ANALYZE THIS, ANALYZE THAT

Plant optimization, lucrative contract work, cell biology, and instrument sales lure analytical chemists

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"I often say that when you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind." — Lord Kelvin (Sir William Thomson)

Al Ribes draws inspiration from this famous quotation. Analytical chemists like Ribes have skills that apply to a wide range of different jobs in academia, industry, and the government. Overall job prospects have been rosier in past years, but there are a lot left to analyze. Industry? Think globally and sell within your region. Academia? Chemistry departments aren’t the only ones that hire analytical chemists. And who says you have to have the same job all year?

Successful people use special skills or secondary interests to their advantage. Here are a few examples inside and outside the lab for people who adore the art of measurement.

Ribes joined Dow as an analytical bench chemist. “There are certainly plenty of opportunities in industry for people to explore areas that are really outside the scope of typical analytical chemist,” he says.

Ribes hails from Spain. After he joined Dow, the company had a project in Argentina, where, he explains, “they needed a generalist who could handle all sorts of analytical methods and who was bilingual.” He says it was “an unusual opportunity, and I just happened to be in the right place at the right time and have the right skills.”

Upon returning to the U.S., he became certified as a Black Belt in Dow’s Six Sigma program, an efficiency methodology started at General Electric. Ribes’s projects included optimizing the additive system in one plant and the human component at another, improving how products get to customers, and data mining to improve purchasing processes. Now he coordinates analytical services for one business unit.

Ribes thinks analytical chemistry jobs in large companies are depressed. He sees opportunities with upcoming retirement waves and in small companies. “Right now, recruiting is at replacement level due to attrition from retirement or employment mismatch.” And those jobs are mostly filled by Ph.D.s.

He says process analytical, chemometrics, and automation for high-throughput analysis still interest industry, as well as separations, spectroscopy, microscopy, and surface analysis.

There has “always been an element of outsource” for analytical work, he says. “Sometimes we will send some high-volume, more-routine-level work to contract labs,” but internal people familiar with the product line are needed to interpret the data. For some complex work, he says, the external technology department of Dow tries to collaborate “with universities and national labs, because we are cognizant of their wealth of expertise.”

For example, the National Institute of Standards & Technology studies fires. Analytical chemists who are also familiar with materials science quantify the smoke produced and what gases or organic compounds compose that smoke, explains William Grosshandler, chief of the Fire Research Division at NIST. Although NIST’s staff members do not develop products, they help commercial companies understand what happens to a product during combustion. NIST employs many analytical chemists at all levels in various projects including homeland security and standards work.

WHEN THE NEEDS of an industry or government analytical lab change, contract workers often fill the voids.

Most of Kelly Scientific Resources’ place-
**ART AND SCIENCE**

**Smithsonian Chemists Squeezed Out Of Analytical Jobs**

At the intersection of art and science, analytical chemists have problems to solve.

John Winter is one of three permanent researchers at the Smithsonian Institution’s Arthur M. Sackler and Freer Galleries in Washington, D.C. “We have our separate fields of research just as any scientist does,” he says. With 25 years of experience, his specialty is East Asian paintings. Winter is also in charge of examining pieces under consideration for acquisition by the galleries for things like disguised repairs and added decorations, which “are far more common than out-and-out forgery.”

In his work, he uses analytical chemistry techniques for identification of materials, including X-ray fluorescence and diffraction, IR, UV-Vis, GC-MS, HPLC, and scanning electron microscopy.

“Tobe a good candidate in this field, you can’t afford to be too specialized,” Winter says. Originally a natural products chemist, he has forayed into botanical multivariate statistical analysis.

Charles Tumosa echoes those ideas. With a doctorate in physical chemistry, he worked on 4,000 homicides during his 18-year tenure running the crime lab for the Philadelphia Police Department before switching gears to set up the analytical laboratory at the Smithsonian Center for Materials Research & Education (SCMRE) in Suitland, Md. The mandate was to help to preserve the collection. “I always joked that it was a place where we watched paint dry,” he quips. But “no one has ever done a linear study on how paint ages, and that is one example of what we were doing.”

Tumosa enjoyed working at the Smithsonian Institution for 12 years. “What we learned we learned the hard way, and that knowledge is not in books, it’s not on the Web.”

On Sept. 16, however, he lost his job. Positions were abolished for six of the seven research scientists who worked on independent projects at SCMRE. “We were probably one of the last places to do materials science in the arts,” he says.

“It is curious that the National Academy of Sciences thought very highly of our research when they reviewed it and wanted the work expanded rather than curtailed or eliminated,” Tumosa says. “It’s a very unsettled time at the Smithsonian, and I think we are a little bit of the collateral damage that occurred.”

Winter calls the cut “an anomaly to the field as a whole.” Recent infusions of money from private foundations provided for new permanent positions at museums in Baltimore, Chicago, and New York City.

Tumosa sees temporary hires as the newest trend and is looking into teaching. People at various universities and colleges who are in science departments get involved as well, either as a sideline or as their main area of research.

Why go nontraditional? Funding is one answer. “If you listen to places like NIH and so forth, they claim that the innovative research—and the stuff that they are most interested in—is happening at the boundary of disciplines,” Yates says.

Yates looks for staff “who are good scientists.” His team includes an analytical chemist, a computational biologist, geneticists, cell biologists, and molecular biologists. “I have a wide variety of people, and that just adds to the richness of the lab.”

**FOR THOSE** looking to get on the road, consider analytical instrument sales. As a doctoral student in lipid biochemistry, Steven Royce used lots of analytical instrumentation. “Most people were treating the instruments kind of as black boxes—stick a sample in and get an answer out,” he says. “I was always the person who was taking them apart and working on them.” Shortly after defending his dissertation, he went to work at a part of Hewlett-Packard that was spun off as Agilent.

He says, “You can’t be in sales unless you are able to take rejection, and so you have to have a certain constitution to be able to manage the highs and the lows.”

In his 22 years at Agilent, he has held various positions but has shied away from management because he likes the front lines. Now a mass spectrometry specialist covering New England and New York, he enjoys interfacing with scientists in many different kinds of labs—academic labs in the Boston area and in New York City and biotech and pharmaceutical companies as far as Rochester, N.Y. He also works with state police crime labs and health departments as well as the chemical industry. Fifty percent of his time is spent traveling.

Royce works with “salary at risk.” For example, he explains “a typical plan might be 60/40, where 60% is doled out as a salary, and then you make up the 40% through your sales.”

Business varies with “what is hot at the time,” he says. With increased funding for homeland security, he says there’s been investment in liquid and gas chromatography and mass spectrometry. Academic grants are primarily dependent on federal funding from the National Science Foundation and NIH. When those funds are low, academics put off buying equipment.

Sales jobs are available. Although he has a Ph.D., Royce says most analytical instrument sales reps are B.S. chemists with lab instrument experience. “Agilent does recognize years in industry as the equivalent to graduate work.”

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**Photograph:** Paul Coyle