

PROFILES, PATHWAYS AND DREAMS: FROM NAÏVETÉ TO THE HIST AWARD

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Editor's Note

Jeffrey I. Seeman of the University of Richmond is the 2017 recipient of the HIST Award for Outstanding Lifetime Achievement in the History of Chemistry, awarded annually by the American Chemical Society (ACS) Division of the History of Chemistry (HIST). This international award has been granted since 1956 under sequential sponsorships by the Dexter Chemical Company, the Sidney M. Edelstein Family and the Chemical Heritage Foundation, and HIST. Among the highlights of Seeman's work in history of chemistry are numerous articles on the history of 20th-century organic chemistry, service on the executive committee of HIST including a term as chair, founding and administering HIST's Citation for Chemical Breakthrough Award program, the production of video documentaries of prominent chemists, and—the subject of this article—proposing and editing a series of autobiographies of eminent chemists issued as *Profiles, Pathways and Dreams*. More information on the award and on Seeman can be found at http://acshist.scs.illinois.edu/awards/hist_award.php.

A symposium honoring Seeman's achievements in the history of chemistry was held on March 20, 2018, at the 255th ACS National Meeting in New Orleans. Customarily the recipient of the award makes a presentation at the culmination of the award symposium and

the *Bulletin for the History of Chemistry* publishes that presentation. Seeman, a strong supporter of the *Bulletin*, preferred to be in the audience rather than lecture at the symposium. Nonetheless, he happily provided an award manuscript for the *Bulletin*. He consulted several colleagues on an appropriate topic for his award paper, and the following article is the result. In what follows, readers will get to know several of the 20th century's prominent organic chemists as well as Seeman.

—Carmen Giunta, Editor

Introduction

Work like you don't need the money. Love like you've never been hurt. Dance like nobody's watching. —Often but not definitely ascribed to Satchel Paige

I published my first article on the history of chemistry in 1983 in the American Chemical Society (ACS) journal *Chemical Reviews* (1). That paper appeared just as I was beginning my sabbatical at the Dyson Perrins (DP) Laboratory in Oxford, England. As I sat in the reading room of the DP those first months, I watched many of the students and staff reading my article. I still receive compliments about that paper, primarily because it was the first article in *Chemical Reviews*—and perhaps in any ACS *research* journal—that contained a history section

Table 1. Books in the Profiles, Pathways and Dreams series of autobiographies published by the American Chemical Society and created and edited by Seeman.

Author	Title	Year Published
Derek H. R. Barton	<i>Some Recollections of Gap Jumping</i>	1991
Arthur J. Birch	<i>To See the Obvious</i>	1995
Melvin Calvin	<i>Following the Trail of Light: A Scientific Odyssey</i>	1992
Donald J. Cram	<i>From Design to Discovery</i>	1990
Michael J. S. Dewar	<i>A Semiempirical Life</i>	1992
Carl Djerassi	<i>Steroids Made It Possible</i>	1990
Ernest L. Eliel	<i>From Cologne to Chapel Hill</i>	1990
Egbert Havinga	<i>Enjoying Organic Chemistry, 1927-1987</i>	1991
Rolf Huisgen	<i>The Adventure Playground of Mechanisms and Novel Reactions</i>	1994
William S. Johnson	<i>A Fifty-Year Love Affair with Organic Chemistry</i>	1997
Raymond U. Lemieux	<i>Explorations with Sugars: How Sweet it Was</i>	1990
Herman Mark	<i>From Small Organic Molecules to Large: A Century of Progress</i>	1993
R. Bruce Merrifield	<i>The Concept and Development of Solid-Phase Peptide Synthesis</i>	1993
Koji Nakanishi	<i>A Wandering Natural Products Chemist</i>	1993
Tetsuo Nozoe	<i>Seventy Years in Organic Chemistry</i>	1991
Vladimir Prelog	<i>My 132 Semesters of Chemistry Studies</i>	1991
John D. Roberts	<i>The Right Place at the Right Time</i>	1990
F. G. A. Stone	<i>Leaving No Stone Unturned: Pathways in Organometallic Chemistry</i>	1993
Andrew Streitwieser, Jr.	<i>A Lifetime of Synergy with Theory and Experiment</i>	1997
Cheves Walling	<i>Fifty Years of Free Radicals</i>	1995
Autobiographies originally scheduled for publication in the Profiles series but published elsewhere		
Teruaki Mukaiyama	<i>Challenges in Synthetic Organic Chemistry^a</i>	1990
Paul von Rague Schleyer	<i>From the Ivy League to the Honey Pot^b</i>	2015

^aBecause Mukaiyama published a similar autobiography in 1990 (2) in the series *International Series of Monographs on Chemistry* by Clarendon Press and edited by Jack E. Baldwin, this proposed volume was deleted from the *Profiles* series.

^bThis volume was never completed by Paul von Rague Schleyer (February 27, 1930-November 21, 2014).

An edited manuscript remained in the files of Seeman, however. At Seeman's suggestion, the manuscript was re-edited by Andrew Streitwieser Jr. and published in a collection of chapters written by other James Flack Norris Awardees in a volume edited by E. Thomas Strom and Vera V. Mainz and published by the American Chemical Society in 2015 (3).

with photographs and quotes from eminent chemists. But generally, it was not the chemical kinetics portion of the article about which chemists were enthusiastic, it was the history section. I was convinced that the chemical community was enormously hungry for more history of their own field and especially so for the human side of chemistry.

Between 1990 and 1997, the ACS Books Department published the 20-volume series of autobiographies of eminent organic chemists in the series *Profiles, Pathways and Dreams* (Table 1). The authors came from many countries (Australia, Austria, Bulgaria (born in Austria), Canada, England, Germany, Japan, Switzerland via Sarajevo in the then Austro-Hungarian Empire, and the United States). Their research covered most if not all of the subdisciplines of organic chemistry. Five of the 20 authors were Nobel laureates, and all were recipients of the highest awards bestowed upon organic chemists. While all were men in their 60s to 90s, they nonetheless represented a wide diversity of human beings. This diversity is evident from the styles and content of their stories and the chemistry they studied. I was the editor of each book and of the entire series.

