

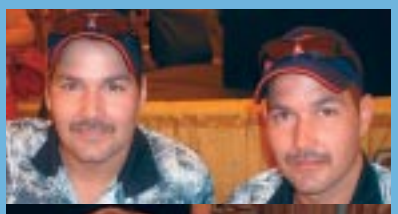
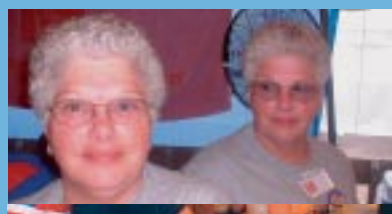



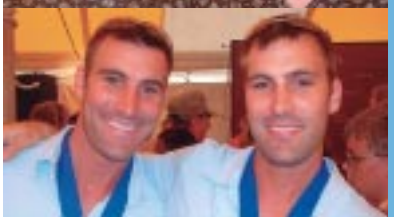

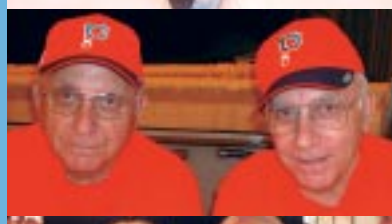

Twin Spin

Gives Monell Researchers a Double Dose of Data


Paul Breslin, PhD
Danielle Reed, PhD
Charles Wysocki, PhD

"It's a deeply surreal experience," observes Monell scientist Paul Breslin, explaining what it feels like to be surrounded by 3000 sets of twins. This past summer, Breslin was one of fifteen Monell researchers initially overwhelmed with "double vision" while collecting data at the 27th Annual Twins Days Festival. In addition to providing countless opportunities for double takes, the world's largest gathering of twins presents researchers with the enticing opportunity to quickly and efficiently collect large amounts of data to help them establish how genes contribute to individual differences in sensory experience. Molecular biologist Danielle Reed explains, "People differ markedly in how they experience their chemosensory world, and the use of twins allows us to assess the extent this variation is due to differences in their DNA."

Held each year in — where else — Twinsburg, Ohio during the first weekend in August, the Festival's primary purpose is fun. Twins march in a "Double Take" parade, compete in contests ranging from "most alike" to "cleverest outfit," take pictures, enjoy the Talent Show, and socialize. But for many participants, the Research Tent is also a popular destination. The Monell team joined scientists from around the country, all interested in learning more about how our genes contribute to who we are. "There were between eight and ten groups," explains sensory psychologist Breslin. "One researcher from NASA was seeking subjects for studies on bone density, another was interested in baldness patterning, the Secret Service was there from Washington recruiting for studies on handwriting analysis, and a group from NIH was studying deafness." Reed continues, "The organizers are very pro-research and the twins really enjoy doing it. It gives a broader dimension to the festival."

This was the Monell team's second year collecting data at the Festival. In 2002, Breslin recalls, "we were very happy with the data we collected, so we decided to invite everyone at Monell who wanted to do twin research to go with us." Behavioral neuroscientist Charles Wysocki, who studies individual variation in olfactory sensitivity and preferences, had some "interesting questions that I wanted answered," and decided to take advantage of the opportunity. He recalls, "Twenty years ago I collaborated in a twin study conducted at the University of Pennsylvania. It took nearly a year to collect data from 24 sets of twins. From what Paul was telling me about his experience last year at Twinsburg, I could test that many sets of twins in a couple of hours. I was thrilled by the prospects, albeit a bit skeptical about the potential."

By comparing data from identical twins — who are genetically identical — with data from fraternal twins — who share only half their genes on average — scientists interested in a particular trait are able to separate genetic influences from those of environment. Reed says, “Twins are the most sensitive method to identify the genetic component of a trait.” She continues, “Relatively few have done basic twin research in chemosensation. Up until now, much of what we do, from marketing of foods to how we treat diseases, has been done with the assumption that there’s unity in how people perceive food and taste, smells and flavors. And that just isn’t true.”

And so Reed, Breslin, and Wysocki enlisted 12 students, post-docs and technicians and loaded a trailer with supplies for an 800-mile road trip to Ohio. At the festival, they set up four stations in the research tent. At one station Reed and an assistant used swabs to collect cells from inside the cheek of each subject. The cells will provide DNA to assess whether twins were identical or not. At a second station, subjects could taste and rate a vast array of bitter and sweet stimuli. These data will help to shed light on individual differences in sensitivity and identification of receptors for bitter and sweet taste stimuli. Another station focused on sour and salty tastes, and yielded exciting results, demonstrating for the first time a strong genetic component for sensitivity to sour taste. “The data are really beautiful,” says Breslin. Regarding salty taste, “the data are less pretty, indicating that there may be more complicated genetics and more environmental contributors to sodium sensitivity.” At the fourth station, Wysocki’s group conducted five different studies, exploring genetic contributions to perceptual responses to odors and olfactory irritants. One test focused on the smell of cilantro. “Some like it and others hate it,” says Wysocki, “and it appears there is a strong genetic influence.”

The Monell researchers studied almost 300 people over two days. Breslin comments, “We tested about twice as many people as last year in the same amount of time with probably 8 times as many tests. We went crazy, and intend to add even more tests next year.” And Reed recalls, “It’s so very busy — we’re clearly the most overwhelmed research area. I told the staff that there’d be no time to eat and they thought I was joking. We’re popular, because we pay and we give prizes — I was surprised to see how much people really worshiped the Monell beach towels!”

The collaboration between Breslin and Reed exemplifies the integration of sensory psychology and molecular genetics that helps characterize Monell’s research. As Reed points out, “There are places with experts in molecular biology and places with experts in psychophysics, but few other places with expertise in both.” Breslin comments on the overall significance of combining sensory and genetic approaches, “Perceptually, people live in very different sensory worlds, and we hope to actually explain these worlds from a genetic perspective. The genes encode the proteins that make up our physiology that then somehow generate the perception.” The researchers anticipate that their collaboration will increase awareness and understanding of individual differences in perception of foods, flavors, and fragrances. Looking to practical outcomes, Reed predicts, “There’s a potential to develop tests to assess what tastes good and what tastes bad to individuals. Such tests will help us predict who will like and want to eat certain types of foods and drinks, and to make sensible recommendations with regard to nutrition, diabetes, and obesity.”

Looking ahead, the enthusiastic researchers envision a twins research center at Monell. In the meantime, they’ve reserved even more space in the Research Tent at Twinsburg and are already planning next year’s road trip. As for Breslin, he’s no longer perturbed by the “surreal” atmosphere, stating, “You just get used to seeing carbon copies of people everywhere.” And Wysocki admits, “Far more than I anticipated in my wildest dreams.”

Twins (monozygotic or dizygotic) wishing to participate in taste studies at Monell should contact Dr. Breslin’s lab at 215.898.9833 or breslin@monell.org. For olfaction studies, contact Dr. Wysocki at 215.898.4265 or wysocki@monell.org.