

the chemists club

Fall 2014



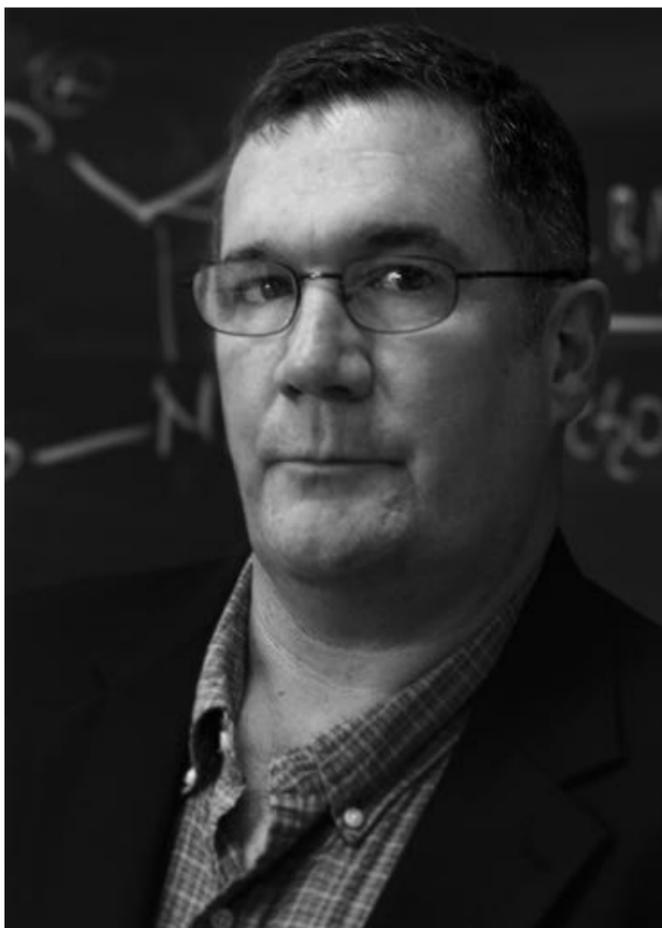
In Memoriam

Gregory Hillhouse

Professor in Chemistry

March 1, 1955–March 6, 2014

This issue of the Chemists Club honors the memory of Gregory L. Hillhouse, who died on March 6 of pancreatic cancer. Hillhouse, who joined the UChicago chemistry faculty in 1983, was an accomplished chemist, a devoted teacher and mentor, a dear friend and colleague, and a deeply committed member of the University. But he was more, too—he had a rare combination of talents and a deep passion for life. The many who eulogized him at Rockefeller Memorial Chapel in June gave testimony to the lives he touched. This issue attempts to take measure of his remarkable legacy. It marks with sadness the passing of a colleague who was still young and had much more to give. Most of all, it celebrates an extraordinary life.



Memory Eternal, dear Greg!

A man of many talents, Hillhouse left a legacy far beyond chemistry

Greg Hillhouse used to joke that his hands were “touched by God.” He was only half kidding. A professor of chemistry at UChicago since 1983, Hillhouse was recognized internationally for his contributions to synthetic chemistry and our understanding of reactivity and chemical bonding. His discovery in 2001 of what he affectionately called “Double Nickel” overturned old assumptions about the impossibility of multiple bonds among late transition metals. This and other achievements earned him the American Chemical Society’s National Award in Organometallic Chemistry in 2013.

But Hillhouse was much more than an accomplished chemist. He was a devoted teacher and mentor to the many students who took his lecture courses, worked in his lab, or found their way to his office seeking advice about courses, or just engaging conversation. He was a fiercely competitive athlete who organized dynastic intramural teams in basketball and softball, banged elbows with Barack Obama and others in pickup basketball, and championed UChicago teams. He also was a talented gourmet cook, a skilled painter, and an enthusi-

astic collector of fine wines, a bon vivant who lived life to the fullest. He seemed to excel at everything he touched.

“Greg was a pillar of excellence in our department and the University,” said Richard Jordan, chairman of the Chemistry Department. “As a world-class researcher, dedicated mentor and role model for his students, and engaged citizen of the University, he epitomized what the University is all about. His research will inspire new lines of inquiry in inorganic chemistry for decades and the influence he had on his students will reverberate for generations. He was a great friend and superb colleague who will be sorely missed by many.” Hillhouse died on March 6 after a short bout with pancreatic cancer. He was 59.

Gregory L. Hillhouse was born in Greenville, SC on March 1, 1955. When he was five or six he received a chemistry set for Christmas. “He was a curious kind of kid,” said his cousin Denise Burckhalter. “After that first chemistry set, it just kind of grabbed him.”

His high school chemistry and physics teacher encouraged his interest in science. He went on to earn a BS in chemistry from the University of South Carolina and, in 1980, a PhD in inorganic chemistry from Indiana University Bloomington. He spent three years on a post-doctoral fellowship at the California Institute of Technology before joining the UChicago faculty in 1983. Despite offers from other institutions, he never left.

Hillhouse was both fun and fun loving. He did not take himself too seriously, but no one doubted his commitment to science. His long interest in the chemistry of nitrogen in transition metal compounds sprang from his doctoral research. Later, he became known for creating organometallic compounds that shed light on the otherwise unseen intermediates involved in catalytic reactions. His work had applications in a wide range of processes, including the development of pharmaceuticals, the operation of catalytic converters, and the combustion of rocket fuel. He published many papers, lectured internationally, and held visiting professorships at MIT and Caltech.

