
Photo: Ayako Yamashita

Gilbert Stork

## Gilbert Stork (1921–2017)

### Master of Organic Synthesis

Professor Gilbert Stork died on October 21, 2017 at the age of 95. He trained multiple generations of synthetic organic chemists and inspired them with his passion for chemistry, with his remarkable creativity, and, most importantly, with his humility and warmth. He had a keen aesthetic sense and a deep appreciation of art. He will be remembered as one of the greatest practitioners of the art of organic synthesis.

Each of us was privileged to be a member of the Stork group. For over sixty years, the Stork laboratory at Columbia University was legendary as an unmatched environment for the study and practice of organic synthesis, a reflection of the extraordinary qualities of Gilbert Stork. His enthusiasm and energy were both contagious and inspiring, and, to us and to the entire chemical community, he provided the consummate example of how to do research and how to mentor students through his unique combination of scientific brilliance and personal kindness.

His career was remarkable for the breadth and depth of his contributions to organic synthesis, from the landmark synthesis of cantharidin (1953), which was arguably the first example of a planned stereospecific total synthesis, to the recently reported synthesis of 4-methylenegermine. Over the course of this extraordinary seven-decade career, he achieved landmark successes in the total synthesis of virtually every natural product class: terpenes, alkaloids, prostaglandins, macrolides, and tetracyclines. Each of these syntheses is characterized by its simplicity and beauty. During the execution of these synthetic masterpieces, he developed a series of methodologies that became central to the practice of organic synthesis, including the use of enamines and enol silyl ethers and the stereoselective generation of enolates by dissolving-metal reduction. His synthesis of prostaglandins from glucose was one of the earliest and most elegant examples of the use of starting materials from the "chiral pool". He was also a trailblazer in the renaissance in radical cyclization chemistry that continues to this day.

The most unique feature of Stork's now classical work in the total synthesis of natural products was that these syntheses were not solely about the completion of the target, no matter how complex, but also about what was learned en route. Profound insights into basic reactivity and the development of new synthetic methods were prizes that he joyously coveted along the way. The power of the methodology that he developed was showcased beautifully in the application of enamine chemistry in his elegant syntheses of lycopodine, yohimbine, and aspidospermine, as was radical cyclization in the construction of seychellene, patchouli alcohol, and prostaglandin F2α.

Stork was born in Brussels, Belgium on December 31, 1921, and moved with his family to the United States in 1939. He earned his BS in 1942 from the University of Florida, and his PhD in 1945 from the University of Wisconsin under the guidance of Prof. Samuel M. McElvain. His thesis work focused on quinine, with which he apparently fell in love while in college (and eventually synthesized in 2001). In 1946, he took a position at Harvard University, where he proposed the Stork–Eschenmoser hypothesis for the biosynthesis of terpenes through polyene cyclization, and achieved the stereospecific synthesis of cantharidin. He moved to Columbia University in 1953, and became professor in 1955 and Eugene Higgins Professor in 1967. His illustrious career was recognized with numerous honors and election to many academies and learned societies.

Stork became professor emeritus in 1993, and for the next twenty-four years continued to pursue his passion for research, publishing on 12α-deoxytetracycline, digitoxigenin, quinine, reserpine, taxol, oligonucleotides, β-mannopyranosides, patchouli alcohol, morphine, codeine, and thebaine. His final publication described the synthesis of 4-methylenegermine, the culmination of a forty-year project with sixteen co-authors including his wife, Dr. Ayako Yamashita, with whom he completed this final project.

We and so many others in the chemical community fondly remember Stork's sense of humor, his charm, and his zest for life. His wit and warmth were very much on display in a footnote in his last paper (published just six weeks before his passing): "At this point, we realized that we did not have enough material (a few milligrams) to go through the several steps for this (final) conversion. One would have to restart the whole synthesis. But I (G.S.) am now 95 years old …" (*Org. Lett.* **2017**, 5150).

On behalf of all of Stork's former students and postdoctoral research associates, and colleagues around the world, we express our deepest appreciation for his influence on the world of chemistry and on all of our lives.

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