress, TX 77429. MS '86, BS '83. Senior proposal manager, Witt O'Brien's. Proposal manager for the largest emergency management, crisis planning, and disaster-response company. We provide integrated solutions through the disaster life cycle to private sector clients, municipalities, and governments around the world.

BLACK, BRIAN ALLEN, 3050 Chelsea Ln., Acworth, GA 30102. BS '87. Director of software application development and support at Georgia Department of Behavioral Health and Developmental Disabilities. Oddly, not much to report this go-round of the Cosmic Ride - busy as the proverbial beavers but nothing of import across our World. Was a bit saddened to see my favorite author (Herman Melville) being quoted in a Buick advertisement, but, as they say, Bad Press is better than No Press! Which brings to mind, as Ishmael says, *for with little external to constrain us, the innermost necessities in our being, these still drive us on.* And indeed, on we must go! Heading back up to Maine (Orr's Island - God's Country) this summer, hope to spend some time with hammer and chisel in some of the old abandoned quarries around Lewiston, and maybe Newry - camping below Mr. Washington, etc. Went as a chaperone on a Middle School Band Trip to Disney World (interesting and quite a time was had by all) and still haven't made my way through

George's Lefebvre's *Napoleon* (but I'm up to 1812... was that a snowflake I just saw...) Hope all is well way out West there (sounds strange with the goings on in Topeka) and if you happen to be on the Island on a summer, stop on by (just ask a local for directions!).

KUKUK, MICHAEL, 14517 Mastin Street, Overland Park, KS 66221. MS '87. President, Blackstone Environmental, Inc.

TIRANDA, CHANDRA D., TL. LIDO D3/10, Puri Cinere, Pangkalan Jati, Jakarta 16514. BS '87. President and general manager at Bukit Energy Indonesia PTE. LTD. Hi All, I miss KU and plan to visit at end of June. I have formed Bukit Energy, Inc. with my former colleagues from Talisman Energy. Bukit Energy, Inc. was formed back in 2010. Now, we have seven blocks in Indonesia in which three blocks are shale gas/oil PSC contracts. I am proud to say that Bukit Energy is the first international company being awarded the shale gas/oil blocks in Indonesia. Have a year and God bless you all.

STATON, MIKE, 4737 45th Ave NE, Seattle, WA 98105. MS '88. Environmental consultant, principal geologist, SLR International Corporation.

1990s

DOUGLAS, BARTON, #8 1840 Kelowna Crescent, Cranbrook, British Columbia, Canada. MS '90. Annemarie and I have been enjoying work and life in Canada for the past nine years. We both worked for environmental/engineering consulting companies in Calgary Alberta. My work mostly involved hydrogeological support

and project management associated with Canadian oil sands projects. Last summer, we retired from our jobs and moved to Cranbrook, British Columbia—a small city nestled in the mountains just north of the Montana/Idaho border. Retirement life at age 50 is awesome!

SIC, AIVARS V., 8925 Millstone Drive, Lenexa, KS 66220. BS '91. Senior analyst, law practice, Hughes, Hubbard, Law Practice.

DRAKE, RON, 6211 Quartz Loop, Arvada, CO 80403. BS '92. Geologist, U.S. Geological Survey.

STEINLE (BOYD), ANDREA, 22338 Blue Jay Rd., Morrison, CO 80465. BS '90, MS '96. Geologic advisor, Noble Energy, Inc. I survived the recent downsizing at Noble and have taken on the role of exploration manager of our Nevada unconventional play. Our family has recently spent a great deal of time traveling to eastern Canada where our daughter is spending her junior and senior year of high school years at the Canadian International Hockey Academy (a high school for hockey players only) in Ottawa. When not traveling to hockey tournaments we are enjoying our "ranch" in Morrison, CO, where we have two horses, two goats, and six chickens.

2000s

FRANKLIN, STEPHEN, 3133 N. Dorris Lane, Appleton, WI 54911. MS '00. Science teacher, Appleton Area School District. This year the science bowl team that I advise won the Regional Science Bowl for the 2nd year in a row. Our trip to Nationals went much better than last year. After the first two sessions we were 4-1 and in danger of making the finals rounds, but we finished

4-4 in division pool play. Our last match was against the Kansas Team from Blue Valley. I really hoped we could win that one, but alas they were very smart (and nice) kids. However, we took first place in the division challenge.

