



GEOLOGY & GEOPHYSICS NEWS

Chairman's Letter

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Welcome to the 2012-13 edition of the G&G newsletter. We have an incredible amount of departmental and alumni activity to report!

First off, we are delighted that **Pincelli (Celli) Hull** and **Noah Planavsky** have joined us as Assistant Professors. Celli is a paleontologist who is expert in using a

broad range of approaches, including genetics, morphometrics, and stable isotope geochemistry, to study evolutionary processes in space and time. She did her Ph.D. research at Scripps Institution of Oceanography (University of California at San Diego) and her postdoc right here at Yale with G&G Professor **Derek Briggs**. For her Ph.D. work, she recognized that modern and fossil records of planktonic foraminifera preserve critical links between evolution and environmental changes. For example, she has shown that recovery of communities of marine organisms following the Cretaceous-Paleogene (K-Pg) extinction (the one that wiped out the non-avian dinosaurs) was remarkably heterogeneous in space and time, demonstrating a heretofore unrecognized role for contingency. She will be at the forefront of developing measures of biotic sensitivity to natural environmental perturbations in the geologic past which ultimately will allow us to better understand and predict community responses to global warming today.

Noah studies global geochemical cycles through "deep time" tens of millions to billions of years ago. He completed his Ph.D. at UC Riverside under the direction of Yale G&G Ph.D. alum **Tim Lyons**, and his postdoc at Caltech. His current research focuses on using trace metals in sedimentary rocks to track the redox evolution of the atmosphere-ocean system.



Celli Hull



Noah Planavsky

His impressively diverse publication record already includes advances in understanding fossil microbial structures, the unusual banded-iron formations such as those well known from the Great Lakes region, nutrient cycling through Proterozoic oceans, the long-term history of atmospheric carbon dioxide and oxygen, and the late Precambrian so-called "snowball Earth" ice ages and subsequent explosion of animal life.

Celli and Noah are already bringing new energy and excitement to the department and we look forward to the many groundbreaking areas of study that they will explore. We are also working on additional hiring, so there may be more new faculty updates in the next newsletter!

The Yale Climate and Energy Institute (YCEI), led by G&G Professor **Mark Pagani** (Director) and G&G alum **Mike Orisaglio '74** (Executive Director),

continues to grow in scope and influence. Inside you will read a fascinating account of the YCEI's history, current projects, and future goals including models of the potential impacts of climate change on the shoreline areas of Connecticut and New England. One exciting development in Yale College is the establishment of the Energy Studies Undergraduate

Scholars program. It is an interdepartmental curriculum (not a new major) sponsored by the YCEI

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YCEI

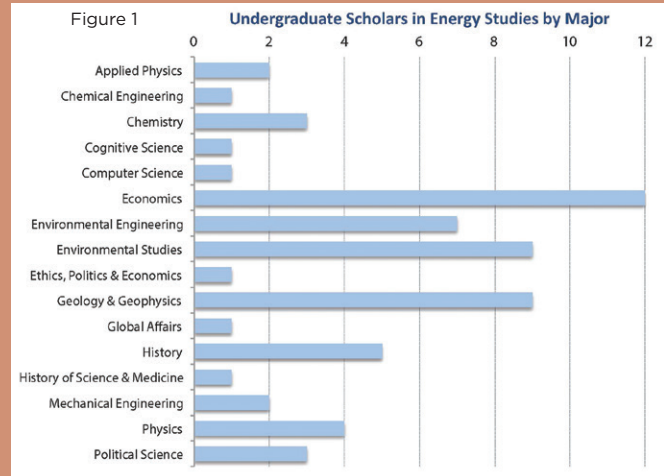
Yale Climate & Energy Institute

A major new interdepartmental initiative called Yale Climate and Energy Institute (YCEI) is rapidly growing in importance on the Yale campus. Faculty, students and post-docs in G&G have played major roles in the founding and continue to be leaders in activities of YCEI. What follows is an introductory report on its history and activities.

History and Personnel

Sometime during the first decade of the 21st Century, energy consumption in developing countries exceeded that of the developed world for the first time. In the spring of 2013 Earth crossed a geologic milestone when atmospheric carbon dioxide concentrations passed 400 ppm, a level not seen for an estimated three million years (coverage of this milestone in the *New York Times* on May 10 included an interview with Mark Pagani of G&G). Between these two events we saw record high oil prices (\$145 a barrel in July 2008) and near-record low natural gas prices (almost one-tenth the price per BTU compared to oil); New Haven experienced Hurricane Irene, Superstorm Sandy and winter storm Nemo, which dropped three feet of snow on the city and closed the university for a week.

In the fall of 2007, an informal meeting involving dozens of Yale faculty was convened to discuss a possible inter-disciplinary response to better understand the climate and energy issues underlying these extreme events, as well as opportunities to mitigate and respond to what is maybe the 21st century's greatest challenge. G&G professors **Dave Bercovici** (then chair of the department) and **Mark Pagani** were tasked with developing a proposal for research and teaching the science of Earth's climate and energy systems, and the environmental, economic



and social impacts of past and future climate and energy transitions.

YCEI was launched in 2009 with a \$3 million gift from a private donor. Rajendra Pachauri, chair of the Intergovernmental Panel on Climate Change (IPCC), served part-time as YCEI director for its first three years, along with deputy directors Bercovici and Gary Brudvig (Chemistry) and assistant director Juliana Wang (School of Forestry & Environmental Studies). A steering committee of faculty members was constituted to suggest activities of the institute. The original group included Pagani, Michael Dove (FES), Alessandro Gomez (School of Engineering & Applied Science), Durland Fish (School of Public Health), Dan Esty (FES and Law School, currently Commissioner of Connecticut Department of Energy & Environmental Protection), Anthony Lieserowitz (FES), Peter Raymond (FES) and Michelle Addington (Architecture).

In 2012, support for YCEI was renewed through a

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that will allow students to pursue energy- and/or climate-related courses and research in the context of an established Yale College major such as G&G.

But there was also sad news this year. **Leo Hickey** and **Karl Turekian** passed away over the winter. Both were giants. Leo wrote many landmark publications in paleobotany that defined the field and were foundational for paleoecology writ large. Karl was a without doubt one of the greatest geoscientists of the 20th Century; he made major contributions to our understanding of everything from the depths of Earth's core to the far reaches of space. Their legacies live on through their countless students,

postdocs, and friends. And of course both were real characters! Who can forget Leo lining the stairways of KGL with rocks for his legendary stratigraphy lab? Or the energy of scientific debate in Karl's famous "coffee hour"? You will read moving tributes to Leo and Karl in this issue that I'm sure will bring back fond memories of them both. The department is still reeling from their loss.

So we hope that you find this year's newsletter to be interesting, informative, and inspiring. As always, we extend a warm welcome for you to visit us whenever you are in New Haven. And please keep us up to date on all your activities! On behalf of the department, I offer my best wishes for the Holidays and 2014.

YCEI



Inter-disciplinary panel of elected and appointed officials join faculty to discuss the future of New England in the context of a warming planet. From Left to Right: Alexander Felson, School of Architecture and the School of Forestry and Environmental Studies at Yale University. Katie Dykes, Deputy Commissioner for Energy, Connecticut Department of Energy and Environmental Protection. Marion McFadden, Hurricane Sandy Rebuilding Task Force, Acting Executive Director and Chief Operating Officer. Kerry Emanuel, Atmospheric Sciences at MIT. Ronald B. Smith, G&G. Chris Murphy, US Senator. Tony Leiserowitz, Director of the Yale Project on Climate Change.

gift to the Yale Tomorrow capital campaign from the TomKat Trust, which was founded by **Tom Steyer '79** and his wife Kathryn Taylor. In addition to funding YCEI for another three years, this gift established the new Energy Sciences Institute on Yale West Campus. In July of 2012, **Mark Pagani** took over as YCEI director, with Michael Dove as deputy director. **Mike Oristaglio '74**, formerly of Schlumberger and now a senior research scientist in G&G, became executive director in October. **Trude Storelvmo** (G&G), James Saiers (FES), Karen Seto (FES), Doug Kysar (Law School), Jordan Peccia (Chemical Engineering), Ken Gillingham (FES) and Rob Bailis (FES) joined the Steering Committee.

Reaching Across Campus and Beyond

The core activities of Yale Climate & Energy Institute are research and teaching. Each year, YCEI awards seed funds for interdisciplinary research projects in climate and energy in a competitive process open to the entire campus. The seed grant program has now launched 20 projects involving more than 50 faculty members in 15 different departments. These projects engage a wide spectrum of topics. One of the first projects developed an improved cook stove for use in rural Bangladesh, to reduce carbon dioxide emissions and other harmful pollutants. Another developed new methods for monitoring and managing energy use in intelligent buildings, with several buildings at Yale serving as test beds. Research on geologic carbon sequestration initiated by an early seed grant was leveraged into a \$3 million research project with the U.S. Department of Energy and later spotlighted in the April 23, 2013 newsletter of the American Geophysical Union. This work showed that sequestration achieved by injecting carbon dioxide into basalt formations to form carbonate

minerals could help to minimize the risk that might otherwise be caused by earthquakes due to underground injection of large quantities of CO₂-rich fluids. Seed grants awarded in 2013 include studies of the importance of biologic aerosols in climate modeling, how the geography of infectious diseases such as sleeping sickness and dengue fever may change as the world warms up, and the possibility of tracing the history of past New England superstorms in cores from the coastal marshes of Connecticut.

Through its interdisciplinary post-doctoral fellowship program, YCEI brings to Yale from around the world several of the best young minds working on the links between climate and energy. Eight YCEI fellows are currently in residence, studying problems such as the dynamics of tropical cyclones in a warmer world, better ways of growing photovoltaic crystals for solar energy, and the diverse feedback loops that link biologic activity to the global carbon cycle and climate change. Three new fellows who started in the fall of 2013 will perform research on models of climate change and drinking water quality in the developing world, on the effects of increased precipitation and warming on old-field ecosystems in Connecticut, and on the historic relationship between climate fluctuations and human violence. One of the first YCEI fellows was Christopher McMinn, who completed a two-year appointment in G&G in 2013 and accepted a tenure-track position at Oxford University.

Energy Studies

In May, the Faculty of Arts and Sciences approved a new Yale program in energy studies under the sponsorship of YCEI. The program, called Energy Studies Undergraduate Scholars, is intended to

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develop student leaders able to promote new ideas for the future of energy. Students will be trained in multidisciplinary aspects of energy through an innovative curriculum built around three broad topical areas: the science and technology of energy systems, the environmental impacts of energy production and use, and the economic and social impacts of energy markets. Energy Studies is not a new major; it is an interdepartmental curriculum that runs in parallel with a student's normal requirements in a departmental major. To complete the program, students must take six courses distributed across the three topical areas of the program, and complete a capstone project, which can be a traditional senior essay, a group project, or a summer job or internship in an energy-related field. The program started in the Fall 2013 term with 57 undergraduates enrolled from more than a dozen departments. (see FIGURE 1) Working with the Yale Center for Professional and International Experience, YCEI expects to provide support for internships, research projects and travel in connection with the Energy Studies program.