Surely, if the project were to begin today or 10 or 20 years in the future, a steadily increasing number of women would be authors, rising in parallel with the increasing number of women who choose careers in chemistry. And just as surely, had I been initiating the *Profiles* series today, the project would have had several goals not imagined 35 years ago. The books reflect how it was in organic chemistry, from the 1940s to the late 1980s.

As I look back into the years 1983-1997, I am embarrassed by what I asked of and expected from the authors. I had no currency in the history of science. But it was a self-supporting vision and with a sense of purpose that I communicated to the authors a commitment to excellence that propelled the project forward. *It Was the Right Time and the Right Place*, as John D. (Jack) Roberts would later entitle his autobiography (4). The series captures a golden era of organic chemistry in the voices of the greatest of organic chemists of the second half of the 20th century. They are (my) heroes and the icons of that field.

I have elsewhere described how the project came about (5), and I have reminisced a bit about my interactions with several of the *Profiles* authors (6-16). Now, I take this opportunity to relive some of those days with the reader, to share some previously untold anecdotes, and not by coincidence, to describe some of what I have enjoyed and learned in pursuing the history of chemistry.

In many instances, my stories will veer off onto more recent tangents. And of course, I can tell only a small portion of the stories collected over a lifetime. Importantly, all the following events and interactions have their roots deep within the *Profiles* autobiographies.

Profiles in Stories

Arthur J. Birch (1915-1995)

It is an honor and it is enormously tricky to edit the autobiography of an eminent scientist, especially an individual who has previously authored hundreds of publications. I felt the real responsibility I had to the authors, for how many autobiographies would any one person write? So, when I reviewed Arthur Birch's manuscript, I was gravely concerned. It read like a jumble of ideas, whipped around like scrambled eggs and then patched together.

There was only one thing to do. I faxed Birch (Figure 1) in Australia. Would he please send me a computer floppy disc of his manuscript? (This was 1987 or 1988, decades before email and Dropbox.) I well remember that what he sent must have been some odd-ball Australian diskette, but fortunately someone in the computer group was able to download it and convert it to WordMARC, the word processor software I used in the late 1980s and early 1990s. I then intensely studied Birch's manuscript, and cut-and-pasted the entire text into an order that made sense, at least to me. Sadly, it did not make sense to Birch. He rejected my organization as I had rejected his. So, he rewrote his entire autobiography, and soon enough, I received a quite excellent manuscript. I also

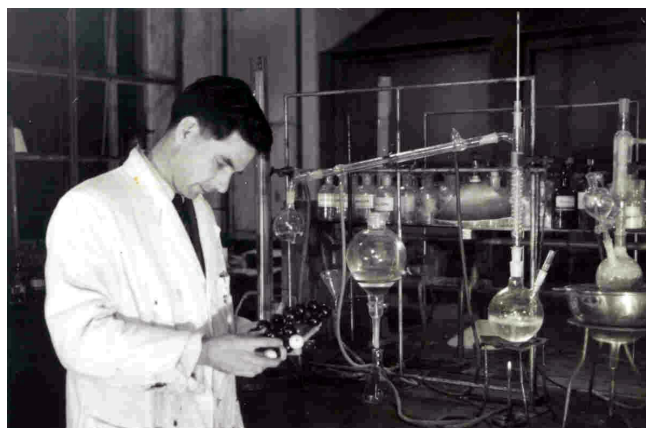


Figure 1. Arthur Birch at his lab bench during his student days, ca. 1944, at the Dyson Perrins Laboratory, Oxford, England, where he discovered the Birch reduction.
Photograph courtesy A. Birch.

should add that Birch responded to my request that he include additional material on a whole series of topics. Thank you, Professor Birch.

I was soon to meet the man in person!

In 1990, Ronald Breslow invited me to participate in a symposium he was organizing for the 202nd National Meeting of the ACS in New York City on August 25, 1991. The audience was to be science-minded high school students from the New York metropolitan area. My assignment was to present a theme in the history of chemistry to these promising youngsters. I decided to present short biographies of several eminent chemists who had to overcome quite serious challenges in their youth in order to persevere. I spoke of Arthur Birch, Carl Djerassi, Herman Mark, and Ernest Eliel, all of whom had to leave their home countries—in Birch's case, because the Ph.D. degree was not yet given in Australia, or, in Djerassi's, Mark's, and Eliel's cases, to escape the Nazis.

When I finished my lecture to well over 1000 aspiring youth, the lights went up, the applause began, and I recognized—from his photographs, for I had not yet met him—Arthur Birch sitting about 20 rows back, right in the middle. Feeling rather warm in the glow of the hearty applause, I rose to the occasion. “Ladies and gentlemen, here in this audience is one of the individuals I’ve just been talking about. Professor Arthur Birch, would you please stand up?” So he did, to the thunderous applause of the audience. When the clapping ended, I continued, entirely in a joyful and even self-confident mode, “Professor Birch, did I get it all right?” “No,” he responded, “not quite.” And then, in front of the entire audience, he began a detailed and rather unanticipated correction.

Carl Djerassi (1923-2015)

I shall never forget Carl Djerassi yelling at me. Carl was not a particularly patient individual, quite the reverse. He was the King of Impatience. Time mattered greatly to Carl, as if the big clock in Grand Central Station was always with him, ticking loudly in his ear. When Carl provided the final manuscript of his first autobiography, he informed me that (5)

The enclosed manuscript incorporates virtually all requests that you made. ... While I will be happy to read any letters from you that acknowledge receipt of this manuscript, or any complimentary remarks, *do not even think* of writing me another letter requesting any more.

Fast forward a few weeks. I was reviewing the galley proofs of Carl's manuscript when I realized that he had

not said a single word about his fused knee. As a result of an earlier skiing accident and in much pain, in 1957 Djerassi decided to have a permanent left knee fusion. Thereafter, he was unable to bend his left leg at the knee. One can only imagine the many inconveniences that caused Djerassi for the ensuing 57 years of his life. But it hardly stopped him; he even invented a “skiing technique for stiff-legged persons” (17) (Figure 2).