JACKOFSKY, DANIEL, P.O. Box 4490, Houston, TX 77210. BA '98, MS '01 Operations Manager, ExxonMobil Exploration and Production South Africa Ltd. I have recently moved from Moscow, Russia, to Cape Town, South Africa, to work on offshore geophysical operations planning. This is a huge change from my last position working Joint Venture projects in Western Siberia, and I am looking forward to the work, and of course living in Cape Town! I have also recently become a first-time parent, so life is pretty good!

SPARKS (ROHS), CAROLYN RENEE, 2005 Jennydale Ct. SE, Grand Rapids, MI 49546. PhD '01. Professor of Geology at Calvin College, teaching Mineralogy, Petrology, Structural Geology, Environmental Geology and Field Geology. There have been many changes during the 2014-2015 academic year. After getting married in January 2014, I changed my last name from Rohs to Sparks. As a professional woman, this was taking a risk but it has been more than worth it on a personal level. In addition to the name change, I am taking on a mid-career change as well. After teaching at Northwest Missouri State University for 15 years and moving through the ranks to tenured full professor, it was time for a new challenge. My dream position opened up at Calvin College and by the end of this summer we will have made the move to Grand Rapids, MI. Having done U-Pb and Sm-Nd dating in the KU-IGL, I set out to

read “The Bible, Rocks, and Time” by Ralph Stearley and Davis Young. An intense and detailed read, I would encourage every geologist to spend the time to read it. I’m sure it will continue to shape my understanding of the Earth. Finally, the year ahead looks to be a full one. With leadership responsibilities in the Central Section of NAGT and NC-GAS, I look forward to serving in a capacity that encourages and rewards teaching and research.

PRINCE, ANDREA, 20922 W. 68th Terr, Shawnee, KS 66218. BS ’02. Senior geologist at AECOM (Formally URS)

DILLETT, PETE. 8931 Caymus Creek Ct., Missouri City, TX 77459. Geologist, vice president of geology, Rock Oil Company LLC, in Houston, TX. My wife Rachelle and I have three boys ages 9, 7, and 1. I left a role at Wells Fargo about two months ago to join the management team at Rock Oil Company, LLC. Rock is a private-equity backed start-up oil and gas company. We currently have 16,000 net acres in the Wolfcamp Horizontal Plats in the Midland Basin and have just starting drilling wells on our asset.

STIGALL, ALYCIA, 7675 N. Blackburn Rd, Athens, OH 45701. MS ’01, PhD ’04. Professor, Ohio University, Department of Geological Sciences. Dan Hembree (MS 2002, PhD 2005) and I continue to enjoy working at Ohio University. During the past year, I earned a promotion to full professor in the Department of Geological Sciences. My research group continues working on aspects of diversity, biogeography, and macroevolution with Ordovician brachiopods as our focal taxa. If you like Late Ordovician marine fossils, check

out our outreach website: www.ordovicianatlas.org or download the soon-to-be released Digital Atlas app for iPhone/iPad. In summer 2014, we focused our work in Estonia, but this year we’re back on Laurentia. My students and I have recently begun a new project in the Middle Ordovician Simpson Group of the Arbuckle Mountains. During the fieldwork, I found myself continuously recounting tales of my KU carbonates classes – with Bob Goldstein (we took a field trip to the Arbuckles) and Paul Enos – to my own students. I’m always thrilled to pass along G-Hawk lore and knowledge to the next generation of geologists. Naturally, our kids (Max 6 years old and Josie 4 years old) are also big Jayhawk fans.

VINCENT, PAUL, 707 Azaleadell Dr., Houston, TX 77008. MS ’05. Earth scientist, Chevron. Paul has spent the last year exploring for oil in the Kurdish Region of Iraq for Chevron. Stacie (BA Spanish/Psychology ’00) is busy volunteering in classrooms and herding children. Ramona and Charles are budding scientists that are guiding the family in discovering the world.

BRUMBAUGH, RYAN, 2223 Central Avenue, Indianapolis, IN 46205. BS ’06. Near surface geophysicist, project geophysicist at Mundell and Associates. My wife (Kate) and I live in downtown Indianapolis with our two kids (Evangeline, 3 years old and Alistair 17 months.) Last year I took a position with Mundell and Associates, a small environmental engineering firm, where I lead the geophysical services group. This year has brought many interesting projects, including some challenging karst delineations sites. I co-authored and presented two presentations at this year’s SAGEEP in Austin, TX.

