



# GEOLOGY & GEOPHYSICS NEWS

Yale University | Department of Geology and Geophysics

Spring 2016

## Chairman's Letter

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Welcome to the latest installment of our Departmental newsletter. We are a bit tardy in publication, as exciting things kept happening until late in 2015 that we just had to include! The activities of our department members and alumni remain as vibrant, thought-provoking, and influential as

ever, and you can read all about them here. A case in point is the focus piece on Assistant Professor **Pincelli (Celli) Hull's** groundbreaking research on how species and ecosystems respond to environmental changes, including catastrophic mass extinction events.

**Brian Skinner**, one of the truly great scientific leaders and communicators in our field, retired on July 1, 2015. His pedagogical gifts and mentorship are legendary and unrivaled. Put simply, Brian is a giant, and it is just impossible to describe all of his contributions to basic science, science policy, and scientific education (although the text inside makes an attempt!). He mentored me when I was a junior faculty member; I will always be grateful for his invaluable guidance and advice.

In the fall, the Department of Geology and Geophysics and Jonathan Edwards College jointly hosted a celebration for Brian and Cathy at the Graduate Club. As most of you know, **Cathy Skinner** was once Master of Jonathan Edwards College, and the Skinners have been loyal members of the Fellowship of the College for decades. It was a marvelous evening, attended by many of Brian's students, friends, and colleagues who provided moving tributes to his influence on their lives and careers. To get a sense of the magic of the evening as well as Brian's lasting contributions to science, please read the stories and anecdotes gathered here in the newsletter. And I am pleased to report that Brian and Cathy remain as active members of the Department — we look forward to their presence in KGL for many years to come!

I also bring you the sad news of **Bob Berner's** passing. Bob was one of the greatest geochemists and, more broadly, geologists who ever lived. As is the case for Brian, it is simply impossible to list all of his accomplishments. Much of his research centered on the quantitative geochemistry of sediments, and it's not an exaggeration to say that he defined the field as we know it. He made seminal contributions to, for example, the geochemistry of sulfides and carbonates in the oceans, diagenesis, weathering, and geochemical cycling. Arguably his broadest impact has been in the area of carbon cycling. For example, Bob spearheaded the quantitative interpretation of the CO<sub>2</sub> content of the atmosphere over the last 600 million years of Earth history. His work provided the basis for virtually all modern carbon cycling research going on today. This understanding of past CO<sub>2</sub> levels and paleoclimates has provided an invaluable baseline of comparison for determining the impact of today's anthropogenic CO<sub>2</sub> emissions on the atmosphere and the associated climate change. He was a thoughtful teacher and mentor, inspiring a whole generation of geochemists who got their PhD's or did their postdoctoral research in his lab. Today the students of Bob's students are now making their impact on the field! He will be greatly missed, but the memorial tributes contained within the pages of this newsletter show how his scientific legacy will live on. We are forging ahead in geochemistry with a new faculty search that is in full swing as I write.

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There is so much more to read about, including our new graduates, research, teaching, field programs, and of course alumni news. Please tell us about your activities so we can highlight them

in future newsletters, and don't hesitate to stop by KGL and see us whenever you are in New Haven. Best wishes for a happy and fulfilling 2016!

## FACULTY RESEARCH

### The Dynamics of Life in Good Times and Bad

Pincelli Hull (pincelli.hull@yale.edu)

*That life has managed to persist in the face of wholesale environmental change for billions of years is remarkable. Global glaciation. Massive volcanism. Bombardment by asteroids and comets. In some instances such events were accompanied by mass extinction but in other instances, they were not. How and why marine species and ecosystems respond to environmental change in the way that they do is a central theme of my research.*

The global ocean provides an excellent realm for addressing such questions. Covering most of Earth's surface, the open ocean (the marine realm generally beyond sight of land) plays a critical role in Earth system dynamics through climatic and biogeochemical feedbacks. The open ocean also provides remarkably complete records of the last 100-150 million years of life in the kilometer thick sediments carpeting the seafloor. These sediments are often composed almost entirely of marine microfossils — the shells of calcareous or siliceous primary producers (that is, algae) and microscopic consumers (like planktonic foraminifera and radiolarians), as well as benthic organisms including ostracods and benthic foraminifera. Research in my group focuses on understanding the dynamics of plankton communities from the sunlit and twilight layers of the world's ocean over the last ~70 million years. This time frame is long enough to span two mass extinctions, as well as broad scale changes in the connectivity and dynamics of the open ocean.

#### *Ends and Beginnings*

Mass extinctions and lesser environmental catastrophes provide case studies of the resilience, and vulnerabilities, of species and ecosystems to outsized global change. Marine life in the last 66-million years has faced mass extinction at the Cretaceous-Paleogene boundary, multiple global warming and ocean acidification events, and global cooling and



Pincelli Hull and Michael Henehan

ice sheet growth, just to name a few. Quantifying and understanding the response of marine ecosystems to environmental crises of the past and present is a major focus of my research, and the focus of a recent review published in *Nature*.

66-million years ago an extraterrestrial bolide as wide as roughly half-the-length-of Manhattan, crashed into the Yucatan Peninsula. This impact precipitated one of the greatest mass extinction events in Earth history — the Cretaceous-Paleogene mass extinction (KPg). Postdoc **Michael Henehan** is leading lab efforts into how this impact, and subsequent extinctions, shaped global ecosystems and biogeochemical cycles over the millennia that followed.

The KPg mass extinction has received enormous attention since Alvarez and others first proposed a bolide impact as the cause 35-years ago, but outstanding questions remain in part because of the close coincidence of massive flood volcanism and impacts in the latest Cretaceous. In a paper now in review at the *Philosophical Transactions of the Royal Society B*, three group

## FACULTY RESEARCH

members (Henehan, Hull and Penman) teamed up with colleagues from the UK to directly contrast the effects of volcanism and mass extinction on the marine carbon cycle in the late Cretaceous. The results of this study underlie ongoing efforts to understand feedbacks between the geosphere and the biosphere during mass, and minor, extinctions. For instance, Michael Henehan is now working to generate resolved records of atmospheric  $p\text{CO}_2$  and ocean pH across the boundary using the boron isotope proxy system — a difficult, but highly powerful, measurement we can now successfully make at Yale. PhD student **Shuang Zhang** is leveraging this approach in his dissertation research on carbon cycle proxies, mechanisms, and dynamics. Michael and PhD student **Terry Tang** (a student of Noah Planavsky's) are also spearheading investigations into the recently drilled global boundary stratotype section for the KPg boundary, as part of the El Kef Coring Program (<http://www.ktboundary.org>).

### *La Dolce Vita*

In some cases, communities collapse when the environment changes, and in other cases, they adapt. Multiple ongoing efforts within our group are focused on determining what it is that separates these two cases — the collapsing ecosystems and the dynamically restructuring ones. The aim is to understand how, and why, it is that some small biotic crises scale into larger ones. To get at this problem, we have been examining the background intervals in the Cenozoic with the same intensity and multiproxy approaches usually used only across exciting geological boundaries.

Fulbright scholar **Simon D'haenens** has been working with undergraduate thesis students **Rain Tsong** ('16), **Paige Breen** ('16), and **Chris Bowman** ('16) to generate highly resolved records of background ecological and oceanographic dynamics during the Eocene greenhouse — efforts they recently presented in Snowbird, Utah. To fully link the dynamics of marine ecosystems to those of the underlying Earth system, Flint postdoc **Don Penman** is also generating a paleo- $\text{CO}_2$  record (using boron isotopes) for the same intervals for which Simon and his team have collected other paleoenvironmental and ecological data. Once these various projects are compiled, we will have a record of normal dynamics of pelagic ecosystems in warm ocean conditions of unprecedented detail to compare with existing records from the

intense icehouse conditions of the last few million years.

These Eocene records also contribute to a larger effort that I lead, with Phil Sexton of the Open University in the U.K., to generate a high resolution, Eocene-spanning isotopic record from the outstanding cores drilled on International Ocean Drilling Program Expedition 342 (Eocene Stable Isotope Consortium: 12 contributing groups across 5 countries and 3 continents). Supported by Yale and NSF (Award #1335261), we have now set up core paleoceanographic capabilities including the ability to precisely measure carbon and oxygen stable isotopes on a new Thermo 253 with a couple of Kiel IV carbonate devices in the Yale Analytical and Stable Isotopic Center. We have measured more than 2000 deep sea samples as part of this effort.



Center: Pincelli Hull. Left to Right: Sara Kahanamoku-Snelling, Leanne Elder, Michael Henehan, David Evans, Don Penman, and Allison Hsiang

### *Biological Paleoceanography*

The detail of the open ocean fossil record provides an unparalleled opportunity for asking fundamental questions of extinction and evolution, particularly when coupled with environmental proxy data for the same interval. In spite of this, biological perspectives on past oceans have lagged behind the physical and chemical ones. This is due in part to the time intensive nature of biological data collection and in part to gaps in our basic understanding of microfossil biology and ecology.

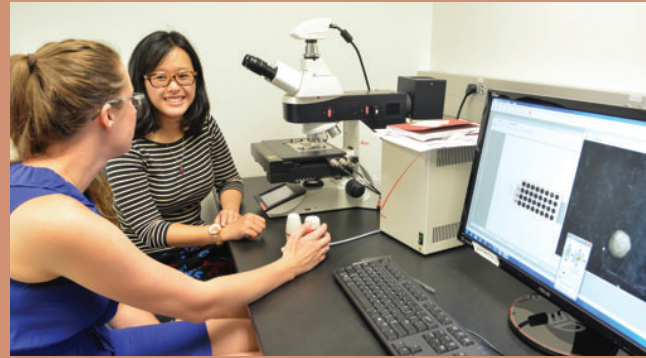
Over the past two years, we have worked to develop an entirely new approach for rapidly measuring the dynamics of marine communities in deep time using shape. Shape provides a powerful means for quantifying the function of communities, because the shape (technically known as 'morphology') of species can be related to their ecology. For instance, the combination of body

**Dynamics of Life** *continued from page 3*

size, powerful muscles, sharp claws, strong jaws, and ferocious teeth all clearly signal the danger of a lion to a lanky-legged antelope sprinting away. Community shape is a powerful tool for measuring community function in deep time because it also offers a common ruler to compare between time periods when species are entirely different.

To apply this ruler, we have to be able to measure shape really quickly and reliably. This is the focus of our bioinformatics postdocs **Allison Hsiang** and **Leanne Elder**, with generous computing support from the department and the Yale Center for Research Computing (**Brian Dobbins**, **Dave Rossman** and **Kaylea Nelson**) and archiving support from the Yale Peabody Museum of Natural History (**Susan Butts**, **Jess Utrup**, and **Larry Gall**).

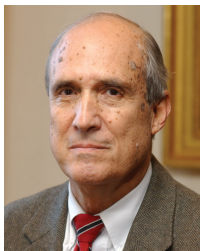
These efforts have enabled a number of exciting projects, including the senior thesis of undergraduate STARS II Fellow **Sara Kahanamoku-Snelling's** ('16) on the determinants of limpet community structure from Alaska to Baja; PhD student **Jana Burke** and undergraduate **Tess Maggio's** ('16) work on the metabolic, environ-



Leanne Elder and Allison Hsiang

mental, and intraspecific determinants of foraminiferal morphology, and a lab group project (including **Maddie Shankle** ('17), Michael Henehan, postdoc **David Evans** and Jana Burke) on the response of foraminiferal calcification to ocean pH.

With the methodology in place, we are currently in the midst of a large effort to set the morphological baseline of marine planktonic foraminiferal communities in the modern ocean and over the past 70 million years. A deeper understanding of pelagic community dynamics in good times and bad is on our horizons.

**IN MEMORIAM****Robert A. Berner** (1935-2015)***Geochemist who quantified the carbon cycle.***

Donald Canfield, G '88  
*Appeared in NATURE, Vol 518, February 26, 2015*

From how minerals form in sediments to how carbon dioxide is regulated in the atmosphere, Robert Arbuckle Berner quantified elemental cycles across the Earth system. He developed the first whole-Earth mathematical model of CO<sub>2</sub> exchange, which revealed marked changes in our planet's past atmospheric levels and the rates at which natural processes might remove anthropogenic CO<sub>2</sub> from the atmosphere. Born in 1935 in Erie, Pennsylvania, Berner died on 10 January 2015 in New Haven, Connecticut. He was encouraged to develop an interest in geology by his older brother Paul, a (now-retired) petroleum geologist. Berner attended the University of Michigan in Ann Arbor for his undergraduate and master's degrees. There, he spotted fellow geology

student Betty Kay. They married in 1959 and formed an inseparable bond, working and writing papers and books together for decades.

Berner received his PhD in 1962 from Harvard University in Cambridge, Massachusetts. During his thesis work on the formation of iron sulfides in sediments, he discovered new minerals, among them greigite, and invented a type of electrode used for measuring sulfide content. His adviser was Raymond Siever, known for his work on the ancient marine silicon cycle, and Berner was also heavily influenced by Bob Garrels, who championed thermodynamics and the concept of geochemical cycles.

He moved as a postdoc to the Scripps Institution of Oceanography in La Jolla, California. After a short stay as assistant professor at the University of Chicago, Illinois, in 1965 he joined the faculty at Yale University in New Haven, where he remained until his retirement in 2006.

Soon after arriving at Yale, Berner realized that mineral formation in sediments depends on how fast chemicals are transported in and out of the sediments and how quickly organic matter is oxidized by microbes. He developed mathematical

## IN MEMORIAM

expressions for these mechanisms and so started the field of sediment diagenesis, which concerns the biological and chemical processes that occur in recently formed sediments. Berner and others went on to establish how sediment processes ultimately control the nutrient balance of the oceans and the concentrations of oxygen and CO<sub>2</sub> in the atmosphere.

In the early 1980s, Berner teamed up with Garrels and Antonio Lasaga to develop the BLAG (Berner, Lasaga and Garrels) model of global atmospheric CO<sub>2</sub> concentrations over geological time. This was the first global model aimed at quantifying all conceivable processes that control CO<sub>2</sub> exchange, and was largely based on Berner's earlier work on mineral-weathering reactions, ocean chemistry and early diagenesis. The BLAG model allowed geologists to understand for the first time how changes in rates of geological processes such as continental plate motion, for example, controlled past CO<sub>2</sub> levels.

