

Remembering Gene Golub Around the World on February 29

By Michael L. Overton

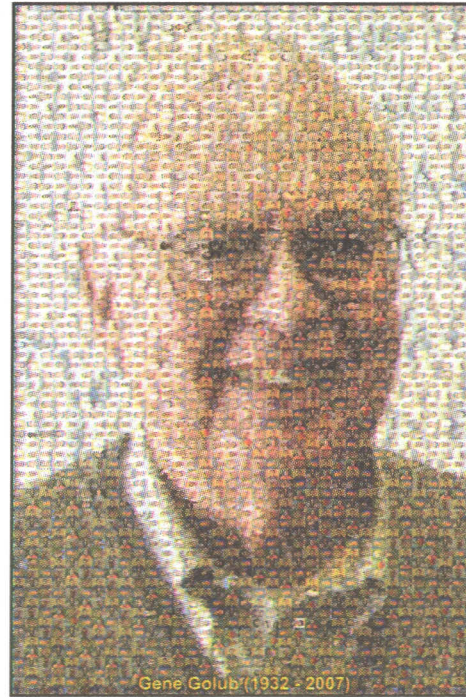
Gene H. Golub was born in Chicago on February 29, 1932, and died at Stanford on November 16, 2007, sending a wave of shock and sorrow around the world. Gene's impact on numerical analysis and linear algebra was huge, as evident in his recently published selected works, *Milestones in Matrix Computation*.* The book's five sections describe Gene's contributions to iterative methods, least squares problems, matrix factorizations, orthogonal polynomials and quadrature, and eigenvalue problems, with commentaries from leading experts in each area.

But Gene's fundamental scientific contributions account only in part for his enormous impact. Beyond the many important roles he played within our community (including a term as SIAM president), he was truly an ambassador-at-large for scientific computing, never tiring of discovering new applications and problems and promoting algorithms for their solution. His interest in people also played a large part, as made clear by the blog set up soon after his death (<http://genegolub.blogspot.com>). Gene loved to help people, particularly young scientists just starting their careers. His hospitality at Stanford was legendary. Numerical analysts from all over the world became a big extended family for Gene, and he welcomed them all to Stanford with great warmth, no matter how young or old, famous or not, for days or weeks or months. He loved to travel and he visited this extended family everywhere. The year 2007 was no exception—he spent five months of the spring and summer based at Oxford, and in October he went to Venezuela and France to help celebrate two birthdays, Victor Percey's 70th and Gerard Meurant's 60th. He had just returned to Stanford from China

ing gift presented to him at the banquet—at a time when cell phones were a novelty. It turned out to be Bart De Moor calling from Leuven to inform Gene that he would be awarded his sixth honorary degree in June.) Parties seemed to be almost as frequent in non-leap years, perhaps to make up for Gene having no birthday in those years. The biggest of these was held just over a year ago: the “Stanford 50, Golub 75” meeting—50 years of numerical analysis at Stanford, dating from the arrival of George Forsythe, and 75 years since Gene's birth. I was one of the organizers and, like the more than 250 people who attended, am so glad now that we held the meeting. All kinds of nice things were said about Gene at a banquet in his honor, and he loved every moment of it.

Soon after Gene's death, several people realized that the most appropriate day to mourn his passing and celebrate his life would be February 29, 2008. And because most of his friends could not go to Stanford, it seemed only natural to hold celebrations of Gene around the globe. The idea quickly gathered momentum. Well over 1000 people participated in 32 events in 23 countries on all six populated continents. As far as I know, not even Gene had contacts in Antarctica.

Appropriately, the biggest celebration was at Stanford, where Gene's colleagues organized a memorial program for the afternoon of February 29, Remembrances in Celebration of Gene Golub. With about 250 people in attendance, all seats and standing room were occupied. Gene's brother and many friends, from as far away as Switzerland, gave tributes, in some cases musical. The memorial was followed the next day by a technical program, Symposium on Gene Golub's Legacy: Matrix Computations—Foundation and Future,



Using photos of participants from all around the world, the organizers of the Leuven meeting assembled a mosaic picture.

Gene. In Toulouse, all the speakers were graduate students. On sabbatical in Italy at the time, I attended the meeting in Pisa. All the other participants were Italian, but everyone spoke English because I was there. I was a little embarrassed until it occurred to me that it would have been the same if Gene had been there in my place—and the Italians welcomed me as warmly as if he were.