Those who knew him say his greatest legacy may have been as a teacher and a mentor. His dedication to students and to teaching was legendary. Jonas Peters, now a professor at Caltech, recalled that when he was still a UChicago undergraduate, Hillhouse stayed up all night with him to complete a poster he was scheduled to show the next day at an American Chemical Society conference in San Francisco. Then he dragged all his chemistry friends over to see it.

“He loved to talk to young people about science, to get them into it, to try to get them interested,” said Surrey Walton, a professor of pharmacy administration at the University of Illinois-Chicago, and one of Hillhouse’s close friends. “He was completely devoted to them.”

Of his many gifts, perhaps his greatest, was the gift of humanity. He cared a lot about science, but he cared even more about people. “He never forgot that science and chemistry are human enterprises, are studied by people,” said Michael Hopkins, a friend and colleague in the Department of Chemistry. “More than just outgoing, what made him

special was that he was very humane. He thought about people doing science not just science itself.”

Hillhouse loved sports, especially basketball and softball. He organized intramural teams in both sports—and made sure he was on the winning side. Under his leadership, teams like Old World Fat, Team Beer, and Group VI dominated the court and softball field. “He was a tremendous basketball player,” said Walton. He specialized in an unusual dribble-and-twist shot, a kind of hook that was both odd and deadly. He had a unique talent for using the backboard. “Even at angles you do not normally see, he could bank it in,” said Walton. “It looked like an accident if you didn’t know him.”

One of his greatest passions was cooking. He used only the best ingredients—saffron, goose liver flown in from New York, the choicest cuts of beef. He threw memorable dinner parties. Sergey Kozmin, a professor of chemistry at UChicago, would fly back from visits to Russia carrying cans of fine caviar for Hillhouse. “He had as much appreciation for caviar as a Russian would,” Kozmin said. He once outbid everyone else in a charity auction for a chance to spend a day as a sous-chef in Charlie Trotter’s restaurant. He was surprised how small the kitchen was.

He loved collecting wine. He attended wine auctions, joined wine-buying clubs, and took trips to California wine country. His collection included California’s Scarecrows, French Bordeaux, and an impressive “vertical”—several succeeding vintages together—of \$700-a-bottle Australian Penfolds Grange. He sometimes celebrated his birthday by uncorking a wine of his own vintage.

Hillhouse disliked formality. He could affect a California surfer slang, delivering it with a leavening of his Carolina drawl. “Hey, man,” he might say. “Let’s go get a marg.” (He liked margaritas.) When Mitch Smith met Hillhouse as a graduate student in search of a school, he arrived at Hillhouse’s apartment buttoned up for an interview. Hillhouse met him at the door wearing a ragged t-shirt that quoted the Rolling Stones: “It’s Only Rock ‘n Roll.” Smith knew then that UChicago was the place for him.

Hillhouse was fiercely independent. And whether on the court or in the lab, he was utterly confident in his own abilities. He wrote his PhD dissertation and early manuscripts without seeking help. “Greg did not play things safely,” said Peters. “He did everything his own way. He pushed boundaries.” One way was in his friendship. He made friends with everyone, including undergraduates, graduate students, postdocs, and assistant professors. His outgoing nature overflowed the normal barriers of university life. “He wasn’t interested in barriers,” said Peters.

He was also fiercely honest. “He could play political games with the best of them, but he chose not to,” said Richard Jordan. “He always told you exactly what he felt.” He tried to do the right thing, Jordan said, not the expedient thing.

His generosity was legendary. He took friends to dinner, brought them to Bulls games, bestowed lavish gifts on their children. But the

most vivid examples of his generosity were little known. The AIDS crisis shook Hillhouse, especially when a close friend died. And so during the 1990s he volunteered regularly at a Chicago AIDS hospice, cooking lavish gourmet meals on Saturday nights. He enjoyed the chance to cook in the full-blown French style, rich with cream, butter, and fats, because, well, the patients needed the calories.

Hillhouse was outgoing and gregarious, but he was also intensely private. He kept some parts of his life separate. He became devoutly religious in later years, attending services at First St. Paul’s Lutheran Church on North LaSalle in downtown Chicago. He knew the Bible extremely well. “His favorite miracle was when Jesus turned water into wine,” said Walton. “He talked about that a lot.”

It also took Hillhouse many years before he felt confident enough to reveal to friends and colleagues that he was gay. “He was afraid it might hurt his career,” said Walton. But he had powerful loyalties there, too. He attended the annual gay pride parade on Chicago’s North Side and flew a rainbow flag off the deck of his condominium on Sheridan Road. “It made him very angry when people discriminated against gays,” said Walton. “He took a lot of satisfaction in seeing how fair and more accepting society was becoming during his lifetime.”

Students knew him simply as “G.” In later years, after his discovery of multiple bonding among transition metals, a few friends jokingly referred to him as “Double Nickel.” Hillhouse had an outsized personality that made a strong impression on everyone who knew him. He liked to laugh, go to parties, and cook incredible meals for friends. When prospective graduate students visited the Chemistry Department, it often fell to Hillhouse to take them out. He made them laugh; he showed them a good time. When the chemistry faculty took visiting speakers to dinner on Monday, they often went to La Sardine, a French bistro, where wine was half price. “What do you say, guys?” Hillhouse would ask. “We could buy the California pinot noir for \$80 and save the department \$40, or we could go for the French burgundy at \$200 and save the department \$100.” Hillhouse “saved” the department a lot of money that way.

