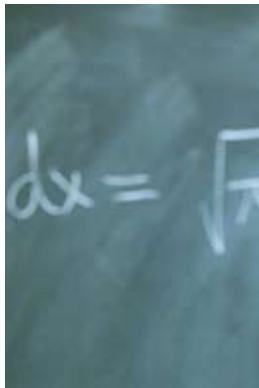


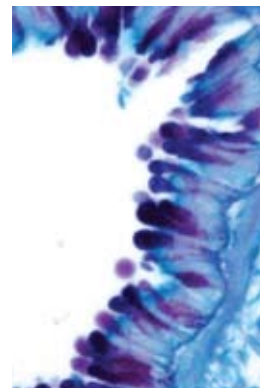
NDSU NORTH DAKOTA STATE UNIVERSITY SPRING 2008 magazine





contents

Editor's note	5
On the cover	6
Contributors	7
Social media Essay by Andrew Mara	8-11
Life of a campus Student photojournalism exhibit	12-13
Asthma	14-21
Shaking things up Alumnus takes on a new challenge	22-27
Excerpts Jessica Wagner	28-29
The gift of perspective Crystal Maus	30-37
Ambassador of Japan	38-39
Teaching is doing	40-47



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editor's note

The first time I met my friend Amy, I said something brilliant like, hey you're short. I meant it as praise, but it may not have struck her as a compliment, since highly-successful basketball coaches tend to value height. So that's the first thing we know about her, she'll give you a second chance. I was awestruck by this amazing person. All these years later, it still amazes me to watch a college coach cope with the pressures. I simply cannot imagine doing the hardest part of your job with thousands of screaming fans watching your every move.

I know next to nothing about how the game of basketball is supposed to work, even though I've been to hundreds of games. I've even traveled on the team bus a couple of times, and from that I got a thrilling glimpse into the mystique. When Amy talks shop, her eyes flash fire. She might be smiling, but it really doesn't mask her intensity. On one of the trips, we lost a game. This is not a good thing. Amy can recount an entire game, every move every player made, and she can do this all day long, sort of under her breath. I suppose it is her way of coping with the annoyance of losing, but it makes for a long day.

Amy has a winning record to envy, has been inducted into halls of fame all over the country, been an invited coach at Olympic festival teams – more measures of success than you can shake a stick at. She expects to win every ball game, or checkers or card game. Tenacious might not be a strong enough word.

Oh, and do not let this be the person who teaches you to water ski. You will experience many new kinds of pain, and for hours after, you'll discover lake water in parts of your body that ought not have lake water in them. Hard as she might try, she won't be able to not laugh that you can't quite get the tow rope back between the two skis every single time you fall and have to start over, even though the water's quite choppy (no doubt from the many falls and all the circles the boat makes to get you again.) But she's a teacher at heart, and so you learn. Don't even think of quit-

ting, she yells. You're not getting back into the boat until you ski. You've almost got it. On the other hand, when she comes for dinner, she can't keep herself from stirring whatever's on the stove and hanging out asking about the recipes and telling great stories. If you let her start doing dishes, your kitchen will never be cleaner.

I became a fan of women's basketball at North Dakota State University in the early 1990s, shortly after I started working at the university. I watched her coach her team through a tough semifinal to a national championship game and then battle through the worst game that very talented group ever played. Nothing worked. She tried everything. On our home gym. It was one of those games that just hurt to watch – so bad that I spent most of the second half behind the bleachers.

The next year she again coached her team to the national championship game. This time they were on fire and this time everything went right. We pounded the livin' daylights outta the same team that squeaked past us the year before. Her teams went on to win many more national titles, fight their way through all kinds of tough games. An amazing career. But I will always remember that exciting game all those years ago. After the win, she was back out shooting around, didn't want to leave the court. She didn't want the season to be over. I feel like I should be getting ready to analyze tape tomorrow, she said. A lesson in success.

Just a few weeks ago, Amy Ruley announced, to the astonishment of all, she was done being a coach. To the relief of all, she also announced she's staying with North Dakota State University, trading in her whistle to work as a fund raiser for athletics. I will miss watching her fire on the sidelines. But I look forward to watching and learning about stepping into new shoes.

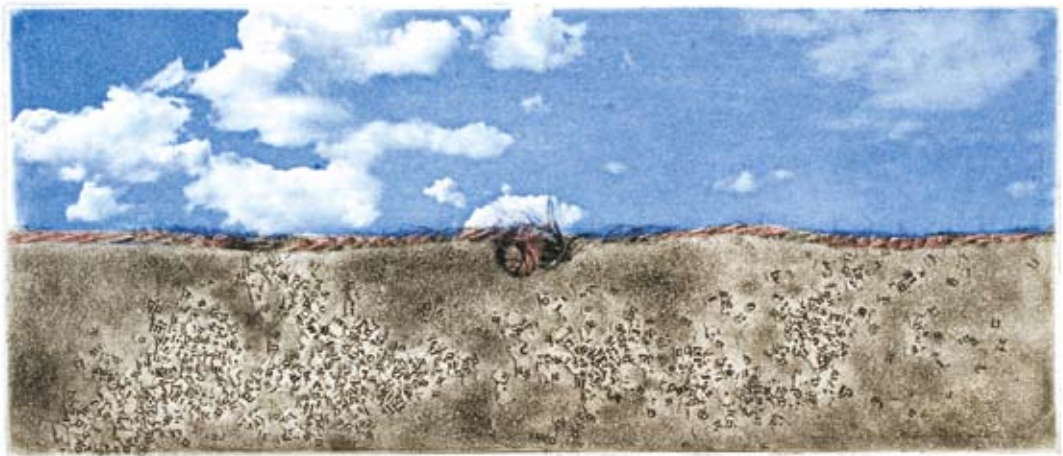
Thank you for reading.

Laura.McDaniel@ndsu.edu

on the cover



Elizabeth Dove is a printmaker, photographer and associate professor in the Department of Art at the University of Montana in Missoula. She also has taught numerous workshops, including the PEARS summer workshop at North Dakota State University in 2003. PEARS is Printmaking Education and Research Studio, a program of the Department of Visual Arts at NDSU. Participants create and exchange a folio of prints produced during the workshop, and pieces also go to the Memorial Union Gallery, which collaborates on the workshop.



This piece, “Between”, is a photo-etching with chine collé (a French term used in printmaking to refer to a collage technique) utilizing letters cut from a dictionary. This dictionary text dust, mixed with dirt, provides the nutrients and fertile soil for growth towards an open and optimistic blue sky. Twine stretched across the horizon line emphasizes the place of human endeavour, the place in between. The knot suggests the tension and difficulty of life, but also the strength and necessity of connections and bonds with others.

contributors



Crystal Maus (The gift of perspective, p. 30-37) grew up on the family ranch in Plentywood, Mont., and is the oldest of five. She graduated with a bachelor's degree in mass communication from North Dakota State University in 2003, and has been working as an account manager at Flint Communications, a marketing and advertising agency in Fargo. In her precious spare time, she designs and sews for her online business, Two Peas. She and her husband Brock live in West Fargo with their sons Gavin and Nolan.



Andrew Mara (Social media, p. 8-11) is an assistant professor of English at North Dakota State University. A former web designer and technical writer for Sandia National Laboratories, he now teaches about and researches posthumanism, university innovation, and corporate and organizational use of new media. You can find him ruminating, arguing, and contributing to blogs, wikis, and message boards across cyberspace.



Dan Koeck, a native of St. Paul, Minn., has a bachelor's degree in photojournalism with a minor in history from the University of Minnesota. He was a photographer at the *Minot* (N.D.) *Daily News* from 1984 to 1992 and joined NDSU in 1992. Koeck's assignment work has been published in *Smithsonian Magazine*, the *New York Times*, *Forbes*, and other national and regional publications.

SOCIALMEDIA

Even the alphabet was a threat at first



Anyone with a child over 12 has probably heard of Wikipedia and Facebook by now. These two Web sites are only two of hundreds of online places where people gather, communicate and swap personal stories, photos and information. The social interaction that characterizes these Web sites, and the hundreds of similar Web sites and software applications, has created a new category, “social media” or “Web 2.0.” Web sites used to be one-way media, more like billboards, brochures and television stations. Now Web surfers expect highly interactive experiences.

Wikipedia, the user-generated encyclopedia, logged its 6 millionth member in 2008 and now contains more than 2 million articles. Facebook advertises the fact that it has more than 67 million active users, with 250,000 people signing up each day. Even more startling than the numbers of people jumping online to contribute to these social media hubs are the types of people who are participating. It is no longer just the wide-eyed teenager in the basement looking for something new and exciting to do on a weeknight. The fastest growing demographic on Facebook is the over-25 crowd. The bulk of contributions to Wikipedia now comes from employees of corporations and organization members.

Still, the perception persists of social media as the danger zone for adolescents. The media continue to hype the perceived dangers. Recent stories about students uploading party photos on Facebook and MySpace reinforce a fear of new communication technologies. In a rush to avert the “danger” of these technologies, parents are told to monitor their children’s activities in these free-for-all dens of iniquity. Schools are advised to block access, and children are told not to speak (or write) to strangers lest they be imperiled.

As someone who hears and studies the stories about similar communication technology advances, I hear an eerie echo in these warnings. My studies have taught me that, of course, we have heard the alarms before. Similar charges have been leveled at nearly every communication technology change over the past 3,000 years. Plato warned his fellow Greeks about the dangers of the bewitching cadence of poetry in *The Republic*. Ironically, Plato also feared that writing would weaken the memory and morals. The warnings about debilitating memory weakening, impending social promiscuity, and the stranger who lurks in the shadows usher in nearly all communication changes.

Communication

Community computers

culture

Design

Documentation

education

Electronic

environmenting

Fargo

ment Grammar

Fun The 150

global

green

Inter



Novels were once thought to promote licentiousness, telephones brought strangers into your home. Even the jukebox was thought a tool to break up the family by chaining men to their barstools. How soon the dangers in the past look virtuous in our nostalgic rearview mirrors.

While the public may believe that online and telephone surveillance is new, I'm afraid the rabbit hole goes much, much deeper. Before Facebook ever hit the scene, Web sites were dropping telltale markers – called “cookies” onto hard drives to collect data about their visitors. The emergence of wiretapping and other cyber-snooping efforts grew out of nineteenth and early-twentieth century cryptography. While proprietary purveyors of social-media like Facebook, MySpace, and Flickr may seem to wear the black hats in an otherwise free online “Wild West,” the practice of media surveillance has a long history.

Tales of life complications brought about by identity theft and online predators serve to drive people further away from things like wikis, blogs, and, yes proprietary content management systems like Facebook. But knowing just how historically common these communication technology panics are does little to tell people how to negotiate through the thicket. Commonsense approaches to protecting yourself and your identity may not apply. Sure, one can avoid documentation of personal activities that may be illegal, unethical, or simply in poor taste. One should not trust the intimate details of your life with strangers. People can even try to stay away from new communication technologies as long as possible. In short: one may attempt to stay out of the water.

