

Emanuel Vogel (1927–2011)

Emanuel Vogel,^[1] Professor Emeritus of the University of Cologne, passed away on March 31, 2011 in Ettlingen near Karlsruhe after a long illness, but still unexpectedly. Tragically, he had just submitted his last publication, “From Small Carbocyclic Rings to Porphyrins—A Personal Account of 50 Years of Research”, which was dedicated to his adored mentor Rudolf Criegee and which can be viewed as his scientific legacy, to *Angewandte Chemie*.^[2]

This personal retrospective starts from Cope rearrangements and valence isomerism in small ring systems^[3] and continues to the central topic of his research—aromaticity and the Hückel rule with 1,6-methano[10]annulene^[4] as a prototype of bridged acenes^[5] to porphycenes and other porphyrin derivatives.^[6] In hindsight, the impressive development of his research seems guided by a logic and inevitability that is reserved for the bold and the lucky: from the norcaradiene–cycloheptatriene problem^[7] to 1,6-methano[10]annulene and the bridged aromatic acenes with 14, 18, and 22 π electrons to pioneering work in the field of annulene chemistry; but also to oxepin–benzene oxide,^[8] the arene oxides in general, and higher benzene oxides, from which the aromatic and olefinic eight-membered-ring heterocycles such as dioxocin and diazocins were accessible; from 1,6-methano[10]annulene to highly strained, unusual, and new ring systems such as benzocyclopropene and later a number of other long-sought π systems such as heptalenes and octalenes, and finally to porphyrin isomers. His research was sometimes systematic but often advanced erratically and by serendipity—a popular term he introduced into the chemical literature to describe unexpected reactions.^[9] Vogel was drawn intuitively to interesting topics and had the talent to explore them systematically and to elucidate their place in the larger picture. His co-workers were amazed again and again by his instinct for interesting developments and the determined way in which he pursued new ideas and concepts with all his strength. As a purist, he was always interested in the core, the parent structure of a new system. He was especially excited when his basic research served as a starting point for the investigations of other scientists, whether in physical and theoretical chemistry (e.g. the investigation of the stereochemistry of the ring opening of cyclobutene derivatives and the valence isomerization as the experimental foundation for the Woodward–Hoffmann rules), in biochemistry and pharmacy (with arene oxides, which, after their successful synthesis, were determined to be central primary intermediates in the metabolism of aromatic compounds), or in medical applications (as with porphycenes as photosensitizers for photo-

dynamic therapy). He was often ahead of his time; he thought in terms of mechanisms and was an early avid user of physical organic methods and new structure-elucidation techniques such as NMR spectroscopy and X-ray crystallography, and he was willing to work in an interdisciplinary atmosphere and cooperated with expert colleagues worldwide.

In the expansion of annulene chemistry at the end of his career, with porphycene as an isomer of porphyrin, he opened up a completely new area of chemistry, namely that of expanded, contracted, and isomeric porphyrins.^[6] This development, in which he was actively involved as a researcher even after reaching emeritus status, fascinated him because it formed a bridge to the “pigments of life”, as the porphyrins were once called by Alan R. Battersby. This research opened the door to a colorful cornucopia of related systems and their metal complexes all the way to new porphyrinoid macrocycles, and also created a path to practical applications. His life’s work was dedicated to basic research, and so he was especially satisfied that one of his systems, a specific substituted porphycene, could be applied as a promising candidate in photodynamic therapy to treat tumors and dermatological disease; this application even made him cofounder of a company. When it came to light that he had, with his porphycene, prepared an overlooked isomer that Linus C. Pauling had conceived of as early as 1944, as became clear in the recently edited notes of the two-time Nobel Laureate,^[10] his excitement for his early discovery knew no bounds.

Emanuel Vogel was born on December 2, 1927 in Ettlingen on the edge of the Black Forest, where he grew up and attended school. His interest in the natural sciences, especially chemistry, was apparent from an early age. After being drafted in the last years of World War II before the end of his schooling, he began to study chemistry in 1946 at the Technical University in Karlsruhe and completed his doctorate in 1952 under Rudolf Criegee. During graduate school he had spent time with Ralph A. Raphael as a visiting scholar at the University of Glasgow (Scotland). In 1955 he was a postdoctoral fellow with Arthur C. Cope at MIT in Cambridge, MA (USA). He returned to TU Karlsruhe, completed his Habilitation in 1957, and worked there as a lecturer until 1961. In that year, at the age of only 33, he was appointed to the coveted position of successor of the Nobel Laureate Kurt Adler as Chair of Organic Chemistry at the University of Cologne, where he was active in teaching and research until reaching emeritus status in 1993, after having declined in 1968—with a heavy heart, as he often related—a position as successor to his mentor Rudolf Criegee at TU Karlsruhe. He increased the worldwide visibility of the Chemical Institute in Cologne and brought prominent speakers to the city, mostly through the



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famous and now traditional Kurt Adler and Otto Bayer lectures, for which he personally recruited endowment funds.

