

Hero Worship in Words

Imitating the Grand Style of R. B. Woodward

by Jeffrey I. Seeman

We all are influenced by our heroes, our role models, the individuals who we feel most represent the ideals to which we strive. In the four decades beginning in the early 1940s, the greatest of all organic chemists—certainly one of the greatest of all chemists—was Robert Burns Woodward. Few could replicate his science or his egregious* behaviors, though many tried.

In the previous issue of *Chemistry International*, a paper titled *Taking IUPAC Literally: Woodward's Pure and Applied Chemistry Words* was published. [1] That paper, along with a companion paper published in 2015 in *Angewandte Chemie*, illustrated Woodward's great written communication capabilities. [2] Woodward's grand or high style of writing is found in many of his papers. Woodward's words were, indeed, elegant and commanding. As such, some of his admirers tried their hand at copying Woodward's grand style. To further celebrate the 100th anniversary of Woodward's birth—he arrived on the scene on 10 April 1917—we present several examples of hero worship in words, the imitation of R. B. Woodward.

Subsequent to the publication of *Woodward's Words* in *Angewandte Chemie*, [2] two eminent chemists, Pat N. Confalone and Rick Lane Danheiser, contacted me and shared some of their writing from the early 1970s which emulated Woodward's grand writing style.

Confalone, a former graduate student of Woodward, is a former vice president at DuPont Global R&D and now Chair of the Board of Directors of the American Chemical Society, and an active participant in IUPAC governance. He sent several excerpts from his 1971 Ph.D. thesis, *Synthesis and Photochemistry of 5-Azido-1,3,4-oxadiazoles*. [3]

"One of the most powerful concepts of synthetic methodology is the effective taming of reactive functional groups by uniting them in a stable molecular array. By thus masking their inherent reactivity, crucial manipulations required elsewhere



Pat Confalone in Ph.D. regalia, Harvard University, 1971. Photograph courtesy P. N. Confalone.

on the molecule can be carried out under conditions whose relative severity would otherwise prove disastrous. When the desired groups are needed, a single mild reaction serves to dissect their once compelling chemical bondage, and thus unfettered, are made available for their predestined role." [3]

"The purity of the recovered starting material woefully indicated that the substance had remained inviolate throughout its many intimate encounters with a host of acylating agents." [3]

"Hence, in the midst of so exciting a foray, further investigation into the crucial cyclodehydration had to be abandoned, as the emphasis of our assault on the target was radically altered by a fascinating quirk of chemical happenstance." [3]

Rick Danheiser, a former graduate student of E.J. Corey and subsequently professor of chemistry at MIT, sent a Woodwardian-styled excerpt from his 1984 review article, *The Total Synthesis of Gibberellic Acid*. [4]

"Confident that we had provided for every possible contingency, we believed that the triumphant completion of the total synthesis of gibberellic acid was finally at hand.

That was naïve. We were totally unprepared for the special surprise our foe had held in reserve for the final confrontation . . . All efforts to suppress this transactonization proved futile . . . It was all too clear that our plan for the elaboration of the gibberellin A ring had been undermined by an inopportune exemplification

* "Egregious" typically means shocking or outrageous, and extends to perhaps even more shocking or outrageous definitions. In ancient times, egregious also meant "remarkably good." For the purposes of this paper, the word is a resonance hybrid of all of the above.



Rick Danheiser at Massachusetts Institute of Technology, c. 1985. Photograph courtesy R.L. Danheiser.

of R. B. Woodward's dictum that 'enforced proximity often leads to greater intimacy.'[5]" [4]

Finally, from the Woodward papers at the Harvard Archives comes the one page mystery document shown in Figure 1, reproduced on the following page. It is a mystery because we don't know who wrote it or why. The careless typing, including typed-over errors, clearly indicates that this was *not* the work of Woodward's perfectionist secretary, Dolores (Dodie) Dyer, whose name appears as if it were written by her. [6, 7] Nor is the author Woodward himself, as Woodward, ever more the perfectionist, would not have produced a

Woodward with Dolores (Dodie) Dyer, ca. 1955. This is a rare picture of Woodward sans his blue tie. Photograph from the W. Lwowski collection, New Mexico State University, courtesy William Maio.



document with so many typist's errors. Likely this document was prepared by one or several of Woodward's students as a playful clownery, a spoof on both Woodward and Dyer. Roald Hoffmann guesses that "they had a goldfish in the office, and one day it disappeared. Dodie accused RBW of doing away with it . . ." [7] Of relevance is the document's clear use of the grand style of writing favored by Woodward. This spoof, very clearly an imitation of Woodward, must surely have amused the grand master, as Woodward kept it permanently in his files, to be found 70 years later by this researcher.

