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Editorial

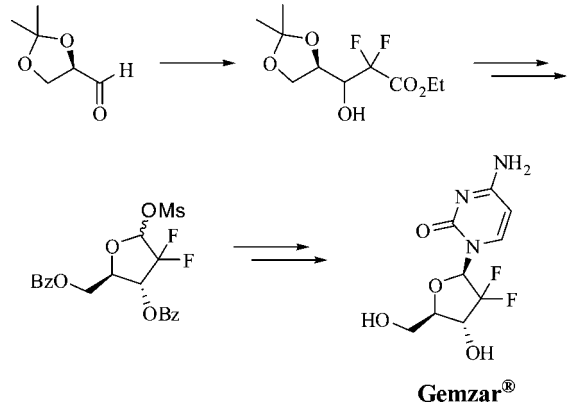
Christopher Randall Schmid 1959−2007

Dr. Christopher R. Schmid, Research Advisor at Eli Lilly and Company in Indianapolis, IN, U.S.A., formerly of Stratford, NJ, U.S.A., died of acute lymphoblastic lymphoma on December 26, 2007.

Born in Camden, NJ in 1959 to Mrs. Neida R. Schmid and Richard J. Schmid of Stratford, Chris graduated with academic honors from Sterling High School in 1977 where he was a star soccer player. He attended The King's College in Briarcliff Manor, NY, graduating in 1981 with a double-major in math and chemistry, and an active member of the intramural soccer team. He completed his Ph.D. in 1985 at Princeton University under Professor Martin Semmelhack in Organic Chemistry. Chris chose a postdoctoral appointment that would provide experience in total synthesis with Professor Clayton Heathcock at the University of California-Berkeley. As one of only three postdoctoral associates in the group, Chris provided leadership and mentoring for the 20+ graduate students in the group, while designing a new total synthesis of norsecurinine.

In 1987, Chris was hired into the Chemical Product Research and Development group at Eli Lilly and Company in Indianapolis. During a distinguished career as a process chemist, Chris contributed to the synthesis of pharmaceutical products Gemzar and Evista, as well as more than a dozen development drug candidates. He was promoted to Research Scientist, Senior Research Scientist, and in 2004 to Research Advisor. He published 13 papers on his work at Eli Lilly and received several patents. His work with the commonly used reagent glyceraldehyde acetonide resulted in a publication on a practical process to provide the reagent in enhanced chemical and optical purity, and an *Organic Syntheses* preparation. A follow-up publication showed the benefits of glyceraldehyde pentanide versus the acetonide. The glyceraldehyde chemistry was developed in support of the synthesis of Gemzar (see Scheme 1).[1] Chris' work

Scheme 1. **Synthesis of Gemzar from glyceraldehyde acetonide**



Gemzar®

on Evista resulted in a publication on the evaluation of alternate routes to the active pharmaceutical ingredient (API) (see Scheme 2).[2]