Annual Conference and Workshops

This year, 2013, has been a busy one for YCEI. In January, The Institute held one of the first international symposiums devoted to climate science and human health, under the theme *The Integration of Climate Science and Infectious Disease Research*. In February, the YCEI Student Congress hosted its fourth annual symposium, a two-day event devoted to *The Atmospheric Science–Climate Policy Frontier*. In March, YCEI and the Society of Petroleum Engineers held a one-day symposium on *Research Frontiers in the Science of Unconventional Energy Resources*, which brought together industry and academic experts to talk about the science of shale reservoirs and about the technical and regulatory issues of protecting groundwater during development of shale-gas by hydraulic fracturing.

The Fourth YCEI Annual Conference was held in April 2013 in Kroon Hall on the topic *Water: The Looming Crises*. This one-day event brought together experts from around the world for talks and panel discussions on the science of Earth's hydrologic cycle as well as the steps that industry, government and NGOs are taking to deal with all aspects of water in a warmer world—from extreme storms and mega-droughts to gradually rising sea level.

In September, YCEI hosted a panel discussion with Senator Chris Murphy (D, CT) on *Regional Climate and Coastal Resiliency*, (see FIGURE 2) and a week

later the Institute hosted a full day of presentations on atmospheric modeling and climate change perspectives with colleagues from The University in Tokyo (Todai). Planned for the coming year are forums on the future of nuclear energy, on the social dimensions of household energy usage, and the impacts of climate change on Arctic culture, economic forecasting and urbanization.

Energy, Climate and Yale in the 21st Century

With its open-ended core activities firmly established, YCEI is looking to expand into targeted research areas organized around interdisciplinary teams of faculty. The symposiums on infectious disease and health and on unconventional resources were springboards for two initiatives that will focus over the next three years on The Climate System and Human Health and on Unconventional Resources and the Environment. These new programs will be designed around strengths of current Yale faculty, but will require a substantial commitment of additional resources, including collaboration with other universities.

At its 2013 September event with Senator Murphy, YCEI announced a major new initiative to create a collection of regional climate, energy and economic models to study how global warming may change Connecticut and the Northeastern U.S., county by county, over the next 100 years. The impact of regional climate change will eventually affect every aspect of Yale, from building plans and maintenance, to changes in the teaching curriculum and research agendas necessary to prepare students for life in a warmer world. As part of this effort, YCEI looks to be a way for Yale to be more active in shaping federal and global thinking on climate and energy. Plans are underway to organize a series of events timed for the release of the IPCC Fifth Assessment Report, due in the fall of 2013, with an updated report on the physical science basis of climate change. To help plan and promote those events, and to facilitate communication within and beyond Yale's campus, YCEI hired Eric Ellman (eric.ellman@yale.edu) as its communications director. YCEI's revamped website is a living archive of past YCEI activities and an outreach tool for future ones. It's the latest step in our effort to channel the combined energy of Yale researchers, alumni and their colleagues to develop practical solutions and policies that can be implemented at local, regional or global levels and help the world mitigate and adapt to climate change while satisfying its future energy needs.

Keep apprised of upcoming YCEI activities on our website: www.climate.yale.edu. Receive notice of website changes by "liking" Yale Climate and Energy Institute on Facebook.

IN MEMORIAM

A Son's Tribute on Father's Day

Vaughan C. Turekian, '93

Appeared in **Science & Diplomacy**, *A quarterly publication from the AAAS Center for Science Diplomacy.*

This June 16, 2013 will mark the first time in my life that I do not have someone to call to wish a happy Father's Day. After a short struggle with cancer, my father, Karl Turekian, passed away in March, leaving an indelible mark on the world, whose processes, composition, and origin he studied during his nearly six-decade career. Reflecting on his life and his influence, I realize that my own path to becoming a science diplomat was laid and paved by this remarkable man.

For me, a pursuit of a career in science diplomacy started with an early infatuation with air travel—the travel mode of choice for researchers and diplomats. My father was my major influence. Some of my earliest memories involve my mother, sister, and me taking my father to the airport for one of his journeys, watching in wonder as he boarded a plane

that would quickly take him to a distant place. The destinations were varied, but each would lead to interesting stories and ultimately be the source of a good souvenir for my sister and me. I was so taken by airplanes that I asked my dad to take me to the airport for my third birthday so we could watch them take off and land—which we did for hours with great excitement. Of course, as a professor, he could not resist explaining the concept of lift and Bernoulli's principle.

Many of my father's trips were to far-off places—but perhaps none were as exotic, given the geopolitics, as his two trips to the Soviet Union. In 1966 and again in 1971 (the year I was born) my father was part of scientific expeditions to the USSR—first to attend the International Oceanographic Congress and then to plan the Geochemical Ocean Sections Study. In later years—including just weeks before his death—

we would discuss what it was like to be one of the few Americans with the opportunity to visit the USSR during the height of the Cold War. It was a fascinating exposure to the fact that science provided a way to make connections between people even in the midst of high stakes political posturing. Eventually, I was able to compare notes with him based on my own forays through science into places like Cuba and North Korea, where science provides one of the few vehicles for interaction. Some of the experiences

were similar—his recollection of the Moscow subway lined up with my encounters with the one in Pyongyang. Some of the experiences were quite different—especially given the rapid communication brought about through the internet age. But there is no doubt that both of us came away from visits to such extraordinary places



Karl Turekian with his granddaughter.

wondering what problems science might solve.

These early lessons concerning the potential role of science as a way to build bridges provided an important grounding, and in recent years I have realized that there were three other principles that I learned from my father that have helped in my path.

Substance and a shared commitment to solving a problem is the bedrock of a friendship: I often joined my father on his summer travels. One trip to Caltech involved a meeting with Clair (Pat) Patterson, the scientist who determined the earth's age of 4.55 billion years. Inside Pat's office these two titans of geochemistry got into a heated discussion, raising their voices. After departing, I was shaken by this tense exchange and I asked my father why he visited this man whom he did not like. My father replied, "Pat, he is one of my closest and most admired friends. We were discussing different ideas about

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how lead isotopes should be used to understand an important problem.” Looking back on that experience, I appreciate that they were two friends with strong mutual professional admiration. Rather than jeopardizing their friendship, that argument (and many others like it) allowed them to fully understand all sides of the problem and begin working together to find a way to solve it.

Life is not linear: On a regular basis my father would remind me that life could not be planned out and that opportunities come to those who are prepared to take advantage of chance and circumstance. He would often recite a quote from Ecclesiastes: “the race is not to the swift, nor the battle to the strong, neither yet bread to the wise, nor yet riches to men of understanding, nor yet favor to men of skill; but time and chance happens to them all.” So it is that my approach to science diplomacy has been a nonlinear path. It started in graduate school, where I earned a doctorate in science, before pursuing different opportunities, first at the U.S. National Academy of Sciences and then through a fellowship at the U.S. Department of State, before arriving at the American Association for the Advancement of Science (publisher of *Science & Diplomacy*) and a receptive audience willing to try this new endeavor of science diplomacy. It is not a conventional course, and if you subtract the elements of time and chance, my path might have been much different.

Transformational change requires challenging

Leo Hickey Eulogy

By Geoffrey Hickey

My father traveled in time. He broke open the Earth with a small hammer, turned its stony pages and read its story. It was the story of life, baroque, branching; surrounded by eddies, loops, and recapitulations. Time flowed through it, eroding and depositing, erasing and rebuilding. It was an unexpectedly grand story, considering the way it was left carelessly lying around the planet.

Like all readers, he was transported to places non-readers cannot see. He stood on the packed dust of the desert and looked out on an ancient forest, teeming with life; on the ocean that preceded it; on the desert again before that. He did this often enough that it became effortless, almost automatic. He could always stand in a garden, no matter where he went.

Montana, Panama, the Florida Keys, the Dreaming Arctic. Australia, Czechoslovakia, Upstate New York. So many places.

the orthodoxy: In remarking about the nature of his career, my father stated, “My job is to knock down some idea and leave something behind for the next guy to knock down.” At the core of his belief was that all ideas need to be challenged and all experts should be questioned. A person gets no closer to discovering truth when upholding conventional wisdom simply to protect the doctrine of the day. Mixing science and diplomacy is not an obvious marriage. There are many in both communities who are leery of the other or don’t see the potential in bringing together such disparate actors. But knocking down some of these preconceived notions and developing new ideas and communities provides possibly the best hope in improving the lot of people and their planet. And over time these new ideas will also need to be knocked down by the next person.

I can’t help but wonder what lessons or principles my own children might learn from me that will help guide them through their lives and careers. I can only hope that they absorb the most important thing that I learned from my father—we live in a remarkable world. It can be traveled and studied, and it holds great mysteries and beauties. By having substantive arguments with their friends, living on the nonlinear path, and challenging the orthodoxy, they can develop a greater understanding of the world and build closer connections to those who inhabit it. This is my hope for the role of science diplomacy. This is my Father’s Day wish.

He brought back surprising things. Not just what you would expect: some fossils, a sunburn, and a good story. Somehow he also found out there a whole life, with friends, family, philosophy, scholarship, and most strangely of all, joy. He found all of us, and brought us together. He gave us glimpses of what had gone before, of what was possible. Of great beasts striding through the canopies of long-vanished forests. Of asteroids not crashing, and then crashing, into the planet and putting an end to all that striding. Of seas rising and falling.

Interlude I:

It is 1982. I am twelve, my father is forty-two. We are camped outside an abandoned cabin between rolling hills in Wyoming. The skeleton of a Model A Ford rises from the grasses nearby, next to the remains of a wire fence. The sun sets; the light turns golden-red. A herd

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of wild horses crests the nearest hill, flowing like the wind through the grass. I walk out among them.

II

There is no escaping our origins; we carry them with us no matter how far we travel. Some losses are irretrievable. The death of his mother when he was very young, and the disintegration of his father's household that followed, was the stone that Leo could never quite put down. He never stopped reminding his children, though we knew it well, how lucky we were. It was a cruel irony that his own success made him an outsider to the stable family he had built; he was the only one of us who grew up without a mother; the only one whose father failed him.

But it is the way of things that loss is also a source of strength. Having lost his parents at such a young age, he was forced to become his own fiercest defender, and to chart his own course through life. He gained a strength of will, or perhaps a willful stubbornness, that never left him.

And here was also the wellspring of one of the gifts he gave most freely, to his family, his students, his friends. He taught us all to chart our own course, not to follow the well-trodden path. Whatsoever thy hand findeth to do, do it with thy might.