And while the royal “we” with the wisdom about these new communication technologies wag our fingers and call for caution, the parade marches right past us. The crowds seem rather indifferent to the indignities, and more firmly focused upon the benefits of using their computers, cameras, and cell phones to connect with others and grow. The students in my classes seem mesmerized by the ability to modify a malleable online identity, adding friends, pictures, and bits of information to their pages at will. Many of my students busy themselves

joining groups, causes, and even founding new causes. What this means in the classroom, is that while I might still give an old fashioned-lecture, students no longer just take notes. They are using technology to collect feedback and push their knowledge boundaries. They might look up an author they just read and ask her a question, write a publicly viewable reflection on a great class discussion or co-write a document with a class studying the same subject halfway across the country

My students' rush to connect has forced me to question most of my scholarly assumptions. Pat lectures about getting to the library to see what is on the shelf, discussions of copyright to avoid plagiarism seem antiquated and even quaint. Instead of enjoining students to look background research and definitions up after class, I have started to ask them to look it up online in class. I wait as they tell the classroom what they found. And unlike many of the critics of sites like Wikipedia, I demand that they correct the problems they see. My students have started to measure their perceptions and the information that shapes them. More importantly, my students know I expect them to play a role in correcting discord. The crowdsourcers are now going to college.

Although I share the concerns about privacy and surveillance (my dissertation was titled “The Rhetoric of Evasion and the Silence of Surveillance” after all), I think some of the problems surrounding social media underline the NEED to have informed people constructing viable alternatives. We dare not turn our educational missions over to the pedagogical equivalent of Starbucks unless we want a culture devoid of analysis and judgment. As educators, we should acknowledge our expertise in information analysis and begin to integrate our strengths in information quality control with the prolific engine of social media. The solution for nefarious surveillance is not more surveillance with a profit motive. Instead, we must begin to teach people how to create a public ethos within the networks they already occupy. After all, it is no coincidence that the word ethos means both “accustomed place” as well as “character.” Universities, and especially teachers, can help guide how students create the narrative of identity in these very public spaces.

Part of our work as educators now includes fighting through the turbulence of apathy to create educational commons different than the “social media mall” so that we can bridge our students' competencies to the civic and professional practices universities are so good at cultivating. We can no more turn our backs on this any more than we can turn our backs on the alphabet, the pen, the book, the music scale, or the poem. At one time, all of these innovations threatened an ancient way of relating to the world. Even things like literacy and the timeworn essay were considered to be decadent and dangerous at their inception. Only when the scholars, the philosophers, and the thinkers create new, deeper pathways into new communication technologies does a communication potential truly open.

Like the Aristotle's peripatetics, who mixed philosophy, exercise, and even military exercises in the Lyceum, students today mix their activities with a similar restless energy. It is our job as educators to help them organize that activity into an ethical and effective pattern of interaction.



THE LIFE OF A CAMPUS:
North Dakota State University, *Fargo*, 2008



Students in my photojournalism class prepared images based on their documentary project designed to reflect the experiences of students at North Dakota State University. In this project, students have chosen work representing classes and study, relaxing, volunteering and campaigning, and other experiences students encounter during their time at university in Fargo. Following the ethical tradition of photojournalism, these photos are not posed or manipulated. They reflect an honest, truthful portrayal of lives, sliced into images frozen by a camera.

The photojournalism tradition of documenting daily life based on rigorous standards of realism and honesty dates from the beginning of the twentieth century. Early photojournalists believed that the power of photography lay in its ability to capture the truth without the filters of brush or pen, and in doing so encourage society to better understand itself and perhaps to change. These photo stories grew to dominate the mass media by mid-century, reflect uncompromising standards of objectivity and image quality. Life magazine became most famous, publishing some of the greatest documentary photography of the century. Its photographers enjoyed great prestige and worldwide distribution.

The golden age of photo documentaries has passed, but still popular today are book or magazine projects documenting daily life of a society or group. The day in the life theme has become an icon of photojournalism in the last 20 years or so. Our photographers have borrowed from this theme to produce this small slice of the students' world. These NDSU students were not able to produce all their photos in one day, but they did work consistently throughout most of the semester. From a series of student-generated themes, the class produced images that were critiqued as a class. The class voted on images they believed worthy of inclusion in the final presentation.

I am pleased that this beginning photography class could produce many high quality images. Some of these students had never taken photos beyond the casual snapshot. But they produced strong images reflecting the culture they live in. I think their work shows honesty and truthfulness, in a world where so much photography nowadays is manipulated or contrived. Digital photography has made it easier to manipulate an image, I know. But it's also made it easier to make honest, unposed images of real people doing real things on a college campus.

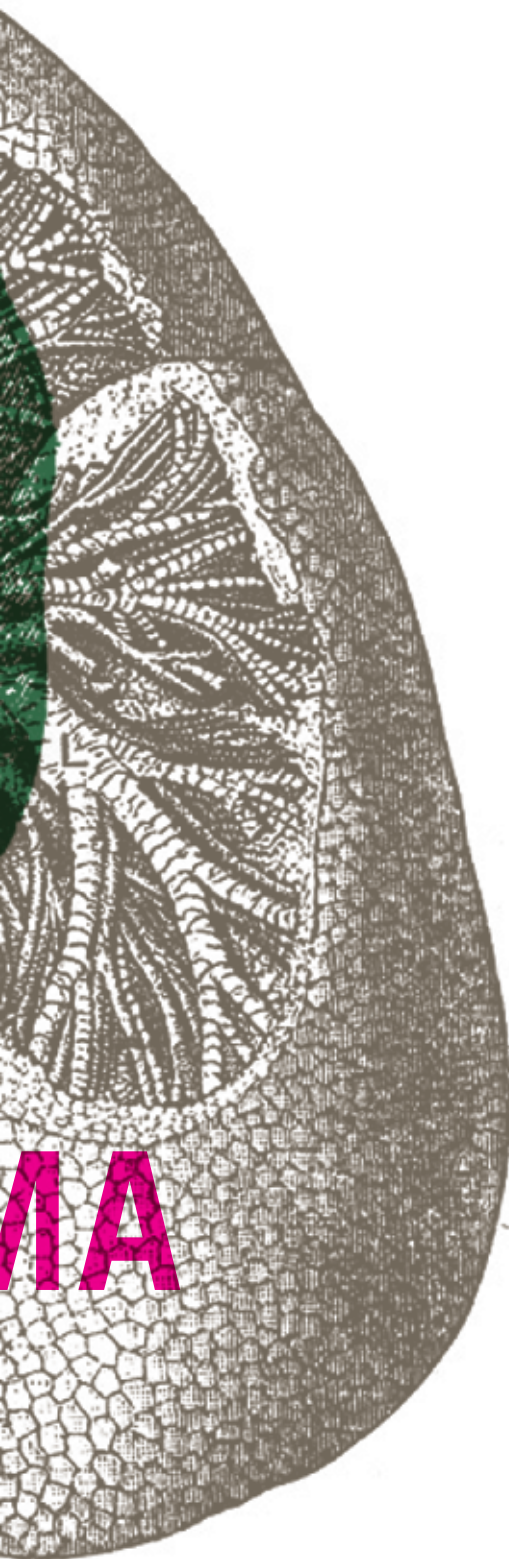
– Ross Collins, associate professor of communication, who teaches photojournalism at North Dakota State University.

**THESE PHOTOGRAPHS WERE TAKEN BY:
CAITLIN DANCER | CASSANDRA KIECKER | MELODY NEER | AMY VANGSNESS**

The full exhibit is at www.ndsu.edu/communication/collins/242photojournalism/documentary08.html



ASTHMA

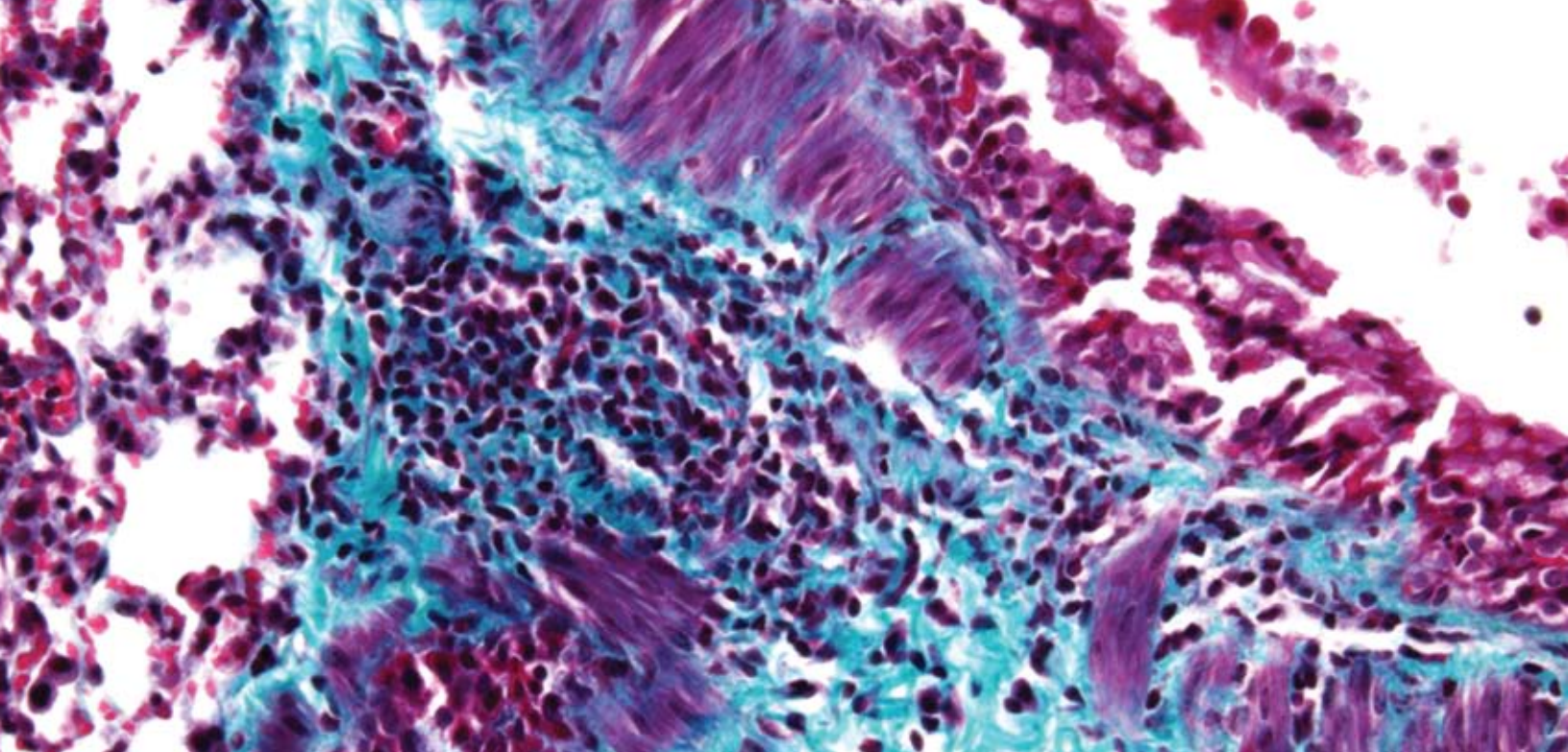


The elderly man, nearly 80 and bent with age, coughs hard and long. By now, he is hoarse from several days of such attacks. After years of this, I have learned to make sure he gets to the doctor. Another round of antibiotics. Another prayer. Another hope that drugs continue to beat back another infection in lungs severely scarred by asthma and chronic obstructive pulmonary disease. A lifetime of fieldwork on the farm – grain dust, crop chemicals, exhaust from farm machinery and other allergens – takes its toll. I can barely imagine how it feels based on my childhood asthma experiences gasping for breath. But his attitude of mind over lungs makes a difference.