2010s

CORBIN, NATHAN, 10900 S. Pennsylvania Ave, Apt 1128, Oklahoma City, OK 73170. BS ’11. Geologist, Devon Energy, Basin Business Unit. I completed my masters in Earth Science at Montana State University this spring 2015. I am currently working at Devon Energy as a geologist in the Delaware Basin and live in Oklahoma City.

SZYMANSKI, EUGENE, 1748 Hawthorne Street, Apt. B., Houston, TX 77098. PhD ’13. Research scientist, Chevron.

FALK, AMANDA, Permanent Address: 232 East Main St., Milan, MI, 48160. PhD ’13. Visiting assistant professor, Centre College in Danville, KY

STOLZ, DUSTIN, 9307 N. 95th East Place, Owasso, OK 74055. MS ’14. Geologist at Samson Resources.

Who’s Who Answers

Top row, left to right, Erasmus Haworth, Kansas; E.H. Sellards, Texas. Bottom row, left to right, David Delo, Florida; Wallace B. Howe, Missouri.

Correction

In the article, “In Appreciation of Bert Rowell,” the Fall 2014 *GHawker* accidentally failed to list David Kopaska-Merkel as one of Rowell’s students. David earned his Ph.D. in 1983 with Richard Robison and Bert Rowell as his co-advisors.

Faculty and Staff: Academic Year 2015-2016

FACULTY

- ROSS A. BLACK**, Associate Professor; Ph.D., University of Wyoming, 1990; geophysics, reflection seismology.
- MICHAEL D. BLUM**, Ritchie Distinguished Professor; Ph.D., University of Texas at Austin, 1992; fluvial and coastal sedimentology, sequence stratigraphy.
- J. F. DEVLIN**, Professor; Ph.D., University of Waterloo, 1994; hydrogeology/contaminant transport.
- DAVID A. FOWLE**, Associate Professor; Ph.D., University of Notre Dame, 2000; geomicrobiology, aqueous geochemistry, limnology.
- EVAN K. FRANSEEN**, Professor; Ph.D., University of Wisconsin, 1989, carbonates, sequence stratigraphy.
- ROBERT H. GOLDSTEIN**, Merrill Haas Distinguished Professor; Ph.D., University of Wisconsin, 1986; sequence stratigraphy, diagenesis, fluid inclusion studies of carbonates.
- LUIS A. GONZÁLEZ**, Professor and Chair; Ph.D., University of Michigan, 1989; stable isotopes, carbonate geochemistry, and diagenesis, paleoclimate.
- STEPHEN T. HASIOTIS**, Professor; Ph.D., University of Colorado at Boulder, 1997; paleontology, ichnology, sequence stratigraphy, terrestrial paleoecology.
- MARY C. HILL**, Professor; Ph.D., Princeton 1985; water resources, uncertainty analysis.
- DIANE L. KAMOLA**, Associate Scientist; Ph.D., University of Georgia, 1989; sequence stratigraphy, basin analysis, clastic sedimentology.
- GWENDOLYN L. MACPHERSON**, Associate Professor; Ph.D., University of Texas at Austin, 1989; hydrogeology.
- ALISON N. OLCOTT MARSHALL**, Assistant Professor; Ph.D., University of Southern California, Los Angeles, 2006; paleobiogeochemistry.
- CRAIG P. MARSHALL**, Associate Professor; Ph.D., University of Technology, Sydney, Australia, 2001; organic geochemistry.
- NOAH M. MCLEAN**, Assistant Professor; Ph.D., Massachusetts Institute of Technology, 2012; Thermochronology.
- ANDREAS MÖLLER**, Associate Professor; University of Kiel, Germany, 1996; petrology.
- EUGENE C. RANKEY**, Hall Professor; Ph.D., The University of Kansas, 1996; sedimentary systems, coastal geomorphology.
- JENNIFER A. ROBERTS**, Associate Professor; Ph.D., The University of Texas at Austin, 2000; microbial hydrogeology.
- PAUL A. SELDEN**, Gulf-Hedberg Distinguished Professor, Director, Paleontological Institute; Ph.D., University of Cambridge, 1979; paleobiology of arthropoda (especially Chelicerata and Miriapoda), paleoecology.
- LEIGH STEARNS**, Associate Professor; Ph.D., The University of Maine, 2007; glaciology.
- RANDY L. STOTLER**, Assistant Professor; Ph.D., University of Waterloo, 2008; hydrogeology.
- MICHAEL H. TAYLOR**, Associate Professor; Ph.D., University of California, Los Angeles, 2004; neotectonics and continental deformation.
- GEORGE P. TSOFLIAS**, Associate Professor; Ph.D., The University of Texas at Austin, 1999; geophysics, hydrogeophysics, ground-penetrating radar.
- J. DOUGLAS WALKER**, Union Pacific Resources Professor; Ph.D., Massachusetts Institute of Technology, 1985; structural geology, geochronology, tectonics.
- ANTHONY W. WALTON**, Associate Professor; Ph.D., University of Texas at Austin, 1972; sedimentology of siliciclastic and volcanoclastic rocks.
- CHI ZHANG**, Assistant Professor; Ph.D., Rutgers, 2012; geophysics, electrical methods & NMR, hydrogeophysics, biogeophysics.