Components since added to the model include the influence of biological evolution on the history of CO<sub>2</sub> concentrations, which hint at relationships between plant evolution and glaciation. These later models also reproduce a history of atmospheric oxygen, and show, for instance, how past periods of elevated oxygen concentrations correlate with spells of insect gigantism.

Bob focused like a laser beam on the problem at hand and was able to find simple and elegant solutions to complex geological problems. He exuded warmth and humanity. In my time at Yale as his PhD student, from 1982 to 1988, he often joined us for Friday happy hour at the local Whitney Winery, entertaining us with stories of science's colorful characters.

He was a Francophile and loved the winery's outside terrace because it reminded him of Parisian cafés. It was more expensive to sit there so Bob inevitably picked up the bill, and sometimes invited us home afterwards for a meal and to sample his (not so fine) wines and whiskey. Fine wine was saved for the celebration of new PhDs. Bob and Betty invited the newly minted PhD to their home for a luxury dinner. Afterwards, the entire lab would descend, often for a long night of ping-pong and poker.

In material things, Bob had simple tastes. When he and Betty inherited a powder-blue Chevy Nova, Bob gleefully announced that it was his first car with a radio, and invited a group of

graduate students to ride with him through New Haven listening to old-time radio stations. Bob later purchased a Honda Civic, which he named Harvey, that had a tape deck and door alarm. He made a 4-track tape recording of piano and percussion parts, which, when played in the car with front doors ajar, mixed perfectly with the car alarm. Bob had a party to celebrate, packing graduate students into the car to enjoy his composition, 'Harvey and the four Bobs'.

He was, however, a serious pianist and classical composer, devoting much time to music after his retirement (see [go.nature.com/bnq4a2](http://go.nature.com/bnq4a2)).

Bob was a loving family man and a dedicated friend and mentor. He stressed honesty and integrity while showing that science was great fun. Bob touched the whole geological community. He is sorely missed.



## MEMORIES OF BOB BERNER

### BY SOME OF HIS STUDENTS, POSTDOCS AND FRIENDS

*Bob was not a formal dissertation advisor for me, but in many critical functional ways he was. He was an intellectual inspiration, a mentor, a generous and unselfish provider of facilities, and became a long-term friend. We enjoyed a shared "Bobness" (per The Bob Book: Bob "is a verb, an attitude, an entire way of life"). He was at times the quintessential nutty professor: absolutely brilliant, quirky, endearing, unpretentious yet proud, sometimes difficult, and often downright hilarious. I can almost hear Bob now at a major meeting, expounding on the intricacies of the C cycle and then urging those assembled that if they wanted to learn more, to "buy my book", while waving a copy.*

*He not only was a scientific trail blazer, but few outside of Yale realize that he pioneered the ghetto fashion of wearing pants half way down one's rear. During his class lectures, as he faced the board, I often wondered if his trousers would fall completely to the floor or continue to hang precariously well below his exposed underwear waist band while he wrote intensely.*

*We had our inaugural FOAM group (Goldhaber, Aller, Cochran, Rosenfeld, Martens, Berner), and Bob masterfully oversaw this unruly and motley bunch devoted to stinking mud, and somehow provided us an umbrella of professional legitimacy. We were all joined in great scientific adventure with a degree of innocence, freedom to explore, and the simple joy of getting dirty during the quest. Bob was the perfect research leader of sediment biogeochemistry and, as posted on the entrance to one of his labs, promised to have the last laugh when he made gold out of pyrite. I am still grateful for the wonderful biogeochemical bash Bob and Betty held for me at their home after my dissertation defense (Bob tolerated my beer drinking while he enjoyed fine wine), although it is remarkable given its nature that I even remember the event.*

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#### **BOB ALLER, G '77**

*What I remember best is that Bob had a great sense of humor — one that permitted him to laugh at himself. I have found that quality to be rare in the upper echelons of the accomplished, so it deserves special mention. Everyone that truly knew him could cite an example or two of this trait. One that always comes to my mind was his reaction to a particular automobile that parked behind the Bingham Lab in the late 1970s/early 1980s. This was a very large yellow Cadillac with a white Landau roof and opera windows. In New Haven of the time, one could only think “mafia don” as the owner, and that’s the way Bob saw it. The peculiarity of this car was its vanity license plate, which was composed of just three letters: R A B. One day, at Bob’s insistence, a couple of his students dutifully followed him down to this parking lot where he proceeded to ham it up as a tough guy with this car and its license plate prominently in the background, while the student took photographs. The photos figured prominently in that year’s student skits!*

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#### **BERNARD BOUDREAU, G '85**

*I remember when the Berner family had inherited a “new” car after Betty’s father died. It was a powder blue Nova and had the distinction of having a radio, the first in a Berner family car. I remember Bob running into my office, grabbing me, and then grabbing a few other graduate students and then*

*treating us to ride around New Haven listening to “oldies” radio stations. Bob was in 7th heaven.*

*At about this same time the Berner’s old Opel was just set to turn 100,000 miles, and Bob had just bought a new car, a Honda Civic he called “Harvey” (after the giant invisible rabbit in the 1950’s movie classic of the same name). Well, Bob decided to have a party that began with James driving the Opel into the driveway just after it hit 100,000 miles. Next up was Harvey. He stacked us into Harvey and opened the car doors so that the door alarm would beep. Then he put his newest composition into the tape deck, a 3-track number with Bob playing piano and percussion. With Harvey’s car alarm beeping, Bob dubbed the combined effort “Harvey and the 3 Bobs”.*

*Finally, I remember one day when I walked into Bob’s office to discuss something or another. I remember shifting side-to-side and squinting; I couldn’t quite get the light out of my eyes. On closer inspection, I realized that Bob was reflecting the light from the Sun from his wristwatch into my eyes, following every move I made, with a big grin on his face.*

*It’s hard to believe he is gone.*

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#### **DON CANFIELD, G '88**

*Among the many important lessons that I learned from Bob, one stood out: “You don’t need fancy data but you need to think really deeply about the data you have.”*

*That’s the story of my Postdoc at Yale. I worked in Bob’s lab during a time when much of what we did required only very simple research tools such as burettes, beakers, and a balance. The data we obtained were likewise pretty basic; concentrations of some pore water and solid phase constituents in marine mud. But the paper we produced was highly cited for many years. The impact of that paper was truly a reflection of the intensity of the interactions that Bob fostered among our little FOAM (Friends of Anoxic Mud) research team and the insights that arose as a result. And, happily, the passion Bob brought to research was mirrored in an equally intense pursuit of the joys of food and wine. An interest we continued to share down through the years.*

*Here’s to smelly mud, Chateau Margaux, and a guy who knew how to appreciate them both.*

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#### **MARTY GOLDHABER**

*When I was a mere G&G undergrad, Bob agreed to serve as Advisor for my Senior Research Thesis. Not least due to his guidance, the project was a tremendous learning experience, although I don't believe it generated conclusive results. His challenging yet empowering statements that I was asking the right questions, including ones that linked geology with ecology, specifically geomorphology with pedogenesis, strengthened my conviction that the research had merit. His recent sabbatical work on paleoclimates infused our conversations and launched my consideration of non-stationary parameters affecting present-day landscapes. I have gone on to expand upon the same questions throughout my career, and Bob's thoughtful advice and recent climate change work have remained guideposts.*

#### WENDI GOLDSMITH, '88

*Bob's sediment seminar is one fond memory. One could show up with a few overheads of new data and a few ideas of what it meant. Bob set the tone asking insightful questions aimed at figuring out the shortest path to addressing the unknowns at hand. With Bob's input (and that of the other students!), one could walk out of the seminar with several great ideas and a clear next step. At the time I thought this delightful exchange of ideas was typical, but now have come to realize that this approach was a hallmark of Bob and his students.*

*At Bob's retirement party a few years ago, it was hard not to be impressed with the number of highly successful scientists coming out of his lab. I think all the success may have something to do with the unexpressed philosophy of the sediment seminar where one approaches whatever little data are available with a whole lot of thinking.*

#### ELLERY INGALL, G '91

*As you may know, Bob gave up working on the diagenesis of marine sediments suddenly because a grant proposal of his to NSF was sent to a reviewer that he specifically asked for it not to be sent to. He then started to think about the carbon and oxygen cycle through geological time. Conversations with Bob Garrels, who was on sabbatical at Yale at the time, and sometimes KKT spilled over and carried on in our presence. They were quite simply magical. At the time we thought*

*such conversations were simply "normal" but looking back on them, we (students and postdocs) were privileged to listen to great geological ideas being hammered out in front of us.*

#### MIKE KROM

*I am a Distinguished Professor of Biogeochemistry at the University of California, Riverside, and director of a new team within the NASA Astrobiology Institute (NAI). I mention the latter because my former student, Noah Planavsky, now an Assistant Professor in Geology and Geophysics at Yale, is the institutional director of the substantial Yale arm of this new NAI team. I think Bob loved the idea of his growing academic family — from the first generation to his academic grandchildren and beyond.*

*I was at Yale from the mid-80s to the earliest 90s, working on my PhD with Bob as my primary advisor. I remember so well the delight I felt when I learned of my opportunity to attend Yale and work with him. This was really the only option I pursued for a PhD, such was the respect and interest I already had for his work.*

*Already then Bob was famous for so many different lines of research. It sounds corny, but I've described him as the Picasso of low-temperature geochemistry. He would dominate or, more often, create a fundamentally new area of research and then blaze another path, often in a very different area of research, for others to follow. His impact runs so deep and in so many directions that it's impossible to quantify. I was particularly drawn to his passion for using elegant and, at times, relatively simple approaches to address Earth history — specifically the evolution of life and its environment.*

*Bob was always drawn to the important question rather than the slickest new technique, unless needed for the questions at hand. This fostered a constant sense for the big picture — the why and when. And it belied his brilliant and nuanced understanding of the most complex aspects of any problem. He cut right to the chase. Through it all, he remained one of the most geocentric geochemists the field has ever seen and in the process helped make Yale THE place for sedimentary geochemistry — in a way that has never been matched anywhere else. This legacy, carried on through his students and postdocs, is unequalled in the field.*

*The good fortune I felt being accepted to work with Bob continued once I arrived at Yale. Early in my time there he walked into my office and asked if I would like to study the Black Sea for my thesis project. He had an offer for precious lab space on an upcoming research cruise. His cachet within the field was such that special opportunities like this came along often. As students, we thrived in his shadow. I jumped at the chance to sail in the Black Sea, and that decision set the stage for the rest of my career.*

*My experience with Bob has been a guiding light and a badge I wear proudly. I learned that one can think critically without criticizing. I learned that a research group can be driven by passion rather than pettiness, and so friendships and the sense of extended family and loyalty felt during my time in New Haven stand strong today. In all my experience, Bob exemplified the concept that well-motivated, competitive researchers discuss science not scientists. His heart was as big as his brain, and all his charming outside interests and eccentricities — from wine to music to sport — are the stuff of legend. He showed us the value of finding the right balance between the personal and professional parts of our lives. For all his charms, though, spotting his wonderful wife Betty across a room was every bit the delight. Betty and Bob allowed us into their lives in such genuine ways.*

*Like so many others privileged to work with Bob, I have remained unfalteringly loyal and grateful for my Yale years, and my hope has always been that my own students will experience a little bit of the magic Bob brought into our lives. He was the best possible mentor for science but also a role model for how to be a demanding but modest and positive mentor — and friend. We've lost someone very special.*

#### TIM LYONS, G '92

*Bob allowed me the same freedom to choose research topics that he had experienced in Ray Siever's lab at Harvard during his PhD days. The NSF funding he had for me was intended for carbonate mineral dissolution studies. I did a little of that but mostly was free to charge after new and very different topics. Bob's willingness to let me explore as I pleased was a gift of trust and curiosity — and we made some real breakthroughs together. The work forever altered my career path and inspired much of the*

*enjoyment I've had with my own twenty or so PhD students and numerous undergrads. Time flies!*

*Seeing Bob and Betty through the years has always been memorable because of the bonds that were built way back in the 70s. I will miss the mixture of science talk, wines, Bob and Ray skits, and music that always brought out enjoyment and laughter as well as the best kind of friendship. Bob and Betty are both exceptional scientists and human beings — able to see value and promise in others.*

#### CHRIS MARTENS

*I was fortunate enough to have met Bob in the early 1960s, and although we were faculty at different universities, we often met for extended periods of time on the "playing fields" of Bermuda and Hawaii. We both had a very close relationship with Robert Garrels. You may have heard of the Bermuda Biological Station Athletic Club. Bob Berner, Bob Garrels and I were the founders and original officers of the organization. One of the social requirements of the club was that in order to have a gin and tonic at the Biological Station, you had to swim approximately 100 meters from a location offshore to an anchored boat and return — for every drink. The two Bobs came up with this one.*

*It was a rule strictly adhered to, and the punishment for violators was that you had to jog a lap around the Biological Station perimeter — or go without your gin and tonic.*

*Bob started coming regularly to Hawaii to visit in the latter stages of his career. He arrived as a true mainlander but after his daily morning swims for several weeks in the ocean at Queens' Beach, he was demonstrably a native! His favorite restaurant was Michel's on the beach where he became famous with the waiter for ordering the foie gras with a lovely wine selection and another fine wine with dinner — a typical night out with Bob and Betty Berner!*

#### FRED T. MACKENZIE

*As an undergraduate geo-major focusing in paleontology, I was extraordinarily pleased when Bob told me that I had been given the "Golden Hammer Award" for my senior thesis. I was a very insecure undergraduate, although secure in my own research. I was at the time, lets say,*



*“quantitatively challenged”, being mildly dyslexic and math phobic. However, it turns out that the document that Bob had in mind for my senior thesis was not!*

*Bob’s encouragement helped me immensely to overcome my math phobia when calculators became common, and I became computer-programming-literate in my early graduate school days in Biology at Yale. I have ended up teaching his carbon cycle models and their conceptual equivalents for over 30 years! He remained deeply generous and encouraging through my career. I miss him deeply.*

#### PAUL OLSEN, '78, G '84

(1) I recall visiting Yale as a prospective grad student in the early 90s. I was very young, eager to impress, and frankly a bit awed by these great and renowned scientists. Bob came down the main stairs of KGL to meet me at the entrance, and ... he had a yellow Post-It note stuck to his belly. I tried to be cool, to ignore this, but eventually my true nature came out. “Why do you have a Post-It note on your stomach?”, I said. His reply was quick. “I need to remember to do something, and by putting the note here I won’t lose it.” Utterly practical.