The same optimism appears in the petite woman with sandy-colored hair, dark-framed glasses and an energetic smile. She's never met my father. But her father, once a farmer, possesses that way of viewing the world too, she says. At 50, her father injured his back, making farming impossible. He then attended North Dakota State University to earn a teaching degree and later inspired biology students in the classroom at Sheldon High in southeastern North Dakota. Jane Schuh is an assistant professor of microbiology at NDSU. She tries to emulate her father's teaching methods. He didn't play favorites as she sat in his class. "I'd always raise my hand and he'd say, 'Yes, Jane, we know you know the answer,' " smiling as he called upon another student.

While she was still in high school, things changed with a single diagnosis. Multiple sclerosis. "That was a turning point." As her father's MS progresses over more than two decades, optimism makes a difference. "He is a man with a tremendously positive attitude and a deep faith." Schuh's mother also had health issues. One result of that environment – a family with a helping gene in its DNA. With 10 kids, there are lots of hands to help. They bunked four to a room in their tiny trailer home. "Lots of kids to play with when you have that many siblings," says Schuh, the second youngest of the crew. She ticks off their professions as adults – doctors, middle school principal, nurses, drug rehab staff, plant manager, marketing manager, academic researcher and a school paraprofessional.

As an undergrad at NDSU, Schuh studied zoology. "People would ask how I went from zoology to microbiology – big animals, little animals." She says it was an asset to her research. "Lots of times I've gone back to my zoology roots and think, this doesn't make sense because an organism doesn't waste time and energy making a bunch of stuff that it doesn't need. So why are they making all this protein and how is it being used? Obviously, if they're making it by the bucketloads, it's important for something. We just have to figure out what."



big curiosity = big research

Sometimes science, like a career, takes serendipitous turns. “I didn’t get into med school, which was probably a good thing.” After completing her master’s degree in microbiology at NDSU, Schuh did postdoctoral work at Michigan State University Medical School in an immunology lab led by a former North Dakotan. Work at the lab focused on asthma research. “There are so many things that we don’t know about asthma – number one being what causes it,” says Schuh. “We think it’s genetically mediated and allergy and environmental factors play a role.”

The practical nature of a farm girl from a large family weaves through Schuh’s research. “If you’re responsibly looking at a research program, for me that means you need to be looking at hypothesis-driven research. You need to have something that’s worth funding,” she states matter-of-factly. “With asthma, you can ask practical questions. With your research, you can, hopefully, impact the disease or people’s therapy or potentially figure out what causes the disease so people don’t get it in the first place.”

As asthma drags on through a person’s lifetime, it physically remodels and changes the airways. “Your airway gets smaller and smaller and it’s like breathing through a swizzle stick.” Smooth muscle increases around the outside of the airways, so when they clamp down during an asthma attack, they really clamp down – like a vacuum cleaner sucking air out of a plastic bag.

Healthy lungs are capable of expanding when you need more air or shrinking when you need to cough, for example. But lungs beat up by chronic lung disease don’t have that luxury. Bronchial fibrosis can develop. “It’s like laying down cement around those airways. That cement-like substance around airways limits their ability to expand and constrict. That’s what the dysfunction is in a lot of people with chronic lung disease.”

Schuh points to staggering statistics. Each day in the United States, asthma causes 40,000 people to miss work or school. Each day 30,000 people have an asthma attack. Another

5,000 people visit the emergency room daily due to asthma. And 11 people die – each day – according to the American Academy of Allergy, Asthma and Immunology.

There’s no abatement in sight. Asthma rates in children jumped 160 percent from 1980 to 1994, according to the Centers for Disease Control, with a 75 percent increase in the general population during the same period. Then there’s the price tag. The Asthma and Allergy Foundation estimates \$18 billion in direct health care costs and lost productivity each year.

Schuh notes what some refer to as a childhood asthma epidemic. “That’s horrible to think that these little 5-year-olds who have asthma are going to be 50-year-olds who have asthma, that are going to be 75-year-olds who have asthma.” The disease doesn’t discriminate between urban and rural dwellers. A common thread, though, is whether you can afford health care services and whether you have access to them. “I grew up on a farm. During harvest, planting, almost any time, you had to be there,” says Schuh. “There’s no way I can see even a well-meaning parent taking their kid 60 miles to the doctor to get treated for wheezing. So these people 50, 60, 70 years later have horrible lungs and have never been diagnosed even as asthmatic.”

She says people often mistakenly believe that kids outgrow their asthma. Actually, airways get bigger, making it easier to move air in and out. And people simply get more clever at avoiding triggers like grass pollen or animal dander or mold that induces their asthma. So Schuh and her team are looking for answers. Some people want to build a better mouse trap. Jane Schuh wants to build a better mouse model.

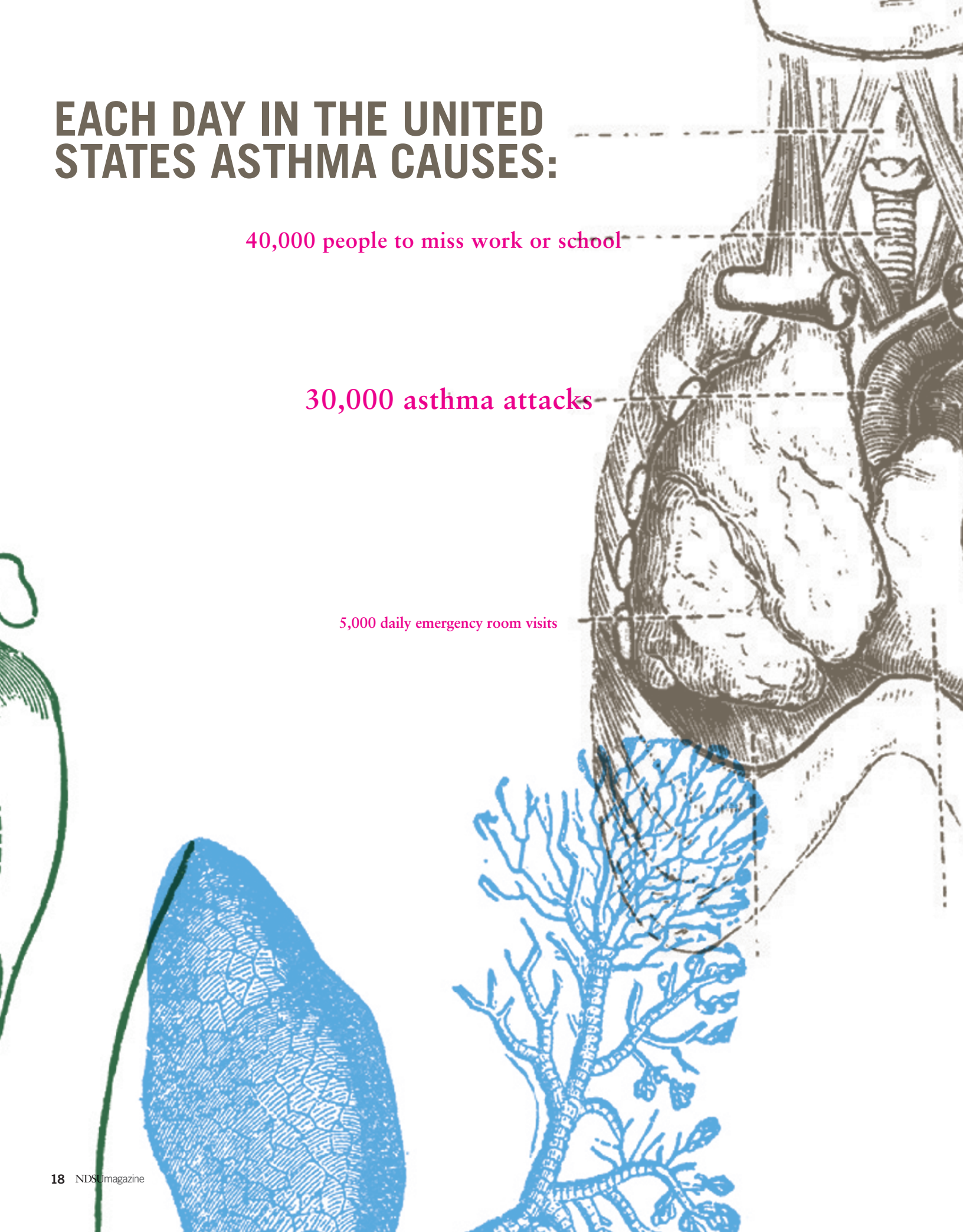
She admits there are good and not so good aspects to using an animal model for asthma research. The animal is given the disease and tracked all the way through. “You can go from the initiation to the maintenance and chronicity of the disease.” Variables are controlled. The lungs of a three-inch mouse don’t exactly mimic those of a 150 lb. person, but this type of model allows researchers to quickly see the effects of the disease. Symptoms occur in mice within weeks, rather than the decades it takes

EACH DAY IN THE UNITED STATES ASTHMA CAUSES:

40,000 people to miss work or school

30,000 asthma attacks

5,000 daily emergency room visits





11 deaths

in humans. “Animal models tell us a huge amount but should be used judiciously and appropriately.”

Her asthma research focuses on finding candidate genes or targets for asthma, on what initiates the disease process early and shows up later. In the course of every day, “You’re breathing all sorts of junk – dander, molds, pollen, pollution, smoke – that attack the lungs,” says Schuh. While most body organs are well-protected as they do their respective jobs each day, lungs are unique. Lungs have one cell thickness between the outside and inside to get air in and out. “Probably our immune system tries to make sense at that interface and deals with it the best way it can. How do we help it deal?”

Schuh’s first research funding from the National Institutes of Health went toward developing a novel model for asthma research. Part of the problem, as she views it, is that a lot of mouse models don’t use an appropriate allergen. “The leading mouse model for asthma or allergic airway disease as it’s called, uses ova albumin. Most humans don’t snort chicken eggs,” laughs Schuh. Instead, her research model uses the fungus aspergillus, since fungus is a prevalent asthma trigger.

In a frequently-accepted research model, fungal spores in liquid are injected directly into the trachea, which allows researchers to control exactly how many spores go into every mouse. But the spores are tiny and hydrophobic, so the liquid doesn’t penetrate very far into the airways or the itty bitty alveoli of its subjects.

“I thought, let’s figure out another way.” So Schuh and her research team use a different method – essentially blowing air across fungal spores in a miniature respiratory chamber for mice. They monitor the results. After 35 days, they find fibrosis in the airways and some smooth muscle, which isn’t usually there. Even after the initial inflammation from the spores subsides, the airways are changing and remodeling. “We hit them once with these fungal spores. Even after inflammation resolves 35 days later, we see a lung that looks a lot different. What’s going on with those lungs?”

Schuh is currently submitting the results of this research to several scientific journals.

big research = big discoveries

An early riser from her days on the farm, Schuh awakes at 4 a.m. each day. “I don’t get out of bed right away. It’s quiet. And I think. Hmm. IgA – I just read a paper. I wonder what IgA is doing in our model.” She later checks the immunoglobulin A antibody in her lab experiments and it’s increasing. “IgA in the lungs is shootin’ up.” Or she thinks about whether a live fungal spore produces the same response as a dead fungal spore. Then she tests it in the lab.

She never thought in a million years she’d be back in North Dakota doing research. But while she was working in Michigan, another graduate student at NDSU, Scott Hoselton, now the technician in her lab, e-mailed her about opportunities at her alma mater. When her former professor and mentor Michael Robinson left NDSU, an immunology position opened up. “I called people I knew here to find out where NDSU was going with research and the answer from everyone was that this was a very exciting time to be at NDSU. There have been pushes in the past to get research going, but there’s never been the financial backing that there has been in this era.” So in 2004, Schuh declined other tenure track offers, saying NDSU provided her the best place “to do research and teaching like I wanted to do it.”

