

NDSU NORTH DAKOTA STATE UNIVERSITY FALL 2007 magazine



NDSU Volume 8 Number 1 FALL 2007 magazine

on the cover

Artist's statement:

At one time, oil paint was a new technology; the history of painting is, in some sense, a pictorial history of technological development. While there is some pleasure, some stature in pursuing the mastery of a centuries-old medium, traditional artistic processes have serious problems. Oil paintings, for example, are highly toxic, expensive to preserve, and impossible to reproduce. We live in a time when tremendously powerful tools for visual expression are developed primarily by and for commercial interests — Hollywood, ad agencies, game companies. Still more troubling is the art communities' sentiment toward software and technology — that it is dehumanizing, cold, impersonal. This is a profound misunderstanding — computers and software are the work of thousands of highly creative humans. It is my deep conviction that artists of all stripes need to understand and exploit the expressive power of digital tools, to create and share new art forms rather than leave the power in the hands of advertisers.

In this simple example, using Photoshop and Maya, a 3D modeling package, I removed the supports from these playground horses. This image, unlike all my other work, is without the cynical, critical, and political. New technologies can really set you free.

Please see a short biography and interview with Dan Reetz on pages 18-19.

Editor

Laura McDaniel

Editorial staff

Char Goodyear

Joel Hagen

Dan Koeck

Kathy Laid

Tammy Swift

Art direction/design

Julie Babler

Address changes

Send address and name changes to: office@ndsualumni.com

Letters

Unless noted "not for publication," communications to the editor are considered for publication, often in a condensed version.

E-mail: laura.mcdaniel@ndsu.edu

PO Box 5167

Fargo, ND 58105

Fax: 701-231-1989

Volume 8, number 1

NDSU magazine is published twice a year, in spring and fall, by North Dakota State University, University Relations, PO Box 5167, Fargo ND 58105.

NDSU does not tolerate discrimination. Direct inquiries to the Executive Director and Chief Diversity Officer, 202 Old Main, (701) 231-7708.

President

Joseph A. Chapman joseph.chapman@ndsu.edu

Provost and Vice President for Academic Affairs

R. Craig Schnell craig.schnell@ndsu.edu

Vice President and Dean for Agriculture and University Extension

D.C. Coston d.c.coston@ndsu.edu

Vice President for Finance and Administration

John C. Adams john.adams@ndsu.edu

Vice President for Information Technology

Bonnie Neas bonnie.neas@ndsu.edu

Vice President for Research, Creative Activities and Technology Transfer

Philip Boudjouk philip.boudjouk@ndsu.edu

Vice President for Student Affairs

Prakash C. Mathew prakash.mathew@ndsu.edu

Vice President for University Relations

Keith D. Bjerke keith.bjerke@ndsu.edu

Director, Athletics

Gene Taylor gene.taylor@ndsu.edu

Executive Director, NDSU Alumni Association and Development Foundation

Jim Miller jim@ndsualumni.com

Executive Director, Chief Diversity Officer

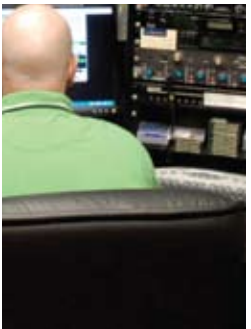
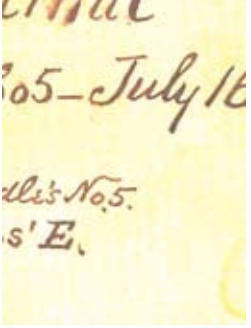
Evie Myers evie.myers@ndsu.edu

General Counsel

Rick Johnson rick.johnson@ndsu.edu

Executive Assistant

Cathy Backer cathy.backer@ndsu.edu



contents

On the cover	2
Contributors	4
Editor's note	5
Thinking Lewis and Clark Essay by Tom Riley	6-9
Engineering a flawless french fry	10-17
Excerpts Dan Reetz	18-19
Field days	20-21
Hard evidence Anthropologist studies bog mummies	22-25
Voice over guy	26-29
H2 NDSU	30-33
Machine2Machine	34-39
Arctic midges	40-45
Dad Essay by Michael J. Olsen	46-47

contributors



Initially eager to break out on his own by leaving his hometown of Minneota, Minnesota, to attend the University of Evansville, Indiana, **Joel Hagen** (*voice over guy*, p. 26-29) soon returned to be closer to family. Two years as a reporter in Fergus Falls drove him back to academic life, to earn a master's degree in

creative writing from Minnesota State University Moorhead. He began work as a feature writer at North Dakota State University in January, and spends his spare time writing fiction and trying to get people interested in Norwegian history.



Michael J. Olsen (*Dad*, p. 46-47) is a Fargo-based corporate communication strategist and occasional essayist for NDSU magazine and other regional publications. He has had a bee in his bonnet for 50 years, frustrated all this time that his father's famous picture of the Fargo tornado was cropped by the

newspaper to exclude the children in the foreground, but this year as the Forum recalled the storm, the full shot was at last published. The anniversary of his father's famous photograph also generated this essay. When your dad is a photographer, you get your picture taken often, sometimes when you are having your nap, as shown here, Michael, circa age 4.



Shadd Piehl (*H2 NDSU*, p. 30-33) is a frequent contributor to NDSU magazine, a rodeo

cowboy and a cowboy poet. He also teaches English composition, literature and humanities courses at Rasmussen College in Bismarck. Piehl and his wife, Marnie, live in Menoken with their three sons, a dog and two horses.



Tom Riley, (*Thinking Lewis and Clark*, p. 6-9) is dean of the College of Arts, Humanities

and Social Sciences at North Dakota State University, and a professor of anthropology. Though his research has been focused on pre-historic agricultural systems in the Hawaiian Islands, American Samoa and Micronesia, he has, since moving to North Dakota in 1996, also become something of an expert on Lewis and Clark.



editor's note

My 15-year-old stepson, once a quiet, almost too shy boy, is now a boisterous, outgoing, taller than his dad, twinkle in his eye, happy pretty much anywhere guy. He has lots of friends and frequent social engagements. He has developed an interest in classic rock, and has amassed a collection of rock band T-shirts. Some are recent purchases, and some vintage, like a Rolling Stones concert shirt his dad never wore, but cherished in theory. He is learning to drive, happily never in my presence. Though there's not a chance in the world he could lose his focus when his very alert 13-year-old brother is in the car, I still don't plan to ride along for many years. Do they say the brain isn't fully formed until your early 20s? I think I'll wait until he's, let's just say 30 and call it even.

Anyway, this once quiet child recently spent the weekend playing Xbox Live, which means he camped out in a chair with a complicated controller in his hands and a headset clamped over his long hair and then blabbed into the thing for hours, mostly in the form of bickering with whoever was on the other end of the Internet-based game network, could have been some guy in Spain, but I gathered two of the other guys were classmates. I seldom grasp what's going on in any detail.

He only stopped the game to eat when his father insisted, and so this boy, who used to be the world's slowest eater,

raced up to the kitchen, bolted down a couple thousand calories — didn't matter of what — in about two and a half minutes and then got his tail back down on the chair so he could yell into the headset that whatever it was that just went wrong in the game wasn't his fault.

When he started playing with the headset a few months before, he mumbled into it in low tones, but something about this new game causes him to enunciate and project in his now-resonant voice. At first, I thought, well, it's his house too, he gets to have some fun. I can go somewhere else and shut the door and turn on a television and put on my headphones and zone him out. That was Friday night. By Sunday night I just wanted him to stifle.

My husband reminds me often that adults have since ancient times thought the next generation was going to cause the end of civilization, so I should just relax. In that spirit, I am trying to remember what it was like to be 15, and whether my pastimes matter much to my success and happiness as an adult. I can't seem to remember a single thing, though I'm sure whatever I found to do, it was never noisy or disturbing to others.

Here's hoping the people in your life have as much gusto for play and potential for the future.

Thank you for reading.

Laura.McDaniel@nds.u.edu

THINKING LEWIS AND CLARK

It didn't strike me how alien their situation was until the still January morning in 2000 when I drove up the dirt road to the overlook where the original Fort Mandan is thought to have been constructed. Located off a ragged section road about eleven miles north of Washburn, North Dakota, a sign and a stone cairn are the only markers for the site, and as I stood looking down at the hoarfrosted cottonwoods, steam roiled up from the frigid Missouri beyond. I was in suit and tie and wool dress coat, a far cry from the winter uniforms over fatigue frocks and added buffalo robes that the military men the Corps of Discovery would have worn two centuries ago on such a cold day. Thomas Jefferson called them that — The Corps of Discovery — and the term still reverberates in our day.



As I walked back from the overlook, I noticed that the left front wheel of my 1994 Buick Century had sunk into the snow at the side of the road. I had to dig it out before I got in and tried to rock the car out of its predicament. The sweat froze on my skin and beard in the sub-zero weather as I dug around the tire and the underbody of the car. All my extremities were quickly frost stung. I looked around and, as I began to entertain the possibility of freezing out there, wondered if I would be able to survive a walk back to the house a half mile back or the one that must be somewhere over the rise.

That was my epiphany. What Lewis and Clark did was dangerous! Just walking around unprepared for a North Dakota morning could be life threatening. For them, the journey up the winding Missouri to the Mandan and Hidatsa Villages was daunting enough during the season of 1804, but the trip beyond to the shores of the Pacific during the traveling season of 1805 was beyond what they could have imagined.

I began thinking seriously about Lewis and Clark when I got to North Dakota in 1996, and I have continued to think about them in the years that have followed as I led NDSU Lewis and Clark in North Dakota bus trips up the Missouri from Fort Rice to the confluence of the Missouri and the Yellowstone. Lewis and Clark spent a total of 146 days in North Dakota, longer than they spent anywhere else on their journey to the Pacific coast.

JEFFERSON'S VISION

There is an abundance of detail about the Lewis and Clark Expedition, the first and most successful of President Jefferson's explorations of the Louisiana Purchase. The others, all later than Lewis and Clark, included the Hunter-Dunbar expedition of the Ouachita River, the Freeman-Custis exploration of the Red River of the Mississippi, and the Zebulon pike expedition into Colorado. But the detail of Lewis and Clark's journey, I call it ephemera, is important in defining the substance of the expedition as well as the times that crystallized its form.

Why is it that saga of the Corps of Discovery has captured the American imagination in a way that no other American expedition of the time has? They weren't the first Euro-Americans to cross the continent. The Scots fur trader Alexander MacKenzie, had made the trip more than ten years before them, and had provided Meriwether Lewis with valuable information on what to expect. It wasn't the first attempt in the fledgling United States to explore the continent. Thomas Jefferson had arranged a subscription by members of the American Philosophical Society in 1792 to finance such a failed expedition by the great French botanist, Andre Michaux. Even earlier when he was in France in the 1780s, Jefferson had spoken up for the eccentric John Ledyard who proposed to walk through Europe to Siberia, crossing what is now known as the Bering Straits then heading south and east across the North American continent until he reached the East coast. Jefferson was unsuccessful in negotiating access to Russia for Ledyard, but it didn't stop the explorer. Katherine the Great's Cossack Soldiers finally thwarted Ledyard's stroll, but not until he had made it across European Russia to Siberia.

But if the Corps of Discovery was covering a landscape that had

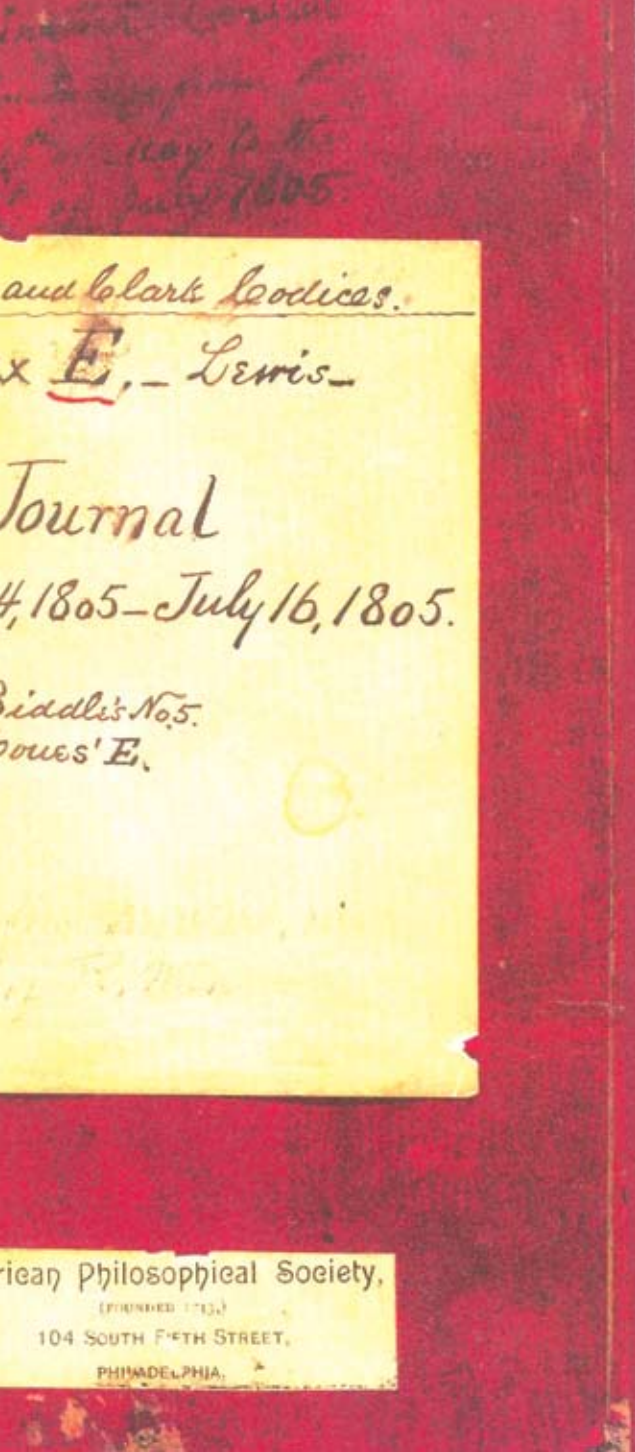
already been discovered, its members were covering it in a far different way than any exploration that the United States had undertaken up until that point in time. The genius and the boldness of two men, Thomas Jefferson and Meriwether Lewis, were responsible for the unique nature of the expedition.