Interlude II:

It is Tax Day, sometime in the late 1980s, and I am riding in my father's car to the New Haven Post office to mail his tax forms on the last possible day. I notice a police car in the lot. On the side it says, "Postal Police". I wonder aloud, "What do the postal police do?" My father, ever wise in these matters, answers:

"They stamp out crime."

Memories of Leo Hickey and Karl Turekian by some of their students

Leo Hickey, April 26, 1940 - February 9, 2013 • Karl Turekian, October 25, 1927 - March 15, 2013

I first met Karl in early 1960. I had received acceptance for continuing my graduate work from both Yale and Stanford. As I had been an undergraduate at Yale '56 I was disposed to accept the offer to work with Konrad Krauskopf the highly reputed geochemist at Stanford. I was living in Houston at the time, and Karl was in town giving a speech for the local chapter of the AAPG. He arranged for us to meet in his room at the then famous, ultimately infamous and now extinct Shamrock Hotel.



III

He was a curator not just of natural history. When his sons had moved out of his house he wrapped and labeled the artifacts of our childhoods, packing them into boxes and storing them away. I think of him now in those lonely moments, surrounded by these reminders that for us, time moves only forward; that our yesterdays can only be remembered, never relived. He saved everything.

In the river of time, not even the stones endure. What hope have we? As his own time went by his

light narrowed, burning bright still in the center but not so wide. He focused; he covered less ground. In 1987, the wine he made won first prize in the New Haven Italian Festival. In the following couple of years, he brewed beer. It was a high water mark, and he receded from it, though all three of his sons took it up in later years.

He stopped taking photographs. He stopped going west for field seasons. He lost Jasmine, his Siberian Husky.

But still where he shone his light, the music played. The Cretaceous Garden, his last exhibit, lit up the imaginations of those who built it, and through them, the visitors who walk alongside a dinosaur, through a garden brought forward in time to the present.

Interlude III

Once upon a time, a tree fell in the woods behind our house, and began to bloom. Slime molds grew upon it. Insects colonized it. Squirrels raced across its top. Gradually it fell to the forest floor and disappeared.

He has gone now, into the West. We will see him no more.

I told Karl that I had been advised not to do graduate work where I had been an undergraduate. He replied, "Yale is not going to be the same." I decided to join Karl at Yale. This is the only time I can remember Karl being guilty of an understatement.

Things were not the same. There was faculty turnover, new equipment and research funds. Even the continents were drifting. Karl put me to work on determining how many trace elements in sea water

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could be analyzed by neutron activation. It turned out to be 22 elements, all of which had to be separated into pure radiochemical forms after irradiation. This work was funded by the then AEC with the underlying purpose of assessing vulnerability of nuclear submarines were to leaving a radioactive trail.

This work involved chemistry, nuclear measurements, and a two month trip to the Antarctic. It was unimaginable preparation for my ultimate career in nuclear weapons detection, nuclear reactor environmental monitoring and industrial applications of radioisotopes. All of this was possible because of Karl's infectious optimism that there were no boundaries for geochemists.

Much later, in 1993, I was visiting the renowned Vernadski Institute of Geochemistry and Analytical Chemistry in Moscow. Over lunch I found myself at a table with one of the staff scientists, Nikolai Katargin, who mentioned that he had worked on trace elements in sea water. I said, "I too worked on trace elements in sea water." and Nikolai brightened and exclaimed, "YOU ARE SCHUTZ AND TUREKIAN". It was clear that the name of Turekian had been long-known to the Russian cold warriors because they were working on trying to find our submarines too.

I would be remiss if I failed to mention another change that took place in the early 1960's. There are probably only a few of us left who remember Karl before he married Roxanne. Her impact was profound and had a great influence on Karl as a teacher. She certainly shares in this wonderful life that has benefited so many of us.

—Donald F. Schutz, '56, G '64

Karl Turekian was a new Assistant Professor at Yale when I took first year geology from him. I later took his senior geochemistry course and he was my supervisor on my bachelor's thesis (I did a terrible thesis, not his fault). I was his laboratory assistant for two years, 1957-58 and 1958-59. Dick Armstrong was also working in his lab at that time. Karl was always supportive of me as a student and encouraged me to go to graduate school (which I did and got a Ph.D. at Cal-Berkeley). He will be missed by everyone connected with Yale geosciences.

—Ed Ghent, '59

I entered as a grad student at the same time Karl joined the faculty. A couple of years later he and I got

into an vigorous argument about errors in isotope dates. I was up for orals a few months later and figured he would give me hell, but he asked an interesting thermodynamics question, and my life continued. I taught Leo when he was a senior at Villanova in 1961-2. About 20 years later I taught with him at YBRA. He used to claim I taught him everything he knew about structural geology. I bet he was a good, calm, organized teacher.

—Lucian B. Platt, G '60

I am truly saddened to learn about the recent passing of Leo and Karl. I never really knew Leo, but Karl made a profound impact on me during my time at Yale as a graduate student.

Even though Karl was not an official co-advisor for my Ph.D. thesis, he was the one who read my first drafts most thoroughly and critically, offering me the most helpful recommendations and encouraging advice to strengthen my thesis. I still vividly remember his copious red markings, suggested edits, and questions/comments about scientific content and implications. Without reservation I can say that Karl's enthusiastic input and support made it possible for me to successfully complete the requirements for the

doctoral degree. Indeed, Karl spurred me to achieve my academic best. He was the epitome of an inspiring mentor—a demanding but genuinely caring task-master. I will always remember all the good times when Karl joined the graduate students at George & Harry's for coffee.

—Bob Tilling, G '63

I think Ben Everitt and I may be only people living who knew Leo at the start of his career, because we were his field assistants in North Dakota when he was doing his PhD. research on the Golden Valley Formation. Western North Dakota was not a prepossessing place for a young geologist, and initially I was turned off. There was no complex structure, no volcanism, no spectacular scenery. The sediments looked like "dirt" to most people. We spent most days digging up semi-consolidated clays and siltstones looking for plant fossils. Leo was a disciplined and hard-working field geologist, and went to mass every week, but always had time for his assistant's projects and to see interesting natural phenomena in the area, like burning coal seams (where Leo eventually found that the adjacent baked



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sediments contained high-temperature metamorphic minerals). One time we went to a place where the common juniper trees had an unusual morphology. When we went to Ben's field area in the Theodore Roosevelt National Memorial Park, we had to make sure the bison had cleared out of the area before we started work. The fences in the park had posts the size of telephone poles, because bison can't be stopped by the wimpy fences which suffice for cattle.

Leo always collaborated with others. We carried a plant press and collected plant specimens for some arboretum, who somehow supported his work. He kept his antennae out for others working in the region, like Ted Cavender on the fossil fish of Sentinel Butte. or the people excavating dinosaurs from the nearby Cretaceous deposits.

The senior research project recommended to me by Leo eventually resulted in a paper in which I described climatic cycles in lacustrine sediments. Leo's other assistant, Ben Everitt, produced a paper which used growth rings in cottonwoods to time migration of point bars. We called ourselves the NoDak Research Institute. How many graduate students have supported that kind of research? Thank you, Leo, for leading me to the best project of my career.

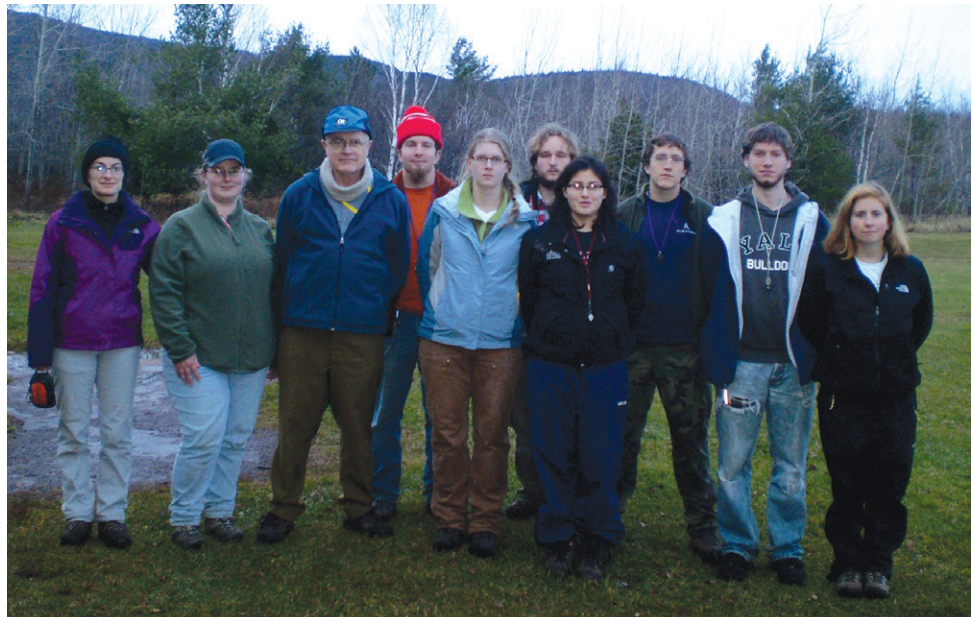
I had some tastes of the Leo Hickey humor. We visited the Chateau de Mores in Medora, N.D. (named after the wife of the Marquis de Mores, an acquaintance of Theodore Roosevelt). Leo quipped that a dinnertime conversation might have gone thus: "More madeira, Medora, m'dear." One time, he told us to stop the vehicle while he went into a wooded area (something unusual in N.D.). Emerging from it, he excitedly told me to come look, because a rare orchid was blooming there. It turned out that he had planted a cutout of a picture of a Showy Lady's Slipper in the woods..

Leo had been stereotyped as a non-quantitative sort of geologist at Princeton. To counteract this, he took us to the heights of Medicine Butte, where we measured cross beds all day to determine paleocurrents in the Golden Valley Formation. Under a ledge of that

cross-bedded sandstone was a Golden Eagle chick. People who had never taken the time to explore the Great Plains would never have acquired that kind of experience, or learned that magic is hidden in ordinary places.

We lived in a house rented from an old lady (Mrs. Nell Robinson) who had been a teacher during the pioneer days of N.D., keeping a revolver beside her bed in her youth. While we were there, she used to burn most of her trash, including rather incombustible things like orange peels and eggshells, in an old stove in the kitchen. Not surprisingly, one day there was a chimney fire; you could feel the heat in the wall above the stove. Fortunately, we all survived.

