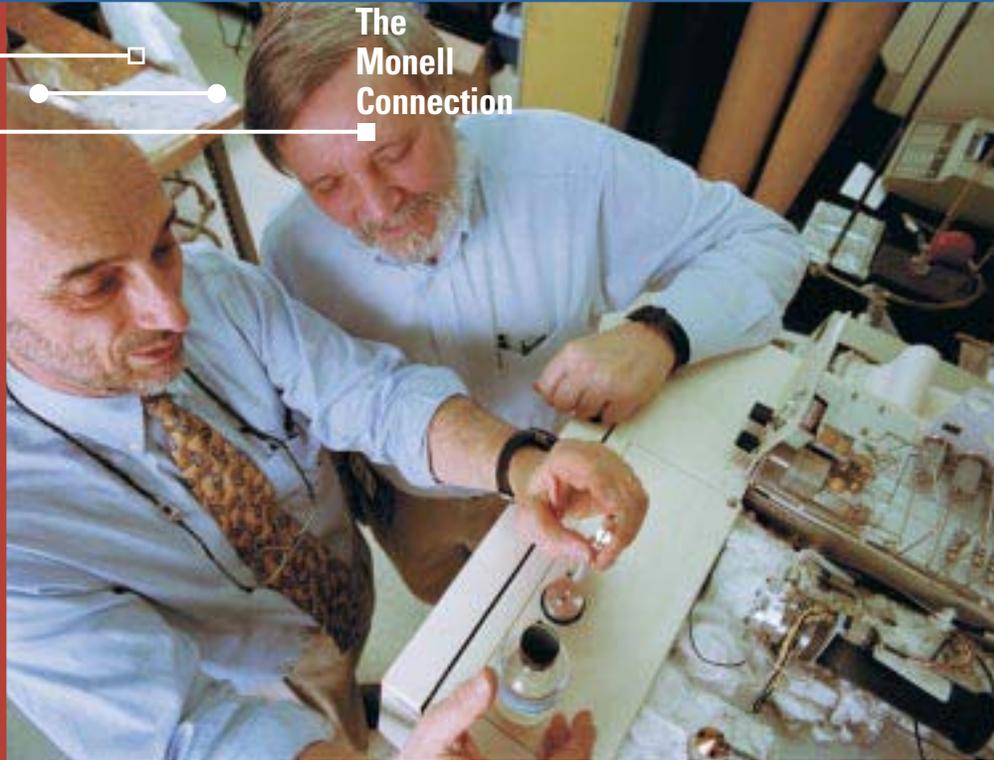


The Monell Connection



Human

Chemical Communication in Humans — It's Much More Than We Thought

Pheromones:



Certy Images

Peering

Through the

Window

Pheromone. The term was coined almost 50 years ago from the Greek words *pherin*, to transfer, and *hormon*, to excite. Presently, it's the transfer of knowledge that is generating excitement at Monell, as scientists from diverse disciplines work together to increase our understanding of chemical communication in humans.

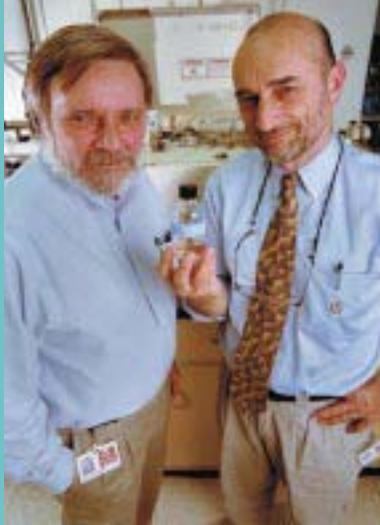
From insects to fish to non-human mammals, pheromones are chemical signals released by one individual that influence the behavior or physiology of other individuals of the same species. Many pheromones transmit information about reproductive or social status. Other chemical signals convey information on identity, age, gender, and perhaps even emotional state, but don't

necessarily bring about an immediate effect.

What about humans? The topic of human pheromones has inspired considerable debate among both scientists and the general public. Humans already have multiple systems to transmit, acquire, and retain information — do we also use pheromones to communicate? If so, what messages are we sending? How is our behavior or physiology affected when we're exposed to a pheromone? Moreover, are we even aware that we're sending or receiving these messages?

Monell scientists, active in the field of pheromone research since the Center's inception 35 years ago, have authored almost 100 publications on the topic, the majority related to mammalian chemical





Charles Wysocki, PhD
George Preti, PhD



Continued from cover page communication. Today, several teams of Monell researchers are working to learn how humans transmit and respond to various forms of chemical communication and to identify the substances involved. Their approach involves rigorous scientific inquiry applied on a foundation laid during the early days of Monell.

Basic research at Monell not only enhances understanding of human chemical communication, but also opens doors to significant applications of this knowledge. As described below, research on chemical signals may result in noninvasive medical techniques to enhance fertility or to detect and diagnose illness in the absence of overt disease. ☐

The Monell Chemical Senses Center, a nonprofit basic research institute, is devoted to investigation of taste, smell, and chemosensory irritation.