The planning for the expedition compares to few endeavors today as well as it does to those of NASA, where the engineering feats of getting people into and back from space is only matched by the numbers and kinds of experiments that are completed while a mission is in space.

Thomas Jefferson specifically asked that the expedition be more than just a cartographic exercise that would begin the map of the lands that would lead to much of United States' expansion in the century to come. It also was to be a scientific expedition of the first order, exploring geology, geography, the natural sciences such as zoology and botany, the economic potential and the cultures and demography of the inhabitants of the continent, those people who knew only vaguely that decisions made thousands of miles away would change their lives forever.

Jefferson himself explicitly saw the expedition as one that charted the potential of the vast expanse of land that the United States had recently bought from Napoleon, and that would determine her future as a nation. "The Age of Reason," "The Enlightenment," and "The Scientific Revolution" are terms that would have been familiar and acceptable as descriptors for Jefferson of his own time. The American Revolution had been the epitome of "The Enlightenment," and Jefferson saw the scientific exploration of the American continent as a logical outcome of a cutting edge approach to the future of the country.

The template for such a scientific expedition was that of Captain Cook's three circumnavigations of the globe that had begun in the late 1760s and that ended in Cook's tragic death at Kealakekua Bay on the Island of Hawaii in 1778. Meriwether Lewis knew Cook's voyages well, and Thomas Jefferson had copies of his third voyage in his library in Washington. He had been an American Emissary to the Court of Versailles when Cook's ships, under the



command of Captain Charles Clerke, had returned to Europe in 1780.

Cook's three voyages were remarkable for the incredibly diverse and important additions to the knowledge base of the Western tradition. It might be argued that Lewis, a voracious reader and a very well educated man, (even if his spelling was only a little less erratic than William Clark's) saw Cook, through the publications of his voyages, as his intellectual mentor. Both Jefferson and Lewis knew that the America's place in the scientific world would be enhanced considerably by an expedition in the manner of Cook, and Lewis learned from Cook if he did not mimic him.

As a result, the Corps of Discovery was a well outfitted military expedition with myriad scientific goals solidly embedded in it. It collected more scientific specimens and information than any American venture until the U.S. Exploring Expedition led by Lieutenant Charles Wilkes in the late 1830s. One of the main differences was that Wilkes commanded a party of two warships and five tenders and transports representing more than 300 men, while Lewis and Clark had a core part of thirty or so with a small contracted party of civilians numbering at various times between twelve and twenty.

SOME DETAILS ARE STILL MURKY

Besides the first systematic report and map of the Missouri River, the Corps of Discovery reported and described at least 120 species of animal, 182 non-replicated species of plants and considerable ethnographic and geological specimens. Some were lost in a shipwreck between Baltimore and Philadelphia, others were ruined in the spring flooding of the Missouri in 1806 at Great Falls, Montana, and still others were dispersed in sales to private collectors. In total, though, the Corps of Discovery was a successful scientific expedition in a huge number of ways. Like Alexander MacKenzie before him, Lewis brought a great dog to scare varmints and to warn of the great bears that he knew they would encounter on their journey above the Mandan Villages. Like Cook, he kept his men healthy. Only one death, that of the ill-fated Sergeant Floyd of a probably ruptured appendix, ruined a perfect record of survival, even though Lewis himself was shot in the buttocks by the one-eyed Private Pierre Cruzatte near the end of the journey. Cruzatte, half French and half Omaha, had joined the expedition at St. Charles, Missouri, in 1804. A great fiddler, hunter and riverman, his poor eyesight was known by all. Lewis, his wound salved, spent the most of the remainder of the journey lying on his stomach in one of the canoes.

Neither Lewis nor Clark lived to see the results of their journey published in any systematic set of volumes. The journals of the expedition as edited by Nicholas Biddle weren't published until 1814, and an annotated version of the complete journals wasn't available until 1893. The most recent and complete version of the journals was prepared by Gary Moulton and published by the University of Nebraska press between 1983 and 1999. The scientific results of the journey were published helter-skelter by a variety of scientists, and it is probable that there are still bits and pieces of scientific information lurking in the shadows waiting to be published, if only for their historic value.

Even bits of information about the journey itself are murky. The

pronunciation of the name of Toussaint Charbonneau's wife, whether it was Sacajawea or Sacagawea, is a case in point. Captain Clark at one point in the journals just calls her "Our Janey." Its real pronunciation is still a matter of debate. The name of Lewis' dog is another example. Until 1985, when Donald Jackson showed conclusively that its name was "Seaman," most publications called the big black Newfoundland "Scannon."

A third example, and my final one here, is the type of air gun Lewis brought with him on the journey. Since it was disposed of in an auction of Isaiah Lukens' property in 1847, it has often been identified as a Lukens manufacture, and a Lukens air gun fitting its description, especially the fact that it had a repaired mainspring, is preserved at Virginia Military Institute and identified as Lewis' air gun. The identification is based on the fact that Lewis complained in his journal entry of June 9, 1805, that the mainspring of his air gun was broken and that they would therefore leave it at the Great Falls of the Missouri in present day Montana. The next day he reports that it was repaired by Private John Shields, the expedition blacksmith.

Interestingly, though, Isaiah Lukens was not engaged in manufacturing air guns in Philadelphia in 1803 when Lewis bought his gun. At 23, he was apprenticing with his father, a clock maker, in Horsham Township some miles north of Philadelphia. The diary of Thomas Rodney, who describes the gun as well as his meeting with Lewis at Wheeling, Ohio, in 1803, shows definitively that Lewis' air gun was not a single shot sporting weapon such as Lukens' guns were, but rather a 22 shot repeating rifle, a military assault weapon of the highest order.

Robert Beeman, a retired academic and one of the world's best known experts on air guns, had in his collection a .464 caliber air gun manufactured by Bartholomäus Girandoni for the Austrian Army in the late 1780s and early 1790s. The weapon is a high powered 22 shot repeating rifle that may trace its pedigree to the Isaiah Lukens' collection that was auctioned in 1847. Interestingly, it has a mainspring that has been repaired with the use of a farrier's file and can fire 22 shots a minute in repeating mode. The disorderly collection of evidence makes it extremely likely that this weapon was the one taken by Lewis on his journey across the continent. If this is the case, it was not a sporting weapon at all, but an indication to Native Americans of the massive firepower available to Americans, and fits in with the cutting-edge, high-tech intent of the expedition. Beeman donated the weapon to the Army Heritage center Foundation last May.

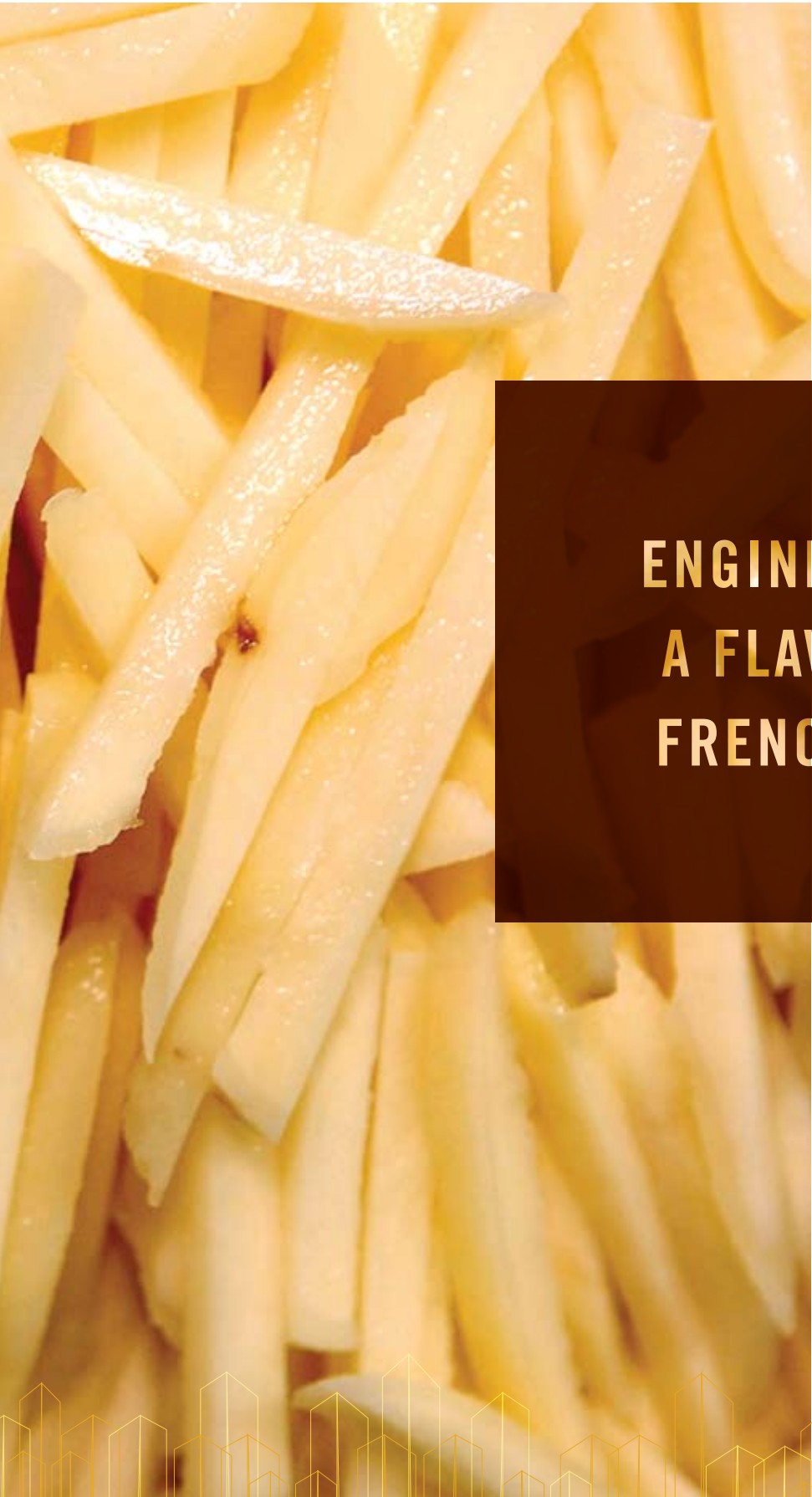
THE BEAUTY IN THE DETAILS

My dad used to say to me, "Tom, you know more about nothing than anyone I know except your brother." When I got older, my brother Gerry told me that dad had told him the same thing. He was probably right about us both.

What is most important about the Lewis and Clark expedition is not in the ephemera noted above. These little things, though, can change the way we look at aspects of their voyage of discovery. Seaman's function on the trek was copied from the Newfoundland that MacKenzie had brought with him as protection. Seaman was a great choice. What had

seemed to me to be a lark of Lewis', the air gun, appears now to be a way of demonstrating to Native people that the United States had more firepower and high-tech weaponry than they even knew existed, a non-verbal way to at least get their attention and to give them something to ponder. These are new takes on the expedition, and show the care with which it was planned and executed.

As I finally got my car onto the road that cold, cold day and slowly came up to the starkly white uplands, I saw what first looked like a herd of small cows, some lying down, some standing. "They aren't cows," I thought. "Maybe deer." But they weren't deer either. It was a herd of what must have been several hundred antelope, yarding against the cold. Steam was coming off the backs of the animals, and what appeared to be young males were standing guard on the perimeter of the large herd. I had never seen so many antelope in one place before. I remembered that Lewis first called them goats, and then decided that they were antelope. I stopped the car and watched them for a few minutes, and then crept along until I had passed the herd. The guard animals followed me with their heads, but didn't move. As I looked back I thought of the great herds of animals that Lewis and Clark saw as they crossed the huge expanse of the northern Plains, and I realized I was privileged to see antelope in numbers seldom seen today, though they might have been seen like this in the winter two centuries ago. It was a spiritual moment for me. As I drove on, I realized how majestic North Dakota's landscape is, and how it transcends all the attempts to contain the land. I thought, too, of the native Peoples here and how vital a force they are today in determining North Dakota's future direction. I think that is when I fell in love with North Dakota and all the potential that it still represents today.



