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FOOD SCIENCE

A smorgasbord of opportunity

Food science is fun — and boasts better job prospects than many other industry niches.

BY ALLA KATSNELSON

Tara McHugh recalls the JustFruit bar with more than a dollop of pride. In her early days at the US Department of Agriculture (USDA), McHugh led development of the technology for making 100% fruit bars, and then helped apple and pear growers to launch a company, Gorge Delights, to manufacture them. "We wanted to get people to eat more fruit," she says. The firm, based in North Bonneville, Washington, still sells the product a decade later, and even now it occasionally checks in with manufacturing questions, says McHugh, leader of processed-foods research at the USDA's site in Albany, California. Her team has also taken on projects such as helping Newgem Foods in Stockton, California, to develop sandwich wraps made from vegetables, and working with Monterey Mushrooms in Watsonville, California, on a growing process that ups the vitamin D content of fungi.

McHugh leads about a dozen scientists who study how food processing affects nutrition, and devise food processes that boost health. "One of the things I've liked most about my job is the ability to partner and take the basic research we develop into commercialization," she says.

The science of food is a great career choice for scientists of a practical bent, says Charles Shoemaker, academic adviser for undergraduate and graduate students in the food-science department at the University of California, Davis. "We're all familiar with eating, all our lives," he says. Food science "is a way to go into a scientific career and stay anchored to something you're really comfortable with". As a profession, it has long been something of a secret, says Shoemaker, but that is starting to change — owing in no small part to the rise of celebrity chefs and television programmes about food and cooking. "It sounds kind of silly in a way, but [US television channel] the Food Network has added a really serious degree of legitimacy to food science," he says.

The field encompasses a wide range of scientific disciplines: the chemistry of how ingredients interact; the microbiology of harmful and helpful bacteria; the biology of the sensory processes that underlie smell and taste; nutritional assessment; and the engineering involved in creating measurement tools or manufacturing, to name a few. Researchers might work with processes that make a type of food tastier, healthier or cheaper; oversee quality standards or compliance with government regulations; or specialize in studying an elemental component of food, such as proteins or carbohydrates.

MIX IT UP

More than in other disciplines, says Shoemaker, food scientists must be able to collaborate, because so many steps, components and ideas go into developing a food product. "You'll take on a project, and at some point you'll have to deal with food-safety issues, chemistry to deal with the stability of a product, engineering in scaling up production," he says. "You're not necessarily going to be an expert in those areas, but you need to be able to converse with relevant people and understand their issues and how they reflect on your product."

Most people enter the job market after completing dedicated undergraduate or graduate degree programmes in food science. The curricula of such programmes often underscore the interdisciplinary approach: Wageningen University in the Netherlands, for example, runs a respected master's programme with specializations in areas such as food biotechnology, sustainable food processing and ingredient functionality. The course features on a list of 52 graduate programmes that meet the educational standards of the Institute of Food Technologists (IFT) in Chicago, Illinois, a professional group allied with food-science organizations around the world.

Most academic programmes require students to complete internships to get more substantive research experience in work environments. A placement might be at a multinational giant such as PepsiCo, based in Purchase, New York, Heinz; based in Pittsburgh, Pennsylvania; or Cadbury, based in London. Or it might be ▶

in a food biotechnology start-up with few staff members; a government facility such as the US Food and Drug Administration or the European Food Safety Authority; or an academic lab.

Even in academia, much food research is funded by companies or trade groups. On the plus side, that gives young researchers plenty of options for funding, and it increases fluidity between sectors, so scientists working in industry may have the opportunity to return to academia.

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Tara McHugh helped to develop vegetable-based sandwich wraps.

TOO MANY COOKS

The heavy industry involvement can also bring challenges, says Megan Clements, who is finishing a food-science PhD at the University of California, Davis, and has already taken on her first job, at Hampton Creek Foods, a start-up in San Francisco. Her dissertation looks at how to measure almond quality and is funded by the Almond Board of California, based in Modesto. "It was a marriage of convenience in some ways, but it was a good marriage nonetheless," she says. However, she cautions that the goals of some industry-proposed projects are too narrow to give students the research experience they need to satisfy their academic requirements and add value to their CVs. Industry agendas can also be fickle. "If suddenly they are not interested in what you originally started with, they might ask you to switch your topic two years in," she says, adding that graduate students should recognize that academic advisers can also have vested interests linked to industry partners that might conflict with the student's needs.