(2) Bob and I were working on text for what would become my first NSF proposal. These were the early days in my scientific writing, and I was trying to come up with the right phrase to capture what we were doing and what type of scientists we were. Sedimentary geochemist? Chemical sedimentologist? Geochemical cyclist? Bob was emphatic. “I’m a geologist.” He went on to explain how he didn’t see any need for this splitting and parsing into finer and finer specialties and sub-disciplines. He was trying to understand how the Earth worked. He was not going to lock himself into one narrow silo with one way of thinking. Maybe his specific tools were geochemistry and mathematics, but he saw himself as a geologist: nothing more, nothing less.

#### STEVEN PETSCH, G '00

*When I think of Bob Berner, whom I met while an undergraduate geology major in the early 1990s, I think mainly of his welcoming and open*

*spirit (which seemed to extend to everyone), encouragement (often with humor), and wise guidance.*

*During the years I spent as a geology major at Yale, Bob was as welcoming as could be to me, which I initially found both a bit surprising (not knowing what to expect from such an accomplished individual) and very much a relief (for the same reason). When I first visited him as he served as Director of Undergraduate Studies, he patiently listened to my proposed courses, mostly allowing me to hold the reins of my own academic career, while offering only gentle guidance. At the end of our discussion, I was most pleasantly surprised that he not only signed my schedule, but offered me a job on the spot! (he had only known me before from one course I had taken with him as professor: a graduate-level seminar in Chemical Cycles and the Environment, which I had found a bit challenging, but greatly enjoyed). The summer job would be in his lab, assisting in a PhD thesis, conducting chemical analyses, etc. conditioned only on getting some appropriate funding, which he arranged. An amazing to me and also generous act on his part occurred as well in that since I was in England doing field studies and study abroad during the time of the grant proposal that included my subsequent senior thesis work, in the days before cell phones, Bob even checked with my high school records in my home town for information to supply missing portions of the application, to ensure that I would be able to have a funded position.*

*I was also very fortunate that he assigned me to someone who I admired as seemingly one of his best graduate students (though all were great) — Tim Lyons. Under Bob’s ultimate direction, Tim not only introduced me to both the practice and the theory of the detailed work he was doing measuring and modeling carbon, sulfur, and iron cycles in marine sediments and pore waters during diagenesis, using sophisticated lab equipment like the LECO carbon analyzer and the UV spectrophotometer, but also encouraged me to read papers on the subject, study, and seek to become knowledgeable about the field of geochemistry, in which Bob was already such a luminary and a pioneer. While working for Tim, though I was not always a perfect mentee, it was obvious that both this amazingly dedicated,*

*meticulous, and inspiring individual and Bob himself were guiding me through a process that was much more than a job, but in some ways a true scientific mentorship. It would have been hard to ask for a better “total immersion” experience in science at Yale.*

*During my senior thesis studies too, Bob’s guiding hand assisted me in my academic goals, and mostly through Tim, encouraged me to engage in work that was both fascinating and ultimately satisfying in addressing questions about the burial and preservation of phosphorus in midcontinent cyclothem deposits in ways that shed light on their mode of formation, and geochemical markers for the ancient oxycline. More importantly, this experience also taught me a great deal about scientific comraderie, in that both Tim, as well as other students and even faculty would share generously of their time, their space, their thoughts (and even sometimes their lunch tables) that made me feel, even as a mere undergraduate, welcomed almost as an equal.*

*All throughout this time, there were, in addition to lunches and informal discussions, times when I would consult with Bob about some aspect of my thesis work (usually at his request, occasionally at mine), and he would always sit down with me — this distinguished member of the National Academy of Sciences and author of, at the time, already I think over 100 papers — and talk constructively about my work in ways that both contributed to my understanding and made me feel my work and my presence were important to him. Even at those rare times when I did not seem to have his full attention (and they were rare) I always sensed he was listening, and his advice, his guidance, and of course his wisdom permeated my experience. He allowed me to come up with ideas, where I could, and also shared his vast and penetrating insights gently, and directed me to concepts, people, or readings that seemed calculated to expand my understanding. Though I eventually decided to pursue fields outside the sciences, had I become a scientist, I believe Bob’s influence would have helped make sure I was a darned good one. (as the many undergraduates and graduate students who did pursue this journey with Bob’s guidance also will attest).*

*Bob’s humor was ever-present, and always lightened the mood of every occasion. He kept funny cartoons and poems he and other scientists had written around the lab (including one about a project’s notation showing “putrification”, since*

*the key term in the equation was  $D_{sub k}$  — i.e. “decay”). For months there was a large chalk-written sign on the door of one of his labs, with a W inside a circle and the “not” sign through it — not a precognitive remark about a future president — but a humorous and exaggerated comment on the notice we had received that the element tungsten could spoil the results of one experiment, and so should be kept away, far away, from that room — presumably like superman’s lab might have such a sign about kryptonite — at least that was the explanation I was told. It seemed to me he had a kind of wit that permeated his remarks, so that while giving each matter or job his full measure of dedication, and insisting that all under him do likewise, he always seemed to maintain a flexible perspective, encouraged us not to take ourselves all too seriously, and was almost never far from a smile. Even in those occasional moments I have heard of more than seen — in which a full-scale lab clean-up or revamping of procedures is called for — one sensed that in the back of his mind the point was to always keep people thinking and conditions ripe for enjoyment of, as well as great success in, our work.*

*I have heard about Bob’s love of music and wine, and while these were generally things I didn’t become quite close enough with him, as a mere undergraduate, to share, I do recall vividly that at an end-of-year celebration party I attended at his home for students, he did share some wine and I recall him being as gracious and welcoming as possible to everyone, as usual, and in particular seeking out the undergraduates, such as myself, to ensure that we would feel welcome. Once again with Bob, this spirit of generosity and encouragement were ever-present. I also well recall his making a toast and us all drinking to a fine future — one that for so many of us, in a wide-range of ways, he helped bring about.*

*I hope these memories will serve as my small part of a proper tribute to a person who helped shape my Yale experience, and I know was respected and admired by all.*

#### **KENNETH A. QUITTMAN, ’92**

*Bob was a truly exceptional mentor, and I regard my best science as being entirely due to his influence. He was also a close friend, and I have*

*spent many happy hours enjoying Bob and Betty's hospitality.*

### ROB RAISWELL

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*For me, Bob's most striking features were his frankness and utter lack of self-consciousness. And from this, there was a degree of comfort knowing that you knew exactly where you stood with Bob. If you screwed up, he would tell you; if he liked something that you did, he would tell you. You never had to second-guess; he wore his thoughts on his sleeve, so to speak. I don't think I've met another person with this degree-of-quality. I've tried to model myself off of Bob in this way, often failing.*

*The freedom that Bob gave his students was liberating (and sometimes scary). In my first meeting with Bob, he told me that he had just gotten back from a small meeting in the UK where he heard about a new paleo-CO<sub>2</sub> method based on plant stomata. He knew from my application that I was interested in plants (I was co-advised by Leo Hickey), so he encouraged me to look into it. One funny element to this is that for a brief period — maybe a few months — I knew more about plant physiology than Bob. But once he recognized that I was going to run with this idea, he taught himself the subject matter, and soon enough I couldn't get anything past him. As we know, Bob's ability to move into new areas and make profound insights was staggering, and I got to witness it, at least in a small way.*

### DANA ROYER, G '02

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*When I came to visit Yale prior to deciding to enter the graduate program there, Bill Graustein, former Berner PhD student, picked me up at the airport and — by way of informing me what I was in for should I come to Yale to work with Bob — said that I would be 'given enough rope to hang myself'. At the time, I had no idea what he was talking about! Years later, I realized what he meant was that I would be given every opportunity to follow my curiosity and develop my ideas, but that with that freedom came risk. What Bob succeeded in doing, which was truly extraordinary, was creating an environment where students felt safe and inspired to pursue new ideas that, while exciting and enticing, had no guarantee of leading*

*to a successful project. In my own case, the fact that I spent much of my grad student career working on developing a method meant that I had little 'real' data until the 11th hour. To his immense credit, Bob did not let on how worried he was. His support never wavered, and I will always be profoundly grateful for the belief and confidence he showed in me.*

*I had a one-on-one course with Bob where we read papers and discussed ideas about, what else, phosphorus! It was during these discussions that Bob asked me why it was that carbonate fluorapatite only formed in upwelling regions, when the pore water geochemistry suggested that it should form in many near-shore environments? This simple question led to the pursuit of finding CFA in Long Island Sound, and elsewhere in non-upwelling near-shore environments. It is this kind of first-principles thinking, independent of the generally accepted 'facts' that was so important for much of what Bob, and his students, accomplished. The model he set in his unassuming way, motivated by pure curiosity and a drive to understand, and devoid of ego, was admirable and inspiring.*

*Bob was a tremendously important person in my life, and the loss is profound, and is felt deeply.*

### KATHLEEN RUTTENBERG, G '90

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*Bob was gracious enough to accept me on a year when he took on many other new students. Bob did not have any form of assistance at the time, but took a gamble with me. I subsequently secured three years of funding from Texaco. Graduate students could not be the PI on grants, so Bob had to show this grant on his Current and Pending reports. In typical Bob fashion, he exclaimed how embarrassed he was by the abundance of grants, while at the same time giving me 100% control of the spending. Bob really knew how to inspire confidence in a student, beyond sharing his vast knowledge of geochemistry.*

*If there was one word you could include in your thoughts it would be compassionate. Under Bob's sometimes grumbly-rough exterior was always a compassionate heart.*

*I know he cared deeply for each of us and gave the benefit of doubt when it came to choice of thesis topic and source of financial support.*

### PAUL SCHROEDER, G '92

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*I fondly remember Bob's great love of French wines and cuisine. As his graduate students, we all had the privilege of being invited at the house of Betty and Bob, where Bob always served us some wonderful wines and homemade dishes.*

*At a meeting in Lyon organized by Francis Albarède in the 1990s, Bob decided to go for dinner at Paul Bocuse's Auberge du Pont de Collonges. He kindly invited me along (I don't recall entirely who else was present). The food was wonderful and Bob made sure it was accompanied by the right Burgundy.*

*Paul Bocuse is Bob's culinary counterpart and is regarded as one of the great innovators of the nouvelle cuisine. Paul's Auberge is the place where the nouvelle cuisine is artfully married with traditional French cuisine, of which Lyon is the capital-bien sûr! By the way, I learned all this as Bob lectured away during dinner, dissecting every concoction coming our way.*

*The absolute highlight of the evening, however, was when Paul Bocuse himself entered the dining hall and started going from table to table, greeting the guests. The look on Bob's face was one of bliss, but also of respect for the master chef and his uncompromising dedication to quality and perfection.*

*Looking back, my days at Yale may not have been that different from cuisine apprenticeship at the Auberge du Pont de Collonges.*

#### **PHILIPPE VAN CAPPELLEN, G '91**

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*There is an old saying that one never gets a second chance to make a first impression. Bob took no chances during my first visit to Yale — fearing that I might leave feeling I had missed something important. In fact, the graduate student on whose couch I crashed told me the day I left that Bob had called him threatening severe injury or worse if I decided not to come to Yale.*

*The student's embellishment aside, I felt wanted, and that feeling persisted throughout my time at Yale. His threshold of acceptance for ideas was high, and whenever one of mine satisfied his high scholarly standards, the license he gave me was a source of great confidence. When I needed motivation, he delivered it, swift and firm, but always toward a resolution that showed his capacity for patience.*

*Bob once said to me something to the effect that he did not want to be remembered as a nice guy — but rather as a good scientist. To say he was*

*a good scientist is an understatement. But he was also a supremely fine person. He could be ordinary and extraordinary in the same breath. He was quick to laugh, expressive, firm, earnest, impish, humane, loyal, and more. It is a privilege, an honor, and a joy to have known him and to be a part of his academic family.*

#### **MIKE VELBEL, G '84**

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*One memory of Bob comes from me walking into his class in KGL as a sophomore Biology major, at the time considering switching to English to study Shakespeare, and walking out as a geology major and somehow twenty years later still working in low-temperature geochemistry! It was a narrow escape from being an aspiring Shakespearean scholar. Bob spent most of that class copying tables and figures out of the Berner & Berner textbook that he had spread out in front of him on the table, a pedagogical style that I am not sure would be embraced by educational specialists, but it was effective, and his enthusiasm was infectious. We used to joke as undergraduates that if you walked into his office you'd never know exactly what conversation you might have but that it would inevitably be interesting.*

#### **JOSH WEST '98**

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*I will always remember the dedication Bob had to his students, friends, and colleagues. I personally never had a better advocate. In my second year at Yale, I really needed to take his course on sediment diagenesis, but I was the only student who signed up for the class. He decided to still give the course. We met twice a week, and I had to complete all of the assignments, tests and projects. I could never skip class and the curve was brutal. Bob gave the lectures as if he was talking to a full class — he gave me everything he had. After that, how could I ever give him anything less?*

#### **JOE WESTRICH, G '83**

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*I met Bob and Betty Berner in 1959 at the Harvard Geology Club cocktail party for new grad students. Bob and Betty had the best parties and normally one didn't even arrive until almost midnight as they usually lasted all night.*

Bob got a post doc at Scripps where I was doing research on my thesis so we continued our contacts after he graduated. We usually got together at the GSA in various cities and at Atlantic City we started our fabulous dinner series deciding to eschew the Society's rubber chicken. Other folks can relate Bob's wonderful scientific career, but many may not know of Bob's other talents as a gourmet, wine and music lover not usually associated with a physical scientist. One classic moment at GSA in San Diego. With fellow wine and food aficionado Bill Normark, we arrived at one of the best restaurants very early. We sat at a center table and had a very leisurely meal and even had our salad last. As the last customers, walking out the door, the maitre 'd came up to us and asked: "Are you gentlemen from Gourmet Magazine". Of course, we just smiled. Another classic example was in Paris at Chez Pauline where Bob was known. With John Morse, we were dining with one of Bob's colleagues from the Sorbonne. After the salad, suddenly a bottle of Chateau

Y'Chem appeared for the dessert course. "Good grief, Jacques, you are diabetic" we cried. Jacques replied; "For my friend Bob, I shoot up extra!" Bob, was a hidden music talent. Not only composing and playing, but started the great tradition in his papers of citing in the acknowledgements, musical inspiration by composers and pieces. Not just a high brow, Bob's love of Bogart movies, especially "Key Largo" led us at Miami GSA to rent a car to drive to actually see Key Largo. His memory for off color limericks, of course, was legendary. Bob really enjoyed life giving geoscience a flavor few if any ever attained. One of the best compliments about Bob was "He, in his papers, answered the questions that everyone was asking".