Monell Chemical Senses Center
3500 Market Street
Philadelphia, PA
19104-3308

Telephone
215.898.6666

Email
info@monell.org

Web Site
www.monell.org

Leslie J. Stein, Ph.D.
Editor & Writer

Mary M. Chatterton, J.D.
Resource Development

Henry C. Williams
Writer

Candace diCarlo
Photography

Jamie Ostroha
Photography, pp 7-9

Sandra Gelak Design

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In the Mood

Pheromonal influences on human reproductive function

For the past 15 years, neuroscientist Charles Wysocki and analytical organic chemist George Preti have combined their unique perspectives in pursuit of a common goal: to understand human chemical communication. The team recently published a seminal paper demonstrating that secretions from the underarms of human males can affect release of luteinizing hormone, a female reproductive hormone that influences the timing of ovulation and the length of menstrual cycles. While it was previously known that underarm secretions from both men and women include constituents that can change the length of the female menstrual cycle, this is the first study to demonstrate a potential hormonal mediator. Preti comments, “Our results show that there is a primer pheromone or pheromones in the underarm. Once we’ve isolated and identified the chemical nature of these compounds, there’s the possibility we can use them to regulate cycles for an individual with abnormal cycle length, perhaps enhancing her fertility.” He quickly cautions, “That’s way in the future.”

Scientists now think that some pheromones have the potential to affect mood. Along these lines, Preti and Wysocki believe that they have uncovered a second pheromonal effect of male underarm secretions: women reported feeling less tense and more relaxed

after exposure to the secretions. Preti, who heads the world’s only academic laboratory investigating the chemical origin and characteristics of human underarm odors, predicts, “There will be an interest in finding these compounds.” Wysocki concurs, adding, “What still isn’t known is if a person’s mood can be influenced by the mood of others strictly through chemical communication. For example, will you become stressed if there’s a lot of stress pheromone being emitted by people around you?” He speculates, “We’ll also see research looking in that direction.”

Wysocki’s interest in mammalian pheromones dates back over 30 years. He believes that his collaboration with Preti leads to fruitful research, explaining, “With pheromones, there’s two sides of the equation — a sender and a receiver. Both have to be considered.” Chemist Preti agrees, “You need someone who knows how to measure a behavioral change if there’s one present. That’s very germane and a compliment to the chemistry.” He emphasizes, “The importance of collaboration is obvious.”

The Scent of a Woman

Social support through chemical communication?

Psychobiologist Julie Mennella looks at similar questions, but from a different perspective. While Preti and Wysocki’s study focused on effects of male-female interactions on reproductive physiology and mood, Mennella teamed up with researchers at the University of Chicago to explore whether chemosensory signals from lactating women influence other women. Mennella explains, “Until very recently in human history, women likely cycled through continuous periods of pregnancy and lactation. So, when considering whether reproductive state would have an effect on other women, we thought of looking at the effect of lactating women on the menstrual cycle.” The collaborators found that odors collected from pads in the underarm and breast areas of breastfeeding women changed menstrual cycle length and sexual motivation of other women. Because mothers nursed several times over the odor collection interval, the researchers don’t know whether signals came from mother, baby, or perhaps both.

Infant-maternal communication may provide another approach to treating fertility problems.

Alluding to anecdotes about women who become pregnant soon after adopting a baby, Mennella speculates that chemical signals from infants may influence reproductive hormones and maternal behavior of women. She is curious to know, “What are those babies doing?”

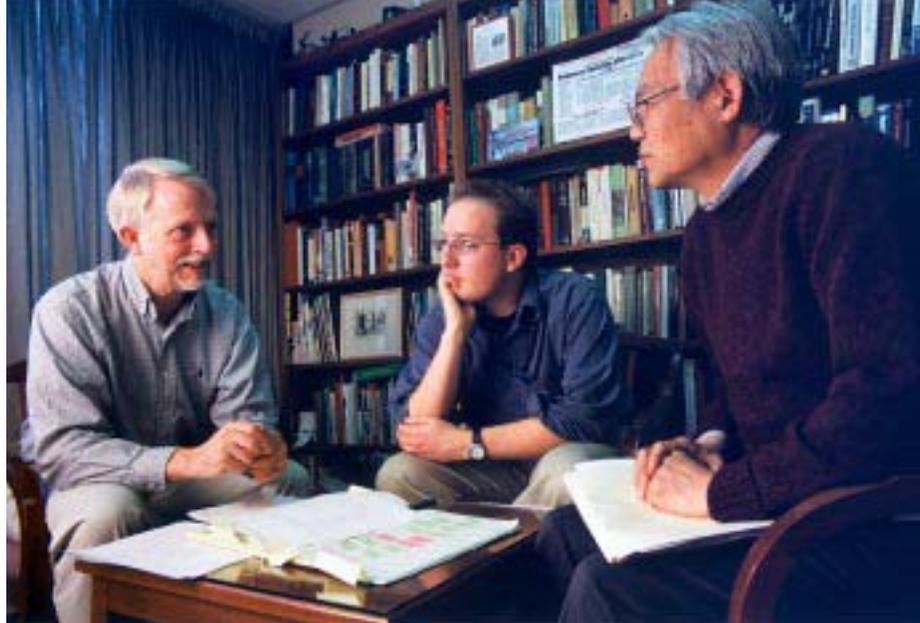
Mennella, whose research program on mother-infant feeding interactions includes a large emphasis on women’s health, points out that research on the implications of human female chemical communication has not received much attention. Regarding breastfeeding support groups, she reflects, “Yes, there’s learning going on. But, odors of other lactating women may also lead to hormonal responses that promote lactation, especially in the first time mother.” She further believes that chemical communication may convey social support, and would like future studies to explore how lactating odors affect mood, “There may be subtle effects of these odors. For instance, does exposure to breastfeeding chemosignals increase maternal behavior in other women?” Mennella predicts that continued study of chemical communication among women will provide additional insight into the intricate social behaviors she is seeking to unravel.