EMERITUS FACULTY

- ERNEST E. ANGINO**, Emeritus Professor; Ph.D., University of Kansas, 1961; geochemistry.
- WAKEFIELD DORT, Jr.**, Emeritus Professor; Ph.D., Stanford University, 1955; geomorphology, Pleistocene geology, archaeological geology.
- PAUL ENOS**, Emeritus Distinguished Professor; Ph.D., Yale University, 1965; carbonate geology.

- CARL D. McELWEE**, Emeritus Professor; Ph.D., University of Kansas, 1971; physical hydrogeology, geophysics.
- RICHARD A. ROBISON**, Emeritus Distinguished Professor; Ph.D., University of Texas at Austin, 1962; paleontology.
- ALBERT J. ROWELL**, Emeritus Professor, Senior Curator, Museum of Invertebrate Paleontology; Ph.D., Leeds, 1953; quantitative methods in geology. Paleontology, Antarctic geology.
- WILLIAM R. VAN SCHMUS**, Emeritus Distinguished Professor; Ph.D., University of California at Los Angeles, 1964; geochemistry, meteorites, geochronology.
- DON W. STEEPLES**, McGee Distinguished Professor and Vice Provost; Ph.D., Stanford University, 1975; shallow seismic reflection, crustal analyses, and microearthquake recording.

PALEONTOLOGICAL INSTITUTE

- MIKE CORMACK**, Information Specialist; Ph.D., Philosophy, University of Kansas, 1999.
- DENISE MAYSE**, Office Manager; BS, Business Administration, Mars Hill College, 1980.

SUPPORT NUCLEUS

- CARIALFERS**, Alumni Coordinator, 2012-present
- JOE ANDREW**, Research Associate, 2009-present
- JASON ASH**, Information Specialist I, 2006-present
- YOLANDA BALDERAS**, Student Affairs Manager, 1998-present.
- WAYNE DICKERSON**, Research Technician, 2008-present.
- IAN J. ROWELL**, Information Specialist, 1981-present.
- TY TENPENNY**, Laboratory Technician, 2015-present.
- MASATO UESHIMA**, Research Assistant, 2009-present.

COURTESY & ADJUNCT FACULTY

- CHRIS BEARD**, Distinguished Professor - Senior Curator, Ecology & Evolutionary Biology
- TANDIS BIDGOLI** Assistant Scientist, KGS
- GEOFFREY BOHLING**, Associate Scientist, KGS
- ANDREA BROOKFIELD**, Assistant Scientist, KGS.
- DAVID BURNHAM**, Preparation Sup, Biodiversity Institute.
- JAMES BUTLER**, Senior Scientist, KGS.
- TIM CARR**, Distinguished Professor, West Virginia University.
- JOHN DOVETON**, Senior Scientific Fellow, KGS.
- GISELA DRESCHHOFF**, Emeritus Associate Professor.
- MIKE ENGEL**, Professor – Senior Curator, Ecology & Evolutionary Biology.
- JOHN GOSSE**, Associate Professor, Dalhousie University.
- DAVID GRAHAM**, Professor, Newcastle University
- JULIAN IVANOV**, Assistant Research Professor, KGS
- WILLIAM JOHNSON**, Professor, Geography.
- BRUCE LIEBERMAN**, Professor - Senior Curator, Ecology & Evolutionary Biology.
- GAISHENG LIU**, Associates Scientist, KGS
- GREG LUDVIGSON**, Senior Scientist, KGS.
- ROLFE MANDEL**, Distinguished Professor - Senior Scientist, Anthropology.
- MICHAEL T. MEYER**, Hydrologist, USGS.
- RICHARD MILLER**, Senior Scientist, KGS.
- Brad Prather**, President, CarTerra, LLC
- BRUCE ROTHSCHILD**, Adjunct Research Associate, Biodiversity Institute
- JON J. SMITH**, Assistant Scientist, KGS
- EDITH TAYLOR**, Professor – Senior Curator, Ecology & Evolutionary Biology; Curator, Natural History Museum & Biodiversity Res. Ctr.
- THOMAS N. TAYLOR**, Distinguished Professor, Ecology & Evolutionary Biology; Curator, Natural History Museum and Biodiversity Res. Center.
- W. LYNN WATNEY**, Senior Scientific Fellow, KGS.
- DONALD O. WHITTEMORE**, Senior Scientific Fellow, KGS.