So I called Carl. He immediately answered the phone. I explained my request. Then the yelling began (18).

I've done more for you that I have done for any editor. I am in my car, on the way to the airport. I am going to Europe. I don't want to hear from you again.

When the verbal manifestation of his anger was over, I calmly suggested that he simply call his secretary, dictate his answer to my question (“How do you feel, having a fused knee?”), and I would add his text to the caption of the photo of Carl showing off his skiing technique. Within the hour, a fax arrived. An expanded caption to Figure 2 appears on page 66 of his autobiography.



Figure 2. Carl Djerassi demonstrating his method for skiing, a real skill given his inability to bend his left knee following its being fused, a result of a medical treatment. Photograph courtesy C. Djerassi.

There were many consequences to me personally and professionally of my editing these autobiographies. One was that friendships developed with many of the authors. Another was that I became a producer-director of videos for academic and history of science themes (19-21). All this ensured together that I knew the life stories of many eminent chemists rather well. Thus I was often asked to lecture and write about them and their history and the history of their era. During the last few years of his life, I wrote two biographical articles on Djerassi (10, 11) and reviews of two of his books (9, 22), one being of *In Retrospect: From the Pill to the Pen* (23). On a phone call near the end of his life, Carl asked me, "Why are you writing these articles? Is it for your own career advancement? Is it for your own publicity?" I paused a moment, to examine my own motivations. "Yes, surely those are factors," I said, "but the real reason, the primary reason is that I have been writing these as a gift to you." I could hear his appreciative nod over the phone.

And unlike many people, I liked Carl, even more so after writing these four articles. I asked him to review my drafts. I had anticipated that he would be fiercely protective of his reputation, how he appeared in print. But no, my Jersey City-born suspicious nature not once detected such behavior. Rather, he was determined that my articles were accurate and complete, even in instances when my descriptions were uncomplimentary, at best. Yes, I admired Carl tremendously. Not everything about him, as I have described (11). But curiously, in those last years, I discovered that I liked him even more than I admired him.

Herman Mark (1895-1992)

Herman Mark, even in his 90s, answered his telephone with a hearty, booming, almost over-the-top "Hello, hello, hello!" I often think of Mark as I begin telephone calls with the same energetic multiplicity of greetings. Recently I shared this memory with his son, Hans, now himself an elderly gentleman. He laughed as one does with a very happy yet respectful common memory.

When I worked with Mark—I met him only once at Brooklyn Polytechnic when he was in his 90s—it was easy to assume that he was just a nice old man. Indeed, he was that, but much more. He was one of the most highly decorated officers (if not the most highly decorated officer) in the Austro-Hungarian Army during World War I. He was an early pioneer in the use of X-ray crystallography for structure determination. In the late 1940s,

he helped invigorate, if not establish, academic polymer chemistry in the United States.

Mark died just before his book was completed. Fortunately, his Brooklyn Poly colleague and fellow polymer scientist Herbert Morawetz worked with me to complete Mark's book.

As part of the publishing agreement, ACS Books provided each author with several complimentary volumes. I asked Morawetz, who, besides himself and Mark's surviving son, ought to receive one of the complimentary books. Morawetz suggested Mark's lady friend, Dr. Elfi Braunsteiner, who lived in Vienna. I wrote and asked if she'd like a book. Yes, she responded, and a few weeks after I mailed the volume, she responded again with thanks.

Fast forward several years. I was taking my mother on a tour of Europe, with major stops in Budapest and Vienna. I thought, wouldn't it be fun to contact Dr. Braunsteiner and perhaps meet her. She responded enthusiastically but also asked, would I please bring a copy of Mark's book as she had not received it. Though somewhat puzzled and certainly unwilling to confront her, I carefully added a volume to my luggage.

A week or two later, Dr. Braunsteiner, my mother and I sat in a classic Viennese coffeehouse. Dr. Braunsteiner then explained. "Last night," she said, "I realized that I did have Herman's book. I remembered that, when it arrived, I was still too sad about Herman's death to read it. But last night, I picked it up and could not put it down until I finished every word. It was like I was with Herman once again." There is an infinite number of ways that the practice of and results from studying the history of chemistry can touch people. And when that "touch" is very personal and is communicated to the historian-researcher, the satisfaction is enormous.

I also remain convinced that increasing age need not be an impediment to intellectual achievement. Many of the *Profiles* authors were well into their 80s and even 90s when they wrote their stories. Herman Mark was in his 90s when he was writing his autobiography.

Ernest L. Eliel (1921-2008)

By refusing one of my requests, Ernest provided one of his greatest gifts to me, my friendship with Otto Theodor (Ted) Benfey.

The background is as follows. Vladimir Prelog was Croatian by birth and had fled to the ETH in Zürich in the early days of World War II, welcomed by Leopold

Ružička, who had also fled Croatia for the ETH in the wake of a war, namely, World War I. Ružička, a Croatian-ETH Nobelist, served as a role model for another Croatian-ETH Nobelist, Prelog. Though Prelog's native language was, of course, Croatian, and even though by the 1980s Prelog was fluent in English and German, he felt that he could best describe his life in German, the language spoken in his adopted canton in Switzerland. To his credit, Prelog arranged to have David Ginsburg (24), a competent and erudite chemist, translate his manuscript from German into English. What neither Prelog nor Ginsburg could anticipate was that the latter would have a stroke just before the translation was to be done.

Ginsburg's medical condition necessitated finding a replacement, a task that Prelog hoped he could, and would, transfer to his editor. And thus, I turned to Ernest. Ernest was a perfect choice for translating Prelog's manuscript from German to English: Ernest was a native German speaker. He was an expert in stereochemistry as was Prelog. And he and Prelog were good friends, Ernest having had a sabbatical in Prelog's laboratory in the 1950s.