Odor ID

Chemical cues to individual identity: Back to the armpit?

When looking at a group of people in a photo, complex patterns of visual cues enable you to recognize a famous movie actress, your son’s teacher, the mayor of your city, and thousands of other people.

Julie Mennella, PhD



Gary Beauchamp, PhD
Benjamin Smith, PhD
Kunio Yamazaki, PhD

Similarly, a distracted mother can distinguish her child’s cry in a crowded room through the child’s unique voiceprint, the result of individual differences in the anatomical structures and muscle movements that produce speech.

Can we also use odor to identify individual humans? Based on over 25 years of research, Monell Director Gary Beauchamp and colleague Kunio Yamazaki believe that we can. Yamazaki, Beauchamp and their collaborators have published over 30 papers on research with mice, showing that genes that determine immune function also determine a specific unique odor, known as an odortype, for each individual. Beauchamp comments, “Presumably, an individual mouse’s odor — and very likely an individual human’s odor as well — is a fixed characteristic of that animal.”

Beauchamp and Yamazaki suspect that immune function genes alter an as-yet-unknown physiological function, which in turn influences the type of chemicals that are released into body fluids such as urine, sweat, and other secretions. Experiments of Monell chemist Alan Singer, now at the University of Washington, demonstrated that mice distinguish odortype through chemical

cues in urine. Additional analysis revealed that the mice appear to be responding to differences in the patterns of chemicals.

That’s where Benjamin Smith comes in. Smith, a postdoctoral fellow from Australia trained in both biology and chemistry, is trying to identify the critical chemicals and patterns responsible for distinguishing odortype. It’s not an easy task. “What we’re doing is taking a complex jigsaw puzzle and looking at the little pieces to identify which part is necessary to recognize the picture,” he explains. Smith isolates groups of chemical compounds from urine of mice with differing odortypes. Next, he and Yamazaki check to see if other mice can distinguish the chemical differences. After countless hours of chemical extraction and behavioral testing, the scientists now believe that the ratio of acidic components, particularly a group of compounds known as carboxylic acids, may be relaying the crucial information.



R. C. Gorman "The Visitors"

While it's unlikely that humans convey information through urine odors, scientists believe that the same pattern of chemical differences is present in all body fluids. Specifically, data suggest that underarm secretions are a source of human odortypes. With that in mind, the research team will compare compounds in human urine and sweat to see if the same chemical makeup is present in both. Chemist George Preti, with his extensive experience in the chemistry of human underarm secretions, will contribute to these studies. Smith observes, "That's the great thing about Monell. We have people with different backgrounds who all approach the problem with different thoughts."



Kunio Yamazaki, PhD
Maryanne Curran,
Senior Research Specialist

How We're Doing The scents of age, disease, and more

In addition to identity, Monell scientists believe that chemical signals provide information on personal attributes such as age and health status. From an evolutionary perspective, it's important for an animal to assess these factors in a potential mate to help ensure healthy long-lived offspring. Recent research at the Center has demonstrated that mice can use chemical signals to determine the age of other mice. Once again, the critical chemical compounds may be related to the immune system.

Regarding health, Yamazaki, Beauchamp and colleagues published a paper last year showing that mice can use odor to distinguish animals infected with Mammary Tumor Virus before any overt signs of disease are evident. Yamazaki speculates on the implications, "There is a wide variety of other viral diseases for which symptoms are slow to develop that could be investigated for unique odor production." Beauchamp continues, predicting, "It may be possible to use the non-invasive route of body odors to identify and diagnose certain diseases, such as AIDS and smallpox, before they are otherwise obvious."

Before any of this can happen, additional basic research is needed to provide fundamental information regarding the identities

and effects of chemical signals, as well as the influences of age, diet and other factors. Research at Monell is providing that information, thus leading to enhancement of knowledge concerning human reproductive function and social behavior, improved and efficient technologies for the detection and diagnosis of human disease. As Charles Wysocki observes, "With every little piece of information we gain, we scrape away a little bit of blackness on the window. As we peek through a little more and begin to see that humans have the potential to communicate with chemical signals, we're finding that human behavior and physiology respond much more to chemical communication than we originally believed." □

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New Board Members

Three distinguished individuals have recently joined the Monell Center's Board of Directors — Arthur K. Asbury, M.D., Alan I. Leshner, Ph.D., and Dwight R. Risky, Ph.D. When contacted, each used the same word to describe Monell — “unique.” The same word can in turn be used to describe each of them. Their addition to Monell's leadership entity augments an exceptional group of people who donate their time and effort to ensure that Monell remains among the nation's outstanding research centers.