**PAT WILDE, '57**



Group Photo, Symposium honoring Bob Berner, December 2005

## RETIREMENT

### Brian J. Skinner Retires, August 2014



*The following text, prepared by Jay Ague, was read by Graduate School Dean Lynn Cooley at the final faculty meeting of 2015.*

Brian J. Skinner, BSc University of Adelaide, AM, PhD Harvard University, faculty member at Yale since 1966, you have made landmark contributions

to mineralogy and economic geology, led the international geological community, and conveyed the excitement of geology to legions of students and the general public. Many of your scientific publications focused on the crystallographic and geochemical properties of the ore minerals that contain the valuable metals we use constantly in our everyday lives. But your contributions didn't stop there; you have deepened our understanding of the geology of the ocean floor, the surface of the Moon, the Australian outback, and nearly everywhere else in between. Indeed, your work has been so fundamental that a mineral — Skinnerite — was named in your honor.

You were promoted to Chair of the Department of Geology and Geophysics within a year of your arrival at Yale, a testament to your extraordinary interpersonal and leadership skills

which had been well honed at the U.S. Geological Survey. These skills, coupled with your world-class science, propelled you into decades of service to the international geological community at the very highest levels. Your terms as President of the Geological Society of America, the Geochemical Society, and the Society of Economic Geologists helped shape the geological sciences as we know them today. You were also highly influential as an editor of journals and books including *Economic Geology*, the leading journal in the field.

You were known for your legendary Geology 110 class, where you taught a generation of undergraduates that geology was far more than just “rocks for jocks”. You were a caring and thoughtful mentor to dozens of undergraduate and graduate students who have now gone on to forge distinguished careers of their own in academia, government, and the private sector. Your presentation of geology — from the atomic structure of minerals to the movement of continents — was so engaging that you were filmed for the “Great Teachers Series” at Yale, long before the advent of online courses. And your pedagogical talents extended easily to writing. An author of more than a dozen texts now translated into six languages, your crisp, clear prose has made geological principles accessible to students across the globe. Today the faculty expresses its united thanks for your tireless service and leadership as one of the great scientific communicators of our age.

## STORIES AND ANECDOTES

### FROM BRIAN SKINNER'S STUDENTS

*As an undergraduate Yale geologist of the class of 1962 I preceded Brian at Yale but met about 40 years later here in California where their daughter lived. More below:*

*My wife Diane and I first met Brian and Cathy about ten years ago at a mutual friend's dinner party and home here in the Napa Valley. Given the Skinners love of good food and wine, my undergraduate degree in geology from Yale (1962) and the proximity of their daughter Lassa in our town of St Helena it was perhaps inevitable that we would meet. Once we learned that the Skinners*



Brian Skinner, 1972  
Reception

*led some adventuresome AYA trips and had a loyal following of “Skinnerites” we began to peruse the Yale Alumni trip offerings more seriously. While we just missed a favorite with them to Western Australia and the Margaret River area, we soon joined their merry crew to South Africa in 2006. Whether it was the geology, culture, history, early hominids,*

*platinum mines or game drives, each day was a rich educational diet served up by both Brian and Cathy — an awesome combination of guides*

enlivened by their delightful and well-informed presentations. Their energy and enthusiasm always belied their ages.

Our bicoastal friendship deepened with visits to their lovely home in Connecticut, with reciprocal dinners at our home and winery in St Helena, and oyster feeds in Tomales Bay along the San Andreas fault fissure. Dependably our times centered around good food, cheese from Lassa, great wine and lively conversation. Sharing my early Yale geology connections with Brian including John Rodgers, a helpful thesis mentor; Steve Porter as his field assistant in Alaska; and Clark Burchfiel as his first graduate student at Rice University were particularly warm memories. We wish him and Cathy all the best in his "retirement".

### JOHN LIVINGSTON, '62

Brian Skinner retiring! Who would think it possible. He has been an institution at Yale from the days when I arrived in 1969 as a graduate student to find him Chairman of Geology and Geophysics. I thought he was quite old then — but that was 45 years ago. Must have been a graduate student perspective. I took his oxides and sulfides course, in which he put on a bravura rapid-fire performance of chalking up phase diagrams and mineral structures at lighting speed, chalk dust flying up into the air, broken up only by my numerous bewildered questions. I learned a lot from the course, and from tutorials with him on oxide and sulphide petrography, and on the petrogenesis of chromian spinel, which has led to a great deal of misspent time over the course of a 40 year career. More relaxed and a lot of fun was auditing his Economic Geology course, which was a tour-de-force in itself. From his long stint as Editor of Economic Geology, and his passion for obscure sulfides, Brian has always been one of the outstanding presences that has made the Yale Department a unique asset to the Earth Science community. Cheers to Brian!

### HENRY DICK, G '76

I have a story about Professor Skinner and a photo. I graduated in '76 and took my first geology class in the fall of my sophomore year — G&G 10a. Professor Skinner noted in the first lecture that although the course had come to be known



Ken Jennings and Brian Skinner, 2014

as 'Rocks for Jocks', there would be no easy pickings on his watch. On a class field trip, we were learning about the Quinnipiac Valley, East and West Rock when I became concerned that I would be late for practice (Yes, I played football). When I asked him when we would be wrapping up and told him why, he looked at me and asked, with a bemused expression, "So you play football, eh?" From that point onward, he became my favorite professor and he teased me about playing until I graduated. Since graduating, I've had the pleasure to stay in touch with him. I brought my daughter to campus last fall and we were lucky enough to run into him at KGL. Here is a photo from that meeting. Please convey my warmest wishes to a great professor and person.

### KEN JENNINGS, '76



Brian after receiving the Penrose Medal from the Society of Economic Geologists, Keystone, Colorado, May 2006

### **Brian Skinner — an Extraordinary Teacher, Mentor and Friend**

Monday 6th December 1971. This was the day that Brian Skinner set my career compass for a wonderful journey through the world of academia, industry, and government.

*On that day I was well into the first of the three semesters of course work that made up Yale's graduate school PhD program. The course I was enjoying the most was Brian's G&G123a — Mineral Deposits. Brian's lectures were insightful and informative and included many amusing anecdotes about the authors of the papers we'd been assigned to read. I was particularly looking forward to the lecture on 6th December 1971 as the topic was "Strata bound ores — Mt Isa, Sullivan, Broken Hill etc". I had studied all three deposits in my junior year at The Australian National University and was eager to learn more about them.*

*Looking back at my lecture notes for the day, the lecture began well with a comprehensive description of the Mt Isa stratiform lead-zinc mineralization, but then the wheels fell off. Brian began to lose the plot! Every Australian economic geologist knew from the pioneering work of Haddon King at Broken Hill, and Dick Stanton at Mt Isa that these stratiform deposits were formed by sedimentary exhalative processes and were classic syngenetic deposits, that is, they were ones that formed simultaneously with their host sediments. Brian made passing reference to this hypothesis and dismissed it with a few scathing comments. To make matters worse he then went on to argue that the mineralization was formed by hydrothermal replacement processes, that is, they were epigenetic, with the mineralization being introduced into the host sediments after their deposition.*

*I thought King and Stanton, and others who had followed them, had shot down this North-American biased hypothesis back in the 1950's and 60's and before I knew it I interjected and said so. A heated argument erupted between the two of us which ended when my nearest classmate, Joe Graf, nudged me and whispered that I should cool it as it wasn't the done thing to argue so vehemently with a god-professor. When the lecture ended and we all rose to leave, Brian said something like "Williams — I want to have a word with you" and Joe whispered in my ear — "I did warn you Neil!"*

*Once the others had gone, Brian eyeballed me saying "Well that was interesting — how would you prove me wrong?" For a moment I stood in stunned silence but I eventually came to my senses and said "I'd do that through a study of the HYC deposit at McArthur River Mr. Skinner". The HYC deposit lies in Australia's Northern Territory. It is a Mt Isa type stratiform lead zinc deposit, but unlike the type example it had never been metamorphosed and therefore is ideally suited*

*to studying the primary formational features of the ore type. The HYC deposit at the time was undeveloped. It had been discovered, and was owned by the Mt Isa Mines group of companies (MIM). Brian smiled and said "Yes I agree, so if I can get you access to the HYC deposit for your PhD thesis, would you be willing to take on the project and prove me wrong?"*

*I knew from my time at ANU that many in Australia had tried unsuccessfully to get permission from MIM to work on this plum economic geology research project. I said this to Brian and he beamed and replied "Leave the geopolitics to me young man! If you'll give it a go, I'll get you to McArthur River", to which I simply replied "Yes".*

*Well we all know that when Brian puts his mind to something things happen quickly. Before I knew it he had arranged with MIM for me to work at McArthur River and in late May 1972 I returned to Australia to collect the samples I needed to prove him wrong.*

*Thanks to Brian's supervision of my research, and the strong support I received from other faculty members, particularly Danny Rye and Bob Berner, I found that I couldn't prove Brian wrong. However, what I was able to show was that diagenetic processes had played a big part in the formation of the deposit. Some 40 years later I note that the syngenetic-versus epigenetic debate on the origin of the HYC deposit continues, but with one important difference, that being that the epigenetic side is now weighed heavily towards diagenetic processes, with even the most outspoken syngeneticists conceding that much of the ore formed during diagenesis, that is, after the deposition of the host sediments but before their consolidation into hard rock. I take great pride in that shift in thinking.*

*Now I am supervising and teaching students as an Honorary Professorial Fellow at the University of Wollongong and I often think about Brian's challenge to "prove him wrong". Throughout my career I have time and again seen academics supervising students on projects to prove the academic's pet theory of the day, and I wonder how much better the development of these students as scientists would have been had their supervisors understood that proving something wrong leads to real progress, whereas proving something right doesn't.*

*After completing my PhD program at Yale I returned to The Australian National University in Canberra and worked as a junior academic. From*





Brian in Tasmania, 2015

there I moved to MIM as a research geologist and up the corporate ladder to the position of Chief Geologist with responsibility of the company's exploration worldwide. From MIM I moved back to Canberra as one of two Associate Directors of the Bureau of Mineral Resources — Australia's national geological survey. I was appointed CEO of the survey in 1995 and led it for an unprecedented 15 years. Thanks to my time at Yale I was very familiar with the USGS and set out to develop the agency into an antipodean USGS, but with better funding and government support. The most important change I oversaw was the merger of the survey with the national topographic mapping agency AUSLIG, to form today's Geoscience Australia. The international standing Geoscience Australia enjoys today owes much to Brian and to Yale.

In all the career moves I've contemplated I've sought Brian's advice, and his counsel has been every bit as confronting and helpful as his original "prove me wrong" challenge. He is not only a great teacher but also a caring mentor.

Over the years my wife Margaret and I have become close family friends of the Skinners, aided in part by the many visits Brian and Cathy have made over the years to see Brian's family back in Australia. Thanks to Brian and these visits I have also become an avid bird watcher and photographer. We have had as many, if not more, birding- than geological-adventures together, the two most recent being to Bodega Bay on the northern Californian coast late last year, and to Tasmania in March this year with a lively group of Yale alumni and their partners.

It has been a privilege having Brian as a teacher, mentor and friend. Brian — thanks for everything.

**NEIL WILLIAMS, G '76**

When I joined Brian's research group as a PhD student in the fall of 1975, there was already a senior Australian grad student (Neil Williams) there, and another grad student new to the group (Dimitri Sverjensky) also was Australian. I had only recently returned to the U.S. after having studied for a year in Germany, but I still felt like a foreigner when Brian, Neil, and Dimitri were conversing. Some of the other graduate students also were amused with Brian's pronunciations, especially when undergraduates in the introductory geology class would talk about "basalt [pronounced to rhyme with 'asphalt'] magmers"! This was almost as funny as when Brian would refer to one of the secretaries, Wanda Stark, as "Wander."

I was really glad that Brian was a good friend of Bob Metsger, Chief Geologist at the Sterling Hill zinc mine in northern New Jersey. I took two underground field trips there with Brian and several of his students. In preparing us for what we would see on one of those trips, he said we would be visiting the "gahnet" zone. We asked him to repeat his statement, so we could tell whether he was saying the mineral garnet (a metamorphic silicate) or gahnite (a zinc-bearing oxide). Both were minerals found in or near the mine. After hearing Brian reply "gahnet" once again, somebody finally asked, "the red mineral or the green mineral?" After all these years now, I can't remember which one it was!

Brian was an excellent teacher, both for the undergraduate and graduate students at Yale. As a grad student, I assisted a few times during his lectures for the undergraduate introductory geology class. I was amazed to see the lecture hall so full that students were sitting on the steps that led down to the front of the room. Even more memorable was a trick that an unnamed male teaching assistant (TA) played during one of the lectures in which he was tasked with putting a stack of Brian's personal slides into the projector carousel (this will only make sense to those of us who are old enough to remember "real" slides!). As Brian lectured, he indicated when the TA should show the next slide. Suddenly, the entire room erupted into laughter. Into the midst of various slides on landforms and rock outcrops, the TA had slipped in an unrequested slide from Brian's extensive collection. There Brian was in full dress, as an African chief — wearing a headdress and beads, feathers everywhere, holding a huge spear in his hand. Brian laughed as loudly as the students. He always had a great sense of humor.

On occasion, Brian would smoke a small, thin Schimmelpennick cigar. One day, Neil, Dimitri, and I were meeting with Brian in his office for a seminar class on ore deposits. He was sitting at his desk, contentedly smoking one of the cigars while we were discussing the assigned article. Brian leaned over his trash can to knock off some cigar ash and then asked Dimitri a rather complex question about the article. As Dimitri carefully answered the question, my eye was drawn back to the trash can (I was sitting across from the far corner of Brian's desk and therefore was the only one who could see the can). I saw a small curl of smoke rising up. I raised my hand to alert Brian, but he thought I was trying to interrupt Dimitri in his answer. Brian asked me to wait until Dimitri was done. I finally burst out with "your trash can is on fire!" Brian leaped up, grabbed the trash can, and rushed next door to his lab, where we could hear him running water and beating out the flaming contents of the can into the lab sink. The three of us were in stitches over the unexpected incident, but as soon as the sound of the water stopped, we wiped those grins off our faces. When Brian returned to the office a moment later, we were all seriously occupied in paging through the assigned article.