Hillhouse devoted himself with rare energy, intelligence, and spirit to chemistry, but also to students, to colleagues and friends, to life itself. “He was someone who always managed to take full advantage of every opportunity in life,” said Hopkins. “He really enjoyed life and being with people, and just got the most out of every moment.”

The most recent research to bear Hillhouse’s name appeared after his death, in the April 30 issue of the Journal of American Chemical Society (JACS). The main author is Vlad M. Iluc, previously a Hillhouse graduate student, now an assistant professor of chemistry at the University of Notre Dame. The title is “Three-Coordinate Nickel Carbene Complexes and Their One-Electron Oxidation Products.” And there, in the middle, sits Double Nickel.



Gregory L. Hillhouse, science

By Daniel J. Mindiola
 Presidential Professor, Department of Chemistry,
 University of Pennsylvania
 Postdoctoral Fellow, Hillhouse Group (2000–2002)

Gregory Lee Hillhouse was a purest and a true fundamentalist who was trying to understand structure and bonding in simple organic and inorganic molecules combined. As an undergraduate at the University of South Carolina with Professor Edward Mercer, Greg became interested in the chemistry of transition metals. Since his early days as a graduate student in the laboratories of Professor Barry Haymore at Indiana University Bloomington, Greg developed a passion for classical coordination chemistry and the ability of transition metals (both early, middle, and late) to stabilize unusual scaffolds and molecules that would otherwise, in their free form, be considered impossible to isolate and study. During his time at Indiana, Greg began exploring fundamental coordination chemistry involving nitrogen and energy-rich molecules such as organic azides and diazoalkane derivatives. It was during this stage in his career that Greg fell in love with metal–ligand multiple bonding. Having completed his PhD, Greg headed west to the California Institute of Technology to work for Professor John Bercaw in the chemistry of early transition metallocenes with small molecules such as water and ammonia. Even today, the work produced by Greg is still cited because of the importance of converting thermodynamically stable resources, such as water and ammonia, to more value added products. This work has over 160 citations. During this time,

Greg's passion for nitrogen rich molecules was prevalent, with these being an integral part of a series of studies with group 4 transition metals. The early 1980s were an exhilarating time in the Bercaw group. It was during this era that future legends in inorganic chemistry were being cultivated: Peter Wolczanski (Cornell), James Mayer (UW-Seattle), Dean Roddick (Univ. of Wyoming), Gerard Parkin (Columbia), Michael Fryzuk (UBC), Vernon Gibson (Imperial College and now Chief Chemist at British Petroleum), Mark Thompson (USC), Ayusman Sen (Penn State), Pamela Shapiro (Univ. of Idaho), T. Don Tilley (Berkeley), Antonio Togni (ETH Zurich), and Don Berry (UPenn), and many others, including Greg.

From the start of his independent career at the University of Chicago in 1983, Greg began exploring the chemistry of carbon dioxide as well as a close relative but more reactive molecule, carbon suboxide ($\text{O}=\text{C}=\text{C}=\text{O}$). Other reactive and high energy molecules then considered too reactive to isolate or study would soon be prepared in the Hillhouse group. His strategy was to synthesize these reactive small molecules once they were bound to a coordinately saturated metal center. By doing so, Greg was able to prepare stable compounds having coordinated diazene, nitroxyl, and nitric oxide ligands. While the former is an intermediate in route to the oxidation of rocket fuel, hydrazine, the latter two, HNO and NO , are central to cellular signaling and involved in many physiological and pathological processes bordering the fields of immunology, neuroscience, and physiology. Nitroxyl is particularly unstable and is proposed to be produced in the reduction and protonation of NO , a free radical found in small concentrations in cells and key to cell signaling. Heavier congeners of hydrazine, $\text{H}_2\text{P}-\text{PH}_2$, were also explored, but with little success given its poor ability to bond to metals. Future work also expanded to using greenhouse gases such as nitrous oxide (N_2O) as selective O-atom transfer reagents. This particular reagent has garnered incredible interest in oxidation catalysis

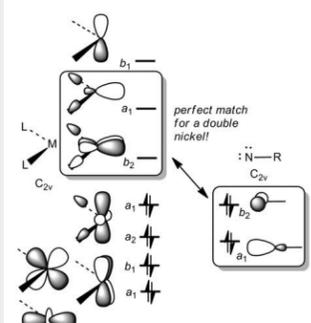
given its high energy (but being kinetically sluggish), resourcefulness, as well as nontoxic nature. Because nitrous oxide is a poor ligand to metals, Greg explored reactive metal–carbon bonds that could insert this kinetically inert molecule and then oxidize the $\text{M}-\text{R}$ group to $\text{M}-\text{OR}$ with ejection of a benign side product such as N_2 . It was also during this epoch that Greg began exploring oxidation reactions (where electrons are being removed) as a route to promote bond forming processes (reductive elimination). Oxidatively induced reductive elimination is an important reaction to forming $\text{C}-\text{X}$ bonds (where X is a heteroatom such as N , O , or S) and the Hillhouse group played an integral part in understanding how oxidants participate in this process. His group also explored strained $\text{M}-\text{C}$ bonds that found a way to insert nitrous oxide without ejection of N_2 . By doing so, his group was the first to isolate a complex with N_2O as part of the supporting ligand. Even more exciting was the fact that these complexes could eliminate N_2 upon oxidation of the ligand. This novel approach still holds great promise as a route