Arthur K. Asbury, M.D.

is a world-recognized neurologist, best known for his clinical and experimental studies of peripheral neuropathies.

Asbury received his M.D. from the University of Cincinnati College of Medicine, followed by post-graduate training at the Massachusetts General Hospital and Harvard Medical School. He then embarked on a career in academia that has included leadership roles at some of the most prestigious institutions in American medicine and international neurology. He currently is the Van Meter Professor Emeritus of Neurology at Penn and President-Elect of the College of Physicians of Philadelphia. Asbury has authored or co-authored over 170 articles and chapters and is editor of the standard reference text in neurology — *Diseases of the Nervous System*. His scholarship has been recognized nationally and internationally through his election to the Institute of Medicine of the National Academy of Sciences and numerous other honors.

Asbury's direct connection with Monell is relatively recent, emerging from his membership for many years on the Board of Penn's Smell and Taste Center. Serving on Monell's governing body offers the opportunity to advocate for an institution Asbury views as “almost unique in its focus solely on the study of the chemical senses.”



Alan I. Leshner, Ph.D.

has earned international acclaim for his scholarship and achievements in leadership positions at some of the nation's

pre-eminent scientific institutions. He received his M.S. and Ph.D. degrees in physiological psychology from Rutgers University. Leshner's research publications focus on the biological basis of behavior and he also has published extensively in the areas of science and technology policy and education. In recognition of his scholarship, Leshner was elected a fellow of the American Association for the Advancement of Science (AAAS) and a member of the Institute of Medicine of the National Academy of Sciences.

Leshner's achievements as an academician are accompanied by his leadership accomplishments in science administration. Leshner has

served as Director of the National Institute on Drug Abuse (NIDA) and also has held senior positions at the National Institute of Mental Health (NIMH) and the National Science Foundation (NSF). Today, he is Chief Executive Officer of the AAAS, the world's largest, multi-disciplinary scientific and engineering society, and Executive Publisher of *Science* magazine.

Leshner's relationship with Monell goes back over 20 years and was deepened during his service at the NSF, when he played a central role in supporting Monell's research. Leshner, a self-proclaimed ‘Monell groupie,’ “jumped” at the offer to join the Board “both because it's a worthy cause, and because it would allow me to stay close to the group.” Leshner considers Monell “unique... It spans all the relevant sciences and does truly multidisciplinary research.” Leshner summarizes, “That combination of qualities has been responsible for the tremendous contributions to knowledge Monell has made.”



Dwight R. Risky, Ph.D.

is a corporate leader who has directed marketing, technology, and business development initiatives on an international scale.

Risky is currently Senior Vice President for Global Consumer Insights and Business Development at Frito-Lay North America, a division of PepsiCo. Risky earned his B.A., M.A., and Ph.D. in experimental psychology at UCLA and took his first career step as a postdoctoral fellow at Monell in 1977. He credits his experience at Monell with instilling the “intellectual curiosity” and confidence in employing empirical analysis that helped him tackle each of his corporate positions. “My experience at the Monell Center was truly formative for me. Monell's cross-disciplinary approach, and the opportunity it provided to rub shoulders with focused and committed researchers, led to an awesome, awakening academic experience.” Risky has maintained a close relationship with Monell over the past two decades, and he joined the Board to “help continue and even energize Monell's important missions — and because I feel I owe a great deal to my Monell experience.” Monell's contributions to “the world's body of knowledge” have always been a key attraction for Risky. “At Monell,” he relates, “the objective is clear and focused — to better understand the chemical senses. Monell's clear focus and multidisciplinary approach are unique to the world, and highly effective.”



Coming Home to Monell *Y e a r s* 35

*Alumni Reunion
Marks Center's
35th Anniversary*

To celebrate the Center's 35th anniversary, Monell hosted its first official alumni gathering on March 20 and 21. Although alumni routinely return to the Center, never before have they come together for an occasion explicitly for them. The event, chaired by alumnus Thomas Getchell, Ph.D., Professor of Physiology and Associate Dean for Research and Basic Sciences at the University of Kentucky, combined fun with work, as the organizers took advantage of the occasion to solicit input on the Center's impending growth and development from those who know it best — former members of the scientific staff.

Susan Knasko, Ph.D., who was at Monell from 1987 to 1997, appreciates the diversity of opinion that Monell alumni can provide to the Center. Knasko, currently Director of Sensory Analysis at L'Oreal USA, comments, "Alumni outside of academic circles can access the mood of industry and government and help Monell better plan for the future." Perspective from the outside also enables Monell alumni to become convincing spokesmen and recruiters for the Center. Their involvement not only enhances the Center's reputation, but plays



a key role in ensuring that the very best scientists in chemosensory research continue to be affiliated with the institution.

As Monell alumni move out into the world, they are able to observe how the Center has changed over the years. Russ Mason, Ph.D. recalls, "In the late 70s and the 80s, the staff was young and everyone had to know a little about many scientific disciplines. Today, consistent with trends toward specialization throughout science, scientists at Monell must know a lot about very focused areas." Mason, who was at Monell from 1980 to 1995, presently is the Mammal Research Program Manager of the National Wildlife Research Center in Fort Collins, Colorado, part of the United States Department of Agriculture (USDA).