**ENGINEERING
A FLAWLESS
FRENCH FRY**





Asunta Thompson was just a sprout of a girl with a very grown-up name. Her parents named her after an Italian friend, but that handle seemed awfully big for such a little thing. Everyone called her Susie instead, and it suited her. She was tomboyish and spirited and brown-skinned from playing outdoors all summer long.

Susie Thompson grew up on a seed potato farm near Barnesville, Minn. When she was 5, she begged her father to let her help with the potato harvest. She wanted to work with the hired women who stood on the potato harvester as it scooped up potatoes from the field, moved the spuds through a series of conveyer belts, then dumped them into the box of a truck driving alongside. The women stood along one of the conveyer belts and plucked out dead vines, rocks, dirt clods and rotted potatoes as the rest of the harvest rolled through to the truck box. It looked like the greatest job in the world.

Susie's dad agreed to let her help. When the big day came, she clambered up the dark green Lockwood harvester to join the other workers. She had to stand on a 5-gallon pail to reach the conveyer belt and she wore brown cotton-knit work gloves to protect her little hands. It was hard, boring work, but Susie was in heaven. She felt the warm sun on her back and breathed in the good smells around her. The comforting aroma of tilled soil. Diesel exhaust from the John Deere tractor pulling the harvester. The slightly sweet odor of dead vines. On that day she knew she wanted to be a farmer when she grew up.

Forty years have passed and Thompson's favorite spot is still the potato field. Thompson is the state's only potato breeder and one of only 11 potato breeders nationwide. Now she's zeroed in on a discovery that could make a difference to thousands of potato farmers across the country.

Thompson is developing two selections of russet potatoes that show promising resistance to sugar ends. Sugar ends. The term sounds so harmless – like a folksy nickname or grandma's home remedy. In fact it's a complex condition that costs American farmers and processors millions of dollars a year. When the potato plant is deprived of cool weather and rain, it can deposit too much sugar on one end of the potato. When that potato is fried, the sugary end will turn dark as if burnt. Now imagine what happens when thousands of potatoes with sugar ends are sliced and cooked

into millions of fast-food french fries. Customers don't want fries with burnt-looking ends. They want long, crisp, uniformly golden french fries, just like they see in TV commercials.

Two-tone fries can dent the potato producer's wallet. When the Red River Valley was pounded by heat and drought in the 1980s, the area's potatoes suffered with sugar ends. The Valley's potatoes were so affected that the big potato processors like Simplot pulled their contracts. Many processors moved their business to the "irrigated sands" of west-central Minnesota. The sands are a veritable Garden of Tater Eden. These areas have a light, loamy soil potatoes love. They also have been outfitted with irrigation, which keeps the fledgling "tubers" – the enlarged stems that will grow into potatoes – from getting too warm or too dry.

Even so, sugar ends remained a problem on both irrigated and non-irrigated land. Part of the issue is that an ever-growing chunk of the potato industry is devoted to producing frozen french fries for our fast-food nation. And the industry standard for french-fry potatoes is the Russet Burbank, which is highly susceptible to sugar ends. Potato scientists all over the United States have spent a couple of decades scratching their heads over sugar ends. They've tried, with some success, to find better ways to raise the persnickety Russet Burbank. But the real answer could lie in building a better potato, which is where Thompson comes in.



Thompson uses the word "beautiful" a lot. Mostly to describe potatoes ("it has a beautiful, red skin"), but also to describe good research, nice-looking potato fields and even certain potato diseases. "Sometimes diseases are beautiful," she says, tooling an SUV down state Highway 17 in north-eastern North Dakota. "I tell that to my students. Sometimes diseases show the magic of nature."

She is on her way to a potato test plot north of Hoople, N.D. Hoople bills itself as "Tater Town U.S.A." It's located in Walsh County, the No. 1 potato-producing county in North Dakota. Thompson drives by impromptu roadside stands with signs advertising "Fresh new potatoes" and potato warehouses and implement dealerships and neat-as-a-pin farmsteads.

She seems perfectly at home here. She gives color commentary on the farm fields she drives by: "Look, there's water standing in the ditches. That never happens up here." She points out spotty growth in a nearby cornfield. She turns up the car radio to listen to the farm reports. In a typical summer, Thompson logs thousands of miles driving between test plots here and in Larimore, Tappen and Park Rapids, Minn. She oversees planting, checks plant progress and logs data like potato flower color or tuber growth. She also helps out with harvest. "The days I really enjoy are being out in the field," she says. "When those little potatoes come up over the digger, it's like opening Christmas presents."

Out here in the field, you see traces of the enthusiastic little girl who longed to be a farmer. Her memories of those early days remain remarkably clear. She recalls wearing a green shirt for that very first potato harvest. She talks of tying a bandana "like a bandit" around her face when the wind whipped the fine, loamy soil around. She speaks of envying how her father could hoist a 100-pound potato sack onto his shoulder. She wanted to do

that too, but even in high school she weighed just 10 pounds more than a full potato sack.

Thompson chose to study agronomy when she enrolled at NDSU the fall of 1979. She'd already picked up a lot about farming from her dad and FFA. Now she wanted to learn the science behind everything farmers did.

On NDSU's campus, Thompson made an impression. She was one of the few women in her agronomy classes, yet she didn't try to be one of the boys. She wore a dress to class every day of her first freshman quarter. She still likes to dress up. Her chic pencil skirts and stylish pumps make her look more like a corporate executive than a potato breeder. When she heads to the potato fields, she wears perfectly pressed blue jeans and a trendy little top. Pink glittery toenail polish peeks out from strappy sandals. "It's OK to be a girly girl and be in ag," Thompson says. "I march to my own drum. I am a maverick. I don't necessarily do what people expect. I believe people should be hired based on their knowledge, skills and passion, not on their gender."

Unfortunately no amount of knowledge, skills or passion could make Thompson a farmer. By her junior year in college, she faced a hard truth. She would not take over her dad's farm. He was too young to retire and there was little land available nearby to purchase. She would have to find something else to do. Something that still allowed her to work alongside farmers.

She got her first taste of plant breeding when she took a job at Pioneer Hybrid International's spring wheat-breeding station in Glyndon. She was just a plebe, taking field notes and helping with harvest, but she loved the work. Thompson then landed a job alongside legendary NDSU potato breeder Bob Johansen. Johansen had developed popular potatoes with lyrical names like the Norgold, the Norland and the Norkotah. Everyone in the potato industry knew Bob Johansen. He was the ideal mentor. As Thompson worked full time for him, she also pursued a master's degree. By the time she completed graduate school, she faced three job offers. One was at the University of Maine. One was with a Carnation plant in Washington. Another was with the University of Idaho's off-campus potato research center.

She chose Idaho. "I took the lowest-paying job in the smallest community," she says, grinning.



“SOMETIMES DISEASES ARE BEAUTIFUL. I TELL THAT TO MY STUDENTS. SOMETIMES DISEASES SHOW THE MAGIC OF NATURE.”





“After so many drought years, I’d sensed the potato industry would be changing, and I knew Idaho had a lot of experience with irrigation. Also, I really wanted to earn a Ph.D., so Idaho was the perfect fit.”

The state was potato Mecca. The Aberdeen-based research station was in Bingham County, the top spud-producing county in the United States. The region exposed Thompson to potato varieties she’d never worked with before. And Thompson would work among some major potato farmers.

By 1998 Thompson had earned her Ph.D. in plant sciences and gained valuable knowledge about russet potatoes and irrigation farming. Her dissertation was on sugar ends. Three years later she’d come full circle. She applied for an assistant professor job at NDSU. The position also meant taking on Bob Johansen’s former job as a potato breeder. And just in time. Sugar ends had again reared its ugly head in Minnesota and North Dakota.



As far back as 1929, an Australian researcher known only as “F. Penman” published the first journal article on sugar ends. He called the condition “glassy end tissue” because a severe case of sugar ends can turn a potato’s flesh translucent.

Sugar ends still didn’t become a widespread problem until french fries became more common. During the second world war, a brilliant businessman named Jack Simplot revolutionized ways to bring convenient, non-perishable foods to the troops overseas. First he introduced dehydrated diced potatoes, which were handy for military cooks but not popular with the poor GIs who had to eat them. His next invention was far more successful: frozen french fries.

Frozen potatoes remained popular after the war. The frozen fry market really took off in the ’70s and ’80s, as time-strapped families ate more meals at fast food restaurants, where they ordered their Big Macs with side orders of fries. This pumped up the demand for “processing potatoes,” or potatoes that are made into french fries.

The kingpin of processing potatoes is the Russet Burbank. The Burbank helped to secure Idaho’s place as the No. 1 potato-producing state in the nation. The mighty russet has become such an industry standard that potato-processing equipment is built to fit the Burbank’s dimensions. It is known for great yields and its ability to be grown in a wide range of environments. Its long, blocky shape allows processors to get the maximum number of long fries out of one spud.

But the Burbank has a few chinks in its armor. It’s finicky about moisture. It needs a long growing season. And it is highly susceptible to lots of diseases, pests and disorders like sugar ends.

To be fair to the Burbank, many potato varieties can develop sugar ends if conditions are bad enough. Most potato scientists believe the one-two punch of heat and dryness will do the damage. Thompson, however, believes heat alone can do the trick. She bases this on “beautiful research” done by a group of German scientists. They put copper boxes around different stolons (underground stems) of the same potato plant in a hydroponic system, then heated the boxes to different temperatures to induce stress. The stolons zapped by the most heat developed tubers with sugar ends.

Now translate those unfavorable conditions to a potato field in North Dakota. In order to thrive, a potato needs warm sunny days, cool nights and moisture. But if the region is hit by a late June-early July heat wave, temperatures won’t drop at night. So at a critical time in the tuber’s growth cycle – when the fledgling potatoes are the size of a nickel – the soil 6 to 8 inches below ground can climb to more than 65 degrees. This overly toasty environment can damage the plant. It begins depositing sugar, rather than the desired starch, in the cells on the stem end of the tuber.

Unless the sugar ends are extremely bad, you won’t see any visible signs of damage. That is, until you slice up the spud and fry it in hot oil. Then the sweet ends fry much darker than the rest of the french fry. Thompson calls this phenomenon the Maillard reaction. Even if you’ve never heard the term, you’ve seen it. It’s what causes bread to toast. Potatoes with sugar ends contain a lot of simple sugars. When those simple sugars come in contact with heat (as in hot oil), the sugars break apart and react with amino acids in the tuber. The result is a browning reaction, similar to caramelization.

The processors, who buy potatoes from farmers and sell the processed potatoes to fast food restaurants, are seriously concerned about sugar ends. So serious they’ll pay potato farmers incentives for potatoes without it. “The competition increases every day,” says Gregg Halverson, a 1971 NDSU graduate and president of Black Gold Farms, one of the largest chip potato operations in the United States. “If my neighbor has perfect potatoes and I don’t, guess which ones the processors want?”

In a room off NDSU’s West Dining Center, a panel of somber taste-testers sample french fries. Thompson and a group of NDSU staff have gathered to taste, judge and compare several new varieties of fries.

This isn’t recreational french fry eating. It’s work. You can’t douse a batch in ketchup because you feel like it. All fries are cooked and salted uniformly, and each batch is served on an anemic-looking paper plate. Taste-testers are NDSU volunteers who are trained in what to look for in a french fry. They are instructed

to not eat, smoke, brush their teeth or drink anything but water for a couple of hours beforehand. And when it comes time to taste, they must concentrate on the color, texture, taste and appearance of each fry. They aren't allowed to discuss results among themselves, even when a batch of fries taste nasty. And some do. The adjectives used on the taste-test scorecards sound like the unsavory cousins of the seven dwarves. Blotchy. Lumpy. Greasy. Mealy. Pasty. Slimy. You get the picture.

Thompson is developing several potatoes with great potential, but her star pupil – a sugar end-resistant russet – is in the taste trial today. It's known only as the AOND95249-1RUSS. The 1RUSS seems to have everything going for it. Less sugar overall, so it fries nice and light. A high percentage of dry matter. (If a potato contains too much water, that water will be displaced by oil in the frying process, creating a greasier fry.) A uniform shape and the length to produce lean, lanky fries. Most importantly, a resistance to sugar ends.

"I'm really proud of what we're doing in breeding," Thompson says. "It takes forever, but our efforts are really starting to take hold."

The 1RUSS has scored high in earlier taste tests. But it doesn't do well in today's test. Neither do two other widely grown russets, the Ranger Russet and the Umatilla. Even the venerable Russet Burbank tanks. "Maybe we just didn't grow it well," says Thompson of the 1RUSS.

She's not discouraged. She knows there will be many more taste-tests down the line. The average new selection gets more scrutiny than a presidential candidate. It will be grown in different conditions, subjected to endless taste-tests, sent to tissue-culture labs to have any potential diseases removed. The average time for a selection to hit the market is 10 to 16 years.

And then the hard work really starts. The potato needs to gain wide acceptance from the fast food giants. The executives of the QSRs – that's industry-speak for "quick service restaurants" – are so concerned about consistent, high-quality fries that they won't change their most important ingredient easily. "They need to know they can tell their people in Helsinki and their people in Denver that they need to cook

their frozen fries for x number of minutes and at x temperature, and that they're going to have the same quality product," Thompson says. "So they're very concerned about changing varieties because that might mean they have to change a protocol. It has to work out economically for them."