She is also part of a research group led by Mukund Sibi, professor of chemistry at NDSU, who received a \$10.5 million grant from the National Institutes of Health – among the largest single grant awards in NDSU’s history. The group researches the role of protease or enzymes in a variety of diseases, including asthma.

Schuh appreciates the biomedical research under way with colleagues here in chemistry, microbiology and other fields. “You bring them all together and all of a sudden you’ve got a critical mass. You have people who on a regular basis get together and talk science and are talking biomedical science.” Such interaction

is crucial as she learned in her days as a post-doctoral fellow at the University of Michigan Medical School.

By 7 a.m. each morning, everyone was in the office chatting. Someone would mention a drug company had a new product to test for lung function. Someone else would say, “Did you see the scientific paper that was published?” As an early bird, Schuh always participated in the discussions, realizing that’s how discoveries begin. “It’s not the 8 to 5 and going to the symposia. It’s sometimes having a burger with somebody and mentioning that ‘I saw this paper, have you read it?’” And she is just as enthusiastic about the rest of her research team heading down the same path. “We do molecular biology, fungal biology, surgery, immunological testing, histology. I tell the Ph.D. students that once they leave this lab, they will have an arsenal of things they can do.”

big liver = big heart

Schuh clearly possesses many attributes. Big curiosity, big enthusiasm, big heart and big liver. Liver? In 2007, when one of her brothers-in-law developed liver disease and needed a liver transplant, her large family once again sprang into action. “I was actually one of a number of people in my family willing to donate. I have a brother and sister-in-law who tested but weren’t a match.” Another brother-in-law was next on the list to donate after Schuh. “That’s the gift for being healthy. You get to donate a large chunk of your liver,” she says, smiling. “I knew, if it were me, someone would do it for me.”

She pauses for a moment. “They have three beautiful girls,” she says, her voice cracking, as she recalls the decision to help her younger sister and her husband, who is doing well after the transplant. She downplays the enormity of her gift. And in optimistic Jane Schuh fashion, says “It was cool, quite honestly.” She found the science of the entire process fascinating. Even after suffering a massive post-transplant reaction to medication, her enthusiasm still isn’t dampened. She underwent the eight-hour surgery only nine months after the birth of her own daughter.

It’s a bumpy ride on the transplant train. “The first couple weeks, you feel miserable,” she recalls. “At four weeks, I felt rough. At five

weeks, I felt good.” The transplant team pointed out that Schuh has an unusually large liver for her size. She’s amazed at how fast the organ regenerates. “Within five weeks, it was completely regenerated. The doctor said, ‘How did you know?’ I told him, because when I rolled over in bed, everything didn’t go phuloop!”

Schuh emphasizes a supportive environment made the process possible. Her husband stays at home with her son and daughter. And her lab staff keeps research on track. “It was very well supported in the department and across campus,” says Schuh, pointing out that her department chair had earlier donated a kidney to his brother. The only drawback, she says, was that she couldn’t pick up her daughter for a long time after the surgery.

big discoveries = big answers

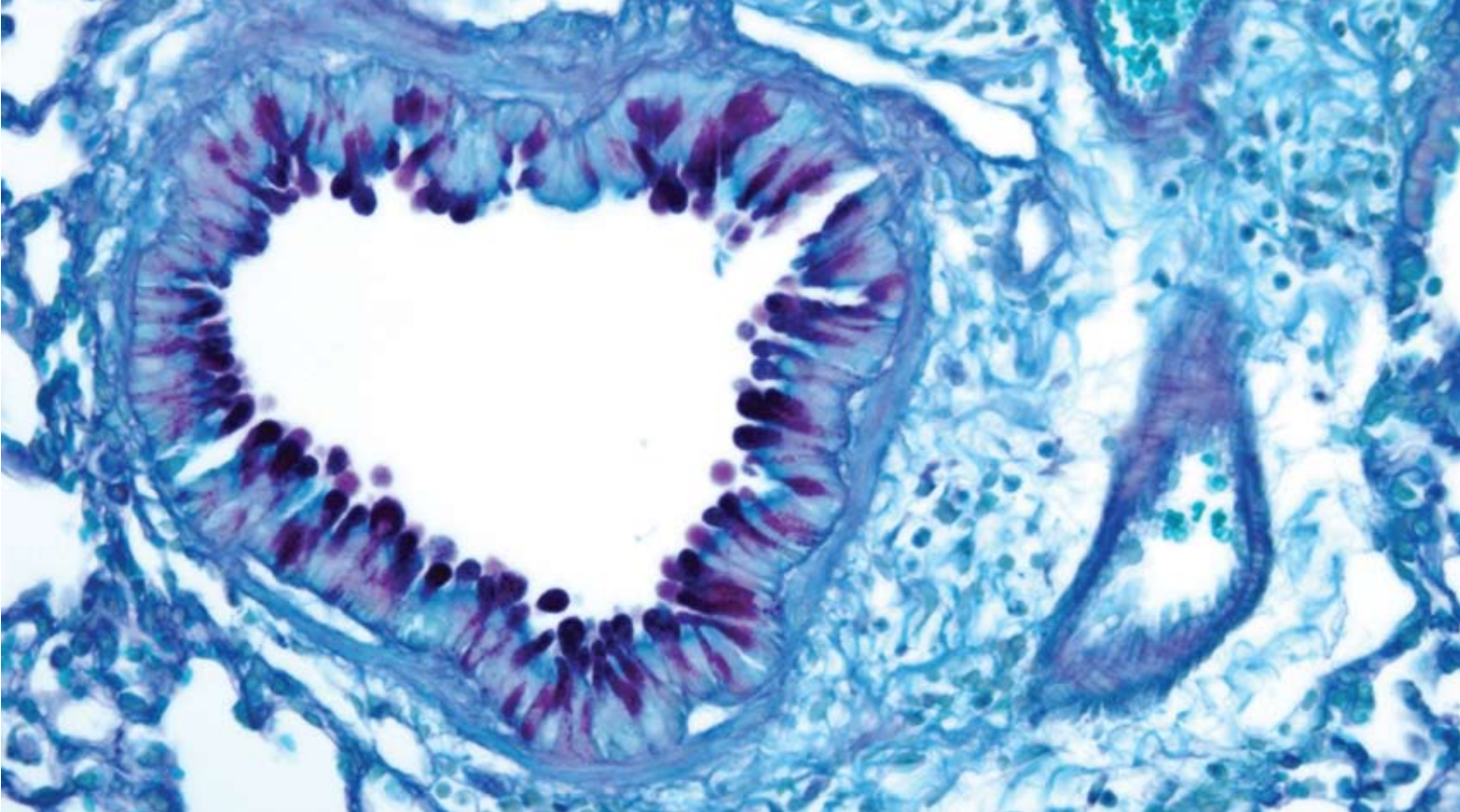
Three pairs of shoes are lined up in one neat row underneath the floor-to-ceiling bookshelf in Schuh’s office. The brown, comfy, sherpa-lined clogs sit cozily next to tan Ugg boots and on the other side, some utilitarian brown, closed-toe loafers rest quietly.

“These are warm,” says Schuh, pointing to the boots. The clogs play another role. “Comfortable feet are very important to think when I’m sitting at my computer so I’ll be padding around in my slippers,” she says. The practical closed-toe shoes are the safety-conscious choice for working in the lab in the summer.

A cartoon from a local newspaper hangs in her office, autographed by her colleagues in the department. It shows a lab technician from the National Institutes of Health in his white coat, peering through a microscope with the letters NDSU in a petri dish. In the balloon above his head, the technician tells Uncle Sam who’s standing behind him, “We’ve found someone capable of making creative discoveries in the treatment of asthma and cancer.”

My dad, my daughter, my cousins and my cousins’ children and I all have asthma. At family gatherings, you don’t need to worry if you forget your rescue inhaler. Some other family member can whip out albuterol quickly if you need it. On behalf of my family’s asthma-laden dynasty and countless others like us, we hope Jane Schuh finds big answers.

—Carol Renner







SHAKING THINGS UP

Randy Gaugler is great for quips. “What you have to understand is that good is the enemy of great,” he’ll say. Or “You know what the difference is between a good habit and a bad habit? A bad habit is a good habit you took too far.” He says these things with the air of someone who has done more than his share of standing in front of an audience. “Know what the difference is between a job and a career?” he’ll ask. “About twenty hours a week,” this when he is talking about all the evenings and weekends he’s put into his work over the years. But the thing he says most often these days is this: “I’ve gone from being Mr. Who’s Who to Mr. Who’s He?”

Not that he’s complaining – exactly. After all, it was his choice to make a move from being one of the leading scientists in his field to being the new guy in a different niche – someone hardly anyone has heard of, whose name doesn’t have the same cachet. At least yet.

The last couple years have been especially good for Gaugler. He’s a distinguished professor at Rutgers, an eminent entomologist, nematologist, entomopathologist, invertebrate pathologist. What all those appellations boil down to is a career spent, until now, working mostly on microscopic, parasitic nematodes –

think of them as tiny, tiny, tiny worms. He’s studied everything from their biology, their mating behaviors, their genetic variability. You name it, and he’s done a lot of thinking about it. He’ll tell you it’s gone fairly well, considering when he started out about 25 years ago the idea of using nematodes to control insects, which is what he’s done in a nutshell, was just a vague idea being held by five or six people in the world. Now, especially with the ban on certain insecticides that had been widely used in farming, obscure parasites are being studied in hundreds of different laboratories in about eighty countries and are being commercially produced and sold in at least a dozen countries.

In fact, he was riding the wave. In 2004, he won the Entomology Society of America’s Recognition Award, which came with eight days in Switzerland, all expenses paid. The next year, a nematode was named for him—*Mononchoides gaugleri*. That November, he and his wife Cheryl left for a six-month Fulbright at Cairo University, where they stayed in an apartment on an island in the middle of the Nile. And the following summer was maybe the best of all. He and Cheryl spent three weeks in China as guests of the Chinese Academy of Science and he is a recipient of their 2006 Albert Einstein Award. (He was in good company there. Fellow awardees included six Nobel laureates.) Randy Gaugler was 56 then, and at the top of his game. He could go on cruise control if he wanted.

Or he could start out again. Because the truth was, he had become bored. He would go to the same conferences that had been so exciting in the early days of his career and to him it seemed like it was the same papers being given over and over. As for himself, he says, he ran out of ideas. He stopped working the weekends. And here’s the worst thing. He had been at the pinnacle for a long time. He had, he thought to himself, nowhere to go but down.

So you could say the pump was already a little bit primed when the long-time director of Rutgers's Mosquito Research and Control program retired. The School of Environmental and Biological Sciences approached Gaugler with an offer. Would he consider taking over as the new director? Maybe to everyone's surprise but his own, Gaugler said he'd think about it.



Gaugler had figured out early on that he had to be self-directed, find his own ideas, procure his own funding. He had been brought onboard at Rutgers in 1982 to go out into the salt marshes of New Jersey and do research on biting flies. That's what his predecessor had worked on for a couple of decades. New Jersey has a lot of biting flies. The flies are harassing and the bites can be painful. But they don't carry any diseases. They don't feed on crops. They don't cause allergies. They don't cause any economic losses. Gaugler could see that his career wasn't going to go too far if his focus stayed on biting flies. So after three years, he wrote a grant on biological control, which is what he had done his doctorate on – using these microscopic worms, nematodes, as biological warfare against destructive insects. He got the funding – from a highly competitive agency to boot. He was off to the races.