Long after their time at the Center, alumni recognize the formative influence Monell had on their careers. Andrew I. Spielman, D.M.D., Ph.D., at Monell from 1988 to 1989 and currently Professor of Basic Science and Associate Dean for Academic Affairs at the New York University

College of Dentistry, credits the Center with impressing upon him "the importance of a critical mass of people before one makes an impact." Offering proof that Monell people can view the same phenomenon through different lenses, Susan Knasko takes a converse view. Knasko commends her Monell experience with demonstrating "that one person can have a large impact on popular and scientific trends."

Bringing together investigators working on sensory systems has always been Monell's defining characteristic. Monique Smeets, Ph.D. expresses it this way, "Sensory scientists are scattered around academic institutes, often working in small groups or splendid isolation. Monell, in contrast, has a concentration of distinguished scientists working solely on the study of the chemical senses. Monell shows us that the chemical senses are worthy of study, that sensory experiences have considerable impact on our lives, and that the research findings have both fundamental and practical relevance to science, health, and business."



Smeets, active at Monell from 1998 to 2002, currently is a sensory scientist at ATO, a research institute at Wageningen University in the Netherlands.

Further expounding on the Center's central attributes, Russ Mason values Monell's "non-parochial view toward science, its multidisciplinary approach to problem-solving, and its outreach to industry." Smeets views the industry linkage as critical to her own growth as a scientist. "There is a steady exchange of information between Monell people and scientists and executives from industry that you hardly find anywhere else. As a result, the research is at the cutting edge from a fundamental point of view, but also inspired by and relevant to industry. I feel

I came away from Monell as a hard-nosed scientist, but with an eye towards strategic opportunities and practical relevance."

For some, appreciation of the role of industry in research was not immediate. Barry Green, Ph.D., Fellow at the John B. Pierce Laboratories and Professor of Surgery (Otolaryngology) at the Yale University School of Medicine, remembers that "the system of industrial sponsorship took some getting used to." Green, who arrived at Monell in 1983 for a 13-year stay, continues, "Eventually, I came to realize that questions about commercial applications can sometimes lead to new avenues of basic research, and one such question led to my first research on chemesthesis, a topic I still study today."

But, in the end, it's the people of Monell who make the difference, and what alumni best remember. "Ultimately, of course, the value and strength of any institution lies in the quality of its people," Green emphasizes, "and in that regard Monell has no peer in the chemical senses, whether judged by its excellent current staff or the multitude of scientists throughout the world who have trained or worked there over the past 35 years." Andrew Spielman anticipates that the new

alumni network will foster "continued access to expertise that is unrivaled in the world."

Monell's 35th Anniversary Alumni Reunion was filled with people, good science, and fun. The first day's activities ended with a reception and dinner at the University of Pennsylvania Museum of Archaeology and Anthropology. Dwight R. Risky, Ph.D. — Monell alumnus and Board member and Senior Vice President for Global Consumer Insights and Business Development at Frito-Lay North America, a PepsiCo Division — was honored for his achievements in the field of chemosensory science.

The following morning, Director Gary Beauchamp and other members of Monell's administration presented the Center's plans for the future and then solicited input from the alumni, leading to a thoughtful and wide-ranging session. The reunion concluded with a casual get-together Friday evening at Beauchamp's home in West Philadelphia, where conversations about people and science — past, present, and future — fittingly brought the first official alumni reunion to a close. ☐



Unlocking Human Potential

Monell's High School and Undergraduate Training Program



Monell has a strong commitment to educating the next generation of scientists, beginning as early as possible in their careers. As part of this responsibility, the Center sponsors a student apprenticeship program with participants who are just starting out in science or trying to learn whether science is for them.

The High School and Undergraduate Training Program provides hands-on research training to high school students and college undergraduates — particularly minority and female students — and encourages them to consider future careers in science and medicine. The ultimate goal is to give these mostly inner city youth the opportunity to unlock their individual human potential.

Serving a Need

Begun in 1981 with three minority high school students, the start of Monell's High School and Undergraduate Training Program

preceded the first Congressionally-mandated National Science Foundation report in 1982 on the status of women and minorities in science and engineering. The NSF's 2000 report, tenth and most recent in the series, continued to find Black and Hispanic students — and females in general — woefully under-represented among all students pursuing science degrees. For over two decades, Monell's apprenticeship program for high school students and college undergraduates has addressed this pressing national concern.

From its modest beginnings, the High School and Undergraduate Training Program swung into high gear when Julie Mennella, Ph.D. became its director in 1991. Mennella came to Monell in 1988 as a post-doctoral fellow and today is a member of the scientific staff with active NIH-funded research programs and specific interests in taste and smell

perception during human infancy and childhood, as well as alcohol use and women's health.

Initially, Mennella was less concerned with national social issues than the value of the student apprentices to the scientific mission of the Center. The students "were a great source of help" to the scientists, and she moved to expand the number of undergraduates in the program. Under her watch, the program has continued to grow because, in Mennella's words, "it fits into the vision of Monell to do the best possible research." If it didn't contribute to the scientific enterprise, "it wouldn't work."