Even so, potato breeders have made a dent in the Russet Burbank monopoly. At one time 99 percent of all french fries came from Russet Burbanks. Today that number has fallen to 65 percent. Someday Thompson's 1RUSS could join the Burbank's contenders. The officials at the processing plants have already shown a lot of interest in Thompson's selection, as have many potato farmers. It could be NDSU's first successful, highly resistant russet for french fry processing. (NDSU's breeding program has released several russets, but none have been widely used to make french fries.)

"If someone could breed for (sugar-end) resistance, that would be huge," says Duane Maatz, president of the Northern Plains Potato Growers. "Susie has already done a lot for the potato industry in North Dakota. One of the really great things about her is she is very good at being the field person. She likes being in the field; she likes talking to growers. She has that practical side of a researcher you don't always get. I'm very happy she's that type of researcher. I would hate having her lost in a laboratory."

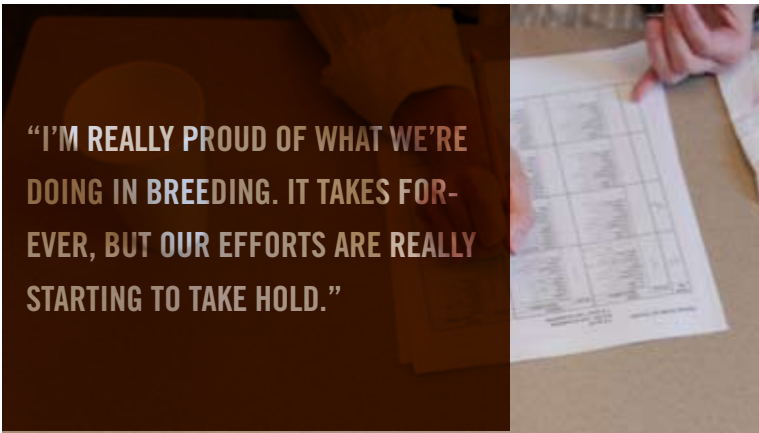


Thompson finally reaches the test plot by Hoople. The field is in full bloom – a mass of white, lavender and deep purple potato flowers. Their surprisingly strong, sweet fragrance hits you the minute you open the car door. Thompson climbs out of the SUV and roots around in the back seat for a clipboard and gloves. She replaces her strappy sandals with farm-friendly socks and running shoes. Goodbye, pink toenails.

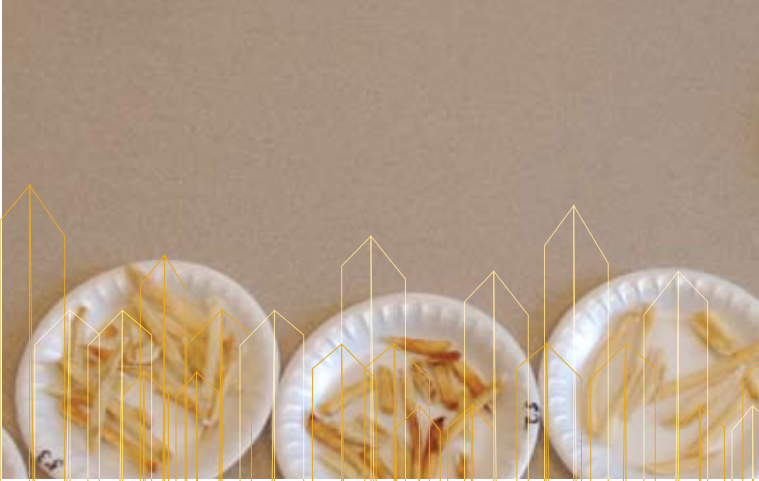
Thompson's job today is to chart colors of potato flowers. She walks so quickly through the soft fields that it's hard to keep up with her. It's a bordering-on-hot July day, and a warm wind whips her brown hair into her face. Absent-mindedly she pulls off the long-sleeve shirt over her spaghetti-strap top and ties it around her waist. She steps easily over the hilled rows where the potatoes are planted. She stoops to examine blossoms, stops to snap photos of certain flowers, squints slightly, jots notes on her clipboard. Two different colors of flowers in one section are a bad thing, she explains. That means two different types of seed were accidentally mixed.

This is just one day in a potato breeder's life. In her quest, Thompson will spend many more days peering at flowers, digging up tubers, participating in french fry taste-tests and crossing plants in the greenhouse, bumping along North Dakota back roads to reach remote test plots, organizing field days to show farmers the latest developments, and giving out quirky awards to motivate her research assistants during the hard work of potato farming. All in the hopes of one day producing a perfect french fry.

—T. Swift



“I’M REALLY PROUD OF WHAT WE’RE DOING IN BREEDING. IT TAKES FOREVER, BUT OUR EFFORTS ARE REALLY STARTING TO TAKE HOLD.”



excerpts *Dan Reetz*



Dan Reetz, a 25-year-old guy with an undergraduate degree in art who recently spent a year teaching English in Russia, is now in his first year of a doctoral program in visual neuroscience at North Dakota State University. He grew up in Bismarck, N.D., and as high school drew to an end, he was thinking seriously about joining the U.S. Army when his art teacher urged him to consider college. He heard back from the school first, so that's what he did. His work has been exhibited and honored regionally and nationally.

Artists are constantly interacting with the visual system, and I think there's knowledge that they build up and explanations of things, like if you divide your composition this way it sort of magically becomes more interesting. I wanted to go the inverse way, which is to learn what we know about the visual system and I want to bring those things back to art.

When I was in the arts I was a bit too rational, maybe a bit demanding of logical explanations for things that spring from emotion and creativity, so I was a rational person among artists, and now I'm an artist among scientists.

I know my art is not always the most aesthetically pleasing. My art is very much commentary. My art has always had a very critical perspective.

One of the problems with a lot of art that I see today is that the artists very often reject technology and embrace traditional methods. I think it's the responsibility of artists to take advantage of this technology and leave it not only in the hands of the capitalist enterprise or whatever you'd like to call it, and to use those tools to create things that aren't motivated strictly to sell.

One turning point for me was that when I was a painter I had very good success selling paintings. I really enjoyed the cash flow, paid some tuition. That was a real joy, but I had attempted to instill them with a lot of critical discourse, and I found that the best paintings that I made, the most powerful thing they could do was compel somebody to purchase them. That was a moment where I decided that was not the way that I wanted to pursue art. It sort of gutted the critical perspective entirely.

Like a lot of artists I experiment in a lot of different media, but you could call me a digital artist.

Visual neuroscience, at least the portion of it that I'm immersed in, is concerned with what are the neural mechanisms of vision. How do we actually see the things we see. Vision is one of those things that seem so obvious and natural, but the fact is that the neuromechanisms of something as simple as perceiving the brightness of an object, just how much light we perceive reflecting off something, are not that well understood.

As a child I wanted to be three things, a cowboy, a football player and a scientist. The cowboy and football player parts thankfully went away and I feel really fortunate to be able to take part in the sciences.

After teaching for a year, I understand very well that I'm not meant to be a teacher. My students raved about me, but I don't understand how teachers can disconnect themselves from the success of their students at the end of the day. I've gained a lot of respect for teachers, and it really taught me to be a student again.

I don't know that I'd like to go on as a professor, but research and development is something I love and I'll pursue very narrow problems for perhaps unreasonable lengths of time.

I think that studying Russian over the year made me extremely sensitive to the fine points of language and especially watching non-native speakers construct sentences with very precise meanings and seeing that they were often more precise than I was. Coming back into the sciences, in my field, there's a very specific distinction between, for example, brightness and lightness. It's important to be precise and to say things in an interesting way so you're not boring everyone to death.

Corruption is a worldwide phenomenon. Some of the police in Russia are crooked, as they say, and I did pay bribes. There were situations in which a little money saved me a lot of hassle.

I know so many tremendously talented people who are sort of crippled by self-doubt or fear of rejection. I don't have that humble thing. I do feel very confident in my own abilities and I want that to come across.

If you're making art, it seems to me the spirit of it is to have as many people experience it as possible.

FIELD DAYS





Every summer, North Dakota State University's research and extension centers put on Field Days, a chance for producers in the region to hear about the progress of research, ask questions, suggest projects, and enjoy a barbecue lunch. If you have the opportunity to travel to all of the centers in one summer as many NDSU people did this year, you are vividly reminded of the beauty of North Dakota, especially if you get to travel when there's been a bit of rain in the west. Here are some of the sights from Field Days in Streeter, Hettinger, Dickinson, Williston, Minot, Carrington and Langdon.

SLOWLY, A MACHINE THAT LOOKS LIKE A BIG WHITE DOUGHNUT COMES TO LIFE, AND BEGINS TO DRONE, ITS CONTINUOUS MECHANICAL HUM BREAKING THE DEAD SILENCE IN THE ROOM. THE NEXT SOUNDS COME FROM THE CAMERA INSIDE. CLICK. CLICK. CLICK. PICTURE AFTER PICTURE, AS A BODY INCHES THROUGH THE IMAGING MACHINE. A WOMAN OBSERVING THE TEST WATCHES FOR CLUES. OTHERS HAVE VOICED THEORIES, BUT SHE WANTS ONLY **HARD EVIDENCE.**



She spends time examining the images. There are five vertebrae in the lower back, each about the thickness of a fingernail. She reviews images of the pelvis, upper leg bones. And then the unexpected. “There’s the cranium and the brain,” her voice rising in excitement. “There’s a perfectly intact little brain in there that’s shrunken and flat, but it’s there.”

Many had dismissed the man as a bag of skin. “But nobody bothered to find out,” she says. “I’m not the kind of person who deals well with not knowing.” She studies the man further. He’s known simply as Damendorf Man, a 2,000-year-old body found in northern Germany. She knows he has a story to tell.

The search for answers to questions raised from such long-dead bodies drives Heather Gill-Robinson, a physical anthropologist at North Dakota State University. Her patients don’t speak, but they leave clues. Buried with these bodies — interesting and repulsive, mysterious and romantic — are clues that others might miss. The eerily preserved hair of dark orange, leathery skin and other treasures like fully preserved capes, shoes, pottery — even preserved whorls on fingertips capable of producing fingerprints. All of it provides a portal to the past.

Shrouded in folklore, it is often portrayed as a time of toil, misery and mystery. The Iron Age spans approximately 500 B.C. to 500 A.D., but exact dates and context depend on the geographic location. Celtic religion and its priests, the druids, held sway in northern Europe. Gods and goddesses needed to be made happy with gifts such as sacrifices. Bad harvest? Someone must pay. Outgoing king? Sacrificed as the new one took his place. It’s a culture that told stories and did not write them down; that cremated most bodies instead of burying them.

Some clues in the bodies that were buried suggest an extremely violent culture. “He had been decapitated,” says Gill-Robinson about another of the six bodies and one skeleton that she studies. “We know that with certainty. ... He had two stab wounds to the heart. We have the heart. I can see the cut marks. There are stab wounds through the skin of the chest. He had been mutilated.”

The why remains elusive. Gill-Robinson’s intense curiosity about how he died is coupled with intrigue about how the evidence of his painful demise could last for thousands of years. Egyptians focused on dehydration to deprive bacteria

from attacking a body and other methods to mummify treasures. But the people of the Iron Age in northern Europe had no such practices. What they had is unique geography. A squishy combination of black water, lichen, moss, and other substances make a worthy chemistry cauldron. Natural embalming occurs in peat bogs — the same bogs believed to be home to gods and outcast spirits. The water-logged bogs create a natural preservative. The lack of oxygen, antimicrobial action and the sphagnum conspire to make perfectly preserved corpses. The bodies tossed into the bogs thousands of years ago are essentially pickled. Although science can explain some of the unique properties, others remain a mystery. All bog bodies have some similar characteristics from their time in their cold, watery graves. “Skin changes to a tougher, more tanned one,” says Gill-Robinson. The look is similar to what is achieved through, say, formaldehyde.

Still more mysterious is how the bodies got there. “The common theory is that they’re sacrifice victims. That is one possibility. There are others. They may be simple burials. They may be people who were disposed of for criminal reasons,” says Gill-Robinson. A Danish researcher suggests a more practical reason. Instead of wasting good farmland on cemeteries, bodies were placed in bogs. “I’m not a big believer in ‘They’re all ritual,’ ” says Gill-Robinson. “I’m really not a big believer of that so I try to talk about the fact that there are other theories.”

Her quest for fact over fiction led her to northern Germany and a body known as Windeby Girl, found in 1952. The lore surrounding the body involves romance and passion. She caused much excitement when she turned up blind-folded with her head shaved. “These stories of an adulterous 12-year-old girl. They called her the marriage breaker, essentially a home wrecker,” Gill-Robinson says. A body found nearby, thought to be her lover, added to the mystique.