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MEMORIALS

Bill J. Brooks (BS '54), 84, president of Brooks Exploration Co. of Abilene, Texas, and Denver, CO., died on March 11, 2015. Mr. Brooks retired to Lawrence, Kan. He served in the U.S. Army in Korea in 1951 at the height of the Korean War, and was honorably discharged from the Army in 1954. In his decades as a geologist, he made many oil and gas discoveries in Texas, New Mexico, Colorado and North Dakota and owned oil and gas lease blocks in Utah, Arizona, Wyoming and Nebraska. He conducted the last 32 years of his business from Denver, discovering such deposits as Wagon Mound; Sheep Mountain, which was an extremely large CO₂ entrapment; La Poudre; and Stanley Fields. He also bought and sold oil and gas interests in the Williston Basin of North Dakota and Montana. Brooks was a member of AAPG, a charter member of the American Institute of Professional Geologists, and a longtime member of the Independent Producers Association of America, The Rocky Mountain Association of Geologists, and the Abilene Texas Geological Society. Brooks is survived by his wife of 60 years, Grace; daughters Karen Rhea of Pueblo, CO.; and Sara Czapinski of Lawrence, Kan.; and by four grandchildren.

Roger D. Hammond, 62, (MS '79, BA '76) died July 12, 2015. Mr. Hammond studied geology and geochemistry at KU. He was an All-American javelin athlete, participating in the trials for the 1976 Olympics. After earning his master's, he moved to Houston and worked for Exxon for 31 years before retiring. He is survived by his wife of 31 years, Rosemary Stein; his sons, Robert and Richard, and his mother and two sisters.

Salah Z. Jarjur (PhD '72), 74, died in a hospital in Plano, Texas, on May 22, 2015, after a two-week battle with pneumonia.

Charles F. Kahle, 84, of Perrysburg, OH (PhD '62), died Feb. 7, 2015. He served in the U.S. Army, Engineers, from 1954-1956 and held positions of Professor Emeritus, Professor, Associate Professor and Assistant Professor in the Department of Geology at Bowling Green State University. He chaired the department from 1984-1992. He also served as an assistant professor at the University of Toledo and Oklahoma State University and worked as a petroleum geologist for Mobil. Bowling Green gave him its Master Teacher Award in 1994. He authored or co-authored more than 50 scientific publications, and was an authority on the geology of Silurian rocks in Ohio, including rocks near his gravesite in Riverside Cemetery in Maumee, and world renowned for his research on the Maumee River. He was a member of the Society for Sedimentary Geology, Northwestern Ohio Electron Microscopy Society, and the Geological Society of America. Dr. Kahle is survived by his wife of 58 years, Rosemary; his children Charles II of Pittsburgh, PA; Thomas of Westerville, OH; Suzanne of Okemos, MI; David of Yankton, SD; Steven of Toledo, OH, and Sarah of Perrysburg, OH; and 11 grandchildren and one great-grandchild.

Harold "Mac" MacDonald, (PhD '69, MS '62), 84, died May 13, 2015, in Fayetteville, Ark. Before going to college, he served for six years in the U.S Air Force and was a navigator during the Korean War. Beginning in 1971, he served as a professor at the University of Arkansas and specialized in remote sensing and petroleum geology. In 1979 he received the Outstanding Faculty Achievement Award for teaching and research from the University of Arkansas. In 1988, KU Geology gave him the Erasmus Haworth Distinguished Alumni Award. He was a member of NASA's Space and Terrestrial Applications Advisory Committee for Geology and Geodesy, and he received NASA's Outstanding Achievement Award for participation on the Shuttle Imaging Radar Development Team. In 1998, he retired from full-time teaching with the rank of Emeritus University Professor. MacDonald is survived by his wife of 60 years, Imogene Winnie MacDonald; three daughters, Linda Priest of Wichita, Kan.; Sharon Donnelly of Pittsburgh, PA; and Debi Sherrill of Dallas, Texas; two sons, Bruce MacDonald of Fort Worth, Texas; and Neil MacDonald of Newton, Conn.; and 12 grandchildren.