Nematodes are pretty complex. They have a grisly circle-of-life thing going on, a co-dependency with a bacteria, or as biologists say, a symbiotic relationship. Together, the nematode and the bacteria can cause disease in a pest insect. So they can have a beneficial effect if you're trying to get rid of a certain insect. The nematode carries the bacteria in its gut. The bacteria needs to find a specific insect to feed

on so that it can multiply, but it can't do that on its own. It has no mobility. The nematode, however, zeroes in on the insect and acts as a biological syringe, injecting the bacteria into the insect's body cavity. The bacteria multiply and kill the insect within a matter of hours, working all the proteins and carbohydrates from the insect's tissue and reproducing itself until there are billions of bacteria there. At this point, the nematode steps back into the picture. It feeds on that bacteria buffet and produces two or three new generations of nematodes – all ready to go out and do the same thing all over again.

Over the years Gaugler has done fundamental research on nematodes. He's studied the behavior of the nematodes – how they responded to insects, for example, what their sex ratio has to do with foraging strategies, and how they age. He's looked at how their lipids change. He's sampled them in soils on every one of the Hawaiian Islands, looking for new strains with different properties.

But even though nematodes were biologically fascinating, not much was going on in terms of using nematodes as biological control until the early 1980s. That was when several things happened. The first was that new methods were developed to mass produce the artificial media it would take to raise nematodes in industrial quantities. The second was that the Environmental Protection Agency deemed nematodes very safe and exempted them from registration requirements. (Gaugler estimates the cost of registering a chemical insecticide would have been around \$50 million and says that the market wasn't big enough to justify that kind of investment.) The third factor was that the EPA began to restrict and even ban the use of many broad spectrum chemical insecticides. Bada bing. Some scientists thought the nematode might be a good replacement.

And Gaugler was ready to leap in. In the 1970s, molecular biology tools had been developed to learn more specifically about the free-living nematode *C. elegans*, which Gaugler describes as the guinea pig of the molecular biology world. Gaugler now took those tools and adapted them to do genetic engineering on a broader spectrum nematode. With chemical insecticides you have the advantage of a stable shelf life, even under the kind of high temperatures typical in a storage shed. But a nematode is a living, breathing organism. If it gets too hot, it dies. Gaugler was able to engineer a new and improved nematode, one that was heat tolerant. Today, nematodes are used against garden insects, grubs, mushroom flies, and insects that burrow into trees. One of the

ASIAN TIGER MOSQUITOES BREED WHEREVER THEY CAN FIND STANDING WATER. A BOTTLE CAP LAYING AROUND WITH A QUARTER INCH OF WATER IS LIKE A MOTEL 6 TO THEM.

biggest applications is in Florida, where nematodes are used to control the citrus root weevil that is a serious threat to citrus trees. Gaugler's own lab developed eight different beneficial nematodes that have ended up as commercial products.



Gaugler was a wrestler in high school and college. He drives a black Corvette the way he talks – very fast. And he's quick to laugh. But behind the smile, his eyes have an intelligence and intensity to them that makes you not want to mess with him.

He comes from a modest background. Third child of seven. He's naturally competitive, Cheryl Gaugler says, with himself and with others. Maybe it's survival of the fittest. His dad used to say that if you tripped on the way to the dinner table, you wouldn't get anything to eat, Gaugler laughs. He'd suggest that you keep both feet on the ground because if you reached across him, he might put a fork in your hand. Whatever set it in motion, Gaugler always, always, wanted to be the best. Looking back, considering that he had hardly been out of North Dakota until he went to graduate school, he says he hadn't expected life to go where it has. He's not sure that he thought much about what he expected. He just figured if you worked hard, good things would happen.

Gaugler's curriculum vita is 28 pages long, packed with long lists of grants, even longer lists of publications, three patents, and seven licenses for commercial products. But the first item under awards and honors is this: "Outstanding College Athletes of America, 1970," and a little farther down, amid all the research excellence awards and all the professional societies he's been elected to, you'll find this: "Athletic Hall of Fame, North Dakota State University at Bottineau, 1990." He won the Mon-Dak Conference title twice as a wrestler. No one had ever done that before – or since. It's not because he's a great athlete, he'll tell you. He was slower than average, and no stronger than a lot of people. But he worked harder than anybody else. If the coach told him to run 10 laps, he ran 10 laps, and then an 11th, and then sprinted as hard as he could. He has fire in the belly, Cheryl says, that wrestler's mentality. Anything he approaches he wants to conquer, full out, 110 percent.

He started college at North Dakota State at Bottineau as a wildlife ecology major, but he didn't really know what he wanted to do until the day in genetics class his sophomore year that he looked at a fruit fly under a microscope and was blown away by what he saw – cool little

eye facets with unimagined structure and detail. It was his epiphany. He would study insects.

At NDSU, he was mentored by first-class people – Bob Carlson was his adviser and Ted Schultz was department chair at the time. They showed him the way without telling him what to do. In his senior year he had letters from 15 universities, inviting him to apply for graduate school. He chose North Carolina State University for a special training program funded by the National Science Foundation that brought in experts from all over the world to teach. He could have stayed in North Carolina to do his doctoral work, but chose the University of Wisconsin instead. Each place exposed him to a diversity of ideas and many mentors – you look up to and hold onto the ones who whip you, he says. And it built up his professional network. One of the things that has really helped him in his career, he says, is his willingness to move on, meet new people, and be exposed to new ideas and approaches. When opportunities come by, he tries to grab them instead of letting them pass by.



The thought of a new challenge got Gaugler's juices flowing. New Jersey is the birthplace of mosquito control for the United States. *Aedes sollicitans*, the salt marsh mosquito, a terrible biter, is a dominant mosquito. Salt marshes are the wetlands between ocean beaches and freshwater rivers, so it's easy to associate them with coastal areas. But the salt marsh mosquito can fly inland for fifty miles. Because of this, back at the turn of the last century, a Rutgers professor, John B. Smith, pressed for mosquito control to be considered a state issue rather than a local issue. Smith had trained as

a lawyer. He proposed legislation to regulate mosquito control in New Jersey that became a model throughout the nation.

The Mosquito Research and Control program has had a glorious history, Gaugler says. But it's been status quo for a long time. The program has been doing the same thing, same thing, same thing, while the world around it has been changing.

He'd shake the place up, move it out of the complacent spot it had been in. It was the right time to move the focus from nuisance insects to public health. Mosquitoes were important in a different way now, Gaugler believed. They are vectors, the insect that carried some nasty diseases – West Nile disease, Eastern Equine Encephalitis – from birds to humans. There was so much more a program like this could do.

New Jersey is a sentinel state. It's got this long coastline, climatological diversity – really six separate sub-climates – and major ports of entry. Port Elizabeth is the largest container port in the eastern United States. Then there are the airports – Newark, Philly, JFK – lots of opportunities not only for new mosquitoes to come in but new diseases. In 1959, New Jersey had its first wave of Eastern Equine Encephalitis. It killed dozens of people. They almost closed the turnpike down people were so afraid. In 1964 and 1975, it was St. Louis Encephalitis that swept through and infected a lot of people. In the 1980s it was Lyme disease. That's not a mosquito-borne disease. But that's why he was going to rename the program the Center for Vector Biology. Ticks transmit disease as well.

New threats are here and on their way. *Aedes albopictus*, for instance – the Asian tiger mosquito. It wasn't in the United States ten years ago, but it's well established now. It's black with white stripes down the middle – very small and nasty. They breed wherever they can find standing water. A bottle cap laying around with a quarter inch of water is like a Motel 6 to them. A sand bucket in the backyard that filled up with rainwater or a low spot catching moisture on a tarp can easily become breeding grounds for 10,000 mosquitoes.

Aside from the nuisance factor, the Asian tiger mosquito can carry more than thirty

arthropod-borne viruses, generally referred to as arboviruses. It's a bridge for West Nile, which means that it feeds on both birds and mammals. When mosquitoes bite an infected bird, they get a big shot of virus, and then they transmit it to humans when they bite us.

The Asian tiger mosquito is the principal carrier of two viruses of concern that are spreading in the world – dengue fever and chikungunya. Dengue is a particularly nasty disease. You aren't afraid you're going to die, Gaugler says, you're afraid you won't. There was an outbreak of dengue fever in Hawaii, about a hundred cases in 2000-2001. Luckily, he says, the public health department got in there and hammered it down before it took off.

Chikungunya makes West Nile look like a picnic. It attacks the joints, which degenerate and don't come back. In September, it was found in Italy. Gaugler expects it to spread through Europe the way West Nile has spread through the United States. Travelers have developed the symptoms after arriving here, but that's either happened in winter when mosquitoes weren't active or the travelers hadn't come in contact with the mosquitoes. Either way, it's only a matter of time. The insect that transmits the virus is here.



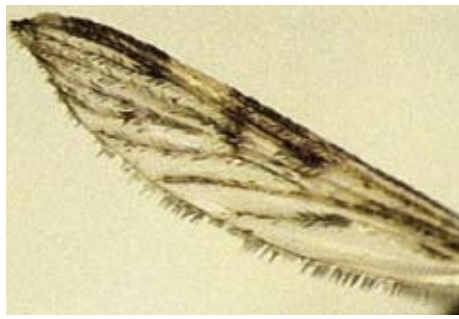
The Latin names of mosquitoes slip off Randy Gaugler's tongue these days as easily as those of his children. *Aedes albopictus*, *Egyptii*, *Culex sollicitans*, *Toxorhynchites*. (*Aedes vexans*, by the way, the flood water mosquito, is the big biter around Fargo.) Change is invigorating, he says. He has ideas again. Everything he sees, reads, hears is new. He's working weekends once more.

Heading up the new Center for Vector Biology meant moving from his nicer digs to a concrete block office and lab building, and he has a second lab building, a tin shed, some garages he's going to have torn down. Gauglerville, he says some people call the cluster.

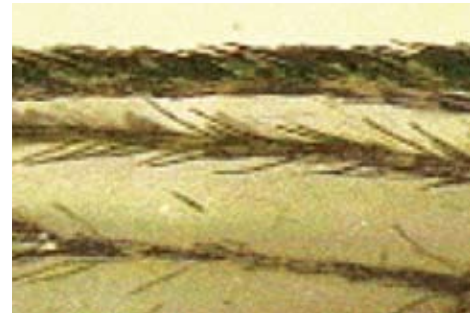
The center has more than a year under its belt. He had figured it would take two years to change the culture, and that still sounds on target to him. His plans are big – move the scope of the center from regional to international, form an alliance with the public health program to offer a joint master's degree, go after federal grant money. It's a privilege to live in a country that has very good vector control, he says. It's not because of vaccines that we don't have malaria in the United States. We don't have malaria because we control the mosquito that carries it. And for him, that's the name of the game.

Patience is not his strong suit. But he was hired to shake things up, and he has. Initiatives at the center are beginning to snowball. In the first year as director, he's garnered \$1.5 million in grants. He's too old to contribute significant research in vector biology, he says, but young enough to still leave a legacy. The other day he e-mailed to say they'd landed a \$3.8 million grant from the United States Department of Agriculture to develop integrated pest management techniques to suppress the Asian tiger mosquito. All told, the grants amount to more funding than the program had accumulated in its first hundred years. The center is on its way, he wrote. Life is sweet.