As others have said, Leo had catholic interests. We visited the Custer Battlefield, where he was familiar with



Stratigraphy Class Trip to the Catskills, Fall 2009. Left to right: Maria McNamara; Amelinda Webb, G '13; Leo Hickey; Adam Behlke, G '13; Lee Christoffersen, '10; Martin Bouda, Forestry Graduate Student; Alex Andrews, '11; Joe O'Rourke, '12; Nico Casasanto, '12; Chelsea Willett, '11.

details of the history of the battle. I knew that he was a fan of Tolkien's works, which I never read until decades later. He was a fan of classical music, so I annoyed him playing the Beatles on his car radio.

Thank you, Leo, for your guidance. Thank you for those days on the prairie long ago. I will never forget you.

I hope you can convey to Leo's wife and family that those of us who knew him "way back when" will always remember him fondly.

—Bruce Boyer, Princeton '66

As a graduate student Karl always had me shaking in my boots. He could shoot down a scientific argument

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at the speed of light and with laser accuracy; and it seemed I was always in his crosshairs. It was only later that I realized that it was an act and that behind the bluster was a warm-hearted and gentle human being. The part that was authentic was the scientific brilliance and the passion for science. We have lost a giant.

—**Bill Chameides, G '74**

I was a student of Professor Turekian, it was a very tough class. Clearly, I was not the best student in his class. When I think about it, I was not the best student in ANY of the classes that I took. I did not pass my oral exam primarily because I did not answer the questions correctly, given by Professor Turekian. Fortunately, I was allowed to have another make up oral exam. I did study hard and this time I was able to answer the questions given by him. I was allowed to stay and finish my thesis work and receive my Ph.D. Professor Turekian was brilliant, dedicated and also had the passion to take care of a not-so-good student like me.

—**Bruce Chai, G '75**

I want to express my condolences to the department. I am shocked to learn of the news. When I was a student there, Karl was a strong and positive presence, well respected and admired. I met him a year ago at AGU and found him to be in good shape at the time. He still had this passion about him. This is sad.

—**Jean-Pierre St-Maurice, G '75**

As student and postdoc I was at Yale from 1970-1978, so I had many memorable and thought-provoking interactions with Karl. Two come to mind most frequently. First is the morning-coffee institution. We might discuss anything, but Karl kept the focus on geochemistry, which he defined as anything that geochemists find interesting. This was a forum for discussing research problems within the group, but also, because of Karl's editorships, an opportunity to learn about exciting work being done elsewhere. I have yet to meet Karl's equal in creating and exploiting "teachable moments" as he could do at these gatherings. And, although I have had much better coffee since, I have never seen a comparably productive, daily coffee session anywhere else - it's a simple idea, but one hard to implement and sustain.

My second frequent recollection dates from the 1997 meeting in New Haven to celebrate Karl's 70th birthday. After he had listened to his former students, postdocs, and research associates, Karl spoke briefly. In the course of his remarks he summarized our science - geochemistry, but I think it applies much more broadly

- by saying "It's all about ambiguity." I have found this to be apt in many circumstances, and it pleases me to remember Karl when I quote him.

—**Larry Benninger, G '76**

I'm so sorry to learn of Leo's death. I have fond memories of the summer I spent with him at Yellowstone-Bighorn Research Association's facility in Red Lodge MT in 1976. Leo needed a field assistant. He contacted then-assistant-professor Bruce Tiffney, who was teaching Evolutionary Biology. Bruce asked his classes. I was interested - one condition: the successful candidate had to be able to drive a stick-shift Chevy Blazer from DC out to Red Lodge. So Bruce taught me to drive his car while I was enrolled in his class (sure of certain failure... but I passed!)

So I drove that Blazer, stuffed to the gills with field equipment, out to MT, where we spent the summer collecting plant fossils around the K-T boundary in the Bighorn Basin. Leo was involved in the debate over whether an asteroid impact could have contributed to the extinction of the dinosaurs. He thought not, based on the plant fossil evidence. The BBC filmed an episode of "NOVA" with us that summer, called "The Asteroid and the Dinosaur." So at 20 years old, I had my TV debut courtesy of my working for Leo, opening a fossil-bearing rock in my hand and exclaiming, "Oh wow! That's BEAUTIFUL!" (oh brother... but still, it was exciting).

Most days, on our way back to Red Lodge after a long, hot day of fieldwork, Leo would stop at the A&W drive-through and buy us big root beer floats! It was a fun summer for a college junior! I think of these memories with great fondness. I know Leo is sorely missed.

—**Julie Galton '81**

I was one of the students at the Geology Field School program in the summer of 1982. There were about 30 or 40 students from Yale, Cornell and Harvard, and a few professors, including David Schindel. At one point during the summer, we took a group picture with most of the students standing, and Schindel decided to lay down across the ground in front of us. When we got back to campus in the fall, Karl looked at the picture for about a millisecond and said, "well, at least it's stratigraphically correct."

—**John Kurtz '84**

As a graduate student at Yale, in the late 1970s, I found Karl to be quite an intimidating figure.

I will never forget that at one colloquium, about half

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way into the presentation, Karl stood up, proclaimed the talk being given “nonsense” (he used a less polite word) and marched to the front of the room, turned off the projector and began to argue directly with the speaker. This argument went on some minutes, and when it showed no signs of abating, members of the audience began to sheepishly leave the room.

The presence of Karl at my oral comprehensive exam at first worried me much. But, in the end, Karl “threw me a softball” (an easy question about geochemistry—I am a paleontologist), and my ability to answer that calmed me and eased my passing of that exam.

Yes, Karl Turekian could be loud, argumentative and intimidating.

But, I had nothing but great respect for his intellectual honesty and his passion for science.

To me he was a great scientist who never lost his devotion to “getting it right.”

—**Spencer Lucas, G '84**

Please offer my condolences to the families of Professor Hickey and Professor Turekian. They were giants in geoscience research, teaching and influencing so many students and directing the early careers of today's leaders in the field. Please also offer my condolences to the Yale G&G department faculty, staff and its extended family of alumni and friends.

Of many great memories of Karl, perhaps my fondest are the impromptu discussions around the coffee maker on topics ranging from 10Be, to 187Os, to trace elements in seawater and to the newest details on the formation of the Earth. He was a tireless intellect and will be missed.

—**Timothy Burch '87**

I'm so sorry to hear of Leo Hickey's passing. He taught two of my favorite classes at Yale, Plant Biology and (my favorite class ever) Stratigraphy. Moving from one class to other was a bit like having Clark Kent for a professor (all jokey self-deprecation) and then realizing that he was really Superman. I have never learned so much in four months. It was like learning a new language, or opening a third eye. For years afterwards I could walk through landscape I'd thought I'd known well and suddenly (looking at stream banks and rock outcrops) be able to tell stories to myself about what was going on in them. I'm forever grateful.

My sincere condolences to all who knew him.

—**Daniel Kirk-Davidoff, '90**

Karl taught me geochemistry and gave me the grounding I needed to comprehend climate-change

research. As an awkward postadolescent, I treasured his kindness and absolutely loved his afternoon teas. He brought a warmth and cohesiveness to the department that it often seemed to lack in the late 90s.

Leo was my first geology professor (Stratigraphy) and my undergraduate thesis advisor. His intellectual rigor meant the world to me, and the honest B+ he gave me on my decidedly imperfect thesis was one of the grades I'm proudest of. He also turned me on to the fascination of botany in a riveting extracurricular lecture. When I went back in 2008 to say hello, he received me with his customary graciousness and showed me his current projects. I always admired his tidy lab with its many boxes of carefully organized scientific papers. Leo was a great humanist as well as a scientist, and he gave me some of the best advice I ever received: There are plenty of smart people out there, he said, but in order to be creative, you have to allow yourself space to play.

I graduated in '99, went to Yale Med, and ultimately became a journalist. These two gentlemen gave me much of the training I now rely upon to do my job. I am very sorry indeed to hear of their deaths.

—**Jenny Blair '99, MD '04**

I didn't work closely with either Leo or Karl while I was at Yale, but I do have a number of very positive memories of both.

Leo helped get me some funding to begin my fieldwork in Norway. The timing of figuring out my project and the necessity to do fieldwork in the Norwegian summer meant that I didn't have time to wait for a GSA grant. Leo, at Mark's request, was more than happy to free up some department funds to get me into the field, and findings from that field season were enough to get me a GSA grant for the following year. It wasn't much, maybe \$1,500, but it was plenty, and it was given quickly and with no fuss.

My other fond memory of Leo was that he wrote a very lovely handwritten note after my Dad died. I don't recall the details of what he wrote but I gave it to my Mum, and it helped cheer her a lot in a pretty dark time.

I also seem to recall having an email conversation with him in Latin once! My Latin is utterly awful meaning that his Latin and his sleuthing abilities must've been pretty good.

Karl...probably my main memory was how much he loved goldfish at the 3.30 coffee! My coolest memory of Karl though was in my very first semester I did his geochemistry class. About two weeks in, he walked over to the desk I was sitting at, handed me a rock (that was in a plastic box) and said “Any idea what this is?”. He

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politely managed to not groan at whatever I replied, and said “It’s a piece of Mars”. Definitely one of the coolest moments of my life to be holding a piece of another planet.

Both were always really nice and would smile and say hi in the corridor even though we didn’t really work closely.

—James Stevenson, G '06

I’m sure other people will mention this as well, but the upstate NY field trip that Professor Hickey led for Stratigraphy was one of the best experiences as a geology undergraduate. Despite the fact that we were standing in snow and the ink in our pens were frozen, Professor Hickey would continue to lecture at the outcrop, and I learned a lot more in those conditions from him than in much more comfortable situations. The charm of the trip was fantastic, and Professor Hickey also enjoyed the cheesy parts, from eating lunch at terribly small and unhealthy gas station stores, or the creme de la creme of the trip, the dinner in the German restaurant. It was clear that he loved taking (unkempt) students to this rather romantic restaurant in the middle of the woods, telling us stories about it weeks in advance. In addition to the German and homey fare, which he enthusiastically told us to partake in, we were regaled by a middle aged live piano player and what was most likely his elderly mother, who was encouraging her son in his music. It was all very surreal and I can still picture Professor Hickey enjoying his food and the situation.”

—Kim Lau, '09

Many former geology students of Leo’s have posted some really nice things about him on facebook. We’re sharing old photos and stories. One Yale student (who was not a geology major) asked, “Oh, was he the professor with the machete you always talked about?” We laughed about the time he described his field work as “We were fine, as long as the wolves knew we were boss,” and when a police car showed up at one of our field trip stops because we were trespassing (I’ve attached a photo of Professor Hickey explaining to the cop why we were there... the cop seemed very confused!).



His concept of the “chronocopter” was a valuable teaching tool and it helped us truly understand the dynamic depositional environments that created the rocks we saw in front of us. I’ve told the story of our lab exercise in “staircase stratigraphy” to my family and coworkers, and everyone tells me that he must have been a great teacher.

I’m very sorry for the Department’s loss. All of his former students remember him fondly and he will be missed.