A meeting in Tel Aviv was especially appropriate, as Gene's Jewish heritage was important to him. Students and the singular value decomposition—two of Gene's favorite themes—were the focus of a meeting in Kharagpur, India, where people had warm memories of Gene's visit in January

materials posted include programs, pictures, information about the organizers (all of whom deserve many thanks), a video recording from Stanford, and a mosaic picture of Gene, made up of photos of attendees all around the world, assembled by the organizers of the Leuven meeting. Also on the site are links to obituaries of Gene from the *CAIMS Newsletter*, *Linear Algebra and Its Applications*, *Nature*, *The New York Times*, and *SIAM News*, as well as to special issues of *ETNA* and *Numerical Algorithms* that will be published in his honor.

Gene Golub was a complex man. He was raised primarily by his mother, in a classic immigrant success story. He was single most of his life; his four-year marriage in the late 1990s brought him great happiness followed by bitter disappointment. The tragic deaths of his beloved niece and nephew hit him hard, leaving only his brother and sister-in-law and their granddaughter in his immediate family. He could be demanding, easily taking offense when none was intended, and offending others without realizing he was doing so. Despite his achievements and recognition, he often felt insecure, and said so. Yet he loved life, and was enormously grateful for all that it had given him. He was interested in everything, was a voracious reader, and had a great sense of fun. His kindness and generosity knew no bounds. He loved his extended family around the world, and they loved him back, and were glad to show it on February 29. Their tributes to Gene touched as much on what he meant as a friend and mentor as on his scientific achievements, in many cases describing life-changing decisions based on Gene's encouragement. Speaking for myself, Gene has surely had more influence on my life

when he was admitted to the hospital on November 11, only three days before he was scheduled to leave for Zurich to receive his 11th honorary degree. He was diagnosed with acute myeloid leukemia two days later. Many people called him and visited him on November 15; he sounded shell-shocked by the diagnosis but was already talking of what he would do after the prescribed four weeks of chemotherapy. His sudden death the next morning came as a terrible surprise to everyone.

Although Gene had only 18 actual birthdays during his 75 and a half years, he celebrated his birthday more than anyone I know. In a leap year, someone would inevitably organize a meeting—the biggest was in 1992, during a special linear algebra year in Minneapolis, when he turned 60 on his 15th birthday. (I still remember the ring-

organized by Chen Greif and Dianne O'Leary. A highlight was the closing session featuring excerpts from the recorded interviews that formed the basis for Chen's biography of Gene in *Milestones*. Scientific programs in Gene's honor were also held in Austin, Dartmouth, and Urbana-Champaign (where Gene received his BS, MA, and PhD). Smaller gatherings took place in Chicago, Salt Lake City, San Diego, and State College, Pennsylvania. Canada and Latin America were represented by meetings in Waterloo, Mexico City, Caracas, and Rio de Janeiro.

Remarkably, a total of 10 meetings were held in Europe: in Berlin, Delft, Leuven, Linköping, Moscow, Oxford, Pisa, Porto, Toulouse, and Tripolis. (Gene traveled to Europe so often that it was hardly surprising that he was among the thousands of transatlantic travelers stranded in Newfoundland on September 11, 2001.) The Leuven meeting—the largest, with about 100 participants—included a live video connection to Dartmouth and Waterloo. In Oxford, every speaker talked about recent joint work with

2007. Another meeting was held at Hong Kong Baptist University, where Gene had planned to celebrate his birthday this year, and where an Institute for Computational Mathematics will be established soon, in part thanks to Gene. Other sites in Asia were Shanghai, Singapore, and Tsukuba, at the Japanese space center. Chinese banquets, which Gene loved, were part of the February 29 celebrations not only in Asia but at many other locations as well.

Africa was represented by Stellenbosch, where Dirk Laurie presented an original crossword puzzle based on Gene's publications. The program in Auckland, the site with the earliest sunrise on February 29, was not the first to begin; that distinction went to Canberra, where the program started on February 28, honoring Ron Mitchell as well as Gene. A second Australian gathering took place in Adelaide.

Links to all the events can be found at <http://www.cs.nyu.edu/overton/genearoundtheworld/>;

than anyone else has, excluding only my own family.

Mike Botchev, in Delft, recalled something significant that Gene said in Rome in 2004: "When I was young, I was lucky to have so many supportive people around me. So, I thought it's just a way for me to give something back: encourage young scientists." And Zenaida Castillo, organizer of the Caracas meeting, wrote to me that "Gene Golub meant a lot for us, not only by his contributions, but also because some of us had the honor of meeting him in person, and those moments talking to him, sharing our work with him and exchanging ideas, were very important in our professional and personal lives, and we are passing this experience to the new generations of students. For that reason I am sure, Gene will be with us forever."

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**Milestones in Matrix Computation: The Selected Works of Gene H. Golub with Commentaries*, edited by Raymond Chan, Chen Greif, and Dianne O'Leary, Oxford University Press, 2007.