—Sally Ann Flecker



THE LATIN NAMES
OF MOSQUITOES SLIP
OFF RANDY GAUGLER'S
TONGUE THESE DAYS
AS EASILY AS THOSE
OF HIS CHILDREN.





excerpts

Jessica Wagner's first trip to Europe was as a tenor saxophone player. She was 17 and a senior at New Rockford High School and that experience inspired much of what has followed. Wagner graduated from NDSU in 2007 with degrees in Spanish and French, and the very next Monday launched a translation, tutoring and language interpretation service in a Fargo business, inspired by a college course in French translation, an on-line how to book, and her own determination to do what she loves.

When I got to college is when I fell in love with language and really that's been my passion since then. I've studied languages in classes, on my own, over the internet, with people I've met and it's really kind of defined everything else I do.

I've studied twenty-three. I'm useful in seven and I work in four.

My mom says that about me, that I'm a collector. I always have been, starting with Barbie dolls. And when it came to language, it was just, well I've come this far, and Spanish makes sense. Italian is close to Spanish so let's look at Italian for a month or two, and I got to where I'm conversational in Italian. From Italian I thought well Latin's close and then from Latin to Greek and then I went back and tried Provencal which is close, sort of between French and Spanish, and then my brother had studied German so I went with that one for a while. I dated a Belgian briefly who spoke Dutch so I studied Dutch for a while.

I've looked into Swahili and Chinese and Japanese. I worked in a Chinese restaurant for a while which helped with the Mandarin.

Once I started translating and realized how much I enjoyed it, really, just the process itself of taking someone else's thoughts and making them accessible to other people and being able to use the language and my writing skills.

Our best repeat client now is a magazine in Spain. The first article I got was on the 1956 Hungarian water polo team going to the Melbourne Olympics. You can't make this kind of thing up. It was going to be published in Hungary. It is a magazine written in the south of Spain that is sent to Hungary to be translated into Hungarian and sent to the United States to be translated into English to be published in Hungary. Just a few days ago I got four more translations from them and they are about an Iraqi architect, Madonna, Walt Disney, and the U.S. political candidates. It's been the most exciting job I've had ever.

The idea of someone my age starting a business and being my own boss, being successful at it was really just laughable from the beginning but when it started to work, when our income started, when it finally tipped to where the income was higher than what we were paying out, I don't think I've ever felt anything quite so satisfying.

I fell in love with Irish years ago, but it's an incredibly difficult language for someone to try to learn without having a speaker there. Irish Gaelic, you can't say just Gaelic because there's Scot's Gaelic and Irish Gaelic, so we've just taken to calling it Irish. And so I tried to learn it on my own three or four different times starting about four years ago. This past October, I'd graduated and the business was going okay, I had a lot of time still. So I decided to start this organization, the Fargo-Moorhead Irish Language Association, the FMILA. I advertised at the colleges and in the paper and got together about eight people who would meet regularly twice a month, every other Monday night. I would bring in a short lesson. We would go over the material and then we would converse, which was amazing. It not only forced me to study and really take a close look at the material but also teaching it was an amazing tool for me to get it really engrained and I'd have people to talk with which was an added bonus. Not to mention it was a way to give back to the language community for all I've gotten from it.

I think that doing something I love, like this, is really making my life more worthwhile. I can't imagine sitting at a desk doing something that I didn't feel absolutely passionate about. I would feel as if I were wasting my time no matter how much money I was being given for it.

Why language itself is important there are so many reasons, an absolute plethora of reasons, not the least of which is that the United States is not as much of a world power anymore as it was or as it thinks it is and we need to understand our place in the world scene. I live in Fargo, North Dakota, and work with a company in Spain and Hungary and have translators in Berlin and other places – Singapore is another one of my contacts – then people need to realize that Singapore and Spain are as close as my living room computer right now. If we want our children to have the same opportunities as children growing up in Germany and China, learning three or four different languages, then we need to start following their example.

We still see ourselves as on top of the world, on top of the world's economies, diplomacies, and we're not. The rest of the world either owns us, looks down on us or is more powerful than we are. It really is to my mind an arrogance that we feel that everyone should speak English and we shouldn't make a step toward them.

The more languages you study the easier they come to you because you understand the backwardness of them, looking from an English perspective.



the GIFT *of* PERSPECTIVE



I married my high school sweetheart. We had a great time in college, a beautiful wedding, got great jobs and bought a house. We built a fence, bought puppies, and when the dogs were more than a year old, started thinking about having a child.

In November 2005, we were thrilled to learn we were expecting a baby. I took being pregnant seriously and I was going to do it the best way I knew how. It was a privilege, after all. A responsibility. I'm a rule follower. I worked out, took prenatal vitamins, avoided tanning, seafood and hair dye. At our 20-week appointment my typical pregnancy took a thrilling and atypical turn when an ultrasound revealed we were expecting two babies. Twin boys. It was one of the best days of my life.

When you travel by air, finally reach your destination and look back at your journey, it's hard to believe you began it thousands of miles away. Almost two years later, it is hard to imagine where my little family started.

Eight weeks after we learned about the twins, due to unforeseen complications, our babies were born three months premature. Gavin James and Nolan Keith. The loves of my life - I knew it even before they were born. They weighed less than two pounds each, and didn't look at all how I'd imagined.

When I met my babies for the first time, there were all kinds of wires covering their little bodies. Brock's ring fit easily over their hands and slid down their arms. The diapers they wore barely covered the palm of my own hand. I was discharged from the hospital three days later on Mother's Day. It all felt like some mean trick. It was raining out and I felt pathetic, being wheeled out of the hospital, leaving my babies behind. Just opening the car door felt like giving in.



GAVIN | 1 lb. | 12.7 oz. | 12.5"



NOLAN | 1 lb. | 14 oz. | 13.5"

Those first few days were a blur – like a bad dream – running from a villain, except even though your feet are moving, you aren't getting anywhere. Doctors overwhelmed us with facts about apnea episodes, blood transfusions, heart ligations, oxygen saturations, and the undeniable risk of disability from premature birth. Brock and I learned what each of these things meant and became experts on our babies' conditions. When you do your homework, the bliss of ignorance is stripped away. Having knowledge was a blessing and a curse. We found that a small percentage of babies born at less than two pounds emerge from their ordeals with no lasting consequences. We also learned the possible repercussions of such premature births were blindness, deafness, cerebral palsy, learning disabilities, autism, and mental retardation among other things.

My mom brought the boys some stuffed animals the day after they were born. Gavin's was a yellow lion. It sat in the corner of his little bed to keep him company. Something struck me about it then – I think a part of me knew this boy of mine had a lion heart. I didn't know then how much he would need it in the months to come. There were so many times I wished I had the heart of a lion too.

At three weeks, Gavin became gravely ill. We discovered his ailment was a preemie disease called necrotizing enterocolitis, NEC for short. Usually heavy antibiotics through an IV will keep the infection at bay and typically after a week, babies can resume eating and are okay. But Gavin continued to worsen. After three weeks of struggling to bring the NEC under control by a combination of discontinuing feedings, constant bowel X-rays and multiple rounds of antibiotics, my tiny two-pound baby took another terrible turn. Not only was the condition of his intestines not improving, it had gotten worse and his breathing more labored by the hour. We made the decision to life-flight him to Minneapolis Children's hospital in hopes that surgical intervention could save his life. I cried the entire way to Minneapolis that night in a rainstorm, and all the while praying someone there could bring Gavin back from

the brink. I spent the next three weeks at his bedside, leaving Brock and Nolan in the hospital in Fargo. I was torn about missing all those moments with Nolan, but couldn't leave Gavin for fear he may not be there when I returned.

My life in those months after the boys' birth was bittersweet. It seemed with every decent day Gavin had, there was a devastating setback. Several times a day I would call the hospital in Fargo to check on Nolan. The nurses there would report his exciting accomplishments – drinking his first bottle, taking his first bath, breathing on his own. I was able to celebrate all of those milestones with him through photos, but I'd have given anything to be there in person. There was a twinge of guilt each time I felt joy about something Nolan had done, because my other child was clinging to life in the next room. It's amazing, the games a person's mind plays when in a deep state of grief. Though no one's life had been lost, I still felt incredible grief. Grief for the pregnancy I didn't get to finish, for the healthy babies we were going to have, and for the perfect little family Brock and I had planned. There is one thing I knew even then – nothing was going to be simple ever again.

Gavin underwent surgery three days after arriving in Minneapolis. He reached a critical point in surgery in which they thought he may be lost. He came through that surgery, but was critically ill.

On July 22, 2006, four days before the boys' due date, Nolan came home from the hospital. Weighing 4 lbs. 11 oz. at discharge, Nolan was a tiny baby with big demands. It was a day we had been waiting for, yet we couldn't help being sad at the same time. Thoughts crept in – what would it have been like had Gavin never been sick? What if we were bringing them home together? Would Gavin ever get to come home?

Over the next few months, Gavin underwent a series of six more surgeries to bring his digestive system to some sort of balance. Those procedures and the aftermath of NEC left him with short bowel syndrome. Short bowel is brought about when a person is left with so little intestine they can't absorb the necessary nutrients from food to survive without supplemental nutrition. Doctors said people with short bowel as severe as his are almost always dependent on some amount of intravenous nutrition to live. In most cases like this, patients eventually die because over time, the intravenous feeding slowly kills the liver. Gavin would likely need a short bowel and liver transplant to ever have hope of surviving without it. At that time, transplants of this kind had a very low success rate. Gavin's digestive system needed time to heal and the intravenous feedings were allowing it to do that. At the same time, it was destroying his liver. It was a double-edged sword and Gavin was in a race against the clock.

As time wore on, we were unable to be with Gavin during the weekdays. We had another fragile preemie to care for at home and jobs we needed to keep. Every weekend, we packed up Nolan and spent two straight days with Gavin at his bedside in Minneapolis Children's hospital. It was like a marathon that had no end in sight. It became our routine and our life for eight months. I'd call to check on Gavin every day at 10 a.m. and again at 10 p.m. and every day asked about weight, blood work, breathing, eating, was he happy today?

The nights were worse than days. It's an incredibly painful thing to know your baby is alone in a hospital and you're unable to hold him like you should. So every night we'd hear of all the cute things he did from his wonderful nurses. Tell him hello. Tell him we love him, miss him. Give him a hug goodnight.

In September of 2006, Gavin's hearing was tested. He had missed the newborn screening hospitals usually do, and was at high risk for hearing loss. He'd been on a ventilator, was a very low birth weight baby, and had been on powerful antibiotics for the majority of his short life. Test results showed Gavin was profoundly deaf. The day the news came, I felt like someone had dealt our family a life sentence. It was a permanent, devastating blow. I thought about how he'd never tell jokes and hear someone laugh at them, or have music move him, hear a bird chirp, rain falling, someone whispering words of love in his ear.

As Gavin's liver disease worsened, Brock became more determined to find a way to save our son. He found an experimental study being done by a doctor at Boston Children's Hospital. Dr. Mark Puder was facilitating a study using an omega 3 fish-oil based drug called Omegaven. The study showed a reversal of liver disease in short bowel patients when soy fat was replaced by Omegaven.

He knew it was a long shot, but Brock wrote Dr. Puder an e-mail, pleading with him to help save Gavin. What happened next was nothing short of a miracle. Within hours of sending his e-mail, Brock was on the phone with Dr. Puder devising a way to get Omegaven for Gavin. The plan was not without its hang-ups. The biggest one? Omegaven had not been approved by the FDA for use in the United States. We would need special permission from the FDA for emergency use of Omegaven before it could be ordered from the pharmaceutical company who manufactures it in Germany. The second challenge would be getting the internal review board and Gavin's medical team at Minneapolis Children's on-board with our decision to pursue the Omegaven treatments. They'd have to be willing to take the risk with us.