As it happened, Ernest was also writing his own *Profiles* autobiography while serving as Chair of the Board of Directors of the ACS (1987-1989) and ACS President (1992). He was too busy, so he declined. My disappointment rapidly turned into relief, then joy. Ernest referred me to Otto Theodor Benfey.

Ted Benfey, it turns out, was an even better choice as Prelog's translator. Ted is a physical organic chemist by education, having received his Ph.D. with Christopher Ingold of CIP fame (Cahn-Ingold-Prelog *R,S*-nomenclature) and having held postdoctoral positions with Frank Westheimer and L. P. Hammett (25). Ted is also a historian of chemistry who has translated a number of books from German to English (26). And he was ready and available to translate Prelog's manuscript, which he did expertly and to Prelog's high standards.

One other lasting benefit arose from Ted's participation in the *Profiles* series: he and I became great friends.

The reader may notice that I am now writing more about Ted Benfey than Ernest Eliel. Perhaps that is because I have already written five biographical essays on Ernest (in 2002, 2009, 2014, and two in 2017) including a memoir for the National Academy of Sciences (12-14, 27, 28). I refer the interested reader to those publications.

Vladimir Prelog (1906-1998)

I would always take notes when I spoke with Prelog on the telephone. For an example, see Figure 3. I did so partly because what he said was so worthy that I wanted to be able to recreate his words, and partly it was because I so revered him, that I considered his words rather sacrosanct. I keep such notes of telephone calls with only three other individuals, ironically one being a former mentee and colleague of Prelog's at the ETH, my dear friend Albert Eschenmoser. And in part, I wanted to remember Prelog's stories and his jokes. I often retell one of his jokes, always to much laughter and always with proper attribution.

There are also topics much a part of Prelog's life that I found captivating only after his death, such as Prelog's 1943 partial synthesis of quinine (29). It is an irony of life not to be able to talk with a friend about a topic that, only after his or her death, would become central to one's own research. For example, I did talk a lot with Doering about the Woodward-Doering total synthesis of quinine and Gilbert Stork's claim that the synthesis was a "myth." But today, just a few years after Doering's death, I also wish I had talked with him about my current research on aromaticity, anti-aromaticity, and the Woodward-Hoffmann rules, of which Doering would have had a lot to say.

In one of my telephone conversations with Prelog just a year or so before his death, I discovered that he had not spoken in years with his friend Derek Barton. So, during one telephone call with Prelog, I asked him to hold the phone, for just a moment; I then dialed Barton's number, by good fortune got Barton on the first ring and asked him to hold the phone for a moment. I then pushed the "conference call" button and informed them both that, through the miracle of telephone technology, they could now speak with each other. And so these two old friends spoke for what was likely the last time. (Barton also died within a year.)

Setting up this telephone call between Prelog and Barton remains a happy memory for me.

Michael J. S. Dewar (1918-1997)

The most fascinating aspect of editing Michael Dewar's autobiography was my telephone calls with him, or more precisely, with them, "them" being Michael and his wife Mary née Williamson Dewar ("who was more than my equal" (30)). I felt I was talking with characters from a Jeffrey Archer novel: two elderly English academics, married since their youth, who considered a fierce verbal-

intellectual debate as the opportunity for marital bliss and eternal harmony. When I spoke with one, I spoke with both—or rather listened to both—debate even the most minor point until consensus was reached. I envied their relationship, though I'm not all that certain I could endure its equivalent.

Sadly, Michael did not live long after Mary's death. But he and I did communicate several times in his last years. He asked me to send copies of the photographs that had appeared in his autobiography. Somewhere between Austin, Texas, and Gainesville, Florida, and into his retirement community, the original photographs had been misplaced. And in the midst of those communications, Michael stated matter-of-factly that he didn't know how to use a computer. One of his sons was teaching him! This from one of chemistry's greatest theoretical and computational chemists of the post-1950s era.

William S. Johnson (1913-1995)

I have a streak of sadness when I think of Bill Johnson and his *Profile*. Bill died before his manuscript was completed. But fortunately, four of his close friends and colleagues, several of whom were his former students, completed the manuscript and reviewed and approved the galley and page proofs. His was the last of the 20 volumes to be published, in 1997.

I am also sad because I rejected his request to list all his present and former graduate and postdoctoral students in his book. At the time, it just did not seem to me appropriate for an autobiography. Today I feel very much otherwise. I wish I could reverse that decision.

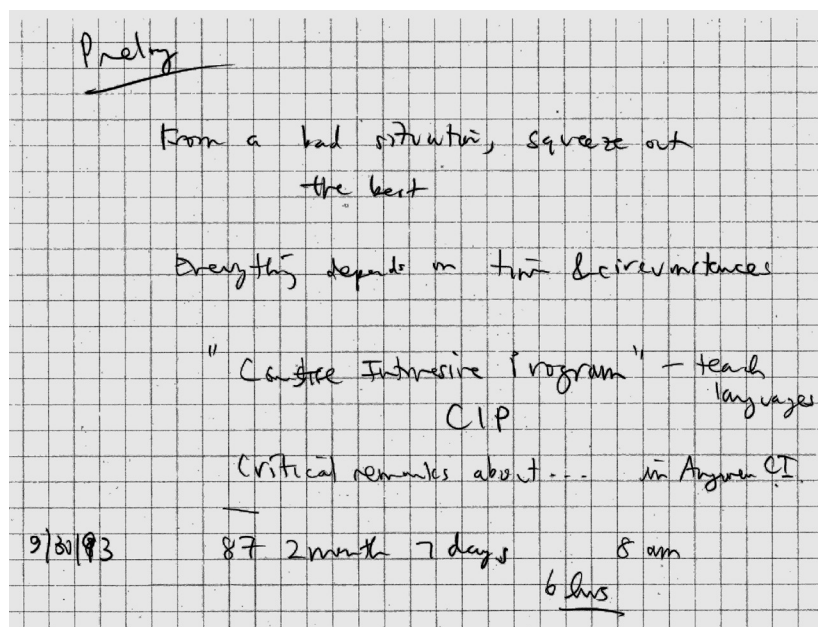


Figure 3. An excerpt from my notes of a September 30, 1993, telephone call with Prelog. "From a bad situation, squeeze out the best. . . Everything depends on time & circumstances." Then follows what reads to be "Concise [?] Intensive Program," perhaps a joke about the CIP (Cahn-Ingold-Prelog) rules for naming a stereoisomer of a compound. At the very bottom of the figure, Prelog is commenting that he is, on that day, 87 years, two months, seven days, and six hours old. Notes from other telephone calls record the following: "Be a good boy, and if you can't, be very careful." "Seek for simplicity, then distrust it." "Don't worry Prelog, it takes only one minute." "Attack together, march separately."