The last anecdote on my list concerns Cathy, whom I only met a few times while I was at Yale. Due to changes in NSF funding priorities and in Americans' (lack of) perception of where their resources came from, it became increasingly difficult for me as a faculty member to pursue my (and Brian's) chosen field of economic geology. Almost by chance, I became involved in research on bone material. I found it so fascinating and challenging that I ultimately changed my research field to biomineralization, with emphasis on bone mineral. Thus, for the past 15 years or so, I have encountered Cathy and her publications more often than I have had the pleasure of seeing Brian at meetings. So, the Skinners have greatly impacted my life and my research for 40 years! I send my best to both of them in their much-deserved retirement years.

#### JILL DILL PASTERIS, G '80

*I can not imagine my professional or personal life without Brian and Cathy. In fact, it is really impossible for me to write of Brian without including Cathy. I think most anyone who*

*knows them knows them as a loving duo full of admiration and respect for one another.*

*Both Brian and Cathy have supported me since the day I arrived at Yale in 1977. They continue to be an important part of my life and that of my family. Every step of the way since 1977 they have mentored, encouraged, and advised me. And they've celebrated joyous professional and personal occasions with me. In fact, when I was promoted to full professor at Vassar, Brian and Cathy came to celebrate with me; at that celebration, Brian took the opportunity to toast me in front of a room full of strangers and I felt that he was proud of me. They celebrated with me and my wife the birth of our two children and participated in the B'nai Mitzvah of both children. Cathy came to my 50th birthday celebration. As anyone can tell, they are people who are loyal, gracious, generous and fun-loving.*

*One of my fondest memories of Brian from when I was an undergraduate in Intro Geology (I believe it was Geology 110) with straight face telling us that the sharp end of a rock hammer was used solely to pick ones' teeth in the field. In all seriousness, his manner of teaching is one that I try to emulate to this day. When students ask me, while looking through a hand lens, what is the mineral they are looking at, I do what Brian did: I ask, what might it be? What are possible choices? What do you see? He never gave me the answer he just helped me figure it out. It's for this and so many other reasons that I nominated him for the Neil Miner award for excellence in teaching from the National Association of Geology Teachers. The letters of support that poured in that I submitted with the nomination were breathtaking in their recollections of the ways in which Brian had supported all of the former students who he had helped along the years. Even more remarkable, the letters came from former students whose graduation dates spanned decades. Clearly, Brian is more than a scientific investigator; he is a scientist who cares deeply about his teaching. In that regard he inspired me as I moved into a career in teaching at a liberal arts college. Finally, as some people realize, it was not so easy to be a young woman pursuing an advanced degree in geology in the early 1980s. Brian unflinchingly took concrete actions to help me every step of the way.*

*Of course, there are so many remarks to make about Brian that extend beyond the ones I have made. Important among all of this is his sense of humor and its influence on helping me stay balanced in my career in academia.*

*It is absolutely true that Brian has been my most influential teacher and supporter. Apart from the help of my parents, all I have achieved and so many opportunities have been made possible by this teacher who I have come to love like a father. When I'm not calling Brian and Cathy at home, I love being able to dial 203-432-3175 and hear "Skinner here."*

*I feel so fortunate that my life has been interwoven with theirs.*

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#### **JILL SCHNEIDERMAN, '81**

*As a graduate of Yale University, Timothy Dwight class of 1983, with a degree in Geology I just wanted to add to Brian Skinner's book a simple thank you.*

*Brian, while you likely don't remember me, when I showed up in your office after my freshman year a bit confused about what major to pursue, you spoke to me about geology and encouraged me to attend your class. From Yale to the University of North Carolina for graduate school to being employed by Amoco in New Orleans and Houston, living in Cairo, Egypt for eight years and Houston again for ten with BP, to now living two years in Baku, Azerbaijan leading geologists and geophysicists working on one of the world's largest oil and gas projects Shah Deniz, it has been an enjoyable ride mixing business with the study of geology. This latest project will be bringing natural gas into Europe via expenditures that will top \$50 billion, and I'm only part of this because of your willingness to not only speak to a confused 19 year old kid, but your ability to inspire a younger generation with your passion for the study of the Earth.*

*Thank you from Baku and all the best in this next chapter of your life.*

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#### **JOHN FREEMAN, '83**

*I remember taking "Rocks for Jocks" on a whim. Professor Skinner said that at the end of the course we would see the world differently. That was so true, that I decided to major in Geology.*

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#### **KATE KRESSMANN-KEHOE, '84**

*Professor Brian Skinner is the reason I have an honors degree in Geology and Geophysics from Yale (Class of 1985).*

*I was enchanted by Brian's demeanor in class, his warm and engaging manner and his love for Foster's Lager (he cracked open a "tinnie" on the last day of finals after receiving a drink as a gift from an Australian student).*

*I ended up majoring in the discipline after taking Brian's freshman survey course and my G&G degree got me a job on offshore oil rigs that varied in location from the Gulf of Mexico, to the South China Sea to the Andaman Islands. My oil field work was my only practical use of my geology study as I used an MBA from Wharton to work on the trading floors of major banks for the last 20 years.*

*Thank you Brian. My liberal education was broadened by my time at the Kline Geo Lab!*

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#### **KIM MATHEW, '85**

*As an undergraduate history major pursuing a double major in environmental studies at Yale, I was faced with a choice of courses to fulfill a natural science requirement. Physical Geology (G&G 110) was on that list, and I signed up, knowing little about what geology was. None of my pre-med or pre-law friends had any clue what geology was either, so I embarked on an uncharted path. With Professor Brian Skinner at the helm, after a few weeks of class I was transformed — geology combined history and science, both topics I loved. And I also was drawn to the plethora of puzzles in geology that remained to be solved. Within a month, I changed my major to geology.*



Jay Ague and Brian Skinner, 1989

*This was in the late 1980s before power point, before the internet, before clickers ... but Prof. Skinner didn't need those things to keep us engaged. We showed up to class because if you didn't, you would miss essential stuff and most important, you would miss the slide show! He showed slides at the end of each class to show type localities, important structures, etc.... these were the highlight. He had images to highlight every geologic process from around the world, including places I had never heard of. In almost every slide was his wife, Professor Catherine Skinner. I remember that having an impact on me, seeing a female geologist doing field work and in the thick of research. This was one of the reasons I thought that maybe, I too, could be a geologist.*

*In subsequent years as a geology major, I remember several field trips with Prof. Skinner. During the first one, which I think was in Mineralogy, he was up on an outcrop, and was using the pick of his hammer to break the rock. The pick missed the rock and punctured his skin, causing his hand to bleed profusely. He continued talking to us about the rock, and did not appear to be fazed at all by the fact that blood was dripping from his hand (although the rest of us were about to pass out!). (see picture of Skinner with Professor Jay Ague — I think this was before the bleeding hand incident). I remember another field trip to a top-secret locality with enormous kyanite crystals — we were not told where we were for fear of mineral collectors razing the site. Although I am sure we were often annoying, he seemed to enjoy the company of undergraduates. He was humored when we showed up for a field trip early Saturday morning looking pale and hungover. He teased us, but in a nice way, and was kind — I remember one Saturday morning when I felt particularly bad, he let me sit in the passenger seat of the van so I wouldn't get sick.*

*After graduating from Yale in 1991, I did a short stint in consulting, and then decided to pursue graduate school in hydrogeology. Since this was still pre-internet, I didn't know what schools had hydrogeology programs, and went to meet with Prof. Skinner to ask his advice. He connected me with Professor Jean Bahr, a former Yale undergrad, who got her PhD in hydrogeology at Stanford and was a professor at the University of Wisconsin-Madison. She became my PhD advisor and introduced me to the wonderful world of*

*chemical hydrogeology, a field I am still pursuing as a faculty member at Virginia Tech. More than 15 years later, he introduced me to Denise Levitan, another Yale undergrad interested in chemical hydrogeology. Denise finished her PhD at Virginia Tech in 2013, and is now working for Barr Engineering. So the cycle continues...*

*I owe so much to Professor Brian Skinner — from introducing me to geology and its wonders, to encouraging me along the way and always being available for advice and guidance. He and Cathy have been valued mentors to me, and I am deeply appreciative. I wish both of them happy times in retirement!*

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#### MADELINE SCHREIBER, '91

*Brian was never on my PhD committee and I never took a class from him, yet I spent more time in his lab than any other lab while at Yale. Why? Brian coincidentally acquired a new X-ray diffractometer with my arrival at Yale. I had worked four years previously operating a similar instrument at Texaco, so Brian gave me carte blanche access. Brian's willingness to share resources set a benchmark for a philosophy to keep academic labs open and accessible to all students, which is the basis that I operate on today.*

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#### PAUL SCHROEDER, G '92

*I was a '95 undergrad of G&G, and worked with Prof. Skinner in his Natural Resources seminar as a student and a TA (really, just the kid who drove the school van and scouted out cool natural resources field trips like hydropower plants and trap rock mines). His unsentimental analysis of natural resource issues, presented with dry wit and a good sprinkling of self-deprecating Australian prison-colony jokes, made a bracing semester for a environmental studies student. In particular, I recalled how effectively he prompted students to check their intuitions with back-of-the-envelope calculations on energy efficiency, land use, and many other topics on which the typical environmental studies student had strong (but sometimes unfounded) intuitions. Now I am a law professor, and although our discipline is different — I miss the field trips! — I still find myself drawing on*

*the ingrained empiricism, on-the-ground curiosity, and humble humor that marked my experiences in G&G courses with Prof. Skinner and other classics like Prof. Gordon and Prof. Hickey.*

#### **ANTHONY JOHNSTONE, '95**

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*I took a number of classes with Dr. Brian Skinner including Issues in the Environment — a class which trained me to write systematically. Senior year, Dr. Skinner served as my thesis adviser. Despite my best attempts, I was a less than stellar G&G student. My lab partner and I celebrated gleefully whenever we saw the shorthand note on his door 'BJS Away'. Though we cherished the time spent in Dr. Skinner's office hearing stories of his field adventures, when BJS was away, there was less of a chance that he would follow up on our slowly progressing thesis work. One day, presented with a sketch of a mineralogical sample that I was analyzing, Dr. Skinner finally broke it to me: 'Alena, not everyone was born to read the rocks!'*

*What a relief! 15 years later, I find myself running a travel company in Jordan & Egypt, where field adventures are plenty, and knowledge of the processes active in the Dead Sea Transform and the Red Sea Rift also comes in handy.*

*Thank you, Dr. Skinner, for your inspiration and support! Congratulations on your retirement! You've got a place in Jordan should you ever need one.*

#### **ALENA BARTOLI, '01**

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Brian and Cathy Skinner, 1973 Dana Club Skit, Costume Party afterwards.

RECENT AWARDS AND HONORS: FACULTY



Alan Mara Bateman

**Alan Mara Bateman** (1889-1971): from a painting by Deane Keller, presented by Bateman’s students in 1958.

On Thursday, November 6, 2014, Alan Bateman was posthumously inducted into the Alaska Mining Hall of Fame. The Statement of induction read in part:

“After working for more than half a

century as the editor of the journal *Economic Geology* Alan Bateman died at his home in New Haven at the age of 82. His in-depth understanding of the Kennecott-type copper-silver deposits in the Wrangell Mountains of south-central Alaska formed the foundation of a new mineral deposit type.

Bateman’s recommendations to decision makers were important to the early successes of Alaska’s ‘home-grown’ Kennecott Copper Corporation. During World War II, Alan served as Director of the U.S. Metals and Minerals Branch, which was in charge of insuring that strategic and critical minerals were secured for the nation’s war effort.”

**Dave Bercovici** (david.bercovici@yale.edu) has been elected to the American Academy of Arts and Sciences, in recognition of his fundamental contributions to geophysics. The purpose of the Academy is “to cultivate every art and science which may tend to advance the interest, honor, dignity, and happiness of a free, independent, and virtuous people.” Dave joins a most distinguished group that includes Aaron Copland, Benjamin Franklin, Martin Luther King, Jr., Mary Leaky,



Dave Bercovici

Georgia O’Keeffe, Jonas Salk, and a constellation of other luminaries that have had lasting impact in the arts and sciences including Yale’s President Peter Salovey. This is marvelous news for Yale, for G&G, and of course for Dave.



Bill Boos

**Bill Boos**

Congratulations to Bill Boos (william.boos@yale.edu) on his promotion to Associate Professor.

**Derek Briggs** (derek.briggs@yale.edu) has been recognized as the 2015 Paleontological Society Medalist. This is “the most prestigious honor bestowed by the Society, reflecting the objectives and standards of the Society. It is awarded to a person whose eminence is based on advancement of knowledge in paleontology.”



Derek Briggs

## RECENT AWARDS AND HONORS: FACULTY



David Evans

**David Evans** (david.evans@yale.edu) is the 2015 recipient of the George P. Woollard award of the Geological Society of America Geophysics Division. From the citation, this award “is presented annually in recognition of outstanding geology contributions through the application of the principles and techniques of geophysics.” David presented the

keynote talk of the Woollard Session during the 2015 GSA meeting in Baltimore, Maryland.

David has also been elected to Fellowship in the Geological Society of America. GSA members are elected to fellowship in recognition of distinguished contributions to Geosciences. David was recognized at the 2015 GSA annual meeting in Baltimore.

**Jun Korenaga** (jun.korenaga@yale.edu) was awarded the Nishida prize from the Japanese Geoscience Union. This prize has recently been established to honor internationally recognized mid-level researchers (under the age of 45) in the field of Earth and planetary sciences. Jun was one of ten inaugural recipients.



Jun Korenaga

**Mary-Louise Timmermans** (mary-louise.timmermans@yale.edu) was honored with the Dylan Hixon '88 prize for teaching excellence in the Natural Sciences and Mathematics. “Your students praise the way you combine ‘a passion for science and research’ with a ‘caring spirit’ and a ‘commitment to students.’” One student noted: ‘Professor



Mary-Louise Timmermans

Timmermans brought an enthusiasm to the classroom each day that proved an inspiration for each and every student. Her constant, contagious smile not only demonstrated her interest in the material, but it was proof that she enjoyed every moment she spent in the classroom with us.’ Many students also describe you as an inspiration and a role model for what it means to be a scientist and a teacher, leading several of your students to consider an academic career.”

And congratulations to Mary-Louise on her promotion to Associate Professor as well.