It took ten weeks for the Minneapolis Children's internal review board to make the decision to allow Omegaven into the hospital for Gavin's use and another two weeks for his medical team to get the project off the ground. During that time, all we could do was watch Gavin's labs get worse and watch him struggle with feedings. Gavin's course of Omegaven lasted for a little over a month. His labs looked better and better each week and his body was able to start tolerating more feedings. He had a new twinkle in his eyes and more energy – both signs of hope. We'd hoped to have him home by Christmas, but right after Thanksgiving, he came down with a crippling case of stomach flu. Christmas was spent in Gavin's hospital room and a hotel. All we could do was pray and wait and hope he'd be ready to come home soon. By the middle of January 2007, Gavin reached nearly full feedings.

The day seemed like it would never arrive and once a date was set for his homecoming, we were afraid to tell anyone. We'd had some potential discharge dates set for him in the past, only to have our hopes crushed by a setback. The nurses trained us to change his central line dressing, how to give medicine through a feeding tube, and how to administer



**WHEN I MET MY BABIES
FOR *the* FIRST TIME,
THERE WERE ALL KINDS
of WIRES COVERING
THEIR LITTLE BODIES.
BROCK'S RING FIT EASILY
OVER THEIR HANDS *and*
SLID DOWN THEIR ARMS.**





DESPITE *the* ADVERSITY *the* BOYS HAVE FACED, THEY'VE DEVELOPED INTO ABSOLUTELY NORMAL, CHUBBY-CHEEKED, RAMBUNCTIOUS TODDLERS.

intravenous feedings at home. It was terrifying and thrilling all at once to be bringing our baby home. On January 30, 2007, Gavin came home with us for the first time.

Having him home was an overwhelming adjustment for all of us. It was hectic, but we were happy. Nolan seemed to adjust the best of all. He was more relaxed with his brother home. I think it has to do with the twin connection everyone says exists. It felt so wonderful to have sleepless nights, 17 doses of medication a day, a feeding tube, and IVs to deal with. It was not what we had imagined, but exactly what we had prayed for. Gavin was home to stay. Rocking him to sleep that first night in the nursery we'd painted almost a year earlier – I felt it all come together. Our family was complete. We were whole again.

Shortly after Gavin was diagnosed with hearing loss, he was fitted with hearing aids. We learned that early identification is key to language development in hearing impaired children. The more sound a child can gain access to early on, the more successful that child will be with developing language and being able to learn. We learned of cochlear implants through Gavin's audiologist at Children's and wanted to investigate it further as an option for him. If he was indeed a candidate and the cochlear implants worked for him, there was a chance he'd develop completely normal speech.

In May of 2007, Gavin was screened by the cochlear implant team at the University of Minnesota. We were thrilled to find out he was an ideal candidate and a date was set for surgery. Though most implant recipients today have one implant, more and more people are opting for bilateral implants to improve speech

perception, sound localization, and hearing in noise. After much deliberation, we made the decision to go with bilateral implants for Gavin. The surgery was not without risks. Among them, heightened risk for meningitis, infection, and facial paralysis. All of Gavin's remaining natural hearing would be destroyed by the implant surgery. Despite those risks, Brock and I viewed having the surgery as Gavin's best chance at a normal life. Implants would allow him to interact with others using his voice. With the right speech therapy and education, he would learn to listen and speak.

The cochlear implant surgeries took place in August and December 2007. His implants have been activated and Gavin is learning to talk. Every time I hear his little husky voice utter something meaningful, my heart swells. I am so grateful Gavin has been given the gift of hearing through the miracles of modern medicine.

Despite the adversity the boys have faced, they've developed into absolutely normal, chubby-cheeked, rambunctious toddlers. There's one speed at our house. Fast.

Nolan is a real macho man. He is confident and smart, loves to give kisses, but has a bad temper and doesn't listen like he should. Something tells me he's going to be a challenge. He has some great dance moves.

Gavin is tenacious and tender. When he smiles, he looks like he's just heard a really good joke. He's a quick study, a social butterfly, loves books, cheese, and the music of James Taylor. He too has some pretty wicked dance moves.

I feel privileged to have been given the gift of perspective. Nothing is perfect or simple, but it sure feels right.



GAVIN | *Crystal* | NOLAN



Meet Miss Mumoko Okayama, an ambassador of Japan. Miss Okayama and her sisters were a gesture of friendship, an exchange to create good will between the school children of our two lands. She is one of the 58 perfect dolls Japan sent to the United States in 1927; one for each state of the 48 states and 10 cities.

In Japan, doll making is taken seriously. The dolls Japan sent to America were commissioned from their finest doll artists. Dolls made in this tradition are objects of art and believed to contain a spirit or soul. Kami is the spirit of the doll and it must be respected. Therefore, everything that would sustain her in new life traveled with Miss Okayama to North Dakota: clothing, shoes, trunks, makeup, mirror, tea sets (both everyday and ceremonial). Each item is exquisitely crafted and stamped with the maker's mark and the mark of her house or family lineage. Pupils from schools that received American dolls were invited to contribute one sen to fund the doll's construction. But this was not enough money to fund Miss Okayama, so the organizers invited the Sasakawa family to make up the difference to help with her creation. This is why Miss Okayama wears the Sasakawa kamon, or mark.

The artist who created Miss Okayama's ivory complexion and delicate features painstakingly built up face, hands and feet with layers of crushed oyster shell called gofun and held in place with a binder called rabbit skin glue. Tints of peach,

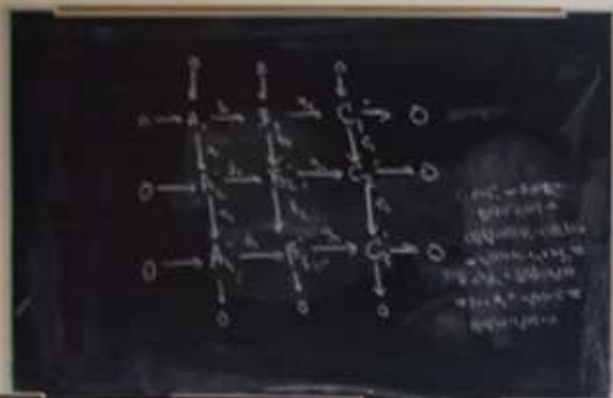
pink, ivory and blue give blush and character to her face. Her fingernails are as miraculous as a newborn's. Her eyes, cut from the gofun's surface have depth and mystery. Her silk kimono and obi would be worn with pride by the finest lady; draped just so, with miniature fan and tiny pocketbook tucked into the stiff obi.

Miss Okayama arrived in North Dakota in 1927 and lived with the Fraternal Order of the Mason's for many years in their grand temple in downtown Fargo. The Red Cross was her next North Dakota home. In 1972 she came into hands of a loving curator at North Dakota State University, Miss Emily Reynolds, chair of the department of textiles and clothing and founder of the historic costume collection named in her honor. In 2001 funds were raised in Japan, and Miss Okayama, who'd grown rather dusty and bedraggled, was restored to all her demure beauty. The Japanese uniform company that helped to fund the restoration even provided Miss Okayama with a new outfit – a Japanese school girl's uniform that she keeps with her things, preferring to wear her faded but still sumptuous kimono.

Her home arranged behind the safety of glass and diffuse light in the Evelyn Morrow Lebedeff building, Miss Okayama welcomes students, school children and curious elders. She remains a serene and lovely ambassador and an embodiment of peace, inviting everyone to stop, visit and imagine taking tea. *Domo arigato. Sayonara.*

—L. Baker





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A photograph of a classroom. In the background, a large chalkboard is filled with handwritten mathematical equations and diagrams. The equations include trigonometric functions like \sin and \cos , and exponential functions like e^{ax} . There are also some diagrams, including one that looks like a graph of a function. The foreground shows a checkered floor with green and brown tiles, and several wooden desks and chairs arranged in rows. A computer monitor is visible on one of the desks.

Teaching is doing

Early in the semester, sounds of marching music and chanting fill the south end of Minard Hall's second floor. The energizing refrain rolls under office doors, and a cadence of voices is reciting something unintelligible. The sounds are loud and irresistible. After it happens more than once during the week, it's time to search for the source. The search leads to a tiny classroom crammed with desks, students, a petite drill instructor and a boom box.

Standing before her beginning German class, instructor Stephanie Grollman marks the beat with her hands and speaks to the rhythm of an instrumental jazz CD. She is even louder than her students as they repeat a new language pattern. Their pronunciation and their accents improve with every repetition. If not quite musical, it is mesmerizing and effective. Grollman came to the idea of using jazz serendipitously. She was listening to jazz in her car and spontaneously began speaking in time to the music, giving a new flavor to a time-tested teaching technique. The next day she tried it in the classroom where the ease and fun of the technique were instantly popular. Students might feel a little inhibited, but they memorize quickly and retain what they learn.

Hers is a lively classroom. She plays a choral director for freshmen, but in her upper level class Grollman is a

theatrical producer. Students work in small groups to create short skits. They assign roles, write out the dialogue in German, rehearse and present the finished performance to the rest of the class. Students whose eyes are scrunched with the effort of remembering a correct phrasing one minute, are full of laughter in the next as correction and encouragement are gently given. *Ist das klar?* Grollman calls repeatedly and then forges ahead or backtracks to make each concept *klar* – clear. Working together makes students feel less spotlighted and allows them to match others if they are struggling. Learning by doing is not just for grade school; it is how human knowledge is advanced.

A fluent speaker of German and English and a learner of French, Portuguese and Latin, Grollman is a native of Germany. She began studying English in the 5th grade and was drawn to the study of languages very young because she loved that moment when she started thinking in another language and was deeply curious about other cultures.

Another Minard classroom: Pine-green chalkboards are rapidly filled with tidy phrases and homework assignments. This is a third year German class and Grollman is acting as historian. The subject of the lesson is the 1960s and 1970s anti-authoritarian movement in West Germany and that movement's connection to protests of the Vietnam War. She explains, in German, how certain perceptions and responses in Germany differed from those in the United States. Concepts are harder and conversation is much more advanced at this level. Students are getting ready to go into exchange programs and experience that great educator, cultural immersion. Like all adept teachers, Grollman incorporates new instructional ideas nearly every semester, whether inspired by her own thoughtfulness, an NDSU workshop on motivating students, or learning about mini-theater from a professional conference. Teaching is doing.