Bill Johnson intensely identified himself as a chemist. Instead of his name on the sign outside his home in Madison, Wisconsin, he had a plaque manufactured with the tetracyclic skeleton of the steroid backbone (Figure 4). The caption to the photograph that appeared in his autobiography reads as follows (31):

This is the house we built in the Madison Arboretum on Balden Street, about 1957 (32). The street number plaque with the brass steroid insignia was swiped, shortly before our move to California, presumably by one

of my students who made restitution some 20 years later by arranging for the plaque to be placed surreptitiously at my seat while I was at the platform during the memorial ACS symposium for Robert Woodward



Figure 4. The plaque outside William S. Johnson's home in Madison, Wisconsin. This plaque was stolen by several of his students, then anonymously returned several years later. Photograph courtesy W. S. Johnson.

in New York, 1979. I take this opportunity to thank whomever was responsible for the safekeeping and return of the plaque.

On January 8, 2002, I presented a lecture “The Human Side of Chemistry: A Photographic Portrait of Contemporary Heroes” at the Mona Symposium on Natural Products and Medicinal Chemistry at the University of the West Indies in Kingston, Jamaica (33). A highlight of that lecture was the inclusion of many entertaining yet pedagogical photographs that I had collected over the years, many during the editorship of the *Profiles* series. When I showed the photograph in Figure 4, I explained its history: stolen, then returned. Just then, a loud shout came from the back of the room: “I was the one who stole the sign!”

I laughed with everyone else. But I failed to identify the culprit ... and I have blamed myself since 2002 for not having done so. Writing this paper activated the muse. I discovered that the Mona Symposium website has a page that lists the non-West Indies participants at the 2002 meeting (34). And a little sleuthing led me to ... well, I shall not name the individual other than to say that my email to him was promptly answered with an admission, and the revelation that the theft was, as he characterized it, a

team effort ... Years after the theft, when [the keeper of the plaque] knew that I would have the opportunity to anonymously return it ...

The world of science is a small, compact network of scholars. Its connectivity is amazingly tight. The degrees of separation are few indeed.

Egbert Havinga (1909-1988)

Surely the most touching moment during my editorship of the *Profiles* series was speaking with Louise Havinga, who relayed to her husband Egbert Havinga, on his death-bed, my firm promise: that his book would be carefully and diligently completed and published. I recall saying to Mrs. Havinga, “Please tell your husband my promise. His book will be published.”

That promise was fulfilled in large measure due to the collaboration of Havinga’s Leiden colleague Harry Jacobs.

Sadly, Havinga and two of the other *Profiles* authors—Herman Mark and Bill Johnson—did not live long enough to hold their autobiographies. But their books were completed with loving care.

Melvin Calvin (1911-1997)

I never actually interacted one-on-one with Melvin Calvin. He wrote his manuscript, I sent my comments to Marilyn Taylor, his long-time high-performing secretary (as administrative assistants were then called), and a final manuscript cleanly and professionally appeared. All questions, requests, and forms were sent to her, and Calvin’s responses came promptly from her.

Was Calvin actually alive and participating in this project? I assumed so. Of course, I never questioned the matter.

I do have two postscripts to add. In 1991, when my daughter, Brooke, was in the seventh grade, she had a science project dealing with photosynthesis. Brooke wanted to learn more about Calvin, so I suggest that she write to him. On February 28, 1991, Calvin responded (35),

I suppose the simplest way to answer is to tell you there is nothing, in my life at least, that surpasses the pleasure which a successful scientific activity gives. Everything else is peripheral to that.

The second postscript involves the 2011 United States postage stamps honoring Calvin, a chemist, and Severo Ochoa, a biochemist. I was asked to serve as the science expert and consult on the design of those stamps. My primary job was to work with the stamps’ designers and be certain that the “chemistry” was both accurate and optimal. That was a delightful and totally unanticipated experience—especially so in that, as a youth, I was an avid stamp collector!

Donald J. Cram (1919-2001)

I experienced my most embarrassing moment as editor with Donald Cram. We got the name of his autobiography wrong.

Shortly after Cram’s book appeared, he wrote me a lovely and heartwarming letter of thanks. And, almost as aside, he dropped the bomb. His book ought to have been entitled *From Discovery to Design* but was (and is) *From Design to Discovery* (36). How this switch occurred, I do not know. But I do know how it propagated. Once a title is designated, it just self-replicates onto the book’s cover, the book’s title page, and onto every other page of the volume itself. One click of the computer and off it goes.

But we—both Cram and I—had the opportunity to find and correct the error before the book went to print, and we failed to do so. Cram and I individually and collectively approved the book’s cover and both of us

reviewed the galley proofs and the page proofs. On the top of every other page of the page proofs was the book's title. Both Cram and I missed hundreds of the same error. I shared this fact with Cram in a subsequent letter to him for which there was no response.

I might add: we also spelled Arthur Birch's name wrong on the title page of his autobiography. What first appeared was "Author," not "Arthur." Yes, close. Fortunately, this error was caught before the books were distributed. I may own the single uncorrected copy (Figure 5).

Rolf Huisgen (1920-)

My most noteworthy interactions with Rolf Huisgen occurred *after* his autobiography was published. By happy coincidence, in the 1990s and 2000s, my professional life entailed many travels to Europe. And almost all of those involved return travel via Munich, the home of Rolf Huisgen. Countless times, Rolf and I enjoyed the

art museums of Munich, especially the Alte Pinakothek, the Neue Pinakothek, and the Pinakothek der Moderne. Rolf introduced me to German Expressionism, most notably what would become one of my favorite artists, August Macke.