As discussed in my earlier paper on Woodward's Words, [2] Woodward did not encourage his students to write in the grand style. Nor, in my opinion, was this an affected style of Woodward, intentionally replacing some other, less grand, style that was his normal manner of communication, in order to impress the reading public. There was no other style for Woodward. That is the way he wrote, in contrast to my conclusion that Woodward intentionally developed and acted a public persona, with the grandeur befitting a nobleman.

In addition to crafting their words to model Woodward's style, according to his one-time graduate student Dan Kemp,

"Graduate students and postdocs would practice for hours, learning to draw structures sufficiently carefully to be able to make their debut at Woodward's evening seminar—to go to the blackboard in front of the audience and in front of Woodward himself, to pick up the chalk and to draw a proper structure as an answer to one of the problems he had posed." [8]

Coda

Decades ago, Pat Confalone and Rick Danheiser surely had fun in their imitation of Woodward's grand writing style. Today, we join in their fun and also celebrate the wonder that was R. B. Woodward. I am certain that few, if any of us, including myself, could pick out which quotes are imitations and which are true Woodwardian prose, had we been given a randomized mixture of Confalone, Danheiser, and Woodward.

It is appropriate to end this paper with a real Woodward quote. What follows is one of my favorites[†]

[†] I do wince a bit, with the presumptive equivalence of "men" with "chemists" in Woodward's words.

(Contribution from the Chemical Laboratories of Harvard
University)

Attⁿ
D. Dyer

" Hallucinations Related to Genus Pisces " (Part 1)

by Dolores B. Dyer

Recent investigations in these laboratories have indicated the existence of anomalous interbowlular piscine migrations of unknown origin, periodicity and purpose. The details of our work will be published when ancillary experiments are completed. In the sequel we intend to show, skeptic's captious comments notwithstanding, that these ubiquitous rearrangements can be rationalized in terms of more familiar concepts.

The enclosed diagram, reprinted from Bailey¹ without permission, will, mutatis mutandis, indicate the analogy we wish to stretch.



1

Bailey, Beetle, Boston Daily Record, 1 March, 1954, p. 25.

Figure 1. A mystery document found within the Woodward Archives at Harvard University. The cartoon, taped to the typewritten text, is Beetle Bailey: © 1954 King Features Syndicate, Inc.

and was independently chosen by Fabienne Meyers, the editor of *Chemistry International*. Enjoy the real Woodward!

[From *The Total Synthesis of Strychnine*, 1955]

"Modern organic chemistry possesses a splendid and powerful armamentarium for the attack on the problems which excite the attention of its devotees. From time to time here mention has been made of some of these weapons, and it is certainly worth emphasizing that this campaign could not have been concluded without constant use of the very great body of principle and mechanism which our theorists have placed at our disposal, and without the beautiful physical tools which we now have. But in one respect, organic chemistry has not changed, nor is it likely to. Its successes depend in the first instance upon the experimental skill and devotion of the men who do the work. DR. MICHAEL P. CAVA spent the better part of a year in the exploratory phases of this work, and was then joined in an intensive effort of another year's duration by DR. W. DAVID OLLIS and DR. ALFRED HUNGER . . . DR. KARL SCHENKER and DR. HANS DAENIKER – the Beresina group; for it was of this gallant band of Swiss, thrown into the breach on a famous and desperate occasion, that DR. SCHENKER thought, when, arriving in the midst of the difficult campaign against Ring VI, he learned his fate for the months ahead. All of these men worked indefatigably, with great skill, and forbearance of a

hard taskmaster. It is a very great pleasure to have the opportunity here to point out that the merit in this work is theirs in large measure, and to acknowledge my immeasurable debt to them." [9] 🏆

References

1. J. I. Seeman, *Chem Int*, **39**(1):4-9 (2017).
2. J. I. Seeman, *Angew. Chem. Int. Ed.*, **55**:12898-12912 (2016).
3. P. N. Confalone, Ph.D. thesis, *Synthesis and photochemistry of 5-azido-1,3,4-oxadiazoles*, Harvard University (Cambridge, MA), 1971.
4. R. L. Danheiser, "The total synthesis of gibberellic acid" in *Strategies and Tactics in Organic Synthesis*, Academic Press, 1984.
5. R. B. Woodward, *Pure Appl. Chem.*, **17**:519-547 (1968).
6. J. A. Berson, email to J. I. Seeman, Hamden, CT, 14 September 2016.
7. R. Hoffmann, email to J. I. Seeman, Ithaca, NY, 14 September 2016.
8. H. H. Wasserman, J. A. Berson, J. B. Hendrickson, D. S. Kemp, E. Wenkert, *Tetrahedron*, **55**:10253-10269 (1999)
9. R. B. Woodward, *Experientia*, **12** (Supplementum II):213-238, (1955).

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