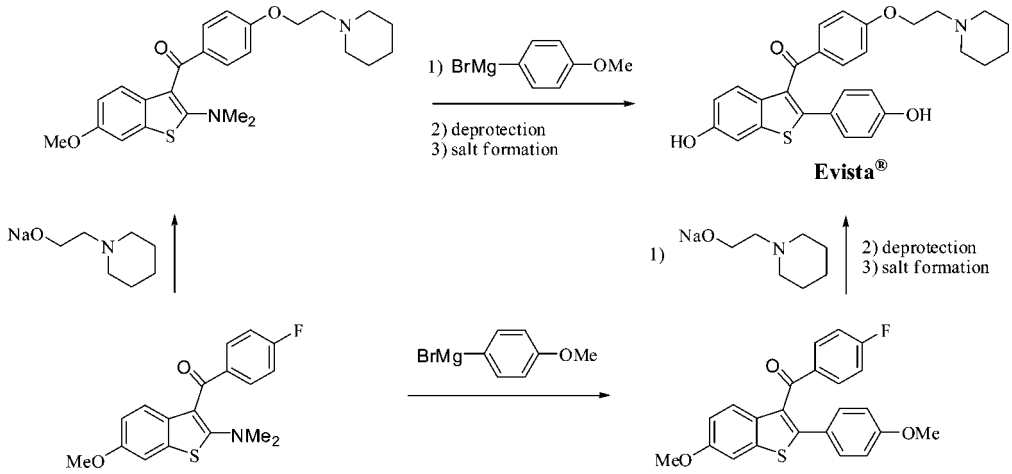
Lilly colleagues recognize Chris for his leadership in the area of intellectual property (IP) in process chemistry as he shared his keen knowledge via consultation and creation of an internal publication entitled "IP Monthly." Princeton and Eli Lilly colleague Dr. Christina Bodurow Erwin remembers Chris as an early adopter of the InnoCentive model, a spin-off company from Eli Lilly that seeks to match "seekers" with "solvers" in an open innovation environment. In the recently published book *Fast Innovation*, by Michael George, Chris is quoted in the chapter entitled "Applying the Intellect of the Planet." He posted a challenge to design a new synthesis of one of his key synthetic intermediates and said "I figured we could at least put the problem out there and see what happened. If we received a solution, great. If not, we were no worse off than before." This posting demonstrated Chris' propensity to be an early adopter and his readiness to reach out to tap the wisdom of the chemistry network. Dr. Erwin sees Chris' willingness "to try new things, even if they were not well accepted or understood by the mainstream, as his gift and contribution to science. What made him so successful was that he went about these innovative explorations in a even-tempered, objective way that created support and even excitement for the exploration he was pursuing."

Professor Martin Semmelhack provided these thoughts regarding the impact of Chris' Ph.D. thesis work that support the picture of an innovation-driven scientist. "My picture is of the poster boy for the term "clean cut"−wonderfully gentle, respectful of others, dedicated to the things he believed in, solid character, reliable, someone you can count on. However, if those

(1) (a) Schmid, C. R.; Bryant, J. D.; Dowlatzedah, M.; Phillips, J. L.; Prather, D. E.; Schantz, R. D.; Sear, N. L.; Vianco, C. S. *J. Org. Chem.* **1991**, *56*, 4056–4058. (b) Chou, T. S.; Heath, P. C.; Patterson, L. E.; Poteet, L. M.; Lakin, R. E.; Hunt, A. H. *Synthesis* **1992**, 565.

(2) Bradley, D. A.; Godfrey, A. G.; Schmid, C. R. *Tetrahedron Lett.* **1999**, *40*, 5155–5159.

Scheme 2. **Alternate routes to Evista**



words suggest someone soft and a follower, I should also add: ambitious, energetic, willing to try new things, forceful at the right times, a strong influence in the group. His spirit is represented by his thesis project. Everyone around him was working on transition metal chemistry, almost all successfully, along with a lot of reinforcement within the group and in the organic chemistry community. At the same time, the idea of using electrochemistry for selective reactions and to recycle redox catalysts had been bubbling gently in the background for some years. It was inhibited by the requirement of completely different sets of literature and tools and was, at best, unappreciated by the synthesis community. A big problem was to find a graduate student willing to take the leap and see what could be done. I do not know if he was naïve or a risk-taker, but he agreed to dig into the proposal. Chris identified an oxidation catalyst, TEMPO, and showed how it could be recycled electrochemically. He brought the fancy and unfamiliar electrochemical apparatus to the group (a true "black box"), supported the mechanism with isotope effect studies, expanded the range of reaction types, and completely independently, embarked on a beautiful idea to use electrodes coated with polymer-supported TEMPO as an oxidizing reagent. This was "green" chemistry before its time, solid-supported reagents before they were fashionable, and the mysterious electrochemistry in its most sophisticated form. He showed the idea to be feasible, and the idea is still here to be developed, but no one like Chris has appeared to make it practical. At the same time, I believe Chris's papers inspired the explosion in the development in TEMPO oxidations that has occurred over these 20 years. He will be missed as a wonderful human being and a fine scientist."

