

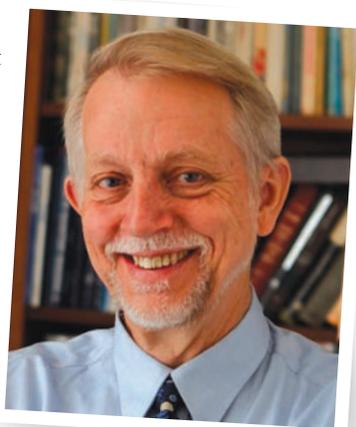
NEXT: Sensory Frontiers

Healthier flavors, quantitatively emotionally engaging fragrances and other sensory frontiers sit at the intersection of product innovation and basic research; that's where the Monell Center and its industry sponsors come in

“The exciting thing about science is that you don't know the answer,” says Monell Center (www.monell.org) director Gary Beauchamp, discussing the organization's chemosensory research. “There's a wonderful collaborative aspect here where [our corporate sponsors] are interested in fundamental questions for reasons that are not yet apparent ... We don't do product research. We don't study anybody's products. We don't develop products. Part of my job is to find the overlap between corporate interests in a practical [sense] and the scientific interests on [Monell's] side. Their product is product; our product is publications in scientific journals.”

Monell's leading-edge research focuses on everything from the mechanisms of taste and smell to the role of chemical senses in human communication, health and nutrition. Recently, that work has focused on such phenomena as taste receptors located in the digestive tract, leading researchers to look into those receptors' role in nutrition; fragrance receptors in places beyond the nose, raising questions about humans' unconscious responses to each other's odors; human preference for foods that offer tingle (carbonation), heat or other chemosensory effects; the use of functional imaging to determine which parts of the brain are involved in processing odor; the differences in how humans process body odors and odors not associated with the smell of humans (perfumes, etc.); human response to odors with high emotional content, such as mothers to their infants' smell; and communication via smell (pheromones).

In most instances, the direct application of this research in F&F products isn't immediate. “We do generate intellectual property patents, but often the patents are several steps away from real-world use,” says Beauchamp. “That hole, which is common to academia



Gary Beauchamp (Monell)

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—Gary Beauchamp, Monell

The Olive Oil Sting and Health

Monell's researchers are interested in humans' preference for foods and beverages that involve chemosensory effects such as heat and tingling (carbonation). In the case of extra virgin olive oil of sufficient quality, that preference might be tied to the presence of healthy components.

“There are compounds in the flavor of extra virgin olive oil that trigger a definitive irritation in the throat,” says Beauchamp. “This compound [is] a polyphenol that is a potent anti-inflammatory compound. One could imagine that one of the reasons the Mediterranean diet is good for you is because people regularly consume oil that has a lot of this [material] in it; it's analogous to taking a baby aspirin a day.” Compellingly, it is the “sting” of good olive oil that makes it both healthy and aesthetically appealing for olive oil connoisseurs. “It's stimulating pain fibers in the throat,” says Beauchamp. “How did they come to like that? How did they know?”



*All of Monell's findings are published in peer-reviewed journals, what Beauchamp calls the organization's “inviolable rule.”

in general, is something we're trying to work on, to find ways to narrow that gap." Noting that research in fields such as electronics and physics can often find rapid practical application, he adds, "Sometimes the gulf is further than we would wish it to be." But it's not always so wide.

Applied F&F Research

Odor and emotions: Monell's work on odor-emotion relationships is a perfect example of immediate, practical research application. "My guess is this is the kind of information that many companies might be interested in, either to help develop products or use methods we've developed internally to evaluate their own products in some way," says Beauchamp.

Women's response to body odors: Monell's research into the differences between how men and women react to odors provides another instance of direct application. "My colleagues here came up with some gender differences of interest," says Beauchamp. The study, lead by Charles Wysocki and published in 2009, concluded that women are far more sensitive to underarm odors, making them more difficult to mask. According to the researchers, this sensitivity is possibly related to evolutionary requirements in mate selection. To illustrate, even at identical intensities it proved more difficult to mask male odors than female odors from women's detection. (Interestingly, men and women appeared to have equal sensitivity to non-body odors such as perfumes.) "Men and women differ in how they perceive body odors from both their own and the opposite sex," said Monell's George Preti at the time of the study's release. "Women are more aware of underarm odor and they appear to be detecting differences in odor quality." Beauchamp notes, "One of our sponsors used that information in the design of a particular product that [was intended to be] either aimed more at women or more at men. Originally, there was no plan in the project at all about that. The sponsors that we work with most effectively are those that have a vision where they want to support something even though they really don't know what the question is—initially they don't even know why they want to know it."

Flavor off notes: "One of our sponsors came to us with a sensory complaint about a product they had," says Beauchamp, discussing a rare case in which the priorities of product development and pure science aligned. "I told them that we don't work on products in terms of trying to make them better—that's not our focus. But, the sensory problem they identified turned out to be very interesting to some of my colleagues here because it involved a novel kind of sensory experience. We actually ended up doing a project with them ... working on the compound that was causing the sensory problem. In the end, we published at least two very interesting scientific papers. And in the course of doing that basic work we discovered that the problem could be eliminated if we just modified the pH. They truly got benefit, and their flavor people were able to use our information to modulate and modify the product."

Supporting Health with Flavors

The flavor industry and its customers sit on the front lines of the diabetes, hypertension and obesity epidemics, presenting a key opportunity for innovation. "The issue of how we taste sweet and salt and what role experience plays in that and how one might manipulate it is of very broad interest to many companies," says Beauchamp. "They're willing to support research in those areas." Noting that artificial sweeteners such as aspartame have been multibillion-dollar enterprises requiring years of development, he adds, "You could imagine the same thing if you found a really good salt enhancer—that would be worth a great deal of money. Not only that, it would be worth a great deal for human health, possibly. Obviously there are strong motivations to do that kind of work. To do it now, effectively, takes basic research. Some companies, many of whom are our sponsors, realize that basic research is necessary for down-the-line kinds of development of [products]."

Taste and Smell Preferences

How are babies' smelling and tasting abilities developed by the time they come into the world? How do those senses develop and change over time? What factors influence that change? Answering these questions will directly impact the ways in which flavored products will be developed in the future. "To what degree is what we can detect—particularly what we like—based on our evolutionary history, and what part of it is due to factors like learning?" says Beauchamp. "Many responses to the basic tastes—salt, sour, sweet, bitter, umami—are at least partially innately determined. Those senses are really exclusively devoted to what we take into our body or keep out of our body. We're built, for example, to like sweet things." Monell is currently looking at early childhood experiences and how those relate to odor likes and dislikes. When it comes to smell, Beauchamp says, "I think all things are going to have some kind of evolutionary history." He recalls a question he once put to a perfumer: Why are humans and insects attracted to the same flower odors? "What could the reason possibly be for that?" he adds. "Is there something about some positive or negative odors that we've evolved to like some things more than others?" The exciting thing about science is that you don't know the answer. Yet.

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