to using a greenhouse gas such as N_2O as a reagent for O-atom transfer. In the late 1990s, Greg began exploring the chemistry of nitrenes (NR , where R is an organic group), a type of reactive radical species integral to formation of molecules such as aziridines that are important in pharmaceuticals. Nitrenes, carbenes, and oxenes are all reactive species essential in oxidation chemistry. Since the 1880s, chemists have been exploring their potential use in bond insertion chemistry (known as the Buchner–Curtius–Schlotterbeck reaction), while organic chemists have applied this methodology of group transfer for the construction of important compounds having biological and pharmaceutical uses. Physical chemists have also been fascinated by the properties of these species given their diradical character. Biology has found a way to harness the reactivity of molecules such as oxenes by using highly sophisticated architectures defined as cytochromes. These molecular machines—so-called monooxygenases—are instrumental in catalyzing over 75% of metabolic reactions in the body.

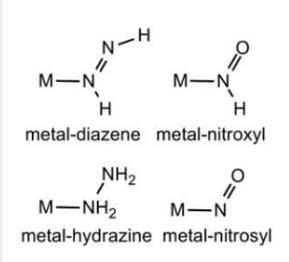
Greg's obsession with nitrenes was further exacerbated (a word Greg always enjoyed using) by the fact that late transition metals were considered too electron rich to stabilize such a group. Early transition metals were known to stabilize nitrenes, but the products derived from combination of the two resulted in very stable species because of the very strong $\text{M}-\text{N}$ multiple bond. Low-coordination numbers were required for chemistry to be unlocked with the early transition metals. Greg combined two and two, and his epiphany was to support a late transition metal nitrene by constraining the geometry to three-coordinate and by using strongly donating ligands to stabilize the metal center. This was not unknown, but Greg unlocked the secrets of this approach from a textbook published by one of his late colleagues at the University of Chicago, Professor Jeremy Burdett. In his coauthored textbook, *Orbital Interactions in Chemistry*, it is stated that bent, two-coordinate fragments of identical electronic configuration to nickel(II) are isolobal or nearly congruent to a nitrene, carbene, or oxene fragment! Taking advantage of this information, Greg devoted his efforts to prepare stable forms of late-transition metal nitrenes. In 2001, I was fortunate enough to help construct such a molecule, and soon thereafter, the carbene and phosphinidene (heavier congener of a nitrene) derivatives were prepared. Greg later demonstrated that these systems could indeed perform transfer reactions to form important organic molecules such as aziridines, cyclopropanes, and phosphiranes. Depending on the nature of the reagent, Greg discovered compounds that could deliver the nitrene group catalytically. It was only a question of time before lower-coordinate nitrenes of nickel were assembled. By making these compounds even more unsaturated, Greg was able to take advantage of the intrinsically reactive $\text{Ni}-\text{N}$ multiple bond and thus explore remarkable transformations such as the amination of carbon–hydrogen bonds. It would be only a question of time before Greg would isolate stable oxene complexes but unfortunately, his life was cut short. These species, if prepared, could teach us about electrophilic single atom oxygen sources, and reveal hidden secrets involved in worldwide applicable processes such as water oxidation that is becoming so important in the context of energy and a hydrogen economy.



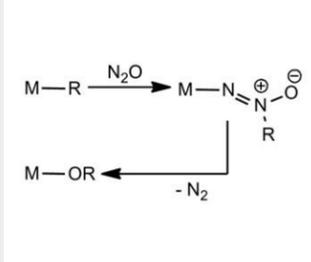
HILLHOUSE, GREGORY



perfect match for a double nickel!



metal-diazene metal-nitroxyl
 metal-hydrazine metal-nitrosyl



$\text{M}-\text{R} \xrightarrow{\text{N}_2\text{O}} \text{M}-\text{N}=\text{N}^+\text{O}^- \xrightarrow{\text{oxidation}} \text{M}-\text{OR} + \text{N}_2$

Some examples of reactive small molecules studied by Greg Hillhouse. M represents a generic metal complex.

N_2O (nitrous oxide) insertion into a reactive $\text{M}-\text{C}$ bond and subsequent oxidation to the alkoxide.

Hillhouse celebrated as chemist, teacher, and friend to the University



Jordan praised Hillhouse's character and called him
a "pillar of excellence in the University."

Greg Hillhouse touched many lives at the University of Chicago. Nowhere was this more in evidence than at the memorial service held for him at Rockefeller Memorial Chapel on June 5, 2014. On a brilliant spring afternoon, chemists and colleagues, students and graduates, friends and members of the wider University community gathered to remember Hillhouse and celebrate his life.

He was, as the Rev. Dr. Elizabeth Davenport, dean of Rockefeller Chapel said at the outset, "a larger than life presence among us."

With the afternoon sun slanting down through the chapel's high west windows, a long line of speakers bore testimony to those words. Hillhouse was a pioneering synthetic chemist, but many spoke of him more personally, recounting memories of times shared in the lab, on the court, or in a variety of social settings. They told stories—or did not tell stories—to evoke his generous, fun-loving spirit, his intense loyalty to friends, and his devotion to the institution where he spent almost all of his professional life.

"I'm sure there are a million Greg Hillhouse stories, and I have my share," said Richard Jordan, chairman of the Chemistry Department. "But we're in a cathedral, so I should probably skip most of them."