John Wettlaufer

**John Wettlaufer** (john.wettlaufer@yale.edu) has been elected as a Foreign Member (in physics) of the Royal Swedish Academy of Sciences (the same group that awards Nobel Prizes in physics and chemistry). From the Academy’s website: “Being elected a member of the Academy constitutes exclusive recognition of successful achievements.

These could be prominent research in mathematics, natural science, engineering, social science or humanities, but also outstanding services to science.” (<http://www.kva.se/en/The-members/>). There are only 175 Foreign Members in the world. This is a tremendous honor for John, as he joins other Foreign Members at Yale including Steve Girvin (Physics and Applied Physics), Peter Crane (Forestry & Environmental Studies), and Peter Jones (Mathematics & Applied Mathematics). Another member with Yale connections is Don Canfield (Univ. Southern Denmark), who did his PhD with Bob Berner here in G&G.

## RECENT AWARDS & HONORS: STUDENTS

### GRADUATE STUDENTS



Eric Bellefroid

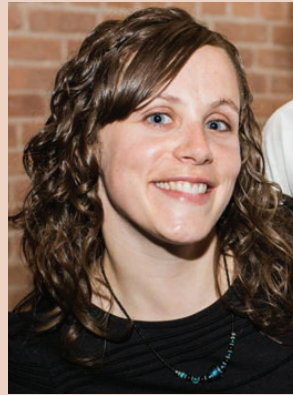
**Eric Bellefroid** (eric.bellefroid@yale.edu) received an NSERC Post-Graduate scholarship (the Canadian equivalent of the NSF Graduate Fellowship). The title of his proposal was “Assessing mid-Proterozoic weathering and its impact on geochemical cycling.” The NSERC Postgraduate Scholarships-Doctoral Program provides financial support to high-caliber students who are engaged in doctoral programs in the natural sciences or engineering. This support allows these students to fully concentrate on their studies and to seek out the best research mentors in their chosen fields.

**Jana Burke** (janet.burke@yale.edu) received an NSF Graduate Research Fellowship. The title of her proposal was “Establishing a Relationship Between Foraminiferal Community Morphology and Environmental Conditions.” The NSF Graduate Research Fellowship Program recognizes and supports outstanding graduate



Jana Burke

students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based Master’s and doctoral degrees at accredited United States institutions.



Robin Canavan

**Robin Canavan** (robin.canavan@yale.edu) was awarded a 2015 Graduate Research Fellowship from the Connecticut Space Grant College Consortium, a NASA supported Space Grant Consortium, for a project entitled: “Taking the Earth’s Temperature: A Geologic Perspective of the Extent of the Tropics During Periods of Elevated CO<sub>2</sub>”.

Robin was also selected as one of three student representatives to The Yale Presidential Carbon Charge Task Force. The Task Force is chaired by Sterling Professor of Economics, William Nordhaus. Robin was appointed through the Graduate Student Assembly while the other two student representatives come from the Graduate and Professional Student Senate and Yale College Council. Students will work together with administrators and faculty on whether it would be feasible and effective for Yale to institute an internal carbon pricing mechanism as part of its sustainability efforts.

**Matt Davis** (matthew.davis@yale.edu) was awarded the Edward S. Deevey Award at the 100th Annual Meeting of the Ecological Society of America for his presentation on the Ice Age of North America titled, “What actually happens to functional diversity during a large extinction?” The award is given for the best oral presentation by a student studying paleoecology.



Matt Davis



## RECENT AWARDS & HONORS: STUDENTS



Daniel Field

**Daniel Field** (daniel.field@yale.edu) received a National Science Foundation Doctoral Dissertation Improvement Grant. The proposal, “Origin of the modern avian locomotor system across a neglected evolutionary interval: insights from new methods and new fossils”, was recommended for funding with the highest priority. The grant is awarded jointly to Daniel and Bhart-Anjan Bhullar.



Alison Nugent

**Alison Nugent** G '15 (adnugent@gmail.com) received an NSF Postdoctoral Research Fellowship (AGS-PRF) for her proposal entitled “Aerosols in Shallow Tropical Convection: Impact on Cloud Microphysics and Precipitation” and is funded through AGS (NSF division of Atmospheric and Geospace Sciences).



Srikanth Toppaladoddi

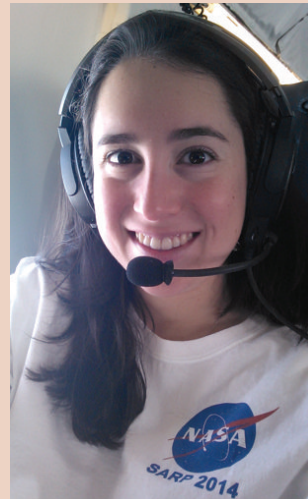


Yiqi Zheng

**Srikanth Toppaladoddi** (srikanth.toppaladoddi@yale.edu) and **Yiqi Zheng** (yiqi.zheng@yale.edu) were awarded NASA Graduate Fellowships in Earth and Space Sciences. Srikanth’s project title was “Oceanic Heat Flux and the Fate of Arctic Sea

Ice: A Combined Theoretical and Observational Study.” Yiqi’s project title was “Using Relationships Between Photosynthesis and Formaldehyde Column as a Probe of Isoprene Emission.”

### UNDERGRADUATE STUDENTS



Johanna Press

**Johanna Press** '15 (johanna.press@yale.edu), won an outstanding student presentation award at the American Geophysical Union’s annual meeting. The title of Johanna’s presentation was “Modeling trace element concentrations in the San Francisco Bay Estuary from remote measurement of suspended solids”. The AGU Annual meeting was held in San Francisco, CA, December 15-19, 2014.

# RECENT AWARDS & HONORS: ALUMNI



Darrel Cowan with former PhD students, 2014

**Darrel Cowan '67** (darrel@u.washington.edu) received the 2014 Career Contribution Award from the Structural Geology & Tectonics Division of the Geological Society of America at GSA's annual meeting in Vancouver. The award is presented for achievements that have led to major advances in the fields of structural geology and tectonics.

Darrel received his BS in Geology from Stanford in 1966, then spent the 1966-67 academic year in Geology & Geophysics at Yale. He returned to Stanford where he received his PhD in 1972. His first professional career was as an exploration geologist in the Alaska Division of Shell Oil Company. He was appointed Assistant Professor at the University of Washington in 1974, and he's still there.



Lisa Tauxe



Lisa at Yale

**Lisa Tauxe '78** (ltauxe@ucsd.edu) was elected to the National Academy of Sciences in 2015, one of the highest honors bestowed on U.S. scientists. Lisa was also awarded the Arthur L. Day Medal from the Geological Society of America for her outstanding distinction in contributing to geological knowledge through the application of physics and chemistry to the solution of geologic problems.

Lisa is a Distinguished Professor of Geophysics in the Geosciences Research Division and Department Chair/Deputy Director for Education at Scripps, University of California, San Diego. Lisa is the first woman department Chair at Scripps.



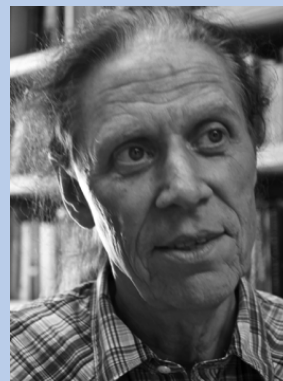
Philippe van Cappellen

**Philippe van Cappellen**

G '91 (pvc@uwaterloo.ca) received the EAG Science Innovation Award. The medal is given to those who have recently made a particularly important and innovative breakthrough in geochemistry. The geochemical research must be highly original and contribute in a significant fashion

to our understanding of the natural behavior of the Earth or planets. This year's award is a commemoration to Werner Stumm, Van Capellen's postdoctoral advisor at the Swiss Federal Institute for Aquatic Science and Technology. Philippe was also named a 2015 Geochemical Fellow by the Geochemical Society and the European Association of Geochemistry.

Philippe is the Canada Excellence Research Chair and Professor in the Department of Earth and Environmental Sciences at the University of Waterloo in Canada.



Jeremy Jackson

**Jeremy Bradford Cook Jackson, '71 G,**

received the Wilbur Cross Medal, the highest honor conferred by the Graduate School and the Graduate School Alumni Association, on October 27, 2015.

The award, established in 1966, is named for Wilbur Lucius Cross (PhD 1889, English), who served as Dean of the Graduate School from 1916 to 1930. The medal recognizes distinguished achievements in scholarship, teaching, academic administration, and public service — all areas in which the legendary Dean Cross excelled.

## RECENT AWARDS &amp; HONORS: ALUMNI

Jackson is senior adjunct scientist at the National Museum of Natural History of the Smithsonian Institution, scientific director of the Global Coral Reef Monitoring Network, and professor emeritus at the Scripps Institution of Oceanography in California. He is considered the world's foremost coral reef biologist and one of the most effective advocates for the marine environment.



Timothy Lyons

**Timothy Lyons** G '92 (timothy.lyons@ucr.edu) has been named a 2015 Geochemical Fellow by the Geochemical Society and the European Association of Geochemistry. The honorary title is awarded to an outstanding scientist who has made major contributions to the field of geochemistry.

Tim is a Distinguished Professor of Biogeochemistry in the Department of Earth Sciences at the University of California, Riverside.



Vaughan Turekian

On September 8, **Vaughan Turekian**, '93 (vturekian@gmail.com) formerly the Chief International Officer at The American Association for the Advancement of Science (AAAS), was named the 5th Science and Technology Adviser to the Secretary of State. In this capacity, Vaughan will advise the Secretary of State and the Under Secretary for Economic Growth, Energy, and the Environment on international environment, science, technology,

and health matters affecting the foreign policy of the United States. Vaughan will draw upon his background in atmospheric chemistry and extensive policy experience to promote science, technology, and engineering as integral components of U.S. diplomacy.



Matt Jackson with his daughter Katla at the IGC conference in Brisbane, Australia

**Matt Jackson** '01 (matthewgerardjackson@gmail.com) was awarded the AGU Macelwane medal. The medal is given annually in recognition for "significant contributions to the geophysical sciences by an outstanding early career scientist." Matt is an Associate Professor at the University of California, Santa Barbara.

**Karen Paczkowski** G '12 (karen.paczkowski@aya.yale.edu), is the 2015-16 GSA-USGS Congressional Science Policy Fellow. Her research focused on determining the physical processes that control lithospheric drip instabilities and mantle flow in subduction zones. During her time on the Hill, she hopes to tackle national challenges in energy, the environment, and STEM education.



Karen Paczkowski

## STUDENT NEWS

**Seniors who graduated in the Class of 2015**

**George Adesanya** (Advisor: Michael Oristaglio)  
“Fugitive methane: The promise and pitfalls of the shale gas revolution”

**Christian Brown** (Advisor: Noah Planavsky)  
“Exploring the evolution of oxygen on the early Earth: Constraining the Great Oxidation Event through the utilization of uranium isotopes”

**Jessica Buckey** (Advisor: Thomas Graedel)  
“Offshore wind potential in the Mid and South Atlantic planning areas”

**Leah Campbell** (Advisor: Maureen Long)  
“Complex seismic anisotropy beneath Germany from \*KS shear wave splitting and anisotropic receiver function analysis”

**Dalton Carr** (Advisor: Jay Ague)  
“Formulating Success: Dissecting Renewable Portfolio Standards (RPS) in both New York and Texas for Application in California”

**Marjorie Hirs** (Advisor: Kanani Lee)  
“Experimental studies in melting pyroxenite”

**Tierney Larson** *Physics and Geosciences*  
(Advisor: David Evans)  
“Mesoproterozoic paleomagnetism of the southern Congo Craton”

**Yusu Liu** *Chemistry* (Advisor: Kanani Lee)  
“High-pressure melting of iron alloys: Towards an understanding of Earth’s core”

**Maggie Lynn** (Advisor: Gaboury Benoit)  
“Mercury: from source to sink, considerations for fish consumption advisories in the State of Connecticut”

**Philippa Stoddard** (Advisor: Mark Brandon)  
“Light carbon stable isotopes in aragonite veins, Lopez Island, WA: Evidence for deep life?”

**Johanna Press** (Advisor: Ronald Smith)  
“Remote monitoring of suspended solids in the San Francisco Bay estuary”

**XinXin Xu** (Advisor: Maureen Long)  
“Seismic anisotropy in the lower mantle underneath North America from SKS-SKKS splitting discrepancies”

**PhD Degrees awarded in 2014 and 2015****December 2014**

**Alison Nugent**  
Advisor: Ronald Smith  
“Orographic Convection and Precipitation in the Tropics”  
Alison is working as a postdoctoral fellow at the National Center for Atmospheric Research (NCAR) with funding from the Atmospheric and Geospace Sciences Division of the National Science Foundation.

**Tolulope Olugboji**  
Advisor: Jeffrey Park  
“Revealing the Fine Structures of the Lithosphere Asthenosphere Boundary”  
Tolu is a Postdoctoral research associate at the University of Maryland.

**Erin Wirth Moriarty**  
Advisor: Maureen Long  
“Interrogating Seismic Anisotropy in Subduction Zones and Continental Interiors”  
Erin is a postdoctoral researcher at the University of Washington in the Department of Earth and Space Sciences. She’s working with John Vidale ’81.

## STUDENT NEWS

### May 2015

#### Zhengyu Cai

Advisor: David Bercovici

“Fluid flow and damage in two-phase media: theory and applications to magma and environmental dynamics”

Zhengyu is working at the University of Maryland as a postdoctoral scientist. He will be working for COMSOL, Inc. in October as an Application Engineer and Developer.

#### Caroline Eakin

Advisor: Maureen Long

“Dynamics of Flat Slab Subduction beneath Peru”

Caroline is a postdoctoral fellow at the University of Southampton / National Oceanography Centre in the UK.

#### Allison Hsiang

Advisor: Jacques Gauthier

“Evolutionary origins of major reptile lineages: Case studies on phylogenetic incongruence and the importance of fossils.”

Allison is a postdoctoral associate with Pincelli Hull in the Yale Department of Geology & Geophysics, where she’s working on developing software for automatically extracting measures of 2D and 3D shape from high-throughput microscopy images of foraminifera in order to understand morphospace evolution through time and across communities.

#### Taylor Kilian

Advisor: David Evans

“Precambrian Paleomagnetism of Mafic Dike Swarms and the Wyoming Craton: Implications for an Archean Supercontinent”

Taylor is doing postdoctoral work in Nick Swanson-Hysell’s lab at UC Berkeley.