But Gill-Robinson saw something else. Her research is quoted in the September 2007 issue of *National Geographic*: “... the theory unraveled after Heather Gill-Robinson of North Dakota State University took a close look at the body ... Windeby Girl was likely a young man.” He may have lost his hair when archaeologists’ trowels dug up the body. Physical examination of the mummy showed that growth interruptions in the bones of the specimen indicated a sick young man who may have died from natural causes. And the



“THE FACT THAT WE NOW HAVE PERMANENT 3-D RECORDS OF ALL THE BODIES THAT WE SCAN - WE CAN GO BACK AND ANALYZE THEM OVER AND OVER AGAIN. AND WE CAN ESSENTIALLY DO VIRTUAL AUTOPSIES THROUGH THE IMAGING WITHOUT HAVING TO TOUCH THE BODY.”

speculation about an affair ended when radiocarbon dating placed the two bog bodies about 300 years apart.

“Windeby Girl was very much a northern German icon, so to take this cultural figure and say that something you’ve built these ideas around for the last 50 years is a very scary thing. This is part of their heritage. I was respectful,” says Gill-Robinson. “We’re going back to do some more work with him.”

While popular images of archaeologists and forensic experts revolve around the whip-carrying movie character Indiana Jones, or lab experts who solve nicely-packaged evidence in a television hour, the reality is much less glamorous. It requires patience. It requires belief in science rather than in fabricated stories. And as it turns out, technology to help the living provides keys to unlocking the secrets of the dead. It has changed research for Gill-Robinson and her colleagues. Medical imaging technology and software allow these sleuths of ancient truths to find clues previously missed. “The single biggest innovation for us is the rise of the CT scan and the three-dimensional imaging and reconstruction,” says Gill-Robinson. “The fact that we now have permanent 3-D records of all the bodies that we scan — we can go back and analyze them over and over again. And we can essentially do virtual autopsies through the imaging without having to touch the body.”

Powerful software designed for medical imaging means the bodies can be analyzed in minute detail. “The image analysis takes forever. It takes a long time to edit out soft tissue and reconstruct it,” says Gill-Robinson. NDSU students assist with the painstaking work. James Schanandore,

majoring in zoology and anthropology, finds it valuable experience. “It may take a lot of work, but when you find something significant or important, the work is well worth it.” He is examining the bog body images to determine their age, gender and paleopathologies — looking for fractures or diseases that may affect the bones. Files are eventually sent to a colleague in Manitoba who prints out a 3-D plaster model for further study.

Trace element analysis and DNA analysis coax additional clues from the peat bog mummies. Gill-Robinson can, for example, tell what mummies may have had for their last meals, or possibly their occupations. In the case of the flattened Damendorf Man, he may have been a silver gilder.

But Gill-Robinson has concerns that such evidence is rapidly disappearing, carrying with it the opportunity to understand ancient civilizations. There are only about 40 known bog mummies left in the world. They are scattered throughout the United Kingdom, Ireland, Denmark, Germany and The Netherlands. “These are very precious and they don’t survive particularly well forever,” she says. Some specimens were placed in museums but not curated properly. “Others were destroyed in World War II. Some may be stored in medical schools. Others were sampled to death.”

Ironically, it was an article titled “This Little Piggy Went to Cumbria; This Little Piggy Went to Wales,” that ultimately led Gill-Robinson to her study of Windeby Girl, now known as Windeby Child. While working on her master’s degree in York, England, she buried 12 stillborn piglets or those already killed in barn accidents in peat bogs in



“EVERY DAY I UNDERSTAND THAT I AM PRIVILEGED TO WORK WITH THESE BODIES AND THESE INDIVIDUALS AND UNDERSTAND WHO THEY ARE.”

England and Scotland to test how the bogs naturally preserved the bodies. She recorded depths and pH levels of the bogs for up to two years. The different bog environments created varying levels of preservation. One excavated piglet exploded on contact. Others shrunk considerably but their organs remained intact. Quoted in the *New York Times*, Gill-Robinson pointed out the potential value of the research for law enforcement. “If we know what causes decay and allows bodies to stay preserved, we will be able to predict with more accuracy one’s time of death.”

For Gill-Robinson, the experimental archaeology in the piglet project opened doors. “I built up a good enough reputation in the field that they allowed me and trusted me enough to work with the bodies.” She asked a museum in Schleswig, Germany, if she could review X-rays of bog bodies in their collection. “Would you like to work with them?” they asked. “Sure. Absolutely. Like I’m going to say no!”

A body named Tollund Man, found with a leather noose around his neck, first sparked her curiosity. “I started as a primary school teacher and realized that was not a great career necessarily for me. Somewhere along the way, someone showed me the body of Tollund Man and I said, ‘Well, how does that work?’ And they couldn’t tell me. So that meant I had to go and find out. And I’ve been working on that ever since.”

Her globetrotting started much earlier. With her father in the Canadian military, Gill-Robinson spent part of her childhood in Germany. Later, as part of her teacher training, she taught in Denmark, amid kids from 15 different countries. She lived in the United Kingdom while completing

her master’s degree. Then there was the job for a bookie (a legal bookmaker) in Leicester, England. She taught in Her Majesty’s Prison in Leicester and completed post-graduate work in forensic archaeology at Bournemouth University on the southern coast of England. Back in Canada, for a time she worked as a forensic support technician for the Police Department in Belleville, Ontario.

She currently is collaborating with colleagues on what may well be the largest exhibition of human and animal mummies in the world at the Reiss-Engelhorn Museum in Mannheim, Germany, an exhibit scheduled to run until March 2008. She notes the interesting cultural differences that occur with such exhibits in Europe and North America. She’s published articles on how bodies were displayed for an exhibit in Germany and what changes were made when the exhibit came to Canada. “They did public survey work on whether people thought it would be appropriate or revolting,” she recalls. “They angled display cases in a way so that you had to physically make an effort to see them.”

Despite the slightly morbid fascination some might have about mummies, Gill-Robinson sees relevance in studying the past through these ancient bodies. She finds value in using science to unravel the mysteries of the Iron Age. It gives glimpses of cultures and heritage, akin to her own Danish ancestry. “Every day I understand that I am privileged to work with these bodies and these individuals and understand who they are.”

—C. Renner





voice over guy

We're about an hour into our interview when the computer behind Larry O'Brien makes a noise. He spins around to check his e-mail. It's an audition call. He sets to work in his downtown Fargo studio, a room carpeted with black egg carton foam and an acoustic tile ceiling.

O'Brien is dressed for comfort in a pair of olive green cargo shorts, sandals and a light green Ping golf shirt. With his blue eyes, thin eyebrows and shaved head, he bears a passing resemblance to "The Shield" star Michael Chiklis. He skims the call sheet: "Looking for a male or female for local TV. Warm, confident voice, charming. Will end a 30-second TV commercial only airing in a local area." He sets up the computer to record, and in a voice smoother than his conversational tone, reads a few sentences into the microphone, stopping and starting again at times to try out different inflections. Satisfied, O'Brien turns to his computer. With a few mouse clicks, he splices the good bits together and cuts dead spaces caused by the need to breathe. He sends out an e-mail with the sound file and his standard cover letter. All in the space of two minutes.

He has to be fast to beat the competition. More than 3,800 voice over artists use the same Web site to get work. O'Brien figures if his audition is among the first 30 received, his chances are far better. More often than not, the eight to 15 auditions he completes per day will go unanswered.

He also works with four talent agencies around the country. When he lands an audition through a talent agency, the jobs typically pay better. Newcomers think voice over work is easy, he says, and charge small fees to get their foot in the door, which drives down prices across the field. "They're just belittling their own product when they do that," O'Brien says. Voice over work is a scratch and fight business and it takes years to grow a reputation. O'Brien has his successes, but they come only through hours of auditions and self promotion.

Even on a slow audition day, he doesn't dare leave the office to do errands. The next audition call might lead to a paycheck. During lulls, O'Brien keeps busy by sending out demo CDs for his "Ads On Hold" business, which offers his services for corporate answering machines. He also shotguns about 100 resumes to advertising agencies every month. He spends about 30 percent of his time as a voice over artist getting his name out.

O'Brien reads scripts for clients such as The Radisson Hotel in Riyadh, Saudi Arabia, Global Electric Motors, Microsoft, Scheels sporting goods and the International Bank of Qatar. His voice even announces

emergency warnings before tests on an oil rig off the coast of Saudi Arabia. “Why do they want an American guy? The same reason we like a British voice here,” O’Brien says.

In 2005, one of his demo discs led to a job reading for Corvette. For two years, his voice was on the owner’s manual DVD for every Corvette sold in North America.

O’Brien grew up in Bismarck, N.D., and thought being a disc jockey would be the “coolest job in the world.” His real last name is Robertson. He adopted his professional name at 17 due to an admitted lack of understanding of reality.

“I thought I would have all these women throwing themselves at me and I just didn’t want to be bothered by people calling me at home.”

O’Brien started out in radio in 1976 after graduating from the Brown Institute in Minneapolis. He tried several times to move into other careers. He earned two bachelor’s degrees in the 1980s at North Dakota State University – one in psychology and the other in corporate and community fitness. By the time he finished each program, he knew he didn’t want to pursue jobs in those fields. After earning each degree, he fell back into radio.

By the time he finally left radio in 1993, he was unhappy with the national climate – huge companies were buying radio stations across the country and cutting them down to shoe-string budgets. O’Brien believed the companies no longer cared what announcers sounded like, and it stung.

He found work with TMA Hospitality Group, which owns various nightclubs and restaurants in the upper Midwest. TMA hired O’Brien to do their radio ads. They set him up in a small office above CI Sport in downtown Fargo, not the ideal place for a studio. Trains rolled by every 15 minutes. The flight path for the local airport was close enough to cause problems. The vent above his head didn’t bother him, but the occasional vibration of large compressors two floors below did.

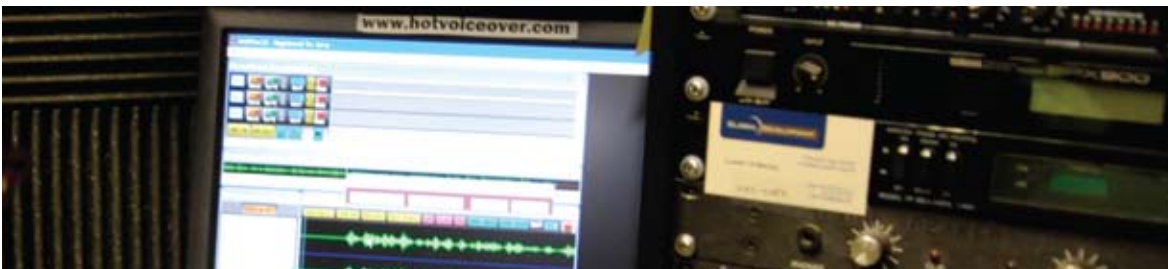
After a few of the nightclubs closed, O’Brien was no longer needed full time. He got to keep the office space to write and record commercials for the remaining nightclubs. But that

only took up a few hours a week. O’Brien had to branch out. He started HotVoiceover.com, Inc. in 2004 and began building a resume that brought his voice around the world. Two years ago, a simple audition call led to his biggest success to date – Madden NFL videogames. Madden publisher Electronic Arts Inc. sold 7.4 million copies in North America last year and 60 million copies in the last 17 years. It’s also the official game of the NFL, which allows only the Madden series to use the names of real players and arenas.

Long-time television announcer Al Michaels used to call the plays in the video game, but when the next generation of videogame consoles, like Xbox 360, Playstation 3 and Nintendo Wii, started to roll out several years ago, the designers wanted a new sound. EA chose to model the play-by-play calls after a nonspecific hometown radio announcer who always roots for the home team. O’Brien beat out a slew of voice talent during an extensive search and audition process. “Larry adds excitement to the game,” said Jason Ostresh, assistant producer at EA Sports. “Larry is the voice of next gen Madden football.” But no one buys a game for the voice over, Ostresh said. The key is to have it present, but not overwhelming. It took time to get it just right. For Madden NFL ’06, his first year with the series, O’Brien logged more than 70 hours of recording. Each player’s name, for instance, had to be read three different ways to match the different moods at that point in the game – so, for example, Brett Favre’s name sounds different when he is sacked compared to when he puts up a touchdown pass to win the game.

“It’s physical work to sit and yell into a microphone for an hour,” O’Brien says. But it’s work he loves. He loves not knowing what he’ll be doing today, tomorrow or a year from now – whether he’ll be voicing a doll of Moses or shouting the warning alarm for an oil rig. He doesn’t know until the computer makes a noise, another audition call comes in by e-mail, and he’s gearing up his equipment for another session.

—J. Hagen



“It’s physical work to sit and yell into a microphone for an hour.”





A yellow and black Butler Cat Challenger M5 tractor is not an uncommon sight on the North Dakota State University campus, after all this is a land-grant institution, an agricultural university. This tractor, however, is sitting in an unusual place — behind Dolve Hall and the mechanical engineering department. On the front end of the tractor perches a strange looking fiberglass tank about the size of a water-cooler jug tipped on its side.

A sticker on that tank proclaims, H₂ NDSU. On the periodic table, H is of course hydrogen, and, as far as Robert Pieri knows, this tractor is the first agricultural-use vehicle to be converted to run, at least in part, on hydrogen.

Pieri and his team of mechanical and electrical engineering students haven't reinvented the wheel in this, he says. What they have done is used the hydrogen conversion technology available for cars and trucks and retrofitted the tractor as part of a Wind to Hydrogen project of the energy company, Basin Electric.