My evenings with Rolf and his wife Trudl (Figure 6) form many joyful times in my life and my memory. I had trouble keeping up with Rolf's fast walking pace, just as I had trouble, in days past, keeping up with the much older (than me) Albert Eschenmoser and Dudley Herschbach. I have written more about my times with Rolf and Trudl, and I direct the interested reader to Ref. 15.

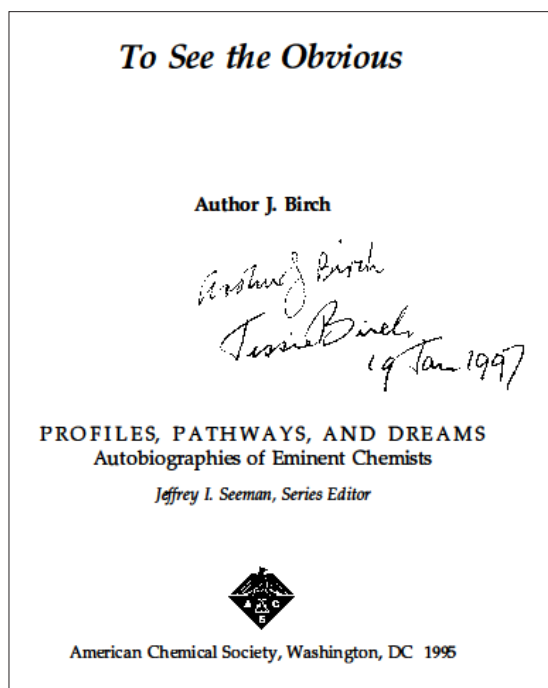


Figure 5. The first and erroneous printing of the title page from Arthur Birch's autobiography in the Profiles, Pathways and Dreams series. Note the spelling of Birch's first name. Fortunately, this error was caught before the book was distributed. The author of this paper may well have the only otherwise-extinct copy. Note that the spelling notwithstanding, both Birch and his wife Jessie signed the book as a gift to the editor.



Figure 6. Trudl and Rolf Huisgen surrounded by their art, at their Munich home, 2003. Photograph courtesy J. I. Seeman.

R. Bruce Merrifield (1921-2006)

Bruce Merrifield was a warm, kind and humble gentleman. He also provided to me an early mark of encouragement and approval. I offered to review the early chapters for those authors who wished my input. Bruce was one of those. I'll never forget his response to my praise. "You really like it ..." He was so very pleased with my praise, and I was so very pleased with his gratitude.

Merrifield is also one of the few modern chemists (if not the only one) to be awarded the Nobel Prize in Chemistry for work that he conceived of and did almost entirely by himself, "with his own hands," so to speak. He describes this work, page by page from his laboratory notebook, in his *Profiles* autobiography.

When I last visited Bruce just a few years before he died, he was still working in the laboratory at the Rockefeller University, side-by-side with his devoted wife, Libby. But he expressed to me his concern that he might not be able to retain his laboratory. Space at Rockefeller University was very tight, and even a Nobel-ist's laboratory and office were not secure. I felt empty, drained with the image.

Koji Nakanishi (1925-)

Koji Nakanishi lives in many worlds simultaneously: first and foremost he is Japanese. But he is also a magician, a chemist, a man of the world, and an American, perhaps in that order. Indeed, he lives in a magic kingdom of natural products and biological systems, his very own fantasy world.

Editing an autobiography can be very personal, and a unique relationship can be established between the author and the editor. One of my remarkable experiences of editing the *Profiles* series was that I met most of the authors in person *only after* their autobiographies had been published. Those were the days of transmitting drafts by mail, typically “airmail” for international service, and less frequently by fax. These processes lengthened the manuscript preparation time considerably. But in a strange way, it made the interactions more personal, or so it seems from today's perspective.

I met Koji for the first time in the spring of 1994 when he gave the Powell Lecture at the University of Richmond, which 13 years later became my home institution. After his lecture, I went up to Koji and introduced myself. He was still standing on the stage; I was a few steps below. Upon hearing my name, Koji let out a deep, honorable “O o o h!” and bowed deeply. As did I, in return. Koji and I met many times thereafter, including a lovely weekend in 2004 when he visited me, for his first—or perhaps just the second—non-working weekend in his life. I took Koji to meet my horse, an experience that neither he nor I would likely forget (Figure 7).

Koji, just as perhaps all prolific scientists, had the ability to sharply focus his attention and shut out distractions. He once told me the story of not recognizing his own daughter in the elevator of their apartment house in Manhattan (19, 37). Nakanishi's daughter later confirmed the story.

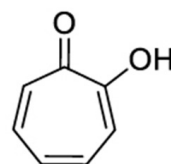


Figure 7. Koji Nakanishi with the author's horse, Awesome, Richmond, Virginia, 2004. Photograph courtesy J. I. Seeman.

Tetsuo Nozoe (1902-1996)

Circumstances placed Tetsuo Nozoe between a rock and a hard place. Perhaps it was I who placed him there rather than circumstances; you can judge for yourself.

Born in 1902 in Sendai, Japan, Nozoe (independently with Michael Dewar (38, 39)) determined the structure of the first non-benzenoid aromatic compounds (the tropolones). For the next 40 years, Nozoe studied the chemistry of this class of compound. Ultimately, Nozoe never really retired from chemistry, even reviewing a manuscript from his hospital bed on his last day (40, 41). Nozoe was 86 when he began writing his autobiography. Even at that age, he was still commuting several hours (each way, every day) to and from Kao Corporation's laboratories to participate in his experimental research on novel non-benzenoid aromatic compounds.



Tropolone

Nozoe complied with everything I asked of him, and he did so immediately. That is, until I asked him to provide the chemistry genealogy tree of the early 20th century Japanese chemist Riko Majima.