—Lee Christoffersen, '10

I’ve always been told that to fully understand a concept is to be able to teach it to others. By that logic, Professor Hickey’s understanding of stratigraphy knew no bounds. In the classroom and in the field, he taught complex concepts with clear and engaging explanations, using creative and memorable concepts like the “Chronocopter,” a time-traveling helicopter that enabled our class to fly back in time and watch bedding and sedimentation in action from a convenient imaginary hovering vantage point, safe from dinosaurs, trilobites, or whatever dangers might be on the surface. But what really made me listen closely to every word was Professor Hickey’s penchant for jokes, puns and one-liners, delivered with perfect deadpan and in perfect rhythm. If my mind wandered to “what’s for lunch?” for even a few seconds, I could have missed out on the colorful fungi that have taken ‘a lichen’ to a particular rock. The Chronocopters, as we came to call our 7-person class, loved the Stratigraphy field trips, not only for their thoughtful planning and world-class outcrops, but also for the times when Professor Hickey would explain matter-of-factly that he brought along an enormous machete to a school field trip because it’s the best way to clear brush. “Why, this machete brought me halfway across the isthmus of Panama!!” he exclaimed near Wharton Brook. Though Professor Hickey only said that line once, we must have repeated this and other Hickeyisms dozens and dozens of times before the semester was out. I have many great memories of Yale Geology and it was a great privilege to experience firsthand Professor Hickey’s incredible talent for teaching.

—Chelsea Willett '11

FIELD STUDIES

G&G Department Field Trip: Great Britain 2013

During August, a group of 17 G&G students and faculty visited the British Isles to take in the varied geology. Led by Professor Mark Brandon and graduate students Ross Anderson and Chris Thissen, the group journeyed some 3,182 miles from Cornwall to Northern Scotland through nearly 3 billion years of Earth's history.

For the paleontologists highlights included walking the famed Ammonite Pavement

along England's Jurassic Coast, seeing some of the oldest Ediacaran fauna at Charnwood Forest, marveling at the pyritization of fossils during a Jurassic ocean anoxic event, and seeing some of the oldest vestiges of life in the form of Proterozoic stromatolites and eukaryotic testate amoebae.

Geochemists and climate scientists got to see periods of global ocean anoxia at the coastal town of Whitby, evidence of Neoproterozoic snowball Earth events in the Scottish Dalradian Supergroup associated with huge carbon isotopic excursions, and evidence of the last glacial maximum in the form of glacially eroded landscapes.

Structural geologists enjoyed the impressive chevron folds at Millook Haven in Cornwall, got the chance to see the Moine Thrust (the first thrust fault to be mapped) in the Assynt region of northern Scotland, and were able to puzzle over the Anglesey Mélange.

Geophysicists were not disappointed either. They had the



Will Gearty '14, Liz Clark G '19, Ross Anderson G '18, Holger Petermann G '18, Chris Thissen, G '14, Mark Brandon, James Super G '18, Frances Liu '13, Simon Darroch G '15, Victoria McCoy G '16, Evan Sniderman '13, Philippa Stoddard '15, Tour Guides, Kneeling in Center Xiaojun Chen G '16, Katelyn Gray G '18, Robin Canavan G '18.

opportunity to see two ophiolite complexes, one on the Lizard Peninsula and one in southwest Scotland. They also saw evidence marshaled by James Hutton of the ability of igneous rocks to intrude older strata at Arthur's Seat, Edinburgh.

Economic geologists saw the historically important tin mines of Cornwall, which have been active since at least the Roman times. The group was also treated to a train ride down a Welsh slate quarry to hear about the industry. We also saw traces of the North Sea oil/gas industry at the British Geological Survey's core sheds.

A central theme of the trip was the history of geological thought. To this end the group visited sites where the pioneers described the first evidence of the theories that now dominate the field. These included Hutton's famed unconformities at Siccar Point and Jedburgh and the rocks at Stonehaven, Scotland where Thomas Barrow worked on his metamorphic sequence. The group

marveled at the mapping abilities of Peach and Horne in northwest Scotland, and saw evidence of widespread ice ages as presented by Darwin and later Agassiz at the Parallel Roads of Glen Roy.

Students were also able to sample the culture of the British Isles. Visits were made to Stonehenge, Chesters Roman Fort on Hadrian's Wall, the Royal Edinburgh Military Tattoo, Uquhart Castle on the banks of Loch Ness, and the Bunnahabhain whisky distillery on Islay. The trip even concluded with a guided tour of Number 10 Downing Street, the residence and office of the British Prime Minister.

The students returned after two weeks of camaraderie with a unique insight into some of the most historically important rock sequences in the world. They also returned a little wetter thanks to the glorious British summer!

To see photos from the trip visit our flickr page: <http://www.flickr.com/photos/100903787@N07/>

FIELD STUDIES

G&G Department Field Trip: Great Britain 2013



The group walking along the coast toward chevron folds at Millook Haven, Cornwall.



Walking on the black shales of the Jurassic toarcian Anoxic Event, Whitby, Yorkshire.



Studying the Moine Thrust, on the Stack of Glencoul.

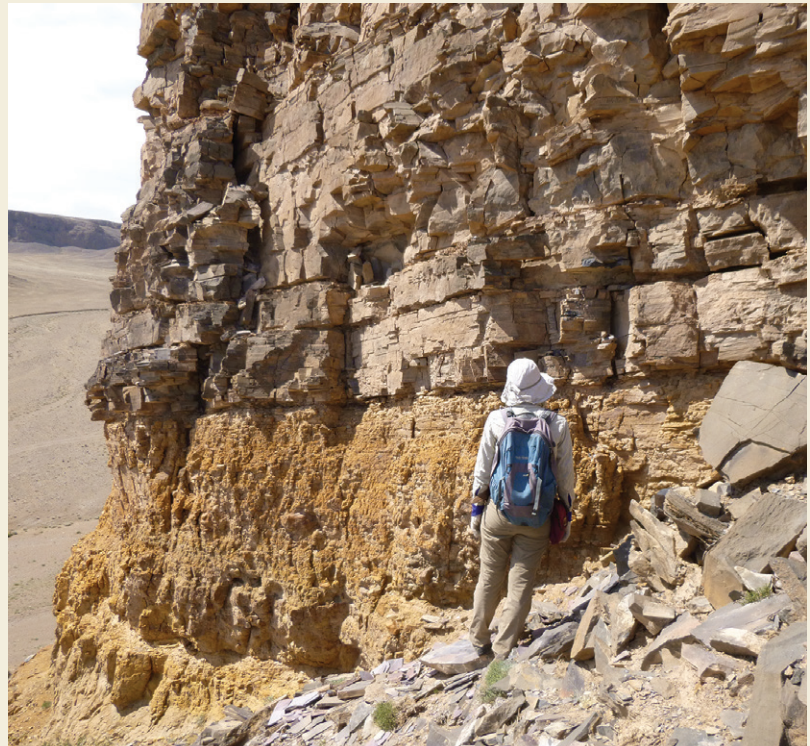
FIELD STUDIES



The MAGIC project. Field work in Virginia, August 2013. Juan Aragon '17, grad student Erin Wirth, Tierney Larson '15, and grad student Anwar Mohuddin pose by the seismometer they have just installed as part of Maureen Long's involvement in the Mid-Atlantic Geophysical Integrative Collaboration (MAGIC) to study the structure and dynamics of the crust and upper mantle beneath the Appalachians.



Maureen Long with her truck load of equipment for placing seismometers in Peru, June 2013, as part of her role in the Peru Lithosphere and Slab Experiment (PULSE), which is designed to study flat plate subduction beneath Peru.



Graduate student Ross Peter Anderson Studying the Neoproterozoic/Cambrian sequence of the Dzabkhan terrane, SW Mongolia. Sturtian diamictite is overlain by cap carbonate. Ross is studying eukaryotic diversification during the Cryogenian and was in Mongolia as part of the MIT/Nasa Astrobiology Team: Foundations of Complex Life.

VISITING FACULTY FROM OTHER INSTITUTIONS



Lidong Dai

Lidong Dai (lidong.dai@yale.edu) is an associate professor at the Laboratory for High Temperature and High Pressure Study of Earth's Interior (LHTHPSEI), Institute of Geochemistry, Chinese Academy of Sciences, People's Republic of China. His research is mainly focused on laboratory measurements of physical properties including electrical conductivity using the multi-anvil high pressure apparatus and Brillouin scattering sound velocity using the diamond anvil cell under extremely ultra-high pressure conditions. All of these experimental results can be applied to understanding and exploration of the deep profile of Earth and Planetary interiors. Dr. Dai is working with Shun-ichiro Karato (shun-ichiro.karato@yale.edu).



Gavin Foster

the University of Southampton who specializes in reconstructing ocean pH and atmospheric CO₂ using boron isotopes in foraminifera. Gavin is a contributing author (Chapter 5 Information from Paleoclimate Archives) of the recent IPCC Assessment Report 5 and his research interests are currently focused on better elucidating the relationship between CO₂ and the climate system in the geological past, and in particular during climate intervals warmer than today. While he is here he will be working with Zhengrong Wang to establish the boron isotope technique here at Yale and with Mark Pagani, Yige Zhang and Hagit Affek on a number of other projects, some of which involving clumped isotopes.



Cristian Medina

Cristian Medina (Cristian.Medina@yale.edu) is a Research Geologist at the Indiana Geological Survey. His research involves topics related to reservoir characterization as applied to geologic carbon sequestration. Cristian will be working with Jay Ague (Jay.Ague@yale.edu)

Gavin Foster (gavin.foster@yale.edu) is the Flint Visiting Research Scientist for the Fall of 2013. He is an isotope geochemist from

RECENT AWARDS & HONORS: FACULTY



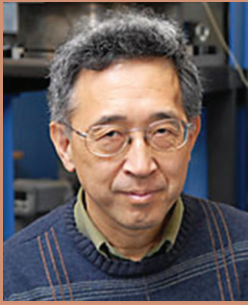
Robert Berner

Congratulations to **Robert A. Berner**, (robert.berner@yale.edu), now Emeritus, the 2013 recipient of the Franklin Institute's Benjamin Franklin Medal in Earth and Environmental Science. Bob is recognized for his work in deepening our understanding of the Earth system through studies of the chemistry of geological processes and their influence on the atmosphere and oceans.



Bill Boos

Congratulations to **Bill Boos** (William.boos@yale.edu) who won a Career Award from the National Science Foundation for his proposal: "The Influence of Desert Heat Lows on Monsoon Precipitation". As NSF says on its website, the CAREER program is one of the "National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations."



Shun Karato

Congratulations to **Shun Karato** (shun-ichiro.karato@yale.edu) who received the “Science Lectureship Award” from Chiba University on October 19th. He was the second Earth scientist to receive this award (the first was Steve Sparks of the UK, 2006). This award started in 2005 and goes to one scientist per year. Previous awardees include Harold Kroto (Chemistry, 2008) and Frank Shu (Astronomy, 2005). And the award includes a bottle of “sake”!