While two members of that team, Austin Decker and Aaron Zuther, lift the hood to examine the engine, Pieri, tall, grey, bespectacled, serious, checks this correspondent's credentials before beginning a lecture that





GEN

ATTENTION
READ INSTRUCTIONS FOR SAFE
OPERATION OF THIS
EQUIPMENT

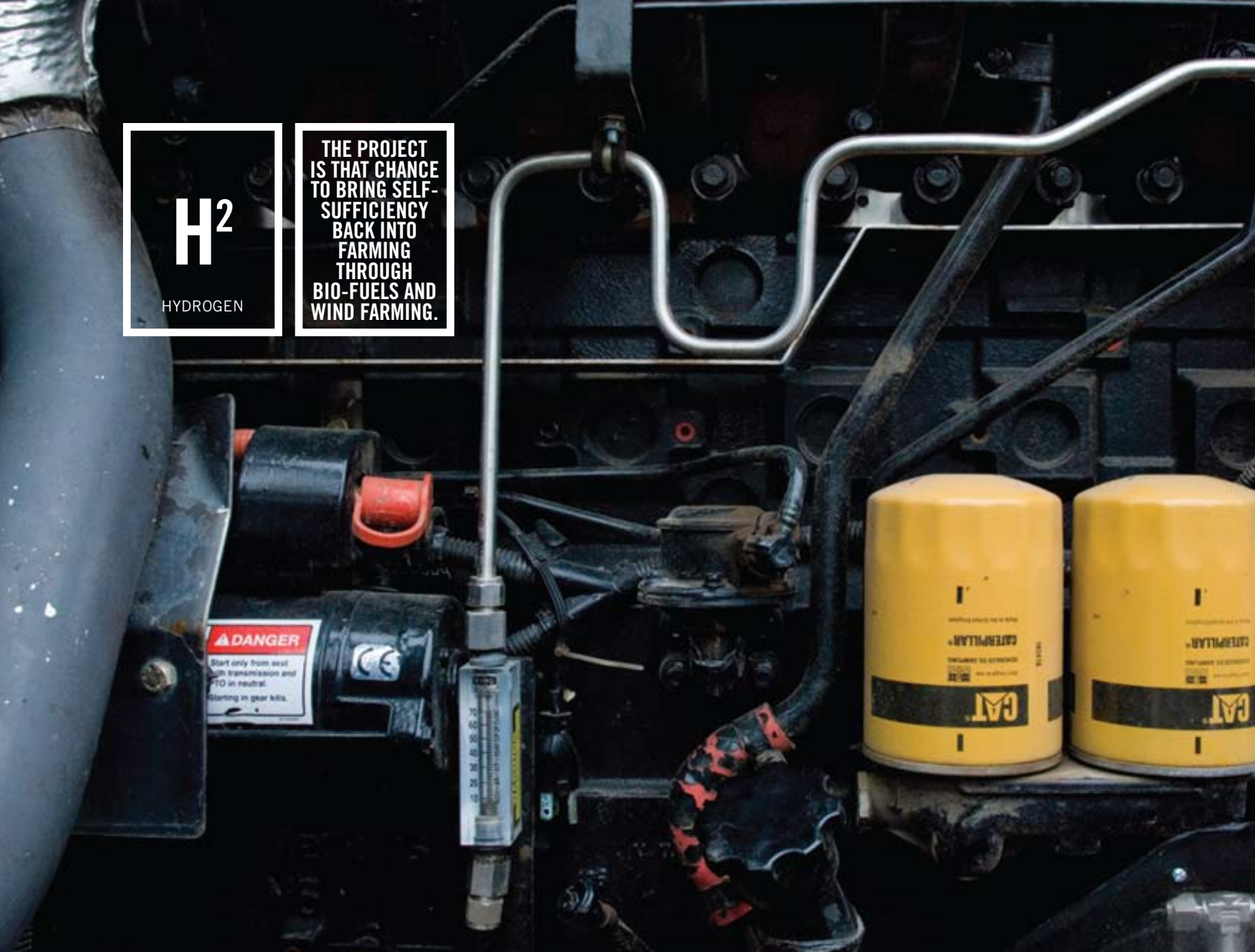
H₂
NDSU

NDSU
Hydrogen

H₂

HYDROGEN

THE PROJECT IS THAT CHANCE TO BRING SELF-SUFFICIENCY BACK INTO FARMING THROUGH BIO-FUELS AND WIND FARMING.



covers the origins and development of the internal combustion and diesel engines, and weaves in such events as the first oil well drilled in western Pennsylvania by Edwin Drake in 1859 and the oil embargo of 1973.

The way Pieri sees it, the Wind to Hydrogen project is a step toward bringing the modern farmer back to a self-sufficiency last experienced in farm country in the 19th and early 20th centuries. Modern wind generators, he explains, have a very small footprint — 100 by 100 feet. Each windmill can be placed 1,000 feet apart in a line, and each will generate three megawatts of power.

What if, Pieri asks rhetorically, a farmer has a canola field, which can be used as a bio-diesel fuel, bordered by windmills producing energy that can be stored as hydrogen and used along with the canola as fuel for the farmer's vehicles?

The answer is that it doesn't negatively affect the environment and is not tying the farmer to fuels coming out of the desert halfway around the world. The science behind it, he admits, can put most anyone to sleep. But what can be understood, and what is exciting about the project, he stresses, is that chance to bring self-sufficiency back into farming through bio-fuels and wind farming.

NDSU's involvement in the project is in its second stage. The first stage was basically to prove that a tractor could burn hydrogen and not blow the top of the engine off. The second stage, Pieri says, is to experiment with the hydrogen to diesel ratio being injected into the cylinders.

Here is some of the science: hydrogen burns readily in a spark-ignition engine, but a diesel engine's ignition comes from compression. The self-ignition point for hydrogen is higher than that of diesel fuel. Pieri pauses and calls to Decker, his mechanical engineering student: "What are the numbers for the self-ignition points for hydrogen and diesel?" Decker, looking up from under his red ball cap, gives the answer promptly — "550 degrees centigrade to around 400 degrees."

Pieri smiles. To have a diesel engine run solely on hydrogen, he continues, the cylinders would need to be almost twice as long as those

in a conventional engine in order to compress the hydrogen enough to self ignite. Which is why this conversion will always need to have a ratio of diesel along with the hydrogen to run, it is needed to ignite the hydrogen gas.

Right now that mix is more diesel than hydrogen, but Pieri and his students hope to reverse that to more hydrogen than diesel. Just what is the right ratio, or the ratio that will use the least amount of diesel, is what they will be experimenting with.

Zuther, the electrical engineering member of the team, says that he signed on to the project because he is interested in the future of alternative fuels and perhaps a career in the field. Currently the flow of hydrogen into the tractor's intake manifold is being regulated manually, he explains. One of his contributions to the project will be to change that flow regulator over to an automatic control that regulates the amount of hydrogen going into the fuel ration depending on engine speed.

Decker adds that ultimately the idea is to have the tractor retrofitted so that it can run on plain diesel, bio-diesel, or hydrogen, automatically regulating the needed flow and ratio of each fuel all with a flip of a switch. The hope is that eventually the technology would be sold as a dealer installed option.

But, Pieri is quick to add, that it is quite a way down the road. And once this project is over, NDSU mechanical engineering students will remove all the retrofitting and return the tractor in its original state to Butler Machinery.

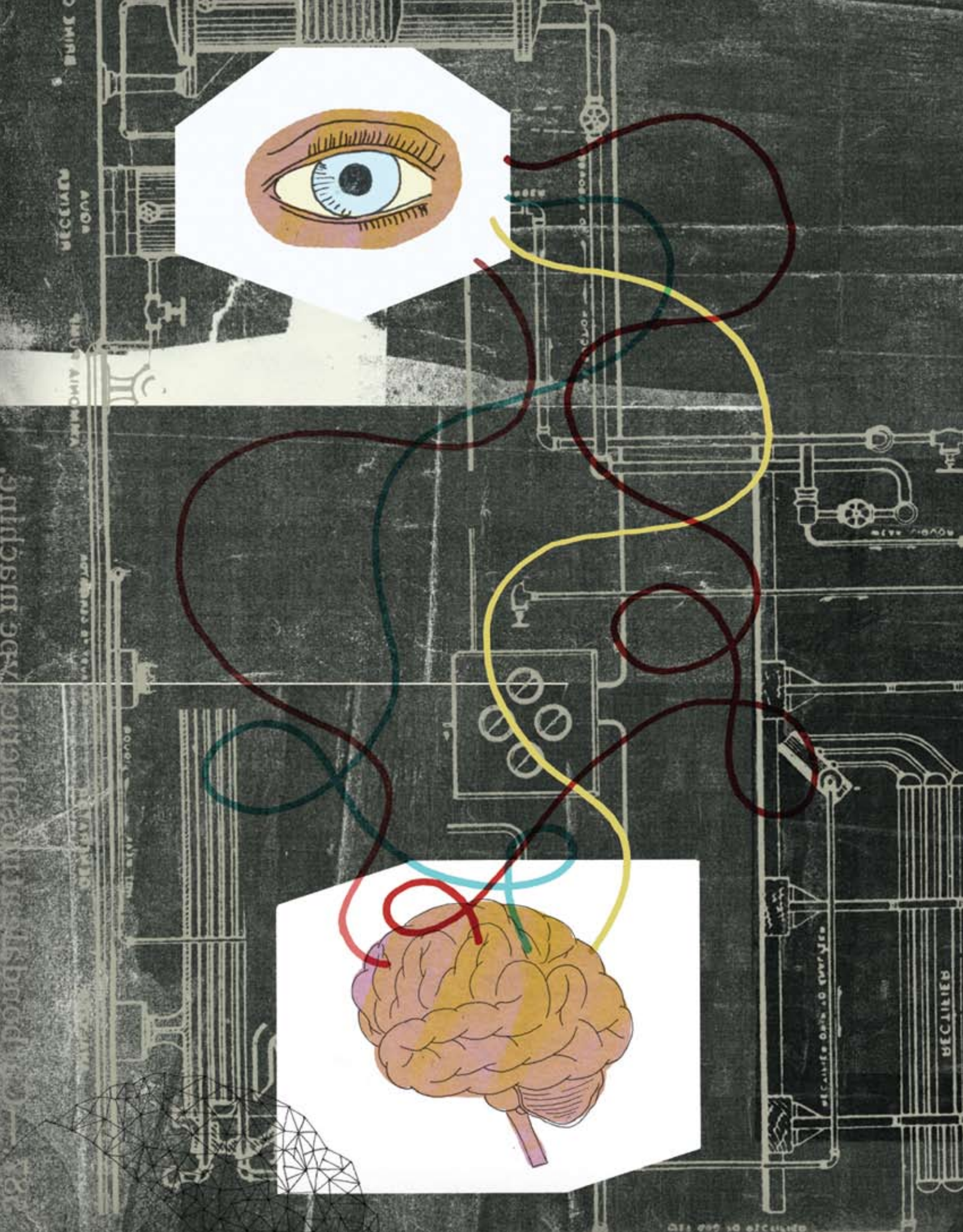
The tractor is only one part of NDSU's involvement in the Wind to Hydrogen project. NDSU's North Central Research Extension Center south of Minot is where Basin Electric is housing its electrolyzer, the machine that separates the hydrogen from oxygen in water and then stores it. The electrolyzer was brought there by Hydrogenics, a company out of Belgium.

Jay Fisher, director of the North Central Research Extension Center, characterizes the project as "cutting edge" and "in its early research and development stages." He has been driving one of three Chevy Silverado pickups converted to hydrogen that are also part of the project. Currently Fisher's pickup, retrofitted from a gas engine so that it runs entirely on hydrogen, is in Arizona being turbo-charged.

To say that Fisher is looking forward to getting that pickup back is an understatement. He has to be one of the few drivers in this country, or anywhere else, who can fill up his tank with hydrogen at his own place (the research extension center) and hit the road or the fields. He explains that this summer, running solely on hydrogen, they found the Chevys to be a little lacking in power. The turbo-charging should fix that. "I want to get my hands back on it and see how it performs," he says.

Of course hydrogen is just one of the alternative fuels that NDSU is studying. The research extension center is also looking at canola and switchgrass biofuels. You look at this, says Fisher, and it's like looking at the first light bulb. All you can really say is, "Wow."

—Shadd Piehl



MACHINE²MACHINE:

gadgets calling gizmos so you can relax

The call came one day last spring when Alex Warner was working at home and taking care of his infant son. Spread before him, awaiting inspiration on a coffee table commandeered as his desk, lay the raw materials for a presentation he was building for a sales pitch to the leading maker of bearings. Fidgeting at his side, 5-month-old Luke proved an indifferent test audience for dad's efforts to land a big, new account for his fledgling company. Then the phone rang. On the other end, a contact Warner had been dealing with delivered a coy message. "Check your e-mail." So he logged on with his laptop and there, waiting in his inbox, was news that could change his life: Pedigree Technologies, an idea he'd hatched three years earlier after a dream job vaporized in the dot-com meltdown, had just been awarded an \$8.4 million contract. Warner called his wife to give her the news, and then stopped by his church on an errand. Still elated, he told his priest about the triumph, but remembered to share credit. "God helped me on this one," he said.