And it has worked. More than 40 high school and undergraduate students now participate in the program each year, and more than 300 have been trained over the past two decades, most in the decade of the 1990s. Over three-quarters of the students have been from underrepresented minority groups and over 60 percent have been female.

Reaping Tangible Results

The training program begins in June each year and continues full-time for at least eight weeks of lectures, field trips, and hands-on laboratory work with Monell scientists. The interns are paid for their time in the program. The summer culminates in an August symposium where students present posters on their research experiences. Many of the students work in the laboratories of their Monell mentors following the summer, and over half return for at least an additional year.

The return rate of the student apprentices is one key indicator of the program's success. Mennella explains that its value to the students increases as their participation lengthens. In the initial year, students benefit immediately from receiving a paycheck, often their first. They make new friends and begin to learn the rudiments of doing science on a professional level. And they gain insight into the demands on scientists. Mennella relates that more than one student was "surprised by how much scientists need to write."

But it is "what happens over time" that's really critical, as the program makes it "comfortable for the students to come back." When they do, they deepen relationships with their mentor scientists and with each other, undergraduates mentoring high school students as they themselves are trained by postdoctoral fellows and senior scientists. A powerful mentoring pyramid is

formed. The interns talk more about science as they gain familiarity with the continuity of complete experiments. Particularly after their third year, they develop the requisite skills to do science, often becoming a "valuable part of the lab." The relationships and friendships continue after their time at Monell in the form of a far-reaching alumni network, with over 70 active members.

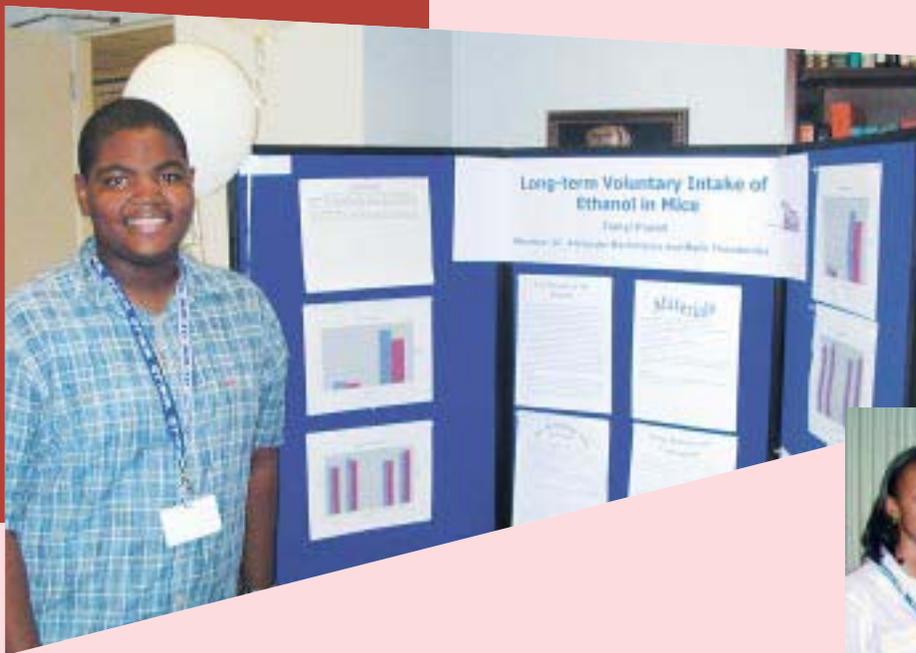
The end-of-summer poster session and subsequent science fairs create opportunities for students to hone additional skills. They learn to organize presentations and to speak in public before their peers, families, friends, and scientists who apply a critical eye to their work. Personal growth comes from increased self-esteem, confidence, and a sense of independence. For some, an incalculable benefit was the simple realization that they "liked working." LaShauna Jackson, a sophomore at Temple University studying nursing, came to recognize that "there are many choices out there and I can do research even as a nurse." And a few realize that science is not for them and plan for other careers.

The tangible results of the program are striking. Over 90 percent of the minority high school students in the program enroll



in college; more than 80 percent of these students major in science. Several have gone on to pursue graduate studies in fields such as medicine, nursing, chemical engineering, and psychology. Many go on to win first prizes in local and national science fairs; students frequently co-author a manuscript or abstract with their mentors; a select few win travel awards to present research findings at international scientific conferences. Recently, Christine Crabtree was a 2001 finalist in the Intel Science Talent Search for her project on human pheromones. In 2002, Jhamirah Howard, a senior at Philadelphia's Central High School, received first place in the Pennsylvania Junior Academy of Science Fair for her work on sensitive periods in infant flavor learning and was the Pennsylvania delegate selected to attend the





National Youth Summer Science Camp in West Virginia.

The advantages of the apprenticeship program for the students are many and varied, but the Monell scientist mentors are grateful beneficiaries, too. “The biggest thing for me in the student program,” says cellular biologist Dr. Nancy Rawson, “is the joy of seeing the students get excited about the process of discovery — the first time they run a gel that has a novel DNA sequence on it, or realize that an experiment has generated information that no one has ever seen before — is worth all the effort and time it takes explaining and training.”