Majima (1874-1962) was the doyen of Japanese organic chemistry in the first half of the 20th century. His students, including Nozoe, and their students were among the most productive and influential Japanese organic chemists for several generations. I asked Nozoe to identify and document for history's sake those influential chemists. But I did not realize the Japanese cultural imperative of saving face; if Nozoe named only some chemists, he would be slighting other chemists by their omission. He wrote to me, apologizing, saying that he had to delete the Majima chemist-family tree based on the warnings of several of his trusted colleagues who had read his draft manuscript.

I urged Nozoe to reconsider. "At age 87, you are the most honored of Japanese chemists. If you do not do this, no one ever will. History of Japanese chemistry will be lost." Nozoe reconsidered and chose history over tradition.

For that and many other reasons, I had a large debt to Tetsuo Nozoe.

That debt was at least partially repaid when, at my urging and under my guest editorship, from 2012 to 2015, *The Chemical Record*—a Wiley journal published for the Chemical Society of Japan—published in 15 consecutive issues the entire Tetsuo Nozoe autograph books, all 1200 pages, along with 19 carefully solicited perspectives (42-44). You see, from 1953 to 1994, Nozoe carried with him to meetings and symposia an autograph book that thousands of chemists and others signed, provided chemical pictographs, wrote poems and otherwise inscribed.

In the editing of the Nozoe Autograph Books project, I was introduced to three of Nozoe's most prominent students, Toyonobu Asao, Shô Itô, and Ichiro Murata. These three "students," then in their 80s, agreed to write two perspectives that appeared with the series. One was a biography of Tetsuo Nozoe (41). The second was on the Tetsuo Nozoe chemist-family tree, which added another generation to the Majima chemist-family tree (45).

Working with what I happily called the AIM team (Asao, Itô, and Murata) brought me back to my time with Tetsuo Nozoe, as if I were working with the great man again. It was an editorial-*déjà vu* experience.

Being a science historian of the modern era has a double advantage. Scientists, in their travels, collect new friends from around the world. And that goes double for historians of science, for they collect as friends both other historians and scientists! A worldwide collection of

friends from my professional associations is a continuing benefit that has given me bountiful joys. And unanticipated gifts arrive often to delight one's soul, like the stamp shown in Figure 8 given to me by the AIM team as their thanks—really, my thanks—for being invited to participate in the Nozoe Autograph Books project.

John D. Roberts (1918-2016)

In four papers, I have written about Jack Roberts's personality, professional characteristics and scientific achievements (7, 46), my experiences editing Jack's autobiography (5, 7), and my long and special friendship with him.



Figure 8. My "Jeffrey Seeman" seal, a gift from Toyonobu Asao, Shô Itô, and Ichiro Murata, three of Nozoe's students and academic chemists of note themselves.

I treasure the memory (and at the time, the fact) that he would immediately recognize my voice on the phone, when I would say, "Hello Jack!" He would then immediately growl. Actually, he would growl several times. The friendliest and most welcome growls I've ever heard. But they were unmistakably growls, stemming likely from the presumption that I wanted something from him. A realist was Jack.

I treasured my relationship with, and now my memory of, Jack's lovely wife, Edith (Figure 9), as I did the wives of some of the other authors. Edith, a professional in her own right (47), was a warm and gracious person. We spoke frequently, and the memory of her smile upon greeting me still brings warmth to my soul.

Lastly, I treasure my friendship with Marjorie Caserio. After receiving her Ph.D., Marjorie was associated with Jack for nearly a decade, first as a postdoc and then as a research associate. From that era, she is best known as Jack's co-author of several quite popular organic chemistry text books, those often being referred to as "Roberts and Caserio" (48, 49).



Figure 9. Edith and Jack Roberts, 2005. Photograph courtesy J. I. Seeman.

I got to know Marjorie first as the reviewer of Jack's autobiography manuscript. One evening some years after, at an ACS national meeting, she was leaving a reception just as Al Padwa (50) and I were. Al invited Marjorie to join us for dinner, and my two-decade-plus friendship with Marjorie thus began.

One doesn't hear about social connectivity among scientists when one is considering a career in science. Indeed, scientists typically take this value for granted. As mentioned above, that is certainly one of the greatest benefits of a career in science. A historian of modern science shares this benefit in the extreme: such an individual discovers that one's network of friends includes the subjects of one's own research as well as their spouses and their colleagues and friends, too.

F. Gordon A. Stone (1925-2011)

I met Gordon Stone only twice, both times after his autobiography was published. The first time, I was visiting Bristol to see a friend and arranged to meet Gordon. I remember two things about him: first, his wide and welcoming smile; second, the man's organizational skills. All around his office were "in-out" trays in which, he told me, information about different on-going projects or manuscripts in preparation were placed. I wondered how big his pile was for his *Profiles* manuscript, but was too reluctant to ask.

The second time I met Gordon was early on a short holiday I was taking in Wales. I had just completed several days of business in London and decided to visit south east Wales, a region I had visited many times when my family and I lived in Oxford. As I drove toward along the M4 motorway toward Bristol and the Severn Bridge that would bring me into Wales, I recalled that Gordon lived in Bristol. So, I pulled off the motorway, called him, and announced that I would be passing through Bristol and wondered if perhaps I could stop by and say hello. He immediately invited me to have dinner and spend the night.

It was a lovely visit, made especially touching in that Judy, his wife of many years, was in the early stages of what I believe was Parkinson's disease. Gordon was the caretaker, the chef, and the host. His loving demeanor toward his wife enveloped the home. I especially remember his tenderness to Judy and their joint warmth to me.

Andrew Streitwieser, Jr. (1927-)

One of the ironies of my professional career has to do with Andy Streitwieser's 1961 textbook, *Molecular Orbital Theory for Organic Chemists* (51). I used his



Figure 10. Andy Streitwieser with the author at the 209th National Meeting of the ACS, Anaheim, California, 1995. Photograph courtesy J. I. Seeman.

textbook for the one of three courses I was required to take as a graduate student at the University of California at Berkeley. I didn't quite understand much of the book at that time, surely a consequence of my lack of ability or attention, not due to Andy's skill as a teacher. Ironically, that book plays a central role in my current research project, the history of the development of the Woodward-Hoffmann rules (52, 53). And in a real turn-

about, for this current research project I have “deposed” Andy several times regarding the content of that book, the last time questioning him page by page, sometimes line by line and even word by word. *Leaving No Stone Unturned* (54), as Gordon Stone entitled his autobiography (see section immediately above), seems to be my research motto also. Andy has been a very fine deponent.