Jordan praised Hillhouse's character and called him a "pillar of excellence in the University." He recalled how as the Department of Chemistry's chairman he knew he could count on Hillhouse to say "exactly how he felt." He knew, too, that Hillhouse would live up to his obligations unflinchingly. "Greg

was clearly a very complex person, as we all are, but for me one word captures the essence of his character, and that word is integrity," he said.

Michael Hopkins, professor of chemistry and an old friend, recalled Hillhouse as he was more than three decades ago, when Hillhouse was a postdoc at Caltech and Hopkins was a graduate student. "If you think about Greg and his personality and his zest for life, and then move back 35 years and imagine that with more energy and good knees, it was really something to behold," he said.

He spoke of Hillhouse's long service to the University. "I don't think that's really an adequate term for Greg," he said. "There's a whole level beyond service. He didn't do service; he gave and he gave and he gave. He was deeply involved in the lives of students. He insisted that the University do its best for students."

Jim Norris, the Robert A. Millikan Distinguished Service Professor Emeritus in Chemistry, recalled how Hillhouse's deep commitment to teaching endured to the end. Not long after he learned he had cancer, he told Norris, "I hope to be able to continue to lecture as much as possible, as I also enjoy teaching very much."

Some speakers testified to Hillhouse's love of intramural sports and affection for UChicago athletes. He received the Athletic Department's Starkey Duncan award in 2009, wore proudly his UChicago letterman's jacket, and enjoyed the use of a special locker in the Gerald Ratner Athletic Center. He was a familiar face at games.

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“Greg was a special man, and he made our student athletes feel special,” said Brian Baldea, associate director of athletics and head baseball coach. “They relied on his advice when selecting classes, creating presentations, applying for study abroad, and just in general navigating the College. So Greg’s care and assistance went far beyond chemistry.”

Vera Dragisich, senior lecturer and executive officer in the Chemistry Department, came to UChicago as a PhD student in 1985. Although not a member of Hillhouse’s research group, she recalled how she and others “pretty much grew up scientifically with Greg as a mentor.” He was “extremely generous with his time, his knowledge, and his resources,” she said. She also learned how to eat with chopsticks at Thai 55, a restaurant near campus, she said, “because Greg wouldn’t let us use a fork. This was a classic example of some of Greg’s tough love.”

Sergey Kozmin, who came to UChicago to earn a PhD in chemistry, said conversations with Hillhouse influenced him and others to pursue academic careers. Later, when he returned to the University in 2000 as a member of the faculty, he was assigned an office in Hillhouse’s suite. “We had many memorable long conversations, awesome dinners, and excellent bottles of wine,” Kozmin said. Hillhouse “was always there when I had to vent my frustrations, when I had questions. He was always generous sharing his own experience and his own stories.”

Jonas Peters, professor of chemistry at Caltech, delivered in

some ways the afternoon’s most emotional testimony. He described how Hillhouse gave him encouragement when he was a UChicago undergraduate, helped him finish chemistry projects, and challenged him and others during group meetings in his office to do better. “In the arc of my life, since I met Greg some 24 years ago, I can draw many lines, ones that now lead to my wife and son, and they all seem to find Greg, my dear dear friend and mentor, at their origin,” he said.

Hillhouse loved rock and roll, especially the Grateful Dead. It was fitting, then, that stories of his life should alternate with interludes of the mellow music of Jerry Garcia—for the first time, perhaps, performed on pipe organ and ukulele.

In the end, many speakers reflected on Hillhouse’s legacy. They spoke of his enduring influence on students, colleagues, and the wider University. They said he had set an example for them all. “I think everyone he’s touched, really the thing for everyone to do is go forward and live up to the standards Greg set,” said Milton “Mitch” Smith, professor of chemistry at Michigan State University.

“It’s sad that Greg has left the court so early,” said Edward “Rocky” Kolb, professor of astronomy and astrophysics and dean of the Division of the Physical Sciences. “But Greg’s spirit is still here. Let us honor Greg by dedicating ourselves to finding and mentoring colleagues who will fill his shoes.” But they will be hard shoes to fill.



Faculty Recollections

I knew Greg personally for the three years between my arriving on campus and his passing. During this time, Greg, more than any other individual, epitomized to me the spirit of the University of Chicago and the Department of Chemistry in particular. He was proud, confident, and deeply committed to his research and to the University. I had much to learn from Greg, but his legacy will continue to have an oversized impact on me and many others far into the future.

Jared Lewis
Assistant Professor in Chemistry

Greg Hillhouse embodied a rare combination of personal qualities and scholarly achievements. Most of Greg's career was spent at the University of Chicago, which he loved and to which he was devoted. Because our scientific interests overlapped, I had many occasions to interact with him and his students and to benefit from his insightful observations. I also was able to observe first-hand his dedication to mentoring his students—undergraduate, graduate, and postdoctoral—many of whom have gone on to distinguished careers, shaped at least in part by the values imparted by their mentor. He has served—and continues to serve—as an inspiring role model. Always enthusiastic and optimistic, Greg brightened the lives of all around him. He was a highly valued friend and colleague who will be sorely missed.

