



Career Profile: Biochemist and Plant Molecular Biologist

by Natalia Dudareva

Describe your present position.

I am a professor of biochemistry and plant molecular biology in the Department of Horticulture and Landscape Architecture at Purdue University in West Lafayette, IN. In my research laboratory, I work with six graduate students and four postdoctoral associates. In addition, undergraduate students conduct research projects in my laboratory every year. For eight years I taught Plant Physiology, a senior-level course, and I now teach Metabolic Plant Physiology, a graduate-level course.

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?

Both. I fell in love with science during my school years and was always fascinated by the number of unanswered questions. It took me many years, two Ph.D.s, several countries (Russia, France, Canada, and the U.S.), hard work, and a strong belief in my goals to get my present position. My knowledge of the field, personal drive, dedication, and my abilities to use my time efficiently and be a team-worker helped me greatly in this process.

In what areas of chemistry did you specialize?

My area of specialization is the biochemistry of plant secondary metabolites, and in particular, volatile compounds. Plants release diverse blends of volatile fragrant compounds that play crucial roles in pollinator attraction, defense and communication. To date, a total of 1700 volatile compounds have been described from different plant species, however, most of the biochemical pathways and the enzymes involved in their biosynthesis have not been elucidated. My laboratory investigates the biosynthesis of plant volatiles, the regulation of their emission, and the role of these compounds in pollinator attraction.

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

We use biochemistry on a daily basis. This includes the purification of enzymes from plant sources. Purified enzymes are subjected to biochemical characterization including substrate specificity, kinetic parameters, pH and temperature optima, and response to possible inhibitors. For discovering unknown pathways and routes we use stable isotope labeling in combination with computer-assisted metabolic flux analysis. In these experiments, volatiles are collected and quantified by gas chromatography–mass spectrometry (GC–MS). Intermediates and end-products are extracted from plant tissues and analyzed by GC–MS and liquid chromatography–mass spectrometry. In our experiments we use snapdragon and petunia flowers. Both of these flowers produce a relatively simple mixture of volatile compounds when compared with other flowers such as orchids, which emit hundreds of compounds.

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Natalia Dudareva

photo by Anthony Quatley

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

My present position requires enthusiasm, leadership, solid knowledge in the field of study, conceptual vision, and creativity for new discoveries, as well as excellent writing skills. Communication skills play an important role in my daily activities since I have a lot of interaction with undergraduate and graduate students as well as my colleagues. The ability to listen to other people, share ideas and expertise, and willingness to help others are important features of team-work and future success. I was fortunate to have exceptional people around me during my life and was able to gather from them the best ways to solve scientific questions. An active interest in science, clear goals, hard work, the ability to plan and organize, efficient use of time, honesty, reliability, and persistence are traits which lead to success in any field.

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

Be very strong and always try to achieve your goals. Even though times can be difficult, find the courage within yourself to continue. Stay abreast of new discoveries and technology. New discoveries are a wonderful thing!

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

The newsletter of the American Society of Plant Biologists often publishes articles about personal careers of outstanding scientists; see <http://www.aspb.org/newsletter/wipb.cfm> and <http://www.aspb.org/publications/plantphys/career.cfm>; both sites accessed Aug 2007.

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Are there other thoughts or lessons learned that you would like to share with our readers?

This work is not easy. But if you really love science, it is exceptional work to do. There is no better gift from life as to teach students, to be around them, and to see how they succeed in their scientific lives and become better than you.

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Related Resources

1. Duprey, Roger; Sell, Charles S.; Lowe, Nigel D. The Chemistry of Fragrances: A Group Exercise for Chemistry Students. *J. Chem. Educ.* **2003**, *80*, 513.
2. Séquin, Margareta. Exploration of the Chemistry of Plants: A General Education Course. *J. Chem. Educ.* **2005**, *82*, 1787.