The student has become the historian-student. The teacher has remained the teacher. And we have become friends (Figure 10).

Reflections on Reflections

Dreams, dreams, dreams.

I could never have dreamed of the personal and professional consequences of the *Profiles* series when I first imagined and “sold” the project to ACS books (5). I refer only in part to all that I learned in the process of editing the project, all the chemistry and the ins-and-outs of scientific publishing. But primarily, I refer to all the relationships that resulted, directly and indirectly, from my participating in this project.

The *Profiles* volumes began to appear in 1990, almost 30 years ago. Sadly, only three of the 20 authors are alive today. When first published, these autobiographies were topical accounts of current chemistry, and many of the authors, though aging, were still the leaders of “present chemistry.” Those days are long gone. Today, these autobiographies are sources for the history of chemistry. In only a portion of my own lifetime, the *Profiles* volumes have transitioned from being topical to historical and archival.

Historians of science who study Lavoisier or Priestley, Liebig or Wöhler, Kekulé or Mendeleev, deal with events that are fixed in time and protagonists dead for decades if not centuries, just as insects are locked in the amber of the Baltic shores. But for the *Profiles* series, many of the authors continued their research for years after the publication of their autobiographies. And half of them lived into the 21st century, continuing to publish. The ability to interview the scientists is an enormous benefit when conducting research in the history of *modern* chemistry. There are substantial and sensitive challenges in dealing with eminent chemists who have written many hundreds of publications though few, if any, autobiographical texts. There is a great difference between an autobiography and a scientific paper. The fundamental instruction I gave to the authors was to write about their scientific achievements as well as about the

human side of their profession. I have described some of these challenges in other papers and have hinted at some of these in the above brief anecdotes (5-8).

I never anticipated that the *Profiles, Pathways and Dreams* series would serve as a model for other autobiographies. John P. Fackler initiated a series *Profiles in Inorganic Chemistry* in which Fred Basolo (55) and Helmut Warner (56) have published their autobiographies. And separately, Albert Cotton’s autobiography was published just after his death (57). These authors and editor have credited the *Profiles, Pathways and Dreams* series as the inspiration for their own autobiographies.

I also never anticipated that I, myself, would use the *Profiles* volumes as source material for my own research. Stephen Weininger asked me recently, “Have you thought about describing the experience of simultaneously being a chemist and an historian of chemistry—sort of being on the inside and the outside at the same time?” When I was editing the *Profiles* series, I was still a full-time practicing and publishing organic chemist, involved in both experimental and computational research. At that time, I considered only other chemists as the customers for the autobiographies. It was my knowledge of and love for chemistry that gave me the ability and perhaps even the permission to interact so intensely with the authors. Today, my interests range more broadly into the history, sociology and philosophy of chemistry, just as the journals I read and in which I publish have moved from the *Journal of the American Chemical Society* and *The Journal of Organic Chemistry* to a much broader set of publications. It is for that internal reason and for external factors mentioned in the introduction that the *Profiles* series, if it began today, would have had a different texture from what it became.

In 1986, Harriet Zuckerman and Joshua Lederberg wrote an insightful article about the nature of discovery. In it, they commented “that personal reminiscence had to be validated by contemporary documents and other testimony as oral history and autobiography are prone to ‘unconscious falsification’” (58). During my editorship, I had never considered the possibility that the autobiographies would be anything other than accurate. In the decades since the publication of the *Profiles* autobiographies, I am aware of only one single disagreement with any of the content of those books. That exception is Herb and Sarah Brown’s disagreement (59) with Jack Roberts’s characterization of an interaction Brown had with Saul Winstein (4). Of course, the matter related to the nonclassical carbocation controversy. On the whole, the *Profiles* series has received major compliments by historians and

chemists alike (60-67), and I often see citations to these volumes in both the chemistry and history of chemistry literature. Thus, these autobiographical representations have withstood the test of intellectual and sociological time and have demonstrated some measure of utility.

What have I learned? What lessons are there, within those volumes, that I should share? When I posed those questions to Djerassi after reading his last autobiography (23) for a review I was to write for *Chemical & Engineering News* (9), he instructed me to read his book again, more carefully! Djerassi never made things easy for others, and in truth, few things are really easy.

Within this article, I have already described much of what I have learned, though some matters are more implicit than explicit. Perhaps the most important are the following precepts. Think big, be creative, and have dreams that far exceed the present. All projects take time and energy, don't waste yours on ideas that, from the get-go, at their best will have limited if any impact. Plan carefully, yet be flexible, keeping your eyes open to new possibilities. Identify the customers of your work and meet their needs, remembering that you are also one of those customers. Find your own special niche. **Have faith in yourself and your ideas. Be an exceptional citizen of our community. Have fun.**

The *Profiles* series has served as the intellectual, emotional and practical foundation for all of my history of chemistry research over the past 30 years. I am deeply appreciative for those experiences, for touching others and for being touched myself. I thank numerous chemists for hundreds of interviews and thousands of email responses and archivists for their boundless welcome and cooperation. I am also deeply appreciative for the HIST Award for Outstanding Achievement in the History of Chemistry. I am enormously touched to find my name associated with many of my heroes who are former Dexter, Edelstein and HIST awardees.

—Dedicated to my teachers, two of many: Ajay K. Bose (Stevens Institute of Technology) and William G. Dauben (University of California, Berkeley).

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tion, to “choose the topic that you take delight in, and that you would like to share your delight with others for posterity.” I also thank Robert Anderson who presented a wonderfully creative and insightful idea for this paper that I shall retain for a future time and place and which perhaps he and I might study collaboratively.

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