#### Chao Liu

Advisor: Zhengrong Wang

“Sr and Mg isotope geochemistry of Marinoan cap carbonates”

Chao is a postdoctoral associate at the Geophysical Laboratory, Carnegie Institution of Washington.

#### Joseph Panzik

Advisor: David Evans

“Assessing Earth’s Proterozoic Geomagnetic Field Geometry and Paleogeography Using Theoretical and Analytical Techniques”

Joe is a postdoctoral teaching associate at the University of Tennessee, Knoxville.

#### Yige Zhang

Advisor: Mark Pagani

“Deciphering the “doubthouse” climate change of the Cenozoic era”

Yige’s currently a Ziff environment fellow at the Center for the Environment, and Department of Earth and Planetary Sciences, Harvard University, working with Ann Pearson.

### 2015 Department of Geology & Geophysics Prize Recipients

#### UNDERGRADUATE PRIZES

PAT WILDE PRIZE • “for excellence in marine geology and oceanography”

#### Johanna Press

WILLIAM R. BELKNAP PRIZE • for excellence in geological studies

#### Leah Campbell

#### Tierney Larson

ESTWING HAMMER PRIZE • “for excellence in the oral presentation of the Senior Thesis”

#### Tierney Larson

## STUDENT NEWS

VON DAMM FELLOWSHIPS • endowed by the late Karen Von Damm '77, to support undergraduate field research and field trips.

**Paige Breen**

**Sara Kahanamoku-Snelling**

**Samantha Lichtin**

**Yusu Liu**

**Adam Sokol**

**Rain Tsong**

**Olivia Walker**

**XinXin Xu**

**Yale Drop Team**

### GRADUATE PRIZES

PHILIP M. ORVILLE PRIZE • The most prestigious prize is the Phillip M. Orville Prize 'in recognition of outstanding research and scholarship in the Earth Sciences' which is awarded to the outstanding graduate student (usually a 4th or 5th year student who is about to finish).

**Erin Wirth Moriarty**

**Yige Zhang**

WILLIAM E. FORD PRIZE • The William E. Ford Prize is given for excellence in mineralogical studies. The term "mineralogical" has been interpreted very broadly in the past.

**Taylor Kilian**

**Colton Lynner**

ELIAS LOOMIS PRIZE • The Elias Loomis Prize for excellence in studies of physics of the Earth, usually manifested in outstanding effort on thesis research. Elias Loomis was a professor of natural philosophy and astronomy in Yale College.

**Ivy Tan**

**Srikanth Toppaladoddi**

ESTWING HAMMER PRIZE • The Estwing Hammer prize is given to an outstanding geology graduate student (or students).

**Zhixue Du**

**Allison Hsiang**

**Victoria McCoy**

KARL K. TUREKIAN PRIZE • The Karl K. Turekian prize for excellence in studies of geochemistry. A very recent addition to the student awards.

**David Auerbach**

EXCELLENCE IN TEACHING PRIZE • The Excellence in Teaching Prize (this is a new prize this year).

This award is given in recognition of the student's outstanding contribution to the teaching process at the Department of Geology and Geophysics

**David Auerbach**

**James Super**

COMMENCEMENT 2015



Taylor Kilian



Alison Nugent and Erin Wirth Moriarty



Caroline Eakin and Alison Nugent



George Manucharyan and Jay Ague



Srinath Krishnan and Allison Hsiang



Joe Panzik



Alison Nugent and Georgy Manucharyan



Tolu Olugboji

# PATAGONIA FIELD TRIP 2014-2015



Lago Jeinimeni

Thanks to the generosity of alumni who value the learning experience of field work, Yale Geology & Geophysics offered the first field program sponsored by the Joseph G. Greenberg Field Studies Fund. This program, led by Mark Brandon, focused on investigating modern and ancient climate and the relationship to mountain building in the Patagonia region of South America. Students learned field skills, conducted field work, analyzed samples in a lab, and presented their results and interpretation to other students and faculty.

The program began in the fall of 2014 with periodic meetings to get organized and talk about the different components of the project. During this time students learned about the geology and climate of the field areas and developed their individual research projects. We departed for the



Emma, Maya, Astrid

field just after Christmas and returned in time for the beginning of classes in January. During the spring term, the team of students met regularly to analyze samples, discussing the data that different group members produced, and ultimately presenting their observations and interpretations to the members of the field program as well as invited faculty.

Student's projects this year included detrital zircon geochronology, developing paleoclimate records from proxy materials including organic molecules, volcanic glasses, and paleosol carbonates, characterizing the modern climate based on stable isotope measurements of precipitation, thermochronometric measurements of the rate of exhumation of granitic rocks in the Andes, and modeling of the development of the Andes at the latitude of  $\sim 45\text{-}47^\circ\text{S}$ .



Lunch along Rio Las Dunas

*Photos courtesy of David Auerbach, James Super, Martha Cosgrove, Paige Breen, Astrid Pacini, Maya Midzik, Maddie Shankle*



FIELD TRIP PARTICIPANTS

Undergraduate Students: Paige Breen, Luke Cartwright, Martha Cosgrove, Sam Lichtin, Maya Midzik, Astrid Pacini, Maddie Shankle, Emma Spence, XinXin Xu  
 Graduate Students: Dave Auerbach, Liz Christeleit, Devon Cole, James Super  
 Faculty: Mark Brandon



## ALPINE EUROPE DEPARTMENT FIELD TRIP 2015



Group shot with the Matterhorn

For 15 days in August 2015, a group of 23 G&G students and faculty traversed the European Alps and Apennines from Germany, through Switzerland, and into Italy. Led by Professor Mark Brandon, and graduate students Ross Anderson and Holger Petermann, with the help of Professors Derek Briggs and Celli Hull, the group travelled some ~3,000 km taking in the sedimentary record of Earth history preserved in the tectonic settings of these two mountain belts.

The sedimentary basins visited preserved an unrivalled view of Mesozoic and Cenozoic Earth history. Geochemists and climate scientists were treated to pelagic carbonate sediments in Umbria Marche, Italy, that record Milankovitch cycles in great detail in addition to evidence of bolide impact and extinction at the Cretaceous-Paleogene boundary. The group also saw evidence of large fluctuations in ocean chemistry with Mesozoic ocean anoxic events, seeing both the Toarcian event in southern Germany and the Bonarelli OAE2 event in Furlo Gorge, Italy.

For the paleontologists, highlights included the famed Jurassic deposits of southern Germany with the exceptionally preserved fossils of the Solnhofen limestones and Posidonia shales, as well as the younger Eocene Messel Pit. They were also treated to seeing the Italian Rosso Ammonitico, an ammonite rich Jurassic building stone used

around the world, and gained a perspective on how fossils are used by other geoscientists as they encountered stretched belemnites in the Swiss Alps.

Structural geologists were able to walk through two mountain belts seeing the many folds and faults, which uplifted these marine basins to sit atop mountains. They also got the chance to see the famed Glarus Thrust (the first thrust fault to be discovered) near Flims, Switzerland; and at Simplon Pass, Switzerland to see beautiful examples of ductile deformation with sigma and delta pressure shadows.

Geophysicists were not disappointed either with the opportunity to transect the Earth's crust down to the Moho, as we walked through the Ivrea and Sesia zones of the Alps from Lago Maggiore up to Brig, Switzerland. They saw a large ophiolite complex complete with pillow basalts and radiolarian cherts in the Ligurian of northern Italy. They also got to experience some of the effects of large bolide impacts when we visited the Ries Crater in southern Germany. Metamorphic geologists were in for a real treat as we visited the area around Zermatt, Switzerland. Here, in the shadow of the Matterhorn, they were able to see pillow basalts differentially metamorphosed with eclogite cores and blueschist rims near the Pfulwe pass. They also got to see the economic and culturally important Carrera marble quarries — the same marble from which Michelangelo's David was carved.

Throughout our traverses over these two great mountain ranges the students also sampled the different cultures of Germany, Switzerland, and Italy. We drove over three of the great Alpine passes (Gotthard, Simplon, and Grand St Bernard); some used by the Romans to cross the mountains and all providing wondrous views. In southern Germany we stayed in the medieval walled town of Nordlingen, one of the few towns to have a complete wall intact. While in Italy we visited the cathedral of the Renaissance in Florence and lodged in a small hilltop castle where St Francis of Assisi stayed on his pilgrimage.

The students returned after two weeks in the Alps with a unique perspective on the European continent, the Earth history it records within its rocks, and how its mountain ranges were formed.

## A TREASURE TROVE OF FOSSILS IN UTAH'S GRAND STAIRCASE

By Ian Miller, G '07

*Dr. Ian Miller is the curator of paleobotany and chair of the Earth Sciences Department at the Denver Museum of Nature and Science. He graduated from Yale with a PhD in 2007.*

Cached deep in one of the most remote areas in the lower 48, some 40 miles north of Lake Powell, lies a treasure-trove of Late Cretaceous fossils. A recent New York Times article "*Utah's 'Grand Staircase' Leads Back in Time to Dinosaur Shangri-La*" highlights some of the pioneering fieldwork being done in this region by the paleontology teams at the Denver Museum of Nature and Science (DMNS) and the Utah Natural History Museum (UNHM) in collaboration with the Bureau of Land Management.

As little as 15 years ago, no one really knew the remarkable potential of south-central Utah to produce exceptionally preserved Late Cretaceous fossils. Acting on old reports, vertebrate paleontologists from UNHM visited the grey, steep hills of mud that comprise the 76.6 to 74.5 million-year-old Kaiparowits Formation. Within hours, they had their hands on dinosaur bones. The next decade and a half has been a fossil bonanza. Nearly 20 species of dinosaurs, all new to science, have been found, collected, prepared and published. Some even defy imagination, such as the wildly ornamented *Kosmoceratops*, otherwise known as the "horniest" dinosaur ever found.

Why such an endemic population of massive animals? The stage, it seems, was set for rapid evolution. Approximately 95 million years ago, the shallow seas of the Western Interior Seaway flooded North America. Extending from the Arctic Ocean in the north to the Caribbean in the south, the seaway cut the continent in two, isolating the western cordillera and forming a long, ribbon landmass called Laramidia. Plants and animals that lived along the eastern coastal plains of Laramidia indicate that extinct ecosystems were rife with dinosaurs, turtles, lizards and the like, all amidst forests of unfamiliar plants. By 75 million years ago, some 20 million years into their isolation, the dinosaurs in Utah had evolved into different species than those found in northern Laramidia. In what seems to be an impossibly small region, a huge diversity of dinosaurs flourished.

Almost a decade ago, just after finishing my PhD at Yale, I joined the project as paleobotanist.

We set out to solve the problem of dinosaur endemism with the idea that, as the primary producers in the ecosystem, plants must play a key role in driving the dinosaur diversity and supporting their seemingly vast numbers. Over nine field seasons and countless weeks in a tent, we have collected nearly 15,000 exquisite leaf specimens. While we have found relatives of plants now living from Colombia to New Caledonia, our biggest surprise has been the abundance of vines. It appears that the Kaiparowits forest may have been drowning in them, not unlike many forests in the tropics today, thus providing the biomass needed to support a diverse dinosaur ecosystem. The question still remains whether plants, like dinosaurs, change significantly throughout Laramidia 75 million years ago. Initial work shows that they do, and dramatically, but that's the next chapter.

All told, our team has sought a more complete understanding of the physical world of Laramidia through its geology, geography and climate, along with the biological record of plants, insects, freshwater invertebrates, and animals small and large, from shrews all the way to tyrannosaurs. You can get a sense of the scope of this work in the edited volume *At the Top of the Grand Staircase: The Late Cretaceous of Southern Utah* (2013); containing 28 articles on all aspects of the Late Cretaceous ecosystems preserved in southern Utah. You can also read about the project in the May 2014 issue of National Geographic in the article "Digging Utah's Dinosaurs." And tune in to any replays of *Making North America*, a three-part NOVA special hosted by Yale graduate and director of the Smithsonian Dr. Kirk Johnson, which first aired November 2015. Finally, you can learn more about our projects at [www.denverpaleo.org](http://www.denverpaleo.org).

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Pinkowski, J. "Utah's 'Grand Staircase' Leads Back in Time to Dinosaur Shangri-La." *The New York Times* 21 July 2015: D1. Print. Online at [http://www.nytimes.com/2015/07/21/science/utah-grand-staircase-dinosaurs-kaiparowits-plateau-fossils.html?\\_r=0](http://www.nytimes.com/2015/07/21/science/utah-grand-staircase-dinosaurs-kaiparowits-plateau-fossils.html?_r=0)

*At the Top of the Grand Staircase: The Late Cretaceous of Southern Utah*. Edited by Titus, A. L., and Loewen, M. A. Indiana University Press, 2013, p. 656.

Miller, P. "Digging Utah's Dinosaurs." National Geographic Magazine May, 2015: Print. Online at <http://ngm.nationalgeographic.com/2014/05/utah-dinosaurs/miller-text>.

## A TREASURE TROVE OF FOSSILS IN UTAH'S GRAND STAIRCASE



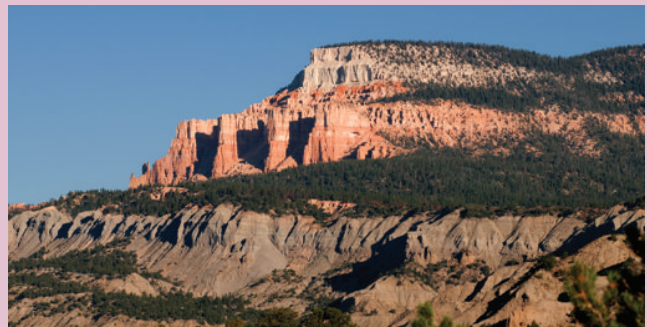
Fossil conifer branch from the ~75 million year old Kaiparowits Formation in south-central Utah. ©Denver Museum of Nature and Science.



Fossil leaf probably belonging to the moonseed family from ~75 million year old Kaiparowits Formation in south-central Utah. ©Denver Museum of Nature and Science.



Dr. Joe Sertich (left), Curator of Dinosaurs at the Denver Museum of Nature and Science, and Dr. Hesham Sallam, Professor, Mansoura University, Egypt, standing in front of a skull from a horned dinosaur. The specimen is upside down and encased in plaster, which is needed to transport the specimen back to the lab. The outline of the skull is drawn in sharpie. ©Denver Museum of Nature and Science.