Shun also received the 2014 Augustus Love medal of the European Geophysical Union (EGU). The Augustus Love medal is awarded to a distinguished scientist in the field of geodynamics, comprising mantle and core convection, tectonophysics, post-glacial rebound and earth rotation.

Congratulations to **Mary-Louise Timmermans** (mary-louise.timmermans@yale.edu) who won Yale’s Arthur Greer Memorial Prize for 2013. This prize, one of Yale College’s highest honors,



Mary-Louise Timmermans

was established by alumni of the Book and Snake Society to support junior faculty research in the natural or social sciences. The prize recognizes Mary-Louise’s work on the age, history, and climate implications of the deep Arctic Ocean.

Congratulations to **Brian & Cathy Skinner**

(brian.skinner@yale.edu, catherine.skinner@yale.edu), who have been jointly awarded the Geological Society of Connecticut’s 2013 Joe Webb People’s Award, recognizing Brian and Cathy’s outstanding lifetime contributions to the state’s geological community. The award will be presented at the CGS Annual meeting on November 15 at Trinity College. Cathy has also been awarded the Distinguished Service Award of the Geology and Health Division of the Geological Society of America. She will share the award with Robert Finkelman of the University of Texas, Dallas.



Brian & Cathy Skinner

RECENT AWARDS & HONORS: STUDENTS



Dave Auerbach

Congratulations to graduate Student **David Auerbach**, (david.auerbach@yale.edu), here seen teaching field camp in Australia, has been selected by the National Association of Geoscience Teachers as an Outstanding Teaching Assistant of the Year.

Congratulations graduate student **Robin Canavan** (robin.canavan@yale.edu) who was awarded a Yale Institute for Biospheric Studies (YIBS) grant to collect samples of early Eocene marine mollusks from the Isle of Wight, Hampshire Basin and

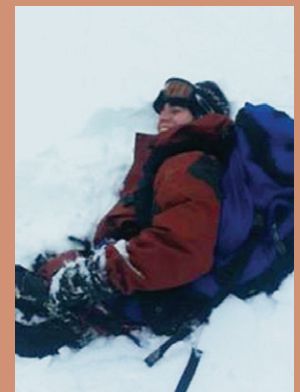


Robin Canavan

London Basin in England. It’s also funding some of her clumped-isotope analysis which will be performed using Yale’s mass-spectrometers, on these fossil mollusks to estimate paleo-sea surface temperatures during the Eocene, a time in Earth’s history when average global temperatures were much warmer and concentrations of greenhouse gases were higher than today.

Robin also received the John F. Enders Fellowship, which she is using for a project related to endothermy in avian and non-avian dinosaurs using clumped-isotope analysis of fossil eggshell from the Cretaceous Dinosaur Park Formation in Alberta, Canada.

Congratulations to graduate student **Matt Davis** (matthew.davis@yale.edu) who was awarded a GSA Student Research Grant,



Matt Davis

RECENT AWARDS & HONORS: STUDENTS

an American Society of Mammalogist Grant in Aid, and a YIBS Dissertation Improvement Grant for his thesis research on the long-term ecology of North American Ice Age mammals. He will spend the fall in residence at the National Museum of Natural History in Washington DC as a Smithsonian Predoctoral Fellow using the museum's incredible extant mammal collection to develop new proxies for reconstructing diet and locomotor capabilities in fossil mammals.

Congratulaions to G&G undergraduate major **Sarah Ditchek '14** (sarah.ditchek@yale.edu), who has received an American Meteorological Society K. Vic Ooyama Scholarship. The award was based on recommendations from the Committee of Undergraduate Awards. The scholarship was awarded in recognition of her outstanding achievements and her desire to pursue an undergraduate degree in the atmospheric or related oceanic or hydrologic sciences. The K. Vic Ooyama Scholarship was established in honor of the late Katsuyuki Ooyama, whose distinguished science career spanned more than 50 years. Dr. Ooyama was known for his valuable contributions in advancing the theory and modeling of tropical cyclones, for his many years of service to NOAA, and for influencing an entire younger generation of scientists studying cyclogenesis.



Sarah Ditchek

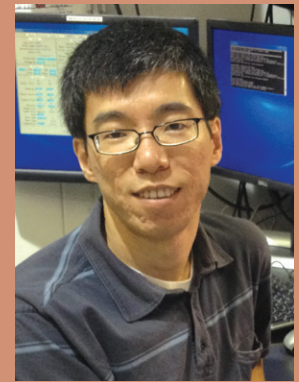


Daniel Field

Congratulations to graduate student **Daniel Field** (daniel.field@yale.edu), who received a Smithsonian Predoctoral Fellowship which will provide him the opportunity to spend a semester as a graduate student in residence at the Smithsonian Institution National Museum of Natural History, where he will work on a variety of projects relating to modern and fossil birds. Daniel is a third-year student studying vertebrate paleontology with Jacques Gauthier. His interests are in bird evolution.

Daniel was also awarded the William S. Hoar Award for the best student talk at the annual meeting of the Canadian Society of Zoologists. The Award was given for the best student paper presented orally at the Annual Conference of the Society, and is intended to encourage and acknowledge excellence in scientific research and communication by students.

Congratulations to former graduate student at **Zhicheng Jing** (zxj65@case.edu), who has accepted a position of Assistant Professor at Case Western Reserve University (Department of Earth, Environmental and Planetary Science), in Cleveland, Ohio.



Zhicheng Jing



Emma Locatelli

Congratulations to graduate student **Emma Locatelli** (emma.locatelli@yale.edu) who was awarded the PA Council award for the best poster at the 56th Annual Meeting of the Palaeontological Association. Emma's poster was about her research in the Bahamas. She was looking at the preservation of gecarcinid land crabs by comparing remains found during a month long series of field surveys in three contrasting environments and sub-fossil remains she found in Holocene sediments. While she found 1400 remains on the surface, only 8 claws were recovered and all of them were in really bad shape. Her primary conclusions were that land crabs have a low fossil record, and processes such as dissolution and weathering are preventing land crabs from becoming part of the fossil record. This is consistent with the sparse record reported in the literature thus far.

RECENT AWARDS & HONORS: STUDENTS



Woosok Moon

Congratulations to graduate student **Woosok Moon** (woosok.moon@yale.edu) who was awarded a Herchel Smith Fellowship at the University of Cambridge. He will be working in the Department of Applied Mathematics and Theoretical Physics, and advancing his PhD work on stochastic Arctic sea ice models.

Congratulations to graduate student **Alison Nugent** (alison.nugent@yale.edu) who completed a three month student visitor program at the National Center for Atmospheric Research (NCAR). As part of their Advanced Study Program, they funded her visit while she collaborated on cloud physics modeling.



Alison Nugent



Rachel Racicot

Congratulations to graduate student **Rachel Racicot** (rachel.racicot@yale.edu), she has received an NSF funded East Asia and Pacific Summer Institute (EAPSI) research scholarship. She'll be travelling to Japan in June, and explicitly working on the evolution of echolocation in dolphins and whales. This work will use CT scans of fossil skulls and earbones,

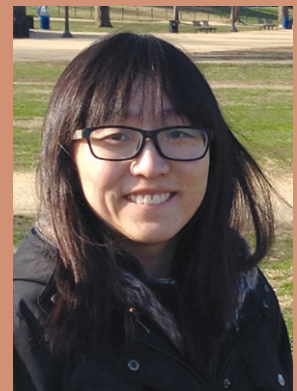
and will start the process of working out when these animals developed their amazing sensory abilities (which allow them to communicate, find food, and avoid predators). This work is also critical from a conservation point-of-view...as many of the species she's studying are endangered, and modern ship engines have been shown to have serious impacts on their abilities to echolocate.



Courtney Warren

Congratulations to graduate student **Courtney Warren** (courtney.warren@yale.edu), recipient of a Fall 2012 Graduate Fellowship from the Connecticut Space Grant Consortium. The Consortium provides funding for research and internships for students and faculty at member institutions as a division of NASA Education.

Congratulations to graduate student **Yiqi Zheng** (yiqi.zheng@yale.edu) who has received an Advanced Study Program award to spend next summer at NCAR working on global modeling of chemistry-climate interactions.



Yiqi Zheng



Robert Young

Congratulations to G&G undergraduate major **Robert Young, '14**, (robert.t.young@yale.edu) for receiving a GSA Student Research Award for his project titled: Laboratory Testing of a Substrate Mechanism for Decay Inhibition and Exceptional Preservation. Robert is conducting the project in conjunction

with and under the mentorship of geology graduate student Victoria McCoy (victoria.mccoy@yale.edu). Essentially, they are looking at how different sediment conditions (permeability and composition) affect decay, which they are approximating by measuring emitted carbon dioxide. They conducted sampling earlier this summer and will analyze and write up their data in the fall.

STUDENT NEWS

Congratulations to the 2013 Department of Geology & Geophysics Prize Recipients

UNDERGRADUATE PRIZES

HAMMER PRIZE • “For excellence in the oral presentation of their senior thesis”

Anthony Fragoso

Eli Mitchell-Larson

BELKNAP PRIZE • The William R. Belknap Prize “to seniors for excellence in Geological Studies”

Anthony Fragoso

Jennir Kasbohm

PENFIELD PRIZE • The Samuel Lewis Penfield Prize “for proficiency in mineralogy”

Philippa Stoddard

WILDE PRIZE (1973) • Pat Wilde, B.A. 1957.

Awarded to a senior for excellence in marine geology and oceanography

Eli Mitchell-Larson

GRADUATE PRIZES

HAMMER PRIZE • Awarded to “an outstanding geology graduate student”

Daniel Field

Taylor Kilian

Alison Nugent

ELIAS LOOMIS PRIZE • “For excellence in studies of physics of the Earth”

Bradford Foley

P.M. ORVILLE PRIZE • The Phillip M. Orville Prize

“In recognition of outstanding research and scholarship in Earth Sciences”

Amelinda Webb

Ross Mitchell

FORD PRIZE • The William E. Ford Prize

“To distinguished graduate students in mineralogy”

Zhixue Du

Chao Liu

Congratulations to the graduate students who were awarded their PhDs within the past year.

December 2012:

Joanna Wolfe

“Fossil, Molecular, and Developmental Approaches to Elucidate Pancrustacean Phylogeny”

Advisor: Derek Briggs

Joanna is a Gerstner/Lerner-Gray Postdoctoral Scholar at American Museum of Natural History.

May 2013:

Ross Mitchell

“Supercontinents, True Polar Wander, and Paleogeography of the Slave Craton”

Advisor: David Evans

Ross is a Postdoctoral Scholar at the California Institute of Technology.

