

## NCW 2007: The Many Faces of Chemistry

### Career Profile: Medicinal Chemist

by Stephen W. Wright

Describe your present position.

I work with a team of chemists, biologists, molecular biologists, and computational chemists. Our team is also assisted by other scientists with specialized training in drug metabolism, toxicology, enzymology, spectroscopy, protein purification, and X-ray crystallography. Together we design, synthesize, and test new organic compounds to identify compounds that may eventually help treat patients with an unmet medical need.

Did you get to your present position because of your background in chemistry and area of specialization or did life experience(s) take you there?

My fascination with chemistry has been a guiding force ever since I discovered chemistry in the third grade, when my dad and I made Prussian blue with my older brother's chemistry set. By the time I took high school chemistry, I knew I wanted to be a chemist, although I wasn't certain what chemists actually did, except work with chemicals and glassware. After a high school field trip to the Smith, Kline & French research laboratories, I knew exactly what I wanted to do for my career.

In what areas of chemistry did you specialize?

During high school, I taught myself descriptive chemistry from old textbooks from rummage sales. In college, I discovered organic synthesis. The process of designing, planning, and executing the synthesis of a molecule fascinated me. I specialized in synthetic organic chemistry in college and graduate school. After starting my career in the pharmaceutical industry, I learned medicinal chemistry, which concerns the physical properties of organic molecules and their interaction with living systems, particularly in human patients.

My other area of expertise has been in chemical demonstrations. The Prussian blue experiment with my father made a

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deep impression on me. I was entranced by reactions that changed colors, gave off gases, or formed precipitates. My high school chemistry teacher's chemical "magic" show on the first day of school was legendary. I spent as much time as possible working with him, trying out new demonstrations and enhancing old ones. At Dartmouth, I worked as an assistant preparing the laboratories and demonstrations. As I moved into my current career, I missed these "old days" and so created opportunities to go into schools and carry out demonstrations and hands-on experiments. Currently I perform a monthly demo day at our local high school. As time passed, I became aware of the shortages of equipment and chemicals at many schools, the increase in distance-learning possibilities, and the difficulties associated with the use of laboratory chemicals for demonstrations at off-site locations. I began to modify my old favorites to use consumer chemicals. My favorite consumer chemical experiment is a clock reaction that uses vitamin C (published in this *Journal* as *JCE Classroom Activity: #40*).

Do you use chemistry on a daily basis? Describe what you do on a day-to-day basis.

I use my chemistry training every day. I spend time daily in the laboratory conducting synthetic organic chemistry and also troubleshoot synthetic chemistry for the team and for our outsourced chemistry vendors. My computer is my



photo by Dove Tustia

Stephen W. Wright

constant companion. With it I stay current with chemistry journals, search the literature for guidance, and keep my laboratory notebook. I also use my computer to model and calculate properties of new molecules to synthesize and to analyze test data on compounds that the team is following, in order to guide my design of future compounds. One of the most important tasks is discussing results and future research directions with team colleagues.

Describe the personal skills that have played an essential role in your present position.

Teamwork and communication are the most important personal skills for a scientist. Science is no longer carried out by individuals, but instead by teams working together, perhaps among several sites and continents. At the time I learned composition in high school English, I couldn't understand what value it would have in my adult life. However, the ability to communicate clearly and concisely is of equal importance to my chemistry knowledge. With the increased use of electronic communication, it is even more important that one be able to communicate effectively in writing.

What advice do you have for those who wish to pursue this or some other nontraditional career path?

Identify what you are passionate about. One can be happy and excel at an endeavor only if one truly enjoys and is

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personally connected to it. Also, be open to learning new specialties and methods regardless of how difficult they might seem at the time. You may discover a new tool or connection that will advance your current direction, or take you in an exciting new direction.

How and where can readers learn more about this type of career?

Two good places to look for information on a career in the design and synthesis of biologically active compounds are the American Chemical Society Web site at <http://chemistry.org> and the Pharmaceutical Research and Manufacturers of America Web site at <http://phrma.org> (both sites accessed Jul 2007). Many interesting articles on the discovery and properties of biologically active compounds can be found on this *Journal's* Web site by searching the *JCE* Index for the keyword "medicinal chemistry".

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### Related Resources

1. Wright, Stephen W. *JCE* Classroom Activity: #40. Tick Tock, a Vitamin C Clock. *J. Chem. Educ.* **2002**, *79*, 40A.
2. Miles, William H.; Smiley, Patricia M. Modeling the Drug Discovery Process: The Isolation and Biological Testing of Eugenol from Clove Oil. *J. Chem. Educ.* **2002**, *79*, 90.
3. Smith, David K. A Supramolecular Approach to Medicinal Chemistry: Medicine Beyond the Molecule. *J. Chem. Educ.* **2005**, *82*, 393.