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Roald Hoffmann

Theoretical chemistry. Nobel Prize in Chemistry, 1981, for theories concerning the course of chemical reactions.
Frank H.T. Rhodes Professor of Humane Letters, Cornell University.

I am from the last generation of Hitler's gifts to America. Born as Roald Safran in a happy Jewish family in Zloczow, in southeastern Poland, I survived the war, with my mother. Few others in the family did. I was 11 when my mother and stepfather and I came to New York City.

There was no need to tell us to study. We saw that in America the world was open, and to an outsider, an immigrant, open in just that way, through education. New York City teachers (who, had it not been for the Great Depression, might have been off doing other things) were wonderful. You can imagine there was a good bit of subtle pressure to become a doctor, or otherwise enter a profession. Under the picture of that crewcut boy in the 1955 Stuyvesant High School yearbook, where it says "career aim," I put "medical research." And in high school the only advanced science course I did not take was chemistry.

My path to chemistry was not straight. It took one year of college for me to work up the courage to tell my parents that I didn't want to be a doctor. Meanwhile, I had fantastic teachers in the humanities and arts at Columbia College—Mark Van Doren in poetry, Donald Keene in Japanese literature, Howard McParlin Davis in art history. The world, a world of art and literature, opened up for me.

But I did not have enough courage to go into the humanities. What to do? Looking at my brilliant classmates, I thought I wasn't good enough for physics (I was wrong). Somehow biology did not attract. Summer research experiences in chemistry pulled me in.

So I went to graduate school in chemistry, at Harvard. But even the first two years, I wasn't sure I wanted to be a chemist—I sat in on courses in other departments; I found a graduate student exchange that took me to the Soviet Union for a year. Eventually I found my vocation there, through the mentorship of three men—Martin Gouterman and William Lipscomb first, and then, just after my Ph.D., in an inspirational collaboration with R. B. Woodward, the greatest organic chemist of his time, intellect incarnate.

I came of age as a theoretical chemist in sync with the first computers, which I used with enthusiasm. Then something interesting happened. Instead of succumbing to the psychological traps computer use engenders, I found my way from computing to understanding. The computer spewed out numbers; I learned how to trim away those numbers, so that the closer I got to writing a scientific paper, the fewer numbers there were. I understood, only intuitively then, that the language of chemistry is a mix of symbolic and iconic representations of molecules, of the bonds between atoms, and the shapes that govern properties. I found a way to make small drawings of orbitals, the places where electrons dwell—drawings that were portable, that could be sketched on a piece of paper. And not just by me. Other people did quantum chemistry and calculated orbitals. But I think I found a way to put them into the hands and minds of every chemist.

It was the time of simplification, of finding one reason for a reaction going one way or another. Only later did I learn to appreciate the differences, the rich complexity of the real world.

It has been the greatest fun to make sense of the shapes and reactions of every kind of molecule in the world—from organic, through organometallic, and inorganic, to the borderland of surfaces and solids, where I work now. I see the connections between everything molecular in this world.

And not just to build bridges between parts of chemistry. I loved the English language, the only language I could write in. What excited me at Columbia remained with me. In time, it made sense to try poetry. I thought, naïvely at first, one could just write of the excitement of doing science. But I should have focused on the language, its life-giving tensions.

The language of science is a language under stress. Words are being made to describe things which are indescribable in words, a molecule found for the first time, equations. Words do not, cannot mean all they stand for, yet they are all we have to describe experience. By being a natural language under stress, the language of science is inherently poetic. There is metaphor aplenty in science. Emotions emerge shaped as states of matter, and matter acts out what is in the soul.

One thing is certainly not true, that scientists have some greater insight into the workings of nature than poets. Perhaps we do, but in such carefully circumscribed pieces of the universe! Poetry soars, all around the tangible in deep dark, through a world we reveal and make. In time I built, and am still building, a land between chemistry, philosophy, and poetry. It is a land in which I need not separate my worlds.