Jack Halpern
Louis Block Distinguished Service Professor
Emeritus in Chemistry



Gregory L. Hillhouse Memorial Chemistry Undergraduate Fund Donors

Mark Banaszak-Holl	Hillhouse Undergrad SB'86
John Bercaw	Postdoctoral Advisor
Stephen Buchwald	Postdoctoral Colleague and Friend
Laurie Butler & Michael Stein	Faculty Colleagues
Sara Chamberlin	Engel Graduate Student
Sarah Del Ciello	Hillhouse Undergrad SB'13
Aaron Dinner	Faculty Colleague
Vera Dragisich	Wulff PhD'90, Colleague
Scott & Shelly Gilbertson	Wulff PhD'88
Harry Gray	Caltech Colleague
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Adam List	Hillhouse PhD'91
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Alex Miller	Hillhouse Undergrad SB'05
Davis Moravec	Hopkins PhD'13
James & Carol Norris	Faculty Colleague
Robert Opila	Gomer PhD'82
Michael Paul	Tian Undergrad SB'14
Jonas Peters	Hillhouse Undergrad SB'93
John Rose	Berry PhD'92
Craig Thompson & Tullia Lindsten	Colleagues
Don & Rosemary Tilley	Postdoctoral Colleague and Friend
Alan Vaughn	Hillhouse PhD'90



SUPPORT THE DEPARTMENT OF CHEMISTRY Scientific research is an endothermic process: it requires constant external inputs to continue. The Department of Chemistry has established the Gregory L. Hillhouse Memorial Chemistry Undergraduate Fund to honor Greg's legacy. This fund will support an annual Gregory Hillhouse Lecture, for which the undergraduate chemistry majors will invite and host prominent speakers. The fund will also support fellowships to enable undergraduate chemistry majors to pursue research in chemistry labs in the summer. The Department of Chemistry will provide a 2/1 match for all contributions to the fund. Contributions should be sent directly to:

The University of Chicago Department of Chemistry
Attn: The Gregory L. Hillhouse Fund
5735 South Ellis Avenue
Chicago, IL 60637

Donations can also be made online at tinyurl.com/donatehillhouse.

The Hillhouse Legacy page can be found at tinyurl.com/ghillhouse.

The students, faculty, and staff of the department are grateful for your support.

LET'S KEEP IN TOUCH The Department of Chemistry is updating its records. Send your current e-mail address and other contact information to chemistsclub@uchicago.edu.

LINK WITH US The Department of Chemistry encourages all alumni to connect with current chemistry students and each other on LinkedIn. The department's group can be found at tinyurl.com/7efp2t2.

Undergraduate lecture and research fellowships to honor Hillhouse's legacy

Greg Hillhouse was instrumental in the formation of Benzene, UChicago's undergraduate chemistry society. Now, the annual Benzene lecture has been renamed in his honor. The Gregory L. Hillhouse Memorial Lecture will be given each year by a prominent scientist invited and hosted by undergraduate chemistry majors.

The honor of the first Hillhouse Lecture went to Jonas Peters, a UChicago graduate and professor of chemistry at Caltech. He delivered the lecture in Kent Hall on May 16, speaking on "Catalytic reduction of nitrogen to ammonia by mononuclear iron complexes."

To support the lecture series and honor Greg's legacy, the Department of Chemistry has established the Gregory L. Hillhouse Memorial Chemistry Undergraduate Fund. The fund will also pay for fellowships to help undergraduate chemistry majors pursue summer research. Hillhouse often lobbied the Department of Chemistry and University administration to increase funding for undergraduate research, which he considering an important part

of undergraduate education. The department will match contributions to the fund with a 2 to 1 match.

Peters was a fitting choice for the first Hillhouse Lecture. He worked in Hillhouse's lab as an undergraduate himself. He remembers going to Hillhouse's office after several other professors had turned him down. "Do you have any space this summer?" he asked. Hillhouse looked at him. "Well," he said. "Do you play softball?"

It was the beginning of a long friendship. "I'm not sure I could be the undergraduate research advisor he was to me," Peters said. He went on to become a professor at the same institution where Hillhouse had worked as a postdoc before coming to UChicago.

Peters specializes in inorganic chemical synthesis. His group at Caltech does research in, among other areas, multi-electron redox reactions of small molecule substrates using late first row transition metals, and dicopper cores as multi-electron redox shuttles and photochemical reductants. He said Hillhouse taught him that "science can be fascinating and inspiring and important—and a good deal of fun."

The Hillhouse Group

CURRENT GRADUATE STUDENTS

Chris Hansen

Frank Olechnowicz

Junjie Zhai

GROUP ALUMNI (AND CURRENT POSITION)

POSTDOCTORAL RESEARCHERS

Steven Baldwin (2010–2014), Bridgestone

Runyu Han (1995–1997), Pfizer Pharmaceuticals

Stephen Lee (1984), Professor - Cornell University

Phillip T. Matsunaga (1991–1993), ExxonMobil Chemical

Daniel J. Mindiola (2000–2002), Professor - University of Pennsylvania

Robert Scott (1990), Physician - Toms River, NJ

GRADUATE STUDENTS

Tan-Yun Cheng, PhD'94, Research Fellow - Brigham & Women's Hospital

Eric Hamp, SM'08, Lawyer - Banner & Witcott Ltd.

Nicole Harrold, PhD'11, Postdoc - Ohio State

Vlad Iluc, PhD'09, Assistant Professor - University of Notre Dame

Beatrice Lin Kendall, PhD'00, Teaching Associate - Skidmore College

Kristina Kitiachvili, PhD'05

Kwangmo Koo, PhD'96, Johnson Matthey Co.