Eugene B. Muehlberger, (MS '55) of Scottsdale, AZ., died April 12, 2015.

LOOKING FOR LOST G-HAWKERS

The former geology students listed below are lost as far as the alumni database is concerned. Please look through the list to see if you recognize anyone. If you have news of them, let us know. We're interested in addresses, name changes, employer names and addresses, or anything else you can tell us. We'd love to retire these folks from the land of the lost.

1931-1940

Frank H. Alexander, '40
Ralph E. Hinkel, '32
Charles S. Rohrer, '34

1941-1950

Robert M. Castator, '49
James D. Chappell, '41
Dale Goodrich, '41

1951-1960

Wayne E. Bates, '57
William L. Brown, '54
Victor C. Cope Jr., '56
Thomas L. Downs, '56
G. Lloyd Foster, '58
Jack D. Fowler, '62
Randall Kay Graber, '52
Julian W. Hawryszko, '57
Robert W. Heil, '59
George R. Huebner, '57
Robert H. Kuckelman, '53
Arthur A. McGinnis, '51
Herbert Mendoza, '59
Patricia Tucker Morgridge, '56
George W. Plant, '52
Charles J. Sloanaker, '51
Robert L. Tedrick, '60
Orbon H. Tice Jr., '52
Cleo E. Vague, '51
Joe E. Wallace, '57
Jay D. Whiteford, '54
Wayne P. Wright, '51

1961-1970

Ibrahim Abd El Wahid, MS '63
Carlos R. Canard, '67
CAPT. Gary P. Davidson, '67
Musa A. Haggiagi, '70
John Huh, '68
Tommy R. McKellar, '62
Yacoub Ahmad Qandil, '61
Frank Radke Jr., '67
Malcom B. Roy, '66
Howard C. Thornton, Jr., '67
Clyde T. Williams, '67

1971-1980

Ola Green Bangole-Yenvou, '75
Abdurrazak A. Endisha, BS '79
Maj L. Taylor Holmes Jr., '73
Edward L. Leanhard, '79
J. Peter Mills, MS '65, PHD '74
Adam Morawski, '77
Francois R. Nguene, '78

Adeleke Odutola, '74
Ali Seyrafian, '78
Benja Songsirikul, '78
David T. Wilson, '73
Leonard L. Woolsey, '71

1981-1990

Talat Younis Abdullah, MS '84
Cihat H. Basocak, '81
Mehemmed A. Busifi, BS '82
Cynthia E. Carroll, '82
Rodziah Haji Daud, '86
Mitchell D. Hall, '83
Dean A. Holderman, '85
E. F. Johnson, '82
Mastura Abdul Malik, '86
Soheila Nasser, '83
Mindy Goodell O'Connell, '86
Gillian B. Poulter, '87
Nelda Haraldson Radford, '85
Zulkify Ab Rahim, '85
Stephen M. Smith, '87
Monsef Swedan, '81
Milos Velechovsky, '85
Kent R. Wells, '87
Susie Woltkamp, '89
Di Zhou, '85

1991-2000

Abdulrahman M. Alissa, '99
Theresa M. Cabras, '99
Tyan-Ming Chu, PhD '96

Elizabeth A. Garrison, '97
Mark W. Martin, '93
Margaret S. Mills, MS '92, PhD '94
Alan Wade, '92
Katherine N. Zentmire, '99

2001-2010

Mohammad A. Abdullah, '05
Curtis I. Akin, '03
Sa' Ad Fahd Al-Awwad, '03
Abdullah Alqahtani
William R. Bailey, '03
Michael W. Christie, '08
Javier A. De Palacios Zambrana, '09
Pema Deki, '08
Kyrie, D. Jeffrey, '09
Debra S. Jennings, '06
Emily A. McWilliams, '06
Elisheva M. Patterson, '09
Cornelius J. Stanford, '09
Mustapha Zater, '06
Gilbert Marek Zemansky, '03

2011-2020

Shamma S. A. K Al Kaabi, '14
Wade T. Jones, '12
James C. Lamsdell, '14
Zhaoqi Li, '13
Joseph C. Miller, '13
Kimberly E. Montague, '12
Fatma Ouaichouche, '12
Chong Zeng, '12

2015 G-Hawker

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