Sarah Vorhies

“Pressure-Temperature Conditions, Timing, Timescales, and Mechanisms of Metamorphism in the Barrovian Zones, Scotland”

Advisor: Jay Ague

Sarah is living in St. Johnsbury Vermont with her family.

December 2014:

Sitindra Dirghangi

“An Evaluation of the Environmental and Biological Controlling Factors of Lipid-Based Climate Proxies”

Advisor: Mark Pagani

Sitindra is working as a postdoctoral researcher in the Department of Plant and Soil Sciences at the University of Delaware. He is working on phosphorus cycling in the Chesapeake Bay.

Amelinda Webb

“The Effects of Stress on Communities: Using Modern and Fossil Data to Explore Community Response”

Advisor: Derek Briggs

Amelinda is an Izaak Walton Killam Memorial Postdoctoral Fellow at University of Alberta in Canada.

STUDENT NEWS

Congratulations to the seniors who graduated in the class of 2013:

Jennifer Kasbohm (Adviser: David Evans)
 “A paleomagnetic reanalysis of the Auborus Formation, Namibia”
 Jennifer has started her PhD in Geosciences at Princeton University.

Florence Loi (Adviser: Catherine Skinner)
 “Asbestos: Yesterday’s Insulator of Public Buildings, Today’s Threat to Public Health”
 Florence is in California working in a clinical research position and finishing up her remaining medical school requirements. She hopes to apply to medical school in the next few years and she’s considering pediatrics as a specialty.

Eli Mitchell-Larson (Adviser: Mark Pagani)
 “Temperature and salinity variability recorded by *Cladocora caespitosa*: A multi-proxy analysis of a shallow-water Mediterranean coral”
 Eli works as an Investment Analyst at New Island Capital in San Francisco, a social-impact firm committed to generating positive environmental impact by deploying capital in sectors from alternative energy generation and climate change mitigation to local food systems and low-impact lifestyles.

Natalee Pei (Adviser: Brian Skinner)
 “The Hydrologic Issues Associated with Shale Gas Extraction by Hydraulic Fracturing in the Marcellus Shale”
 Natalee is doing a yearlong Light Fellowship to study Chinese, she’s spending the fall in Beijing at Tsinghua University and the spring in Taipei at Taiwan National University.

Evan Sniderman (Adviser: Mark Brandon)
 “Detrital zircon geochronology and provenance analysis of Scotland Group sediments, Barbados”
 Evan is working in New York City as a Management Consultant at the firm of Oliver and Wyman.

Thomas Winger (Adviser: Mark Brandon)
 “Pressure solution mass transfer of the Purgatory Conglomerate”
 Thomas is a Lab Technician in the Oxygen Isotope Lab, working with Zhengrong Wang in G&G.

Cole Yeager (Adviser: Zhengrong Wang)
 “Hawaiian Picrite Basalt (ML647-2B) reactivity with CO₂-bearing solution on a microscale: Implications for carbon sequestration via mineral trapping”
 Cole is a graduate student in the John and Willie Leone Family Department of Energy and Mineral Engineering at the College of Earth and Mineral Sciences, Pennsylvania State University

Physics majors with G&G advisors who participated in G&G Senior Presentations:

Anthony Fragoso (*Physics major*;
 Adviser: John Wettlaufer)
 “On the formation of icicles: Compositional supercooling and instabilities in a free boundary problem”
 Tony is at Caltech, as a graduate student in Engineering. He just had a paper published in the *Journal of Fluid Mechanics*, in which he is the first author.

Benjamin Mullet (*Physics major*;
 Adviser: Jun Korenaga)
 “Markov chain Monte Carlo inversion for the rheology of olivine single crystals”
 Ben is currently working at Yale-NUS in Singapore as a Dean’s Fellow helping to start up the new college.

Alexandra Turrini (*Physics major*;
 Adviser: Trude Storelvmo)
 “Analysis and Modeling of Aerosol Effects on Temperature Change: Comparison of Trends in Radiation Data to Atmospheric Models”
 Alex is studying for her MSc in Energy Science and Technology at ETH in Zurich, Switzerland.

Ilya Uts (*Physics major*;
 Adviser: Kanani Lee)
 “Effect of laser annealing of pressure gradients in a diamond anvil cell using common solid pressure media”
 Ilya is working as a Game Designer at High 5 Games in New York City. He is part of the Math Department and specifically works on ensuring that the math behind the slot prototypes is fair and that the game itself is fun to play. Ilya also just had a paper accepted in *Review of Scientific Instruments* in which he is the first author.

POSTDOC NEWS

Jeff Carpenter, is a Research Scientist at the Institute for Coastal Research at Helmholtz Zentrum Geesthacht near Hamburg, Germany, where he studies the physics of the coastal oceans. He worked with Mary-Louise Timmermans

Colin Cooke, who was an Interdepartmental postdoc working with Jay Ague in G&G and Richard Burger from Anthropology, is now a Limnologist/Water Specialist at Alberta Environment.

Peter Driscoll is a postdoc at the University of Washington, at a NASA Astrobiology Institute run out of their Astronomy Dept. While Peter was here he worked with David Bercovic, as a Bateman Postdoc, on the coupled evolution of the Earth's climate, mantle, tectonics, core and magnetic field to answer questions about why Venus and Earth diverged in their respective evolutionary paths.

Robert Farla is currently a postdoc at Bayerisches Geoinstitut, University of Bayreuth, Germany. He worked with Shun Karato.

Konstantin Glazyrin is now a postdoc at the new synchrotron beamline PETRA-3 at Deutsches Elektronen-Synchrotron Ein Forschungszentrum der Helmholtz-Gemeinschaft (DESY), in Hamburg, Germany. Konstantin also recently became a father! While at Yale he worked with Kanani Lee.

Congratulations to **Nick Longrich** for receiving the President's Prize for the best talk at 56th Annual Meeting of the Palaeontological Association. Nick is currently a Senior Lecturer in Evolutionary Biology at the University of Bath in the UK, he was a YIBS postdoc working with Jacques Gauthier and a Lecturer in G&G.

Chris MacMinn has accepted a faculty position in the Department of Engineering Science at Oxford University. He was a YCEI postdoc working with John Wettlaufer.

Kaveh Pahlevan, who worked with Kanani Lee, is now a Postdoc at the Observatory of Nice in Nice, France working with Alessandro Morbidelli.

Kate Selway is an Associate Research Scientist at Lamont-Doherty Earth Observatory of Columbia University, New York. She worked with Shun Karato.

Jill VanTongeren, who was a Bateman Postdoc working with Zhengrong Wang, is now an Assistant Professor in the Department of Earth and Planetary Science at Rutgers University.

Benjun Wu is now an Associate Professor at Nanjing University in China. She worked with Jun Korenaga.

Viktoriya Yarushina is in Oslo, and is working as a researcher at both the (a) Center for Earth Evolution and Dynamics (CEED) and (b) the Institute for Energy Technology (IFE). Viktoriya worked with David Bercovic on fluid injection in rocks with applications to carbon sequestration and shale gas development.

Guangsheng Zhuang a Bateman Postdoc with Mark Brandon and Mark Pagani, has been awarded a Marie Curie Fellowship to work with Yani Najman at Lancaster University, UK on the erosion history of the Himalaya. This work highlights Guangsheng's expertise in isotopic methods, including thermochronology.

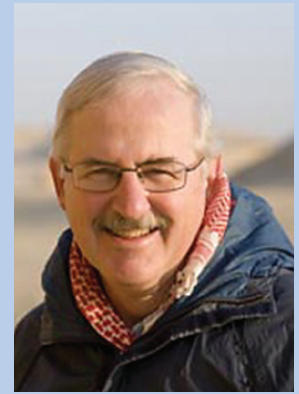
RECENT AWARDS AND HONORS: ALUMNI



George Devries Klein

The Houston Geological Society, awarded its "Geological Legends" award to **George Devries Klein G '60**, (gdkgeo@earthlink.net) for his work in sedimentology and associated contributions to petroleum geology on January 14, 2013.

Congratulations to **Philip D. Gingerich G '74**(gingeric@umich.edu) who received the 2012 Romer-Simpson Medal of the Society of Vertebrate Paleontology, the society's highest award, for scholarly excellence and service to the discipline.



Philip Gingerich



Paul Enos, wife: Carol Curt Enos, daughter: Mischa Enos, grandson: Nathaniel Martin.

Congratulations to **Paul Enos G '65** (enos@ku.edu) for the SEPM's Twenhofel Medal "for a career of ground-breaking innovations in Sedimentary Geology, from the mountain to the microscope, deep water to shallow, modern to ancient, and carbonates to clastics, his research created the foundation upon which we continue to build our discipline."

Congratulations to **Susannah Porter, '95** (Mathematics) (porter@geol.ucsb.edu) who is the recipient of the W. Storrs Cole Memorial Research Award, established to support research in invertebrate micropaleontology. It is given each year to a GSA Member or Fellow between 30 and 65 years of age who has published one or more significant papers on micropaleontology.



Susannah Porter and her two sons



Steven Stanley

Congratulations to **Steven Stanley, G '68**, (stevenst@hawaii.edu) for winning the GSA Penrose Medal, the Society's highest honor. This medal, which is awarded for eminent research in geology, will be presented at the GSA 125th Annual Meeting & Exposition in Denver, Colorado, at an awards ceremony on 28 October

2013. Steve has been a research professor at the University of Hawaii at Manoa since 2005.



Jakob Vinther

Congratulations to **Jakob Vinther G '11** (jakob.vinther@bristol.ac.uk) who has been awarded The Hodson Prize Fund by the Palaeontological Association at its Annual Meeting in Dublin in late December. The Association is one of the world's leading professional societies of palaeontologists and The Hodson Fund is awarded to a palaeontologist under the age of 35 and who has made a notable early contribution to the science.

ALUMNI NEWS



John Stone

John G. Stone '55 (crestonesarabs@gvtc.com) writes: After graduating from Yale, I joined a mini-exodus of geology graduates headed for Stanford ("Bates" McKee, Peter Dunn, Roy MacDiarmid). At Stanford, one of my thesis advisors was Adolph Knopf, emeritus from Yale, who had been my father's thesis advisor at Yale in the 1920's. After graduating with my doctorate in 1958, I joined the Hanna Mining Company, headquartered in Cleveland Ohio, and for the next 30 years was involved in exploration, development, and management of a wide variety of mineral properties and exploration ventures, in both North and South America.

Following my "retirement" in 1988, I worked as a consultant for several years, during which time I once again joined forces with my classmate Peter Dunn, to put together a mini-textbook "Ore Reserve Estimates in the Real World", published by the Society of Economic Geologists in 1994. Together, we have presented the text as a 3-day short course, most recently at the SEG headquarters in Golden, CO last fall. The text itself is now in its 4th printing.