The long arm of industry brings solid job prospects — a particular perk in the struggling economy. Unlike the pharmaceutical industry, which has haemorrhaged research staff over the past few years, food-science recruiters and long-time researchers say that the sector has been touched only lightly by the economic crisis. According to the IFT, earnings for new recruits had dropped by 2009, but have been creeping back up. The organization's annual salary survey showed that in 2011, US food scientists earned a median of $87,000 (M. E. Kuhn *Food Technol.* **66,** 26–38; 2012). Entry-level salaries start at about $40,000; for jobs such as vice-president of global research and development at a multinational company, remuneration can easily reach $250,000, says Susan Canarick, senior executive recruiter at Opus International, a recruitment firm based in Deerfield Beach, Florida, that specializes in food-science positions.

"Nearly everyone who graduates has a job, and many are choosing from two or three."

In Europe, master's-degree holders can expect entry-level salaries of €30,000 (US$39,000) or more for positions in product development or food safety at medium-to-large companies. Researchers with a PhD in an area such as dairy or bakery science could get €45,000–50,000 for an entry-level product-development post, and double that with 5–10 years of experience, says Jan-Willem Broekhoven, a managing partner at recruiting firm SIRE Life Sciences, based in Amsterdam. Jobs with more of a commercial bent — in which researchers must provide technical assistance to customers or keep abreast of regulatory issues, and must have higher-level expertise in a niche topic such as starches or cocoa — might pay €65,000–80,000, he says. "Nearly everyone who graduates has a job, and many are choosing from two or three," says Ralf Hartemink, director of the food-science programme at Wageningen University.

INGREDIENTS FOR SUCCESS

Product development is a common area for researchers to break into industry. Research and development at multinational companies with developed product lines may be tame, says Shoemaker, but there is plenty of innovation and entrepreneurship in the start-up world, which is particularly well-established in California. "It's what the biotech world was like ten years ago," he adds.

For instance, Hampton Creek hired Clements to develop a plant-based product with the right emulsion properties to replace egg in products such as mayonnaise. The company believes that taking eggs out of food preparation improves safety by lessening exposure to pathogens such as *Salmonella* and bird flu, as well as significantly reducing costs and increasing sustainability.

Other areas with good job prospects are nutrition and food safety. Consumers are increasingly demanding healthy foods that contain reduced amounts of fats, calories or sodium, or carry benefits such as probiotics to improve digestive health or fibre to reduce the risk of heart disease. The health claims of such products must be tested, and some items must be reformulated for specific ends.

A growing awareness of food safety has also created a need for researchers to monitor microbial and chemical contamination, and design safer food-development processes. US industry and government agencies are likely to add jobs to ensure compliance with the Food Safety Modernization Act, passed in 2011.

Such highly structured regulatory work is one of two types of government food-science jobs, notes Shoemaker. The other is research geared towards health and the public good. McHugh considers her post at the USDA to be a cross between an academic and industrial position. "We still publish manuscripts and are evaluated largely on our fundamental research, but we also have a unique ability — and it's part of our remit at the USDA — to transmit these technologies to commercialization," she says.

Although specialized academic programmes provide the easiest entry point into a food-science career, there are opportunities for researchers in almost any basic biological, agricultural or engineering field who have a love of food. Jennifer Kimmel, a protein chemist at Kraft Foods Group in Glenview, Illinois, never expected to stumble into a food industry job. But after spending five years as a postdoc studying enzyme kinetics at the University of Missouri in Columbia, she grew worried about getting funding. "I had to get a job really, really fast," she says. With her postdoc drawing to a close, she saw an advertisement for a position at Kraft that asked for experience with enzyme kinetics. She decided to apply, and got the job.

Kimmel's grounding in basic research has turned out to be a strong asset. It allows her to help product developers and other scientists to predict how proteins would work in particular products. That means understanding "not only the phenomena that are supposed to happen, but also the ones that aren't supposed to happen", she says. "No one wants a cheese that doesn't melt." ■

Alla Katsnelson *is a freelance writer based in New York.*