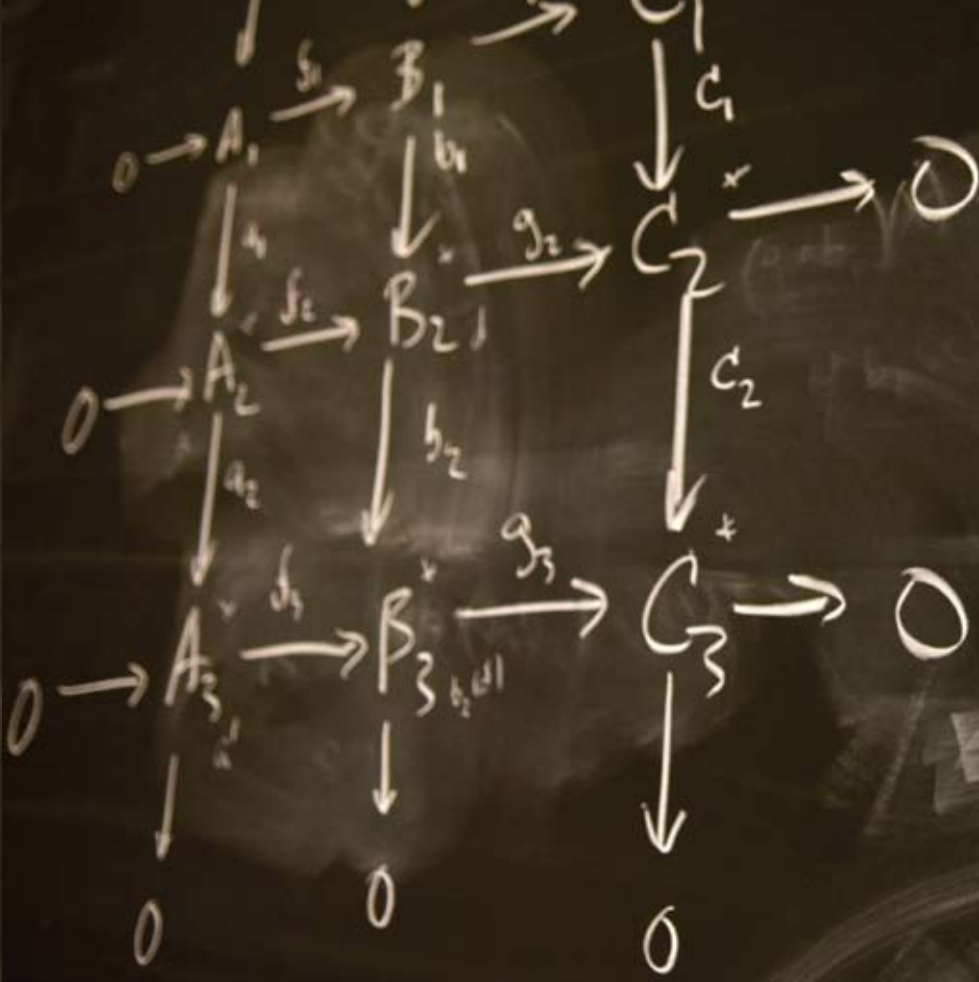
Elegant and gracious, Jo Ann Miller enters the bustling chorus hall unobtrusively. She chats with someone clearly watching for her entrance, touches a piano key, gives a quiet

direction and the storm of chairs swirl into a circle around her. Together she and her students stretch first their bodies and then their vocal chords as she signs the vowels she wants them to sing. A little call and response concludes the warm up and the music making begins. Miller advises students to make translation notes in their music, singling out a resistant student with gentle humor and encouraging him to take notes even though he prefers to trust his memory. To practice a complex work by Bach that they are singing in German, the students split into part circles. Miller stands in the middle where she can hear each section and each voice within the whole and yet also hear the whole. The students sing a tricky phrase over and over, building their auditory and muscle memory. "Sing even better than I do," she tells them lightly, "I know most of you can. Sing like angels rejoicing."

Tucked in the warm southwest corner of the music building, the choir room is not high tech in the way of computers and teaching aids. Risers, folding chairs, some music cabinets and a good piano leave lots of floor space. The technology is all in the room design: acoustic panels line the walls, and smoothly curved oak panels are suspended in a cresting wave across the ceiling. Good acoustics contributes to the singers' abilities to listen to one another and listening is a critical skill in singing or conducting. Miller, herself a graduate of NDSU, joined the faculty in 1989 as the director of choral activities. She is an accomplished singer but her passion is conducting.

Though music is certainly a language in its own right, choral conducting is particularly multi-faceted. One of Miller's gifts is her ability to hear things linearly as well as vertically. The gift is apparent when she stands in the middle of a classroom and calls on individual students from the resounding mass; encouraging one to soften, another to crisper diction and the entire bass section to improve its pitch through a challenging phrase. The power of the music spirals around her like a small tornado and she is the wind master.

Training singers is a much-loved aspect of her teaching, training conductors is the advanced practice. Students don't earn the experience of



$c \in C_1 \Rightarrow \exists d \in B_1$
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$\exists a' \in A_3 \Rightarrow f_3(a') = b_2(d)$
 $\Rightarrow \exists a \in A_3 \Rightarrow a_2(a) = c$

$a_0 + a_1 + a_0 = 2a_0 \rightarrow a_0 = -\frac{1}{2}(1-\epsilon)$

atienic case similar:

$$\frac{1}{\pi} = \frac{1}{2\pi} + \frac{1}{3} (1-\epsilon)(1-4\epsilon)$$

$\rightarrow \frac{1}{\pi} = \frac{1}{2\pi} + \frac{1}{3} (1-\epsilon)(1-4\epsilon)$
 where $\epsilon = 0$



$$\int -x^2 dx = \sqrt{\pi}$$

being on the podium until their junior or senior years. At that point, a few will discover the same love and passion that Miller feels for the conductor's art. "Choral music is different than purely instrumental music – we have the best of both worlds – expressive music and harmonies and singing about ideas and feelings," Miller said. "It's when I am working with the students on this music that the satisfaction and fulfillment of being a teacher takes place. The music is what inspires me and the ability then to share it and teach it to my students is the fulfillment of my passion for this choral music." It is possible to see Miller's experience of deep listening being communicated to her choir. There is an inaudible poetry in the way she leads the choir to sing beyond each individual's potential. She's given them the language of music and they do indeed sing like angels rejoicing.

Humming Bach, hot coffee and notebook in hand, I wind through the labyrinth of Minard to the 3rd floor classrooms in the Annex. This mini-Minard tucked between the main hall and the music building was completed in fall 2003. The yellow brick and red sandstone architecture is a good match for the campus' second-oldest building (101 years) and nicely connects to the modern styling of the music education building. I've taught in these classrooms and like them. They are web-enabled, light-filled and pleasant. But it's a freezing Saturday morning, so why would anyone be here? Math is the reason. Today is the annual Math-In. Held on the Saturday before finals week, it is the gift that NDSU's Math Club gives back to the university. Like most service projects, it started small and grew as word spread and test scores improved. This year more than 300 students take advantage of the event, setting a new club record.

The third floor classrooms are full. Students are assigned to a room according to their level of accomplishment. The largest room is given over to studying the basics, mostly freshmen and students from disciplines that don't emphasize math. Every desk is awash with coats, caps, backpacks and paper. Young men dominate the scene working in large huddles while the young women cluster together in pairs. A half-dozen teachers and teaching assistants wander the

room responding to waving arms. Meanwhile, in the room devoted to the more advanced students, the atmosphere is quiet and intense. There are only two teachers here, though the room is full. The students seem to work more singly; the pairs look to be couples and I amuse myself for a few minutes imagining the conversation in a mathematical romance; the murmur of beautiful proofs.

A few days later, waiting outside his office, I overhear mathematics professor Jim Coykendall, speaking to a student: "I'm worried about you. Math is a jealous mistress; you need to be filling up several notebooks a week to survive in this class." Then he walks the student to the front desk and has him take a new math placement test to see exactly where that student belongs. Did Coykendall connect with that young man and will that student work harder? Almost certainly. Or perhaps the boy will decide that he wants a less demanding field and move on without believing he is a failure, only that he doesn't choose to serve such a jealous mistress.

Jim Coykendall has always loved and served her. He began his teaching career as an undergraduate teaching assistant, a rare phenomenon. Twenty-one years later he is chair of NDSU's Mathematics Department, has turned the Math Club into a truly cool place to hang out, and this year is experiencing the best Calculus I lecture group he's ever taught. He was raised in the Appalachian Mountains, so he has a sweet drawl that gets stronger when he expounds on the beauty and creativity of the logic, leaps and proofs of mathematics. Coykendall arrived at NDSU in 1996, seeking a research school with a doctoral program and shunning opportunities to join the National Security Agency (the nation's biggest hangout for top-notch mathematicians) because his love of students is equal to his love of mathematics, which he calls the Queen of the Sciences. Laden with administrative duties as chair, he is quick to seize opportunities to interact with students. The Math-In was his idea and at the tutoring sessions he is as present and engaged as any of his team. Math Club was sinking when he arrived at NDSU. He tossed out the old formula and began staging speakers and

discussions that highlighted the controversies and creativity of the discipline. The club began to grow and today is a dynamic student organization that often has 50 or more people in attendance.

Coykendall truly wears his heart on his sleeve when it comes to his students. He likes their work ethic, their sense of personal responsibility and their honesty. His love of students doesn't soften his expectations, however. His exams are legendary for their difficulty and thoroughness because he knows that advancing students before they are ready does them a great disservice. He says students who don't make it fail because they don't participate, or perhaps don't have the drive. Aptitude in math is almost synonymous with having a love for it and students who get positive encouragement all along the way are most likely to develop that love.

Mathematics is the basic language used in science and technology. Coykendall and other mathematicians will argue that it is the foundation of scientific disciplines as well. Some find it an easy language to master. The rest of us struggle. When teachers share truths like "you need to work harder" or "I know you can do better," they are asking students for self-examination. This, too, is a fundamental aspect of teaching and learning.

Jeanne Hageman carries her grocery bag of faux food into her French 101 class. Students are soon giggling at the plastic hamburger patty and purple Easter egg as they recite *le boeuf*, and *un oeuf*. After 18 years of teaching university-level French, Hageman knows without doubt that every class has its own personality and each requires that she adapt her instructional methods. Of course, 18 years of experience also generates a ready reserve of ideas, flexibility and intuition. Some groups of students prefer clear rules, so grammatical emphasis is needed. The students on their way to France want conversation and lots of practical "Where is the bus stop?" language. She responds to those needs while helping them stack the building blocks of language learning: reading, writing, speaking and listening.

Like many who live an academic life,

Hageman's campus office is a narrow room lined wall to wall and floor to ceiling with bookshelves, with space only grudgingly given to a filing cabinet (topped with books and papers) and a battered steel desk (piled with books and papers). This quiet, studious Midwestern woman is animated about her students and full of praise for those who teach foreign languages in middle and high schools. Hageman was inspired to pursue a career in language after an experience as an exchange student to Belgium while she was in high school. Students admire her patient teaching style and her love of foreign film stirs their enthusiasm. She teaches them to mine the treasures of being multi-lingual from movies and books, as well as conversation. Understanding a French film without subtitles gives a direct sense of accomplishment. Reading *Red Riding Hood* in its original form without the "happily ever after" ending imbues a sense of its mystery and ancient age. Teaching is storytelling.

Each semester students arrive on campus in varying states of excitement and trepidation. They enter classrooms with unsullied notebooks set to gather up whatever knowledge comes their way. Whether the classroom is a laboratory, a choral hall, the great outdoors, or a well-worn room packed with skinny desks, their teachers serve them with similar gifts and energies. It seems that excellence in teaching and excellence in learning have the same roots. So perhaps what makes a great learner is also what makes a great teacher. In the middle of the night snippets of conversation are rolling through my mind. Grollman's poignant "I am an ambassador of Germany and I want to do a good job"; Hageman's firm "I don't believe there are people who can't learn languages"; Miller's "All I need from a student is that they want to learn"; Coykendall's passionate "I could not live without the students."

Teachers can be impatient and irascible, consistent, concerned, detached, particular, generous, serious or playful as the occasion and the students require. (And we all recall a few who could be pompous and condescending.) But teaching is doing, it is listening, it is challenging, it is storytelling, it is love.

Laurie J. Baker

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