As can be seen from our e-mail

address, after years of using horses as a poor form of transportation on various field assignments, after retirement, my wife and I became interested in breeding Arabian horses on a small scale, and over the years, have produced several champions, and last spring, I rode a "century" ride on our home-grown stallion at a local dressage show (combined ages of horse and rider equal 100 or more).



Ullman family (from left): son Andrew, soon-to-be daughter-in-law Anne Marie, wife Kim (Yale, 1975), Bill, and daughter, Katherine.

Bill Ullman '74 (ullman@udel.edu) writes: After graduation, I worked for Don Rhoads (now retired in Falmouth, MA), and his post-doctoral associate, Josephine Yingst (now Aller, now at Stonybrook University) before going to the University of Michigan for my MS degree. I spent most of my time at Michigan taking additional geology and chemistry courses, after which I completed my PhD in sedimentary geochemistry with Bob Aller (Yale, PhD, 1977, now also at Stonybrook University) at the University of Chicago. Following my PhD, I spent 20 years as a research faculty member at Australian National University where I worked on the chemistry of salt-lake deposits and the chemical evolution of groundwater in the Great Artesian Basin. On returning to Chicago where my wife was completing her law degree, I worked at Argonne

National Laboratory in the Radioactive Waste Management Group. Since 1986, I have been a faculty member in the School of Marine Science and Policy at the University of Delaware where I teach courses in geochemistry, oceanography, and ethics of scientific practice. Until recently, I was the director of the School's Oceanography Program. I also teach and advise students in the Geological Sciences Department at the University.

My current research concerns nutrient transport and attenuation in watersheds and the role of agricultural, land-use, wastewater management practices in the watershed on the ecology of downstream receiving waters (marshes, estuaries and the coastal ocean). Recent technology allows us to measure important biogeochemical parameters at frequencies high enough that we are beginning to be able to determine the role of episodic events (rainfall, wind, and severe storms) on nutrient transport in ways that were unthinkable even 5 years ago. I operate two continuous biogeochemical monitoring stations that are used to support wastewater management and to protect the ecology of the Delaware and Chesapeake Bays. More information about my research and background is available at my website <http://www.ceoe.udel.edu/our-people/profiles/ullman>.

Any former G&G students who are vacationing at the beach in Lewes, DE, where I live and work, should drop by. Also, if anyone knows of good students who are eager to study marine and estuarine chemistry (or any other field of marine science), please have them contact me.

ALUMNI NEWS



John Flynn

John Flynn '77 (jflynn@amnh.org) writes: Credit (or blame) Brian Skinner. And Karl Turekian, former Gibbs Fellow Bruce MacFadden, Karl Waage and the Peabody Museum. During my first semester at Yale, Brian's rigorous and inspirational course opened my eyes to the notion that "laboratories" could include the great outdoors. Badly infected by the "bug" for exploration fieldwork, integral to both my scientific research and mental rejuvenation, I enjoyed long summers working in fossil-rich Eocene deposits of Southern California (marine and terrestrial), West Texas (volcaniclastics), and Wyoming intermontane basins for my Columbia University dissertation, and later led or participated in more than 50 expeditions to Chile, Colombia, Peru, Mexico, Angola, Madagascar, and India seeking Cenozoic and Mesozoic mammals and other fossil vertebrates. Karl and Bruce first exposed me to the importance of interdisciplinary research, later pursued across paleomagnetism and geochronology, to phylogenetics and "DNA and skeletons"-based evolutionary studies of living and fossil vertebrates, and apprenticing with Karl and the Peabody Museum set me on a path that has always been

linked to the essential scientific and educational resources provided by museums. During my 30 year career I have served as a visiting lecturer at Yale G&G (for a semester while finishing my doctorate), professor at Rutgers, curator and professor at The Field Museum (and U. of Chicago, with a transformative stint as a Guggenheim Fellow, living for a year with my family in Chile), then returning to the American Museum of Natural History (with adjunct appointments at Columbia & CUNY) in 2004 where I not only continue to seek new fossils, but also care for some of the museum's 32 million specimens, curate exhibits, teach, and help guide the Museum's recently founded Richard Gilder Graduate School as Dean of the only museum-based Ph.D. granting program in the western hemisphere. How could I have asked for anything more rewarding from my G&G education?

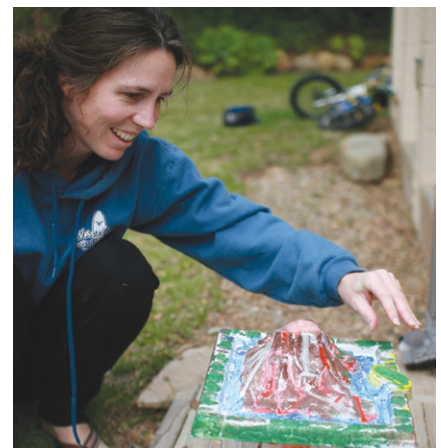


Catherine Izard

Catherine Izard, '06 (Catherine.izard@gmail.com) writes: Since I left Yale, I have spent my time getting far too many advanced degrees. After Yale, I moved to Norway to get a Master's in Industrial Ecology at the Norwegian University of Science and Technology in Trondheim. While the spectacular weather that we experienced during the department field trip in 2004 turned out to be false advertising, I had a wonderful two years in

Norway nonetheless. After that, I moved to Pittsburgh to pursue a joint PhD in Civil & Environmental Engineering and Engineering & Public Policy at Carnegie Mellon, which I finished this spring. My research evaluated how the timing of climate change policy affects construction investments and stranded costs from premature retirements of electricity generating capacity in the US.

On a personal note, I got married in May, 2012 to a fellow PhD student at CMU. I have included a photo of myself in the Cordillera de los Frailes, Bolivia, which was taken on our honeymoon this spring. I am also thrilled to report that my husband and I attended the wedding of Laura Jeanty (a fellow G&G 2006-er) in Boston this August. Both Laura and her husband have just finished PhD's in physics at Harvard and are on their way to Europe for post-docs. My husband and I, on the other hand, moved to San Francisco in June, where I am working on publishing my dissertation research and exploring opportunities outside academia in the Bay Area.



Susannah Porter

Susannah Porter '95 (Mathematics) continues her research on early life, focusing on the microfossil record -750-1000 million years ago, just before the global 'snowball Earth'

ALUMNI NEWS

glaciations, when the eukaryotic clade was first diversifying. She also studies the early Cambrian record of biomineralizing animals and what it tells us about the evolution of mineralized skeletons. Susannah teaches courses on Early Life, Invertebrate Paleontology, and Physical Geology, as well as a large general education course on the Age of Dinosaurs to hundreds of UCSB students, and this past year was honored with a UCSB Distinguished Teaching Award. She also serves as Associate Director of UCSB's Earth Research Institute. Susannah is involved in outreach to K-12 schools, and in particular has begun a collaboration with a local Santa Barbara county high school class to create 3-D computer models of ancient microfossils she has discovered in rocks near the bottom of the Grand Canyon. Susannah continues to draw inspiration from the career of her father, Stephen Porter, former Yale (SY'55, PhD '63) and Professor Emeritas of Quaternary Geology at the University of Washington. She lives with her two sons and her husband on the campus of a boarding school near Santa Barbara, where her husband teaches physics and chemistry.



Sarah Dewey preparing for an Arctic flight, summer 2013.

Sarah Dewey '10 (dewey@uw.edu) is a second-year graduate student at the University of Washington School of Oceanography, working with Jamie Morison of UW's Polar Science Center. Sarah writes: My research in physical oceanography focuses on the seasonal ice zone in the Beaufort Gyre circulation system north of Alaska. Because much sea ice melts and reforms annually, the seasonal ice zone occupies a complicated intersection of ocean, atmosphere, and ice dynamics.

The data I use are taken every degree from 72N to 76N along two lines of longitude, 140W and 150W. These data are collected monthly from about May to October, using expendable probes (Air eXpendable Conductivity-Temperature-Depth and Current Profilers, or AXCTDs and AXCPs) launched from a U.S. Coast Guard C-130 flying as part of the

Coast Guard's Arctic Domain Awareness mission. The Coast Guard must conduct these flights to extend its logistical capabilities to Arctic environments, and so UW scientists are able to use them as opportunities to deploy probes over large swaths of ocean. The probes then transmit data in real time via the C-130's antenna.

There are few thrills to compare with flying several hundred feet above the Arctic Ocean, watching sea ice whiz by through the open cargo door of a C-130; this exhilaration is only matched by the excitement of seeing a subsurface story unfold onscreen as the AXCTDs transmit information to a computer onboard the aircraft.

After the data is collected, I use both an observational and a model-based approach to investigate how the characteristics of the water column evolve. In

addition to mixing analyses, I look at how the data compare with climatology and satellite data and examine changes in heat content and freezing point month-to-month and year-to-year, to create an overall description of how the surveyed area is changing



Matt Ramlow completing the Pacific Crest Trail.

Matt Ramlow '11 (matthew.ramlow@aya.yale.edu) writes: After graduating in 2011 concentrating in both Geology and Geophysics and Environmental Studies I moved to Washington DC to complete an internship with the Verified Carbon Standard (VCS). The VCS is a GHG (greenhouse gas) program which provides requirements and procedures for quantifying GHG emission reductions and certifying carbon credits. After my internship with VCS I moved out to Victoria, British Columbia to work for the Pacific Carbon Trust, a public-private enterprise that manages British Columbia's commitment to a carbon neutral public sector. In the summer of 2012 I took a minor break from the working world to complete my lifelong dream of completing a thru-hike of the Pacific Crest Trail backpacking through the Sierras and Cascades

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from Mexico to Canada. After completing the trail I returned to DC where I now work as a program

officer for the VCS. As a program officer, I assist in approving GHG quantification methodologies,

reviewing GHG reduction projects, and developing new areas of the VCS program.

Yale *Department of Geology & Geophysics*

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GEOLOGY & GEOPHYSICS NEWS

Alumni Please Note:

We would especially like to hear from you. Please send your news to rebecca.pocock@yale.edu.

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Prize-winning mineral display at the Tucson Gem and Mineral Show arranged by Stefan Nicolescu. The specimens are all from the Peabody Museum collection. The Yale University Peabody Museum of Natural History is invited every year to attend the Tucson Gem and Mineral Show. Each year the show has a specific theme; the one for 2013 was fluorite. The 2013 YPM TGMS display featured fluorite specimens from the “forgotten” locality of Muscalonge Lake in Upstate New York. The locality was mentioned in the first edition (1837) of James D. Dana’s *A System of Mineralogy*, but by the time the fourth edition of *The System* was published in 1854, the locality was exhausted. The central piece of the YPM display was a specimen of fluorite donated to Yale College by James D. Dana himself.