Elizabeth Lane, SM'09, PhD program - Brown

Carl Laskowski, PhD'10, Postdoc - Caltech

Sonja Lee, SM'94

Adam K. List, PhD'91, Senior Lecturer - Vanderbilt University

Milton R. Smith III, PhD'90, Professor - Michigan State University

Joel S. Southern, PhD'99, Head Baseball Coach - Elmhurst College

Justin Teesdale, SM'14, PhD program - Harvard

G. Alan Vaughan, PhD'90, ExxonMobil Chemical

Rory Waterman, PhD'04, Associate Professor - University of Vermont

Leslie White, SM'95, Sherwin-Williams Co.

UNDERGRADUATE STUDENTS

Janann Ali, Undergrad RA'92, Lawyer - McCarter & English LLP

John Anderson, SB'08, SM'08, Postdoc - Northwestern

Robert Blake, Undergrad RA'87, Professor - Glendale Community College

Carl Brozek, SB'10, PhD program - MIT

Donnie Bungum, SB'09, PhD program in Philosophy - St. Louis University

Paul Clark, Undergrad RA'89, Sr. Research Scientist - SC Johnson

Christopher Clough, SB'02, SM'02, Senior Scientist - SAFC Hitech

Amanda Corcos, SB'10, PhD program - University of Wisconsin-Madison

Barbara Coughlin, SB'87, Senior Manager - Environ

John Curley, SB'04, Senior Scientist - Primus Power

Sarah Del Ciello, SB'13, PhD program - Caltech

Jeffrey Dysard, SB'95, Director of R&D - Cabot Microelectronics

Dan Frankel, Undergrad RA'87, Radiologist (Palos Heights, Illinois)

Peter Hattan, SB'99, Private sector (Brooklyn, NY)

Corinna Hess, SB'96, Lecturer - Durham University (UK)

Mark Banaszak Holl, SB'86, Professor - University of Michigan

Reda Karaliukas, AB'00, Doctor of Chiropractic

Ronald Keys, Undergrad RA'88, Science Instructor -

Chippewa Valley Technical College

Seok Kim, AB'89

Peter Konidaris, Undergrad RA'89, 10AK Group (UK)

Samuel Lee, AB'86, Hewlett Packard

Jared Linebarger, SB'98, Physician -

Gundersen Lutheran Hospital Oncology

Jon Malinoski, SB'98, Industry/Materials Manager - General Cable

Andrew Margolskee, AB'11, Teacher - George Washington HS

Theodore Matson, SB'06, Postdoc - UVA

John Mavropoulos, SB'95, Dermatology Residency - Johns Hopkins

John Mark Medley, Undergrad RA'95, PhD'10 in ChE -

University of Kentucky

Alexander Miller, SB'05, Assistant Professor - UNC-Chapel Hill

Jonas Peters, SB'93, Professor - Caltech

Adrian Ponce, Undergrad RA'93, Jet Propulsion Laboratory

Arvind Rajpal, Undergrad RA'90, Pfizer R&D

Peter Rupert, Undergrad RA'85, Cocrystal Discovery Inc.

Lee Shephard, Undergrad RA'83, Thirone Corporation

Nathaniel Sherden, SB'04, Postdoc - John Innes Centre (UEA)

Christopher Sherwood, AB'92, Cisco Systems

Chadwick Sofield, Undergrad RA'88, Moses Lake Industries

Andrei Straumanis, Undergrad RA'89, Consulting Executive Editor - POGIL

Andrew Tennyson, SB'03, SM'03, Assistant Professor - Clemson University

Niklas Thompson, SB'13, PhD program - Caltech

Ryan Witzke, SB'14, PhD program - UC Berkeley

Ben Wolf, SB'85, Cinematographer - NYC

Annita Zhong, Undergrad RA'94, Irell & Manella LLP





Gifted scientist, Hillhouse stood out as teacher and mentor

One morning last January, Michael Hopkins arrived at his office to find a message from his friend and colleague, Greg Hillhouse. It contained grim news. Hillhouse said he had been diagnosed with inoperable pancreatic cancer.

But he did not dwell long on his illness. He quickly turned the subject to that day's lecture in Chemistry 201. Would Hopkins, a fellow inorganic chemistry professor, deliver it in his place? That was not all. In a series of exchanges that morning, Hillhouse communicated precise instructions on what Hopkins should say. "He really wanted to make certain I covered all these points," Hopkins said. "It was really important to him that the students received the best possible lecture." That was typical of Greg Hillhouse. He always seemed to put his students first.

Hillhouse's concern for students expressed itself partly in his service to the University. Among other things, he was the Chemistry Department's undergraduate advisor. One of his favorite causes was summer research for undergraduates. He believed research was an essential part of their scientific education, and he lobbied hard for the University to provide more opportunities.

John Boyer, dean of the College, said he often consulted Hillhouse on issues related to science education. "Greg had a very good sense of what was possible, in terms of what would work and not work in students' culture," Boyer said. He added that Hillhouse "was very dedi-

cated to maintaining the highest standards of rigor and pedagogical impact in teaching, but he also was concerned for the personal welfare of students." Hillhouse was also a champion of undergraduate athletes. Once, speaking to a group of them, he said, "I'm in awe of what you do." The feeling was reciprocal.