Warner's firm will be helping the U.S. Navy combine tiny sensors with wireless networks to devise remote surveillance systems. And that, in turn, could help give Pedigree important visibility in the scramble to exploit the next big wave in computing: machines talking to machines. Really, really small machines, in the technology's most novel form. So-called "smart dust" — a smattering of tiny sensors mated with transmitters that "talk" over wireless networks — allows machines to perform useful new services. Pedigree's niche is to focus on machines that require maintenance or systems that require monitoring.

Consider pumps, for example, one of Warner's obsessions. Pumps are



TENANTS GET A BREAK ON THEIR RENT AND SEMINARS ON MARKETING AND OTHER FUNDAMENTALS. BUT MORE THAN THAT, THEY CAN MIX WITH OTHER INNOVATORS, SWAPPING IDEAS AND INFORMATION.

mechanical worker bees that toil away in the background, largely invisible and usually forgotten. Until they break down. Failure can mean messy disaster, as any homeowner whose sump pump has stopped in a thunderstorm knows. So instead of walking down to the basement and finding a pool seeping from your sump pump, well, your pump could call your cell phone — or, better yet, your plumber's — at the first sign of trouble. Just think about all the pumps out there pumping away, each one a potential failure waiting to happen. In Fargo alone, Warner estimates conservatively there must be at least 50,000 commercial pumps — a vast market waiting to be tapped.

Just one of many. Anything that must be replenished, monitored or serviced is a good candidate for the kind of techno-solutions Pedigree delivers. It's one of the stories unfolding at NDSU's Research and Technology Park, a hub of research and development of technologies that blend computing, nanotechnology, advanced electronics and wireless communications. Pedigree's startup, in fact, coincides with the evolution of the business incubator at NDSU's Technology Incubator, which opened early this year. The tech park's cluster of companies devoted to smart wireless networks, embedded devices and like technologies is becoming a hub, gaining a foothold alongside the likes of Silicon Valley and Boston. It's all happening on the northwest edge of the North Dakota State University campus, on 55 acres that not so long ago served as test plots for developing new crop varieties.

Alex Warner, who grew up on a farm near Hillsboro, N.D., always dreamed of someday launching his own startup company. He just never thought it would happen so quickly, or so unexpectedly. He had charted another course. After graduating from NDSU in 1997 with degrees in plant science and communications, he served a tech apprenticeship, working with several information-technology companies, including a pioneering Internet service provider in the Twin Cities and a big networking firm now known as NUVO Networks. He roved among sales, consulting and technical operations, working while earning a master's degree in computer information systems while in Minnesota.

His hard work and hustle were rewarded when he was hired by Accenture, formerly Andersen Consulting, a leading global consulting and management firm, and leading player in the nexus between business and technology. "That was very exciting for me," he says. "I felt I had made it." The Accenture job, the attainment of a goal he'd set, would give him invaluable experience and contacts. Warner's plan was to put in about five years of consulting work, then leave to launch his own tech startup. There was just one problem: Accenture's offer, in early 2001, came just before the dot-com bubble burst. Not only did the consulting job fail to materialize, but Warner couldn't find work at other tech firms in the Twin Cities. "We ran into dot-com death," he says.

But Warner, who kept tabs on developments back home, saw signs of new life in Fargo. The announcement that Alien Technology, a leader in "smart tags," would open a design and manufacturing plant, and the rise of Phoenix International, which makes embedded computerized controls for farm machinery, were just two examples that signaled the

dawning of a new era. Most encouraging: Alien and other firms locating at the tech park were developing products using “smart tag” technology, which enables tiny electronic chips with wireless transmitters to replace bar codes. Warner realized his experience in networking and communications fit nicely with the technologies being developed at NDSU. Once widely adopted, Radio Frequency Identification, better known as RFID, the formal term for technologies including “smart tags,” promises to revolutionize inventory tracking and other tasks. “I thought that’s going to be the next stage in computing as things move forward,” Warner says.

So he moved to Fargo, where his wife also found work at a law firm, and went to work at SEI, becoming a pioneering account manager for a unit of Microsoft Business Solutions. Moonlighting in his off hours, working in the home office in his basement, he did market research on emerging technologies and what would become Pedigree Technologies, which he established in December 2003. He decided to focus on systems that can monitor and track equipment or other assets. From the outset, he consulted experts at NDSU. Philip Boudjouk, vice president for research, creative activities and technology transfer, put Warner in touch with key people in the field. Engineering faculty lent their expertise, as did students, some of whom became employees. Initially Warner was given space in the Research II building, and then moved into incubator space when the \$10.7 million incubator opened.

Family support parallels the incubator’s helping hand. Warner’s father, Mike, has extensive business experience beyond the family farming operation, including leading roles at American Crystal Sugar and Dakota Growers Pasta Co. Warner senior has been an investor and key adviser at all stages of Pedigree’s development. “My father is absolutely essential,” Warner says. “That’s been tremendously helpful.” Warner’s family has invested in Pedigree, generously but prudently, without betting the family farm. “We have a practical viewpoint on capitalization,” he says. His boyish features belie the strains of starting a company from essentially nothing, and the years of long days and having to perform several jobs at once. Oddly, Warner says, having sacrificed so much time and effort, a huge roll of the dice financially and in terms of his career, give him a surprising serenity. “It’s nerve-racking, but at the same time it’s liberating. There’s something about that ultimate risk that can give you the utmost confidence.”

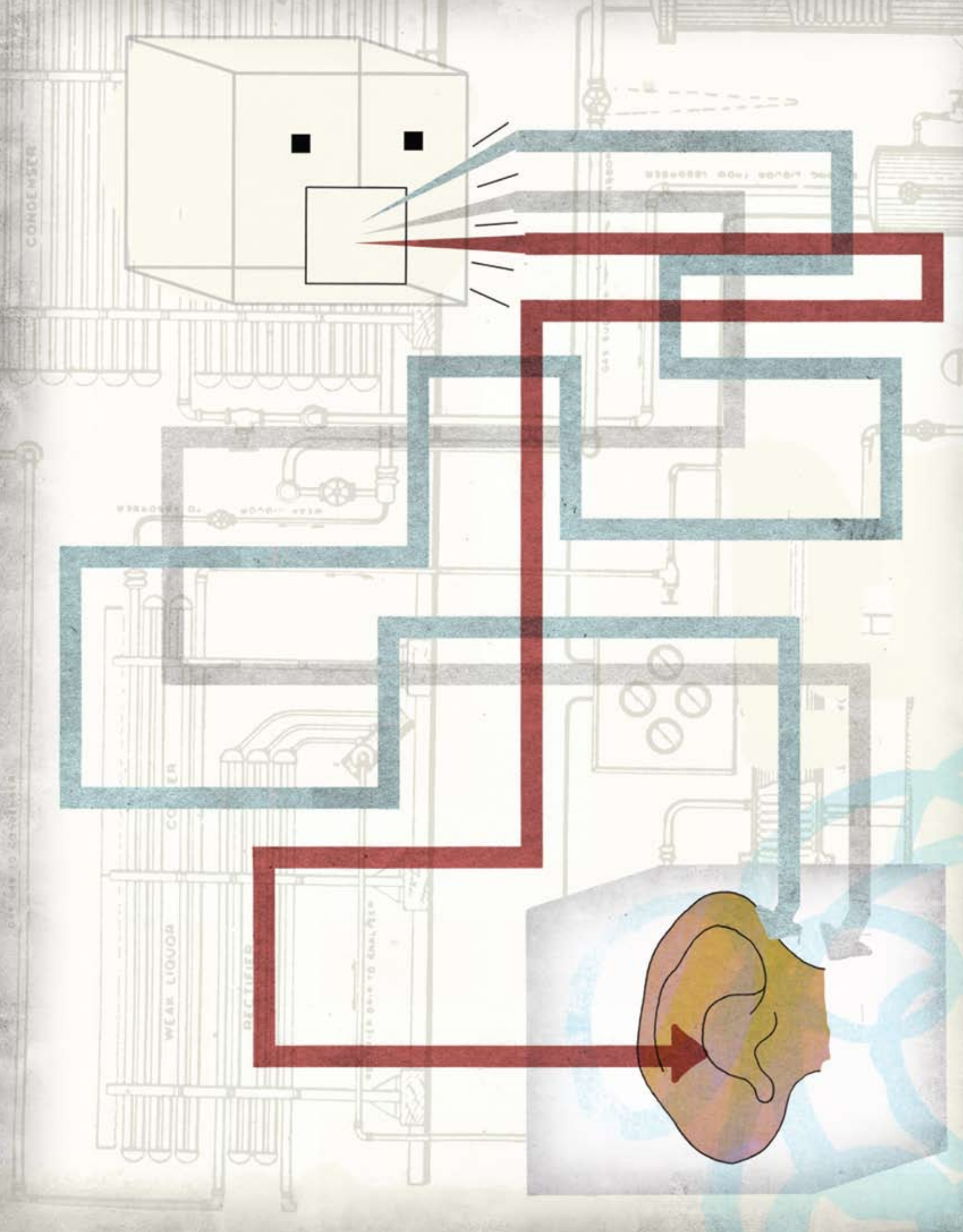
As with the other tenants, Pedigree’s digs combine office with lab space. Software and hardware engineers work side by side. The hardware crew’s pods are easy to distinguish from their software colleagues: Their counters are cluttered with parts racks, soldering guns, a drill press. All tinker beneath a framed photograph of the laboratory of Thomas Edison, whose many inventions include the light bulb and phonograph. “We call this Menlo Park,” Warner says, paying homage to Edison’s lab. Other startups occupy similar spaces in the center, which includes shared production space. One innovative neighbor, Appareo Systems, makes devices that generate three-dimensional graphics to allow a user to track and recreate an experience — anything from flying a plane to piloting a boat. Another Pedigree neighbor, equipment manufacturer Bobcat Co., an anchor tenant at the center, got its start

decades ago in a much more primitive incubator: a turkey barn. “What we’ve created here and hope to build on is an environment for entrepreneurs to create new technologies,” says Tony Grindberg, the tech park’s executive director. “Alex is a perfect example of what we want to do here. Alex is a risk taker. He’s passionate about new technology and starting a company. We’ve been able to support his vision.”

Tenants get a break on their rent and seminars on marketing and other fundamentals. But more than that, they can mix with other innovators, swapping ideas and information. To foster productive interaction, the center holds popcorn socials on Thursday afternoons, a half hour set aside for people to take a breather and mill in the lounge or chat in the hallway. Clustering tech companies that are engaged in advanced electronics, computing, RFID, and related fields helps to cultivate a knowledge base that can, with time, help draw highly skilled people. “Talent is a major attraction for technology companies,” Grindberg says. “In today’s climate, those that can attract the best and brightest have an edge.”

It’s fitting that the first test of the software and hardware developed by Pedigree came in the sugar-beet fields that dot the Red River Valley. Warner’s years growing up on a sugar-beet farm made him know too well that a farmer’s profits can evaporate before harvest. A good yield can degrade into a mediocre crop or worse if conditions — too much heat or moisture, for instance — go unchecked. Traditional monitoring involves farmers visually inspecting their fields and consulting data sorted by county — at best a cumbersome and imprecise method.

But tiny sensors equipped with wireless transmitters can stand watch in the field and send reports on beet temperature, humidity, leaf wetness and soil moisture, beaming messages every five minutes via antennas to the Internet. The experiment two years ago to remotely monitor sugar beets in the field proved the sensor networks’ effectiveness, a critical step toward attracting investors and customers. A similar project the next year also demonstrated the efficacy of using wireless sensors in the field, this time to monitor wheat fields for dreaded scab,



THEY CREATED AN EASY-TO-USE COMBINATION OF SOFTWARE AND HARDWARE. THE KEY IS A DEVICE CALLED A GATEWAY THAT ALLOWS A WIDE ASSORTMENT OF MACHINES AND COMPUTERS TO COMMUNICATE WIRELESSLY OR VIA THE INTERNET WITH ONE ANOTHER.

a fungal crop disease that has cost North Dakota farmers millions of dollars in recent years. Wireless transmitters, attached to stakes in fields, sent their wireless signals, relayed via transmitters, home to the farmer for real-time reports to guide decisions about whether and when to spray fungicides, among other things. Those demonstrations, and another to monitor sugar-beet piles, were important in proving the value of what Pedigree's innovators had devised.

They created an easy-to-use combination of software and hardware. The key is a device called a gateway that allows a wide assortment of machines and computers to communicate wirelessly or via the Internet with one another. "We can talk to anybody's stuff," Warner says. "That's how we built our system. We act as a universal translator. It's almost a system of systems." Before netting the Navy remote sensor-surveillance contract, Pedigree was earning a reputation as one of the early leaders in machine-to-machine innovations, with favorable mentions in the trade press, a new face alongside familiar names such as Honeywell, for its user-friendly wireless sensor networks. Earlier this year, tapped as the founder of a pioneering firm in the field, Warner was invited to speak at a national conference about the technology's potential.

The Navy contract, announced in June, will progress over several years as the sensors and networks are built and field-tested in stages. The announcement can help catapult Pedigree as firms jockey for market leadership in a fast-changing industry. "It's a big credibility builder," Warner says of the Navy contract. "Companies are looking for that." Success will come to those who can make wireless sensor networks that are easy and appealing. For an analogy, he singles out the popular iPod. Apple wasn't the first to sell a portable digital music player, but the iPod became a market mega-hit because of its ease of use and stylish appeal. Google did the same with Internet search services. Warner calls it "crossing the chasm." He wants to be able to cross the chasm with devices that monitor or service equipment for mass markets, such as fuel replenishment systems for convenience stores and pumps. Lots and lots of pumps. Even a small slice of such large markets would be lucrative, especially for a start-up firm with 14 employees, a mix of electrical engineers, computer scientists, sales and marketing staff.

Pedigree now has six or seven commercial customers, including the Navy and a convenience store chain that wants a more efficient way of monitoring its underground gasoline tank inventories. "Some big end users, one large equipment manufacturer," Warner says. "The Navy being the largest customer so far." Product development and marketing preparations have finally progressed to the point that Pedigree can now

focus more on expanding its customer base, a niche that likely will include equipment manufacturers that want to provide top-notch field service. "We're at the starting line for attracting our markets," Warner says.

Grindberg remembers the early days when Warner was working with just one employee, and has enjoyed watching Pedigree take its first steps. It didn't always seem like a straight path to the Naval Air Systems Command, which awarded the firm its first big contract, to implement the remote surveillance network — something Grindberg never could have envisioned when the tech park emerged in 2000. He gets moments of vicarious achievement, such as when he recently saw Warner demonstrating Pedigree's technology to a group from Microsoft. "Alex represents a technology that by all accounts did not exist seven years ago," he says. "We grew up together."

Running a start-up is full of alternating emotional highs and lows, Warner says. There are moments when a technical riddle is solved, or when a pitch goes smoothly and the prize feels within reach. But there are the corresponding moments, the times when a client pulls back and decides to wait a while longer. Warner is philosophical when that happens. He says success comes from fostering relationships, and breakthroughs can arrive at unexpected moments. He's still waiting to learn the outcome of the sales presentation he was working on the day the phone rang with news of the Navy contract. The bearing people invited him to stay in touch, and his laptop still holds an enticing image of a national map filled with pump symbols, which Warner sees as future Pedigree customers.



arctic midges

researching a key link in the food chain




Log on to Google Earth and zoom in on Barrow, Alaska, population 4,417. One of the dark grey specks about three miles southeast of town is Pond J, the site of a teeming little ecosystem that is helping Malcolm Butler contribute to the growing body of research on global climate change and its effects.

Barrow is the northernmost town in North America. Its buildings stand on deep pilings at the edge of the Chukchi and Beaufort Seas. Neither the social nor physical landscape is tidy in Barrow. Pond-covered tundra looks orderly from 5,000 feet, but on the ground it's a marshland. Sea ice piles up on the shore in untidy heaps. This is part of the North Slope, an area widely known for the political controversy that swirls around its rich oil fields and an environment that until recently has been relatively free of human impact.

But scientists of all stripes have a long history in the area where zoologist Butler loves researching the life cycles of the small aquatic insects known as midges and has developed a passion for the trashy, friendly, jumble of cultures that is Barrow. Known to friends and colleagues as Mac, he is tall and loose-limbed with a shy warm smile and a full, close cropped beard. The hair is all white and there is a bit of Santa Claus in Mac Butler — the twinkling eyes perhaps, or the enthusiasm for just about everything that enters his awareness. A professor in the Department of Biological Sciences at North Dakota State University, Butler teaches invertebrate zoology, aquatic ecology, and introductory biology. He's a good teacher, making the complexities of insect life cycles not only understandable, but fascinating. He's a dedicated researcher; he complains that time in the lab passes all too swiftly. But Butler's true happiness lies in his fieldwork.

Decked in hip waders and wool shirt, down vest and sample bags, Butler is home when he is in the marsh or checking collection containers in Pond J. His research focuses on limnology (the study of inland waters) and wetland ecology. Butler earned a doctorate in zoology in 1980, but his arctic research adventures began a few years earlier. Faced with the angst of choosing a dissertation research topic at age 23, Butler vividly recalls the serendipity and excitement of a sudden opportunity to head far north to Barrow, Alaska. When his research mentor invited him to join a team studying Barrow's tundra ponds, a habitat abounding in midges, Butler quickly signed on as a research assistant.

It was the summer of 1975. Butler already sported his signature beard — although the hair was red-brown. (No one around here has seen Mac Butler without a beard, though the color has moved through the rainbow of middle age. It is Butler's original beard, grown following high school graduation in 1969.) A 1975 photo shows the leaders of the research team piled in the back of a battered red and yellow pickup, wearing parkas and big smiles. Sitting atop equipment crates padded with their backpacks, they grin for the camera and head off from Barrow for a flight into the Alaskan wilderness to establish a brand-new North Slope research camp. The resulting field station at Toolik Lake is set in postcard Alaska: rolling, flower-covered tundra below glacier-topped mountains with picturesque lakes, browsing grizzly bears and roaming herds of caribou. Butler, by his own rueful choice, is left behind to study midges in the tundra ponds at Barrow for the next two summers. No picture-perfect wilderness here. Un-uh, this is monotonous coastal tundra, squishy, chilly and flat — extending for miles inland from the ice-



choked seas. A mere 10 miles of road lead from the village, past “NARL” — the Naval Arctic Research Lab, up to the “Top of the World” at Point Barrow. A short side road gives access inland to a summer paradise for ducks, bugs and arctic scientists. In the eyes of his colleagues who shifted their research to Toolik Lake, Barrow was “The armpit of the Arctic, cold, ugly, and human-impacted,” Butler says. “And yet I like Barrow

A: because I have this history there, I have this knowledge of the tundra ponds and their fauna.

B: I like the fact that it has this cultural legacy, this long human history and ongoing social, cultural dynamic that I just find really intriguing. So I’m up there with these dual interests, the science and the midges, plus I’ve always been intrigued with traditional arctic hunting-gathering cultures as a side interest.”


Barrow has a long history of offering hospitality to scientists. Research has been conducted there since the 1880s. The Naval Arctic Research Laboratory was constructed at Barrow in the 1940s. When the Navy’s research activities declined in the 1980s the local Iñupiat community set aside land and created the Barrow Environmental Observatory and the Barrow Arctic Science Consortium. The Barrow Global Climate Change Research Facility has just been completed. The entire operation is a unique collaborative venture between the indigenous people and the scientific community — one that the Iñupiat initiated and manage. This focus on science provides employment for the community and a unique environmental laboratory for the scientists. Because global warming has become a reality to most, it’s a rare week that we don’t hear news reports of discoveries from arctic research. The cold slows everything down and it becomes much easier to document environmental changes occurring. Truly, decay happens slowly in Barrow. The average summer temperature is 39 degrees F and there are only about 90 days when the tundra is thawed to the permafrost. Winter temps run around minus 39 degrees and the wind chill can drop that by as much as 50 degrees.

Butler’s first Alaskan adventure spanned 1975 to 1980, and was followed by a NATO post-doc in Germany. Arriving at NDSU in 1981, Butler chose research projects that kept him closer to home and his young family, but maintained

his interest in midges with their “bloodworm” larvae. The bloodworms are an early stage of development that ducks and other birds devour like caviar and we freeze-dry and use for bait. He didn’t get back to Barrow until 2006. When he returned after 26 years, it was to find the tundra little changed; the planks he’d laid in Pond J were just where he’d left them — sunk a little deeper into the pond sediments, but still a sound platform from which to again observe and collect his arctic midges.

Butler’s on-going dissertation research has produced some big results. He was able to demonstrate just how important arctic insects could be in this ecosystem. Butler’s midges, flies in the family Chironomidae, are pretty unique among midges of the world — quite a feat since “chironomids” are found virtually everywhere. Essentially, the midges of Pond J don’t bite; many tundra-dwelling species don’t even fly much anymore. (This is a boon for their human watchers who are less likely to get a mouth or nose full of midges.) As winged adults, some smaller species have learned to live brief two-dimensional lives — swarming on the surface of the water to avoid being blown out to sea the second their wings hit the wind. They’ve slowed down their larval development, the largest species taking up to seven years to complete the life cycle. And in this frozen place midges play a tremendous role in the food web — both in the water and on the tundra, where breeding birds voraciously consume the emerging aquatic flies. The abundance of midges is a testament to the fertility of the peat that blankets the land. The tundra’s peat is a book for ecologists in the same way a geologist reads a history in slimmest layers of rock or ice. Traces of carbon whisper hints about food sources and ecological linkages. In the age of global warming it’s a good language to speak.

The challenge, Butler says, is that everybody likes the charismatic megafauna. You know, whales, caribou and polar bears in the north or gorillas and elephants in the south; the big, romantic stuff. It’s hard to get students, or even some other zoologists, interested in aquatic insects. Even the locals know about insects only as pests, rather than a key link in the food chain. Researchers are encouraged to use traditional knowledge, the wisdom of the local people, in their research proposals and resulting publications. And this knowledge has been really useful in documenting changes to the polar regions. After all, it’s not like most of the scientists call the Arctic “home.” Six weeks is an average







research stay. It's hard to know a place in that time. However, none of the traditional knowledge keepers in Barrow know about their insects. The indigenous people of Barrow are Bowhead whale hunters. The Barrow whaling captains and elders, who know nearly everything knowable about Bowhead whales and caribou, don't pay much attention to the tundra's tiny life forms. Butler was the one to explain to locals that the young ducks and shorebirds are hatching and looking for their first meals at the very time that massive numbers of the adult midges emerge. It's a great match and a critical one for the young birds, who must fend for themselves from hatching in a pitiless land. In a cold, short season, the chicks and ducklings grow up fast. The insects grow slowly. Similar midge species might complete their life cycle in a month in warmer temperatures, while maturation in Barrow tundra ponds may take years. The big red ones — like the blood worms freeze-dried and sold as fish food south of the border (the Alaskan border that is) — grow for seven years in Barrow ponds that are thawed only about 90 days a year. Timing changes may accompany global warming; if the midge larvae and emerging adult flies aren't there for the babies — goodbye ducks and shorebirds. One of the missing links has been temperature data on the ponds. This year Butler installed thermal loggers, small record-keeping thermometers, and formed a partnership with a dedicated local science teacher whose students are helping to collect the data.

Butler's recent return to Barrow reignited his passion not only for the research, but for the place. A sustaining interest — more than 30 years of connection to a place — builds an ability to see the beauty in a village littered with garbage, old carcasses, and slowly rusting metal. Through the cycle of his returns, Butler has grown to care deeply about the Iñupiat people and their whaling culture. While he admires the research facilities at the competing Toolik Field Station and has colleagues who work there, the insects are not the whole story. He likes the mysterious symmetries of the tundra ponds and the contrasts with the adjacent Arctic Ocean; the whaling festivals and the politics of little Barrow.

Prior to Barrow, the village was called Ukpiagvik and the area was a popular hunting and fishing spot for the native Iñupiat. The name Ukpiagvik means "the place to hunt snowy owls." The duck hunting is akin to North Dakota in October and only occasionally colder, though duck hunting season is

in spring. This whaling culture marks its year with gatherings and festivals related to the annual cycle of the hunt. Iñupiat culture is centered on whaling and the Iñupiat hunt the Bowhead whale almost as they have done for more than 2,000 years: Sixty feet and 100 tons of whale harpooned from a traditional skin boat in an open lead miles from shore across treacherous sea ice. Fewer than 10,000 Bowheads now exist and only traditional subsistence hunting is legal. Whaling captains are big men in the community and they continue the tradition of sharing the whale harvest. The festivals are the public “sharing times” and even tourists and friendly scientists take part. The captain and his crew put on the event and the main delicacy is the mikigaq — fermented whale meat and muktuk (blubber and skin — the “rind” of the whale). A member of the whaling crew moves through the crowd with a kettle and ladle. Folks hold forth plastic bowls or even zip lock bags to get a bowl of goose soup. Another crew member circulates with a white plastic pail, his rubber gloved hand bloody and dripping with what looks like raw liver — that’s mikigaq. “I developed a real taste for it,” says Butler. “You’d be surprised at how good it is.”

Barrow and blubber are something of passion for Butler. He’s read the local histories and talks easily with the people of the town. As he describes family connections dating back to the first European whaling ships that found their shores, Butler’s eyes twinkle and his broad hands talk. Kind and quiet is Butler and it’s easy to imagine him starting up a conversation with a question about why the fresh muktuk is sliced in that particular way and proportion: ideally a thin slice with ½ inch of the creamy fat to an equal amount of tough black skin. This year Butler happened upon a Nalukataq festival, the time when the tail and flukes of the whale are brought out of a permafrost storage cellar and distributed, marking the end of a safe and successful whaling season. This is the festival familiar to “outsiders” because it includes the blanket toss game that is ubiquitous to the region. His curiosity roused, Butler chats with another bystander to learn the practicality of tossing someone high in the air in a land without trees or hills — a means to farseeing, to whale spotting and to testing courage and trust. There is no trampoline, only a blanket and

whoever is willing to take a turn throwing you 15 feet in the air and catch you again. Injuries are expected. Outsiders are everyone who isn’t Alaskan, by the way.

Butler also got to attend an earlier festival, called Apugauti, which marks the day the whaling boat is