One could rightly say that Emanuel Vogel played an exceptional role in forming organic chemistry in Germany after the Second World War and was an impressive representative on the international stage from early on. He gladly accepted invitations to lectures and guest professorships and often used such trips as an opportunity to become familiar with the host country and its people. These trips took him to Israel, India, Japan, South America, Australia, the Soviet Union, and again and again to the USA. He was always accompanied by his wife Christiane, whom he married in 1960 and who was at his side for more than 50 years, supporting him by shielding him from everyday matters so that he could concentrate on his scientific endeavors. His more than 330 publications document his scientific success, which inspired organic chemistry in many ways. Most of his publications, especially his pioneering work and his important review articles, appeared in *Angewandte Chemie*, for which he was a long-time member of the Editorial Board.

He was a model of scientific diligence and propriety and a glowing example in his pursuit of perfection. His lectures were brilliant and fascinating; perfectly staged, he could excite even non-specialists with his colorful presentations, complemented by demonstrative samples whenever possible. Many people will recall his “sample case”, which he often presented at his fascinating lectures. As an aesthete, he loved bright colors and beautiful, simple, and, if possible, symmetric forms and impressive formulas. His artfully composed Christmas cards, on which he emphatically presented the newest creations from the Vogel kitchen in full color, were famous. He even designed one of the

first color covers of *Angewandte Chemie*, which showed one of his molecules.

Vogel's scientific achievements were rewarded with many honorable prizes: 1975 the Emil Fischer Medal of the Gesellschaft Deutscher Chemiker (German Chemical Society), 1994 the Gay-Lussac-Humboldt Prize, and 2000 the Robert B. Woodward award. He received honorary doctorates from the University of Siegen (Germany) in 1997 and from Ataturk University in Erzurum, Turkey, in 2007. He was a member of a number of scientific academies both in Germany and abroad.

His sometimes epochal discoveries were enabled by the large number of his scientific co-workers (over the years many more than 200), whose contributions he highlighted again and again. Although his research group in Cologne was at times quite large, he was always interested in individual students' progress, but he granted his co-workers freedom to develop their own ideas and work independently. Only in recrystallization was he relentless, and in that he fit the image of a traditional German organic chemist: substantial amounts of pure substance had to be prepared, if possible in crystalline form and always with correct elemental analysis. The help he offered was not always well-received. Experienced co-workers knew how to keep their cautious and sometimes anxious boss out of the lab: a sign on the door saying “Caution, diazomethane” was enough.

Most of his students entered industry, and many of them worked for Bayer in nearby Leverkusen, to which he had close connections ever since he, as a young lecturer, made an impression on the head of central research at the time, Prof. Dr. mult. Otto Bayer, who thought highly of him for the rest of his life. But he was also able to inspire a number of his students to pursue an academic career. In Germany, Wolfgang Roth, Harald Günther, Wolfram

Grimme, Frank-Gerrit Klärner, Dieter Cremer, Hans-Josef Altenbach, Klaus Müllen, Udo Brinker, Wilhelm Püttmann, Norbert Jux, Clemens Richert, and Martin Bröring can regard him as an academic mentor. Of the many foreign postdoctoral associates, Masahiko Iyoda, Yoshitero Sakata, Joao Valdir Comasseto, Juan Marco, and Metin Balci found their way into the academic arena.

Emanuel Vogel was reserved and humble. He preferred to put the spotlight on his achievements rather than on himself; he wanted



to convince people with his work. He was proud when *Chemical & Engineering News*^[11] reported on his research, and he was excited when his 10 π -annulene appeared on the cover of a well-known textbook or when his molecules were discussed in Nicolaou's book *Molecules That Changed the World*^[12] and Hopf's *Classics in Hydrocarbon Chemistry*.^[13]

In contrast, he did not mind driving his beloved old black VW beetle, and he was thievishly pleased when he pulled up to a world-famous hotel in it after the concierge had learned who was inside.

He had a natural, elegant authority about him, and even close associates referred to him respectfully as "Herr Professor" or "the boss". He had an outwardly reserved, somewhat aloof appearance, but he was warmhearted and amicable to those who knew him better. He liked to hold court—in the institute and privately—and it was a special honor to be invited to his home. Many friends and colleagues have pleasant memories of the entertaining, convivial occasions in his welcoming home in Cologne, and interesting conversations on all sorts of topics from art, culture, and especially chemistry. In 2005 he returned to his home town, where he and his wife built the house of their dreams, perfectly planned, so that his collection of artwork by Hundertwasser, which presented his favorite pieces (no wonder, considering how colorful they are), was displayed optimally. He also received many visitors there to reminisce but especially to discuss new developments in chemistry, which he continued to follow with interest.

Now he is gone forever, but his works and deeds will remain unforgotten.

Farewell Prof. Vogel, Farewell Emanuel.

Hans-Josef Altenbach

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