Less well known was Hillhouse's service on the College's disciplinary committee, three years as its chairman. Once he and the other members heard the case of a young woman who had stolen from her fellow students. They recommended counselling. When it became clear that the woman had no family or resources to fall back on, Hillhouse quietly offered to pay for it. "To me this memory captures Greg's essential character," said Susan Art, who was dean of students at the time. Even as he fulfilled many institutional roles, she said, "he also saw each student's humanity and put himself in the service of supporting what is essentially good and promising in each person."

Hillhouse's efforts on behalf of students often went on quietly and behind the scenes. He did much that would never appear on a resume. He never asked for acknowledgments or recognition. But inevitably, recognition came. Among the many awards he received were the Llewellyn John and Harriet Manchester Quantrell Award for Excellence in Undergraduate Teaching in 1997; the Starkey Duncan Award, given to him in 2009 in recognition of his service to UChicago athletes; and the alumni's Norman Maclean Faculty Award in 2011.

For Hillhouse there was no clear line between chemistry and the rest of life. His students and postdocs worked hard in the lab; then they moved to a restaurant, a softball game, or maybe even a camping trip with another lab. "We all worked hard and we played hard, and Greg was there with us on both accounts," says Vera Dragisich, a former UChicago PhD student and now senior lecturer and executive officer in the Chemistry Department.

Some of Hillhouse's students went on to distinguished careers in chemistry, earning degrees at prominent institutions like Caltech and MIT. But much of the conversation in his office, or over dinner, had little to do with chemistry. Malcom Forbes, a professor at the University of North Carolina at Chapel Hill, came to UChicago in 1983 as a PhD student and was assigned a desk in Hillhouse's lab. He recalled "long conversations well into the evenings in Searle, about life, science, and everything in between." Hillhouse, he said, "gave me great advice that made all the difference for my future endeavors. He was a special person."

One quality that stood out in Hillhouse was that it mattered little where you stood in the academic pecking order. "He was always eager to talk with me about my research," said Ryan Witzke, a recent UChi-

[Malcom Forbes] recalled "long conversations well into the evenings in Searle, about life, science, and everything in between." Hillhouse, he said, "gave me great advice that made all the difference for my future endeavors. He was a special person."

cago undergraduate and coleader of the undergraduate chemistry club, Benzene. "Besides helping me develop my lab skills, he was also a very good friend."

And then, his role did not end when you graduated or left the lab. Membership in the Hillhouse Group "lasted a lifetime," said Steven Baldwin, a recent postdoc in his lab. "And the key to that membership was that Greg never stopped trying to help you."

Once, during a rough patch in his career, Mitch Smith talked to his old advisor over the phone. One of Hillhouse's first PhD students, Smith had gone on to become a professor of chemistry at Michigan State University. But people had been questioning his work, asking why is this important? "What you need to do is whatever you think you want to do," Hillhouse told him. It was just the advice he needed. "He really galvanized me to move forward," Smith said. "I simply couldn't have been able to do what I've done or influence the students I have without Greg."

It is no surprise that, even toward the end, Hillhouse's thoughts turned toward his students. Hillhouse worried that the members of his group publish as much research as they could in the time he had left. He talked with them often about his plans for them during the coming months. "That was Greg in a nutshell," Baldwin said. "He chose to spend the little time he had in the service of others. That was really a key feature of Greg's life."

the chemists club

Fall 2014

Dear friends,

Greg Hillhouse was dear to us in so many ways: as a fellow scientist and world-class chemist; as a teacher and mentor whose generosity to students, postdocs, and junior faculty was legendary; as an exemplary citizen of the University; and most of all as a treasured friend and colleague over the 31 years that he was a member of the Department of Chemistry. In the 15 years we overlapped, I knew I could count on Greg's integrity and unflinching honesty. He was a pillar of excellence within the University. He also was a lot of fun. He loved life and lived it to the fullest. We remember and honor that side of him, too.

It is right that we honor Greg by devoting this issue of the Chemists Club to him. It is a small gesture, admittedly, but we hope it will remind us all just how extraordinary Greg was, and how much he meant to us. Even as we mourn his passing, I am glad we have this opportunity to celebrate his life and legacy.

To honor his memory further and to promote the cause of undergraduate education, which was so important to Greg, the department has established the Gregory L. Hillhouse Memorial Chemistry Undergraduate Fund. The Hillhouse Fund will support an annual lecture, delivered by a prominent scientist chosen and hosted by Benzene, the undergraduate chemistry club. In addition, the fund will support fellowships for chemistry majors to pursue summer research. Greg believed that participating in laboratory research was a vital part of an undergraduate science education, and he long argued that the University should provide more opportunities for it. I am delighted that we can honor Greg in this way. I invite friends of the department to honor Greg and support our undergraduate chemistry majors by contributing to the fund. The Department of Chemistry will provide a 2 to 1 match for all contributions.

The day Greg received his diagnosis, he quickly turned to the tasks at hand: arranging for someone to teach that day's Chemistry 201 class, and helping those in his lab to publish as much research as possible in the time he had left. We are keenly aware of the high standards he has set for us, as a talented scientist, as a devoted teacher, and as an independent spirit who gave so much to those around him. In that spirit we, too, look ahead to the task at hand, a new year of teaching and research.

I am pleased to welcome four new faculty members to the department: Bryan Dickinson, Yamuna Krishnan, Raymond Moellering, and Suri Vaikuntanathan. We are delighted that they are joining us. The next issue of the Chemists Club will highlight their research and teaching interests.

Best Regards,



Richard F. Jordan
Professor and Chair