Making It Happen

That the High School and Undergraduate Training Program even exists — much less has achieved substantial success — is a testament to the commitment of Monell scientists, who devote enormous energy and time to work with their young protégés. “Every one of my colleagues, at one time or another,” Mennella recalls, “has mentored a student.” The Center’s scientific staff participate eagerly, even through their mentoring responsibilities come on top of their full time commitment to research. Somehow, Mennella finds time to tend to the myriad administrative tasks required to run the apprenticeship program, which has tripled in size over the past

decade. She is assisted by part-time program coordinator Jamie Ostroha, a Ph.D. candidate in materials engineering at nearby Drexel University.

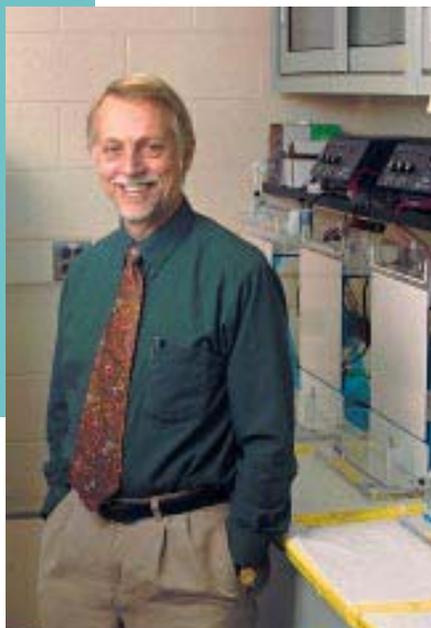
In the past, funding for the apprenticeship program has been provided by a series of much-appreciated donors. The National Center for Research Resources (NCRR) at the NIH, The Annenberg Foundation, local philanthropist Mrs. Patricia Kind, and the Howard Heinz Endowment have all played central roles in supporting the program. Now, as the program continues to grow in both size and scope, Mennella finds herself on a perpetual quest for sources of financial support to help defray rising expenses.

But it is truly a labor of love, one with measurable positive results over a long period. At a time when the nation struggles with how best to educate its youth — particularly those who begin life at a disadvantage — to succeed in the world of tomorrow, Monell’s High School and Undergraduate Training Program represents an effective model. There are countless ways to unlock the human potential of those too often ignored or passed over — Monell’s apprenticeship program has proven to be one. ☐



Perspective

The Other Side of the Wall



Paola Nogueiras

Gary K. Beauchamp, PhD
Director

Molecular Gastronomy: a number of years ago I attended a fascinating conference that was organized around this topic. Held in a mountaintop village in Sicily and convened under the auspices of the Italian government, the participants included physicists, chefs, food writers and a few others such as myself, all interested in food. The physicist-founder of this meeting, which occurred once every 2-3 years (but alas is no more), was famously quoted to the effect that more is known about the temperature inside the sun than the temperature inside a soufflé. The meeting itself consisted mostly of convivial discussion, a few informal presentations, “experiments” in the kitchen (located in a medieval building), and great meals shared throughout the town. In other words, this was academic heaven for someone like myself deeply interested in flavor, taste and smell and food.

At the time, the title of this conference — molecular gastronomy — seemed a bit audacious. Perhaps it was intended in part to lead the meeting sponsors into thinking we were discussing more hard science than we actually

were. But it did raise an interesting question in my mind: how might one approach molecular gastronomy as a scientific topic?

The question has percolated in my thoughts over the years and now there is a glimmer of an answer. New discoveries during the past two years have revealed much about the receptors involved in detecting taste molecules. These discoveries involved substantial molecular genetic work with mice but because of the extremely close genetic relationship between mice and people, immediate connections to human perception can be made. Hence, the previously “audacious” combination of molecular biology and human sensory studies is the basis for our plans for major expansion of the Center. The time is definitely ripe for such a melding and our vision is to insure these two seemingly very different fields are tightly entwined.

To accomplish this objective, we are committed for the first time to expanding the Center out of our existing building. To do this we need to break through a wall: our goal over the next several years is to renovate an entire floor of the adjacent building for molecular biology and proteomic research. Shortly thereafter, we hope to occupy a second floor on the other side of the wall to expand — in fact, double — our human sensory science program. In keeping with the Center’s interdisciplinary approach, the physical proximity of these two

new laboratories is intended to facilitate a strong synergy between programs in basic molecular/cellular biology and human sensory biology. This synergy, along with the modern facilities and equipment, will provide Monell scientists with the essential resources necessary to increase our understanding of human chemosensation and how it influences our lives.

Monell currently has research programs designed to investigate how individual differences in human taste perception — how people experience the world uniquely — are dependent upon genetic variation in these taste receptor genes. Parallel work in olfaction is ongoing and we anticipate that the equally vast individual differences in perception of irritants (such as hot peppers, certain drugs, carbonation) will also be a focus of future genetic research. All of this work will be facilitated by the new laboratories.