View of Powell Point. The grey hills on the bottom belong to the 76.6 to 74.5 million year old Kaiparowits Formation. The pink and white cliffs at the top belong to the ~45 million year old Claron Formation. The Claron Formation also forms Bryce Canyon, which is about 20 miles west of Powell Point. ©Denver Museum of Nature and Science.



Fossil leaf probably related to the climbing fern *Lygodium* from the ~75 million year old Kaiparowits Formation in south-central Utah. ©Denver Museum of Nature and Science.

# A TREASURE TROVE OF FOSSILS IN UTAH'S GRAND STAIRCASE



Digging a leaf quarry in the -75 million year old Kaiparowits Formation. Dr. Ian Miller, Curator of Paleobotany, is in the foreground. David Allen, project intern, and Dane Miller, project intern are in the background. All are from the Denver Museum of Nature and Science. ©Denver Museum of Nature and Science.



A fossilized imprint of dinosaur skin from a hadrosaur from the the -75 million year old Kaiparowits Formation. ©Denver Museum of Nature and Science.



The grey mudstone hills of the -75 million year old Kaiparowits Formation. The people clinging to the hill in the middle of the photo are digging a fossil leaf quarry. ©Denver Museum of Nature and Science.



A digital reconstruction of the -75 million year old Kaiparowits Formation ecosystem. The foreground shows the horned dinosaur is Nasutoceratops. The background includes the small theropod, Talos, and the hadrosaur, Gryposaurus. All the fossil animals and plants are based on fossils that were found in the formation. © Raul Martin with permission.



A digital reconstruction of Kosmocerotops, the most horn — imbued dinosaur to ever have lived! This animal is known only from the -75 million year old Kaiparowits Formation. © PLoS One with permission.

## ALUMNI NEWS



Arthur Bloom

**Arthur Bloom** G '59 writes "as a former graduate student, instructor, and visiting lecturer in the department, I have more-than-average interest in your activities. I retired from Cornell's Earth and Atmospheric Sciences Department in 1996 but still spend some time there."

Art's son, Jay, generously established the Arthur L. Bloom Fund, in honor of his father, intended to allow geological scientists and students to use the latest technologies while traveling the Pacific region to probe our physical environment.

**Nicholas K. Coch** G '65 (coch@earthlink.net) writes: Over fifty years ago I left Yale to pursue a career in academic teaching and research. Presently, I am completing my 48th year in the School of Earth and Environmental Sciences at Queens College of CUNY and at the CUNY Graduate Center in Manhattan.

In 1972, I married Carol Yanek and she pursued a long career as an oceanographer with the U.S. Army Corps of Engineers, North

Atlantic Division. She became an expert on dredging and regulatory management of waterways in the Northeast. She was intimately involved in recovery work after 9/11. We spend part of the week in New York City and part at our second home in the Hamptons where we have the room to indulge all of our hobbies.

My career started as a coastal plain stratigrapher working in Virginia. I then evolved, in turn, into a coastal-estuarine geologist, a lunar sedimentologist, as a NASA P.I., and now I am a hurricane researcher. These four major changes in my research goals point out the importance of a broad background in meeting new career opportunities. For that I thank my professors. This is something I try to impress on beginning geologists.



Nicholas K. Coch at the Bermuda Reinsurance Conference 2014

My present research is involved in predicting hurricane damage under the unique geologic, demographic, meteorologic and oceanographic conditions present in the Northeast U.S. The results of that work have

been presented in a number of U.S. and European TV shows and professional publications. Each year I give a number of talks to insurance, reinsurance, and emergency management groups on the subject of geologic hazards and climate change. Along the way I received an N.A.G.T. Teaching Award, was a Sigma Xi Distinguished Lecturer from 2007-9 and received a "Telly" for our video on Hurricane Sandy. I greatly enjoy my hurricane research as well as guiding students into the wonderful field of geology. I intend to continue for the next few years.

We were the first class to leave Kirtland Hall and occupy Kline Geology Lab. As president of the Dana Club that year, the student space planning was my responsibility. Being back in KGL a few years ago brought back many memories of my fellow students and our activities — particularly our fabulous Dana Club skits. I hope that tradition still continues. I talked to several of the current graduate students at our KGL reunion a few years ago. I am sure that they will have the same warm memories of life at KGL that I have. It was great to catch up with some of my classmates at the reunion. I would love to hear from any other classmates, particularly Chris Durden, Barrie MacDonald and Jeremy Reiskind at "coch@earthlink.net". Thanks for the memories!

ALUMNI NEWS



Keith Howard

**Keith Howard** G '66 (khoward@usgs.gov) Yale graduate work was mentored and inspired by John Rodgers and Dick Armstrong, and has been followed by nearly 5 decades with the U.S. Geological Survey in Menlo Park, CA. After a decade in NASA-sponsored Apollo mission support and lunar and volcanism research, I conceived and successfully convinced the Administration and Congress to begin a USGS climate-research program in the '70s. The Yale PhD inspired a focus on crustal stretching and metamorphic core complexes in addition to an array of other tectonic, igneous, and landform processes in the Basin and Range and beyond (Andes, Scotland, Io, Pyrenees, Greece, Madagascar). In the '80s to '90s I led the Pacific to Arizona Crustal Experiment — a geologic-geophysical transect across the southwest U.S.A. — and held a Fulbright at Cambridge. Since retiring 8 years ago I taught some at San Jose State, and my continuing USGS Emeritus research includes Colorado River history, magma

intrusion, extensional tectonism, and caldera mechanics (<https://profile.usgs.gov/khoward>). Good fortune has sent fine postdocs, students, and lots of other great collaborators my way over the years. I'm blessed with a terrific wife (Linda) and family. With groups of friends I also enjoy wildflowers, choir, wine tasting, and fiddling in a couple of string bands.



Windfall Film Crew and Kirk Johnson on site on the beach, Kupreanof Island, Alaska

**Kirk Johnson** G '89 (johnsonkr@si.edu) writes: I spent seventy days in 2014 filming scenes in 17 states for the three-part NOVA special on the geology of North America. The project was produced by WGBH in Boston and Windfall Films in London. It was my first time as a documentary presenter, and I can tell you that this task requires a specific and curious skill set. In true British documentary style, I had to deliver pithy yet accurate lines about geology while climbing ice walls, dangling from ropes, and wading in slimy ponds. I also got to dive amongst the stromatolites near Exuma Cay in the Bahamas with G&G faculty member **Noah Plavsky**. There were several highlights, but the best was finding a complete Paleogene palm frond in Alaska on camera while the



Kirk Johnson (center), Jim Baichtal (left), and Ray Troll (right) after excavating an Alaska palm frond minutes before the rising tide covered the site. Kirk is the Sant Director of the Smithsonian National Museum of Natural History.

tide was racing in. Nothing says climate change better than the two words: Alaskan palm. The show, called **Making North America**, aired nationwide on PBS on November 4, 11, and 18, 2015.



Deirdre Byrne - Beach Clean-up with Table Mountain in the background, South Africa

**Deirdre Byrne** '90 (dbyrne@aya.yale.edu): I received a BS from G&G in 1990. From Yale I went to Columbia University's Lamont-Doherty Earth Observatory where I obtained a PhD in 2000 with Professor Arnold Gordon, studying the ocean's thermohaline circulation, in particular the interocean transfer of mass, heat and salt from the Indian to the South Atlantic via the Agulhas

## ALUMNI NEWS

Current, which flows just off the coast of South Africa. From Columbia I went to the University of Maine, still focusing my work largely on the South Atlantic and around South Africa; while at U Maine I spent a couple of years as a visiting scientist at the University of Cape Town.

I left academia in 2010 to join NOAA, where I worked at the National Oceanographic Data Center on designing and implementing satellite Earth observing systems, and on ocean information products and data management. After five years at NOAA, my husband and I were invited to come to South Africa to work for Oceans and Coasts in the National Department of Environmental Affairs. We accepted and moved to Cape Town in January 2015. Here, we are helping to plan and implement a national ocean observing and monitoring infrastructure and concomitant marine information management system. As my husband, Dr Christopher Duncombe Rae, is South African this was a natural decision for us, bringing us closer to his family. In our spare time, we are enjoying Cape Town's world class beaches, hiking, food and arts scene, while our son is flourishing in Grade 3.



Chelsea Willett in Chile

**Chelsea Willett '11** (chelsea.d.willett@gmail.com) writes: The first year of my PhD program in Earth and Planetary Science at the University of California, Berkeley included two trips to Torres del Paine National Park in Chile to collect samples for low-temperature thermochronometry (see photo). While stateside, I took excellent courses from some of geology's greats and got the ball rolling on a suite of helium diffusion experiments in apatite. In Summer 2015, I had the great honor of being a bridesmaid for **Alex Andrews '11** when she married in Vermont.



Rachel Racicot

**Rachel Racicot G '14** (rachel.racicot@yale.edu) is working with Professor Nate Smith at Howard University, they are in the process of moving to the Los Angeles County Museum of Natural History to continue working on corals, dinosaurs, and cetacean evolution.

## ALUMNI IN MEMORIAM



Peter A. Rona G '67 with an autonomous underwater vehicle used for his studies of the Hudson Canyon, off the coast of New Jersey, in 2009 and 2011.

**Peter A. Rona G '67**, (1935-2014) renowned for his deep-sea exploration, died on February 20, 2014 of complications of multiple myeloma. He was 79 years old.

Rona, Professor of Marine Science and Earth and Planetary Sciences at Rutgers since 1994, spent 25 years as a scientist for the National Oceanic and Atmospheric Administration before he came to Rutgers. During his time at NOAA, Rona led the expedition that first discovered deep-sea hot springs and their associated life forms in the Atlantic Ocean. He discovered that the Mid-Atlantic Ridge, the great tectonic boundary that runs from north of Iceland to the Southern Ocean contains hydrothermal vents which host communities of animals unknown to science until then.

Between 1999 and 2003, Rona and his Rutgers colleague Richard Lutz, now Director of the Insti-

tute of Marine and Coastal Sciences in the School of Environmental and Biological Sciences at Rutgers, served as science directors of *Volcanoes of the Deep Sea*, an IMAX film that took viewers down to deep-sea vents in the Atlantic and Pacific oceans. "We brought Hollywood lighting and camera technology to the deep sea-floor to clearly illuminate for the first time the spectacular hot springs and their strange ecosystems for the public to see, from school children to the delegates to the United Nations Convention on the Law of the Sea," Rona said. The film has since been seen by 165 million people around the world.

"Peter was a treasured friend of over 40 years and one of the finest and most honorable gentlemen I have known," Lutz said.] "His contributions to deep-sea science have been immense. We've



## ALUMNI IN MEMORIAM

lost one of the true giants in the field and he will be missed.”

Peter Arnold Rona was born in Trenton on August 17, 1934. “I was one of those kids who collected rocks and minerals, climbed mountains, loved the outdoors and identified with geology from early on,” Rona told a Rutgers publication in 2006. “I pursued a path to explore the oceans, the last frontier on Earth, starting as an apprentice in a laboratory at Columbia University that studied the physics of sound in the sea. Going to sea for nine months of the year, I was hooked.”

Rona once reckoned he might have spent more time in submersibles on the bottom of the ocean than any other marine scientist. Asked what a trip in a submersible was like, he answered, “Cramped and cold — but wonderful, just the same.” The experience was so fascinating, however, Rona said, that he usually forgot how cramped and cold he was.

Throughout his teaching career, Rona acted as a talent spotter for future marine scientists and engineers. He convinced many bright but undecided young people to follow his path to sea — among them, Donglai Gong, now assistant professor of marine science at the Virginia Institute of Marine Science. In 2004, sitting in on Rona’s class on hydrothermal vents after getting a master’s degree in physics, Gong asked what Rona thought were particularly intelligent questions, and found himself the object of a full-court press to go into marine science. “He encouraged me to contact the people at IMCS and think about doing a PhD in marine sciences,” Gong recalled. “I did. And that’s made all the difference.”

Rona published more than 250 scientific papers in his career and edited five books. He was the recipient of the Shepard Medal for Excellence in Marine Geology, the Petterson Bronze Medal of the Swedish Academy of Sciences and the U.S. Department of Commerce Gold Medal for exceptional scientific contributions to the nation.

Peter Rona’s wife of more than 40 years, Donna Rona, died in 2013. He leaves his daughter, Jessica.

*Rutgers Today*  
February 24, 2014



Stephen Porter

Prof. **Stephen C. Porter**, 1934-2015 Prof. Porter was born and raised in Santa Barbara, California, and spent his final days there. In the intervening decades he built a widely influential career with research spanning six continents. He was best known for his work on glaciation, ranging from studies of individual drainages to process-oriented papers and continental-scale compilations, and for his extensive work on Chinese loess. He enjoyed a long career on the faculty of the University of Washington, influencing many young scientists as graduate advisor and as a highly engaging instructor. His service to the scientific community was extensive, which included leading the UW Quaternary Research Center; editing the journal *Quaternary Research* (1976-2001); President of the International Quaternary Union (1995-1999) and President of the American Quaternary Association (1992-1994). Beyond scientific contributions and leadership, Steve was known as a kind and thoughtful man of integrity and commitment.

*Elsevier, Quaternary Research 83 (2015)*

## YALE CENTER FOR RESEARCH COMPUTING

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Kaylea Nelson

Computational Research Support Analyst **Kaylea Nelson**, PhD, joined the Yale Center for Research Computing in June 2015 to provide best-in-class computational research support to both Geology & Geophysics (G&G) specifically and to FAS more generally. She has been supporting faculty members and researchers in areas including high performance computing (HPC), scientific computation, computational collaborations, and large-scale data management.

Kaylea is also engaged in training, and led the first of a series of boot camps on HPC for G&G faculty this fall. She is available to meet with faculty during her regularly scheduled office hours in the Kline Geology Laboratory.

Kaylea holds a PhD in Astrophysics from Yale University.



**Alumni Please Note:**

*We would especially like to hear from you. Please send your news to [rebecca.pocock@yale.edu](mailto:rebecca.pocock@yale.edu).*

# GEOLOGY & GEOPHYSICS NEWS

## Yale Department of Geology & Geophysics

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GEOLOGY &  
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A portrait of Karl Turekian by artist Heidi Coutu was unveiled at the Chair's reception in October, 2015. We express our sincerest thanks to all the alumni and friends whose contributions made this portrait a reality.