F&F Innovation Within Reach: Devin Peterson and Gary Reineccius

Gary Reineccius

Devin Peterson

"There really aren't many places in the United States doing flavor research," says Gary Reineccius, professor and department head of Food Science and Nutrition at the University of Minnesota. "The numbers are getting smaller, the funding more difficult. Flavor [research] is not something the government supports. If we are looking at basic work that needs to be done, it really has to come from industry one way or another." He adds, "Every company is into headcounts. They don't [always] have money to hire more people, so they need outside resources such as the Flavor Research and Education Center (FREC) will provide." FREC (*www.flavor.umn.edu*) is a new platform for academic and industry collaboration spun off from the university to help overcome these hurdles. Devin Peterson, associate professor in the Food Science and Nutrition department, adds, "Companies are realizing the cost of (flavor) research and are looking for better, more efficient ways to meet their technical needs."

Serving flavor and fragrance manufacturers and consumer product companies, FREC helps to identify and pursue avenues of innovation, conducts basic research, provides opportunities for networking and offers continuing education. FREC research will consist of mid- and long-term projects that form the foundation for commercial applications. FREC research currently focuses on aroma and taste compound isolation and analyses; taste-aroma interactions and flavor modulation; flavor and food processing; and flavor synthesis, release and dynamics. Although just being formed, FREC's staff already includes nine PhDs, several interns, faculty staff and others affiliated with the University. The number will grow substantially once FREC is formally launched this fall. FREC has the strengths of association with the department's sensory center and food processing plant. On a broader university basis, research centers are available to focus on analytical measurement (mass spectrometry, nuclear magnetic resonance spectroscopy and imaging), nanoparticles, material science (for flavor delivery), psychology, clinical testing and numerous other areas. As mentioned earlier, FREC is planning to offer continuing education for industry professionals. The curriculum is currently focused on introductory-type courses, but could eventually transition to deeper analytical technique training and cutting-edge technology. FREC will officially open during an event taking place August 4–5 in Minneapolis.

"By having a consortium of clients and bringing them together we will reduce the costs of innovation to a more feasible and attractive level," says Peterson. "By opening that first door in a collective manner," as Peterson puts it, "companies are able to affordably determine feasibility and relevance when in-house funds may not be available. We see the high cost of the initial feasibility testing as a stumbling block for the industry." Research concepts will be submitted both by the FREC team and by member companies. Depending on the level of sponsorship, a limited number of companies will have an opportunity to choose some of the research ideas to be pursued by FREC. The basic Center-sponsored research remains confidential to member companies until publication of results; none will be held as proprietary by FREC. In some cases, however, FREC may work with individual companies on proprietary projects. In others, companies may take elements of the research conducted by FREC and move that process within their own research program for ongoing proprietary research. The result, says Peterson, is that smaller companies will now be able to access and provide services that are normally the territory of larger organizations.

Among its key research areas, FREC is addressing bitter flavors associated with whole grain products. "Companies have been struggling with flavor development and palatability in a lot of these products, [many of] which contain a lot of sugar," says Peterson. "It's the biggest off flavor masking agent we [currently] have. This is not an ideal or sustainable approach." Peterson adds that palatability is crucial for health and wellness products and so new research is crucial for future innovation, particularly in flavor modulation. He concludes, "The low-lying fruit has been picked and we need to start bringing in other disciplines and technologies and knowledge from other disciplines to move forward." Additional research efforts include taking a more complex look at flavor using what FREC terms "flavoromics." "There is still a need to understand what flavor is," Peterson says of this untargeted approach. "For three or four decades we've been … only looking at compounds that elicit a sensory response alone, isolated, from the food and other potential flavor stimuli. We need to think outside of the box to look at what's truly contributing to a flavor." To "fill in the white space" in flavor understanding, he says, will require understanding how aroma (volatiles), taste (non-volatiles) and food chemistry affect/modulate one another to arrive at the final flavor impression. FREC will also be researching how flavor formulators can better understand and quantify freshness, and how to better optimize controlled delivery.

FREC staff will summarize and disseminate research conducted by other institutions in order to identify relevant areas for innovation. "People are conducting basic research around the world and we can efficiently and cost effectively provide this information to our industry membership," says Reineccius. "We attend meetings outside of our discipline. For example, he says, "It's amazing what you can get out of the Controlled Release Society (*www.controlledrelease.org*), from pharmaceutical [groups], from agrochemicals or the cosmetic fields. They come up with some fascinating methodologies and approaches that need to be translated into our discipline. Once we make that basic translation, then companies can say, 'A-ha, I see how this can be used in our products.'"