The expanded research facilities will also enhance and enable much additional work of both a genetic and human perceptual nature. To list just two examples, the new modern laboratories will foster advances in animal genetic work and enable human olfactory studies that currently are not possible. More generally, the state-of-the-art facilities will help us to attract outstanding new faculty, the life blood of any first class research organization.

Right now, we have the vision but not yet the wherewithal needed to complete this project that is vital to Monell’s future. In the coming months we will be requesting financial support from the government, our corporate sponsors, foundations, alumni, current staff, and friends (and anyone else we can think of). Although this is clearly not the ideal time to raise money (is there ever one?), this is certainly the ideal time for Monell to expand and grow. With substantial help from our friends I believe we can succeed. Our vision — intimately connecting molecular biology with human chemosensory perception — should begin to build a science of molecular gastronomy and much more. ☐

The Name in Front of the Mission

In 1932, Maude Monell Vetlesen honored her first husband by contributing \$2 million to establish the Ambrose Monell Foundation. It was this generous act that permitted the founding of the Monell Chemical Senses Center 65 years later.

During the early 1900s, Ambrose Monell headed International Nickel, the world's leading nickel producer and refiner. When a new alloy was invented in 1904, it was named Monel in honor of the company's leader. This new metal was stronger than pure nickel and resistant to corrosion in special environments. Particularly popular between 1909 and the 1950s and still produced today, Monel has been used in a wide variety of products in the home, construction, and industry.

The first spark of the relationship between the Monell Foundation and the yet-to-be-established research center on the chemical senses was struck in the mid-1960s when a young academic at Cornell University — Morley R. Kare — gave a talk at the Nutrition Foundation. As Kare remembered it, "At the conclusion of my talk, a gentleman came up to chat with me. This was my introduction to Mr. Henry G. Walter, Jr., CEO of International Flavors and Fragrances." Hank Walter also happened to be a member of the Monell Foundation Board. He was

**Monell Chemical
Senses Center**



to become, in the words of current Director Gary Beauchamp, "a central driving force not only in Monell's creation, but also in its growth and development."

Walter paved the way for Kare's presentation to the Monell Foundation on the feasibility of establishing an institute to study taste and smell. Ambrose K. Monell, grandson of the original

\$1 million to establish and support the Center.

The Monell Center was originally established as a division of the University of Pennsylvania. In 1978, the association between the two institutions was reorganized and the Center became a separate legal entity. Through it all, the Foundation has been a steady supporter of the Center, with its grants to the Center



In a remarkable twist of fate, Monell Director Gary Beauchamp was surprised to discover that the original water heater in his West Philadelphia home had been constructed from Monel metal.

Ambrose Monell and currently on the Monell Foundation Board, believes that the Foundation's directors were particularly impressed by Kare's "desire to pursue research in a multidisciplinary fashion." As a result, the Monell Chemical Senses Center began its life on December 15, 1967 when the Monell Foundation Board made an initial grant of

Ambrose K. Monell, grandson of the man whose name graces both a Foundation and our Center, reflected on the occasional difficulty of carrying that name. With a smile, he recounts the first time he walked into the Monell Center building. He announced to the receptionist that he was Ambrose Monell and had an appointment to meet with Morley Kare. The receptionist eyed the young man in front of her and responded with just a touch of sarcasm, "Yeah, and I'm the Queen of England."

increasing significantly over time.

Speaking in 1993 on the occasion of the Center's twenty-five year anniversary, George Rowe, Jr., President of the Monell Foundation since 1993 and a member of the Monell Center Board for many years, said that "the Center has been one of the Foundation's most favored projects." Rowe today emphasizes, "As evidenced by the Foundation's support, the Foundation has always been very pleased with the contribution that the Center has made to the studies of taste and smell. It has always been an enthusiastic supporter of Dr. Kare and his very able successor, Dr. Gary K. Beauchamp." □

From the Pockets of Babes... *Monell Capital Campaign off to an Auspicious Start*

A young member of the Monell Center's extended family recently was



inspired to make the first contribution to the Center's upcoming capital campaign. Over the next three years, Monell plans to raise \$8 million to renovate two floors in the adjoining building into sorely-needed laboratory space.

When Director of Resource Development Mary Chatterton presented plans for the fund drive to alumni attending the March reunion, fourth-grader Jesse Tordoff was in the audience. Jesse, spending a day at work with her parents, Monell scientists Danielle Reed and Michael Tordoff, listened carefully, especially when Chatterton emphasized the need for support from "those who know us best: Monell's friends and family." That night, Jesse — who had just celebrated her tenth birthday — informed her parents that she wanted to donate half of her birthday money to help build the new laboratories. The next day Reed proudly presented Chatterton with \$10, wrapped in a note reading "For Monell's Construction Fund from Jesse Tordoff."

Please join Jesse in helping Monell to grow in the 21st century. Use the enclosed envelope to send in your tax-deductible donation or contact Mary Chatterton at 215.898.4236 or chatterton@monell.org. Every gift — small or large — can make a difference. Just ask Jesse.

The official registration and financial information of The Monell Chemical Senses Center may be obtained from the Pennsylvania Department of State by calling toll-free, within Pennsylvania, 1-800-732-0999. Registration does not imply endorsement.