Chris was a highly visible promoter of process chemistry as a critical discipline. He regularly attended the international process chemistry Gordon Research Conference, "Organic Reactions and Processes", serving as conference Chair in 2003. Chris also served on the organizing committee for the Midwest Pharmaceutical Process Chemistry Consortium (MPPCC) annual symposia where he participated in some of the earliest discussions about the need for a process chemistry journal. Chris was a founding member of the editorial board for the new journal, *Organic Process Research & Development* (OPRD) in 1997. It was partly through his foresight and persistence that the American Chemical Society along with the Royal Society of Chemistry agreed to fund setup of the journal. In 2000 he became an Associate Editor of the journal and worked diligently to raise the profile of the journal while increasing the quality and quantity of papers published. In his editorial column in 2000, he challenged the process chemistry community to "contribute to a growing body of scientific knowledge that will continue to find use in developing new products, processes, and technology." In addition to giving back to the scientific community, Chris promoted the writing of scientific papers since "few activities do more to sharpen one's science, thinking, and focus than organizing and writing a manuscript for submission to a journal.... And of course, a company's scientific publication record is a key consideration in its ongoing effort to recruit and retain top talent." OPRD Editor Trevor Laird has expressed his personal gratitude for Chris' service to the journal and the advancement of process chemistry (see *Org. Process Res. Dev.* **2008**, *12*, 1).

Chris enjoyed writing within the scientific domain and achieved eloquence atypical for the genre, perhaps leading to his interest in an OPRD editorial position. His capacity to transfigure hard science to prose with humorous entendre was so well-known, Eli Lilly colleagues David Bradley and Tim Braden drafted a verb for it: word-Schmiding. Chris had a terrific sense of humor and improvised more than his fair share of puns and jokes. Most were innocent enough to share with any audience, although occasionally an exemplary vocabulary, or a translator, was required. Beyond providing entertainment at lunch, meetings, and retirements (including his own), Chris leaned on his wit as an avenue to teaching in the laboratory. An associate working with Chris once boasted victory over a hydrogenation based on the disappearance of the substrate's red color. After analytical data proved otherwise, and the embarrassed associate approached Chris with the data, Chris injected some levity by noting the red color had just moved to his associate's face. After a stress-reducing laugh, Chris pointed out the NMR signature of a nonconjugated intermediate, explaining the misdiagnosis. Chris was a very effective teacher, well steeped in the foundations of chemistry, a good listener, excited by the science, and sharing it with a smile and a few laughs.

Outside his scientific work, in addition to golf and Texas hold-em poker, Chris supported worthy causes he believed in passionately. At Princeton and Berkeley, he was active in campus Christian ministries, Princeton Evangelical Fellowship and InterVarsity. He was an active member of his church, Faith Missionary Church, serving on the board of Deacons, and as chair. His commitment to theological education led him to fund several key people working in college campus missions here in the United States (notably at Brown and Princeton Universities), in graduate school ministries nationally through InterVarsity, and international theological education in Africa. He provided scholarships for individual students at Nairobi Evangelical Graduate School of Theology (NEGST) for years, and in support of that school and those students, he became a founding member of Christian Leaders for Africa and an integral part of Light of the World Ministries (LOWM), the sending agency for one of its vital professors. In fulfilling those roles, he visited NEGST in Kenya several times and also served as Secretary for LOWM. As the lymphoma began to consume his life and energies, he remained committed to those life-long purposes, and to the very end was consistently unwilling to complain about his condition.

For myself, I echo the comments above from those who knew Chris well. We shared a laboratory in Professor Heathcock's group, and we were colleagues for 19 years at Eli Lilly. Chris was my model for a scientist dedicated to his art, a man with the utmost integrity, and a colleague who maintained an ideal balance between work, friendships, and Christian service. He was certainly a model for a life well-lived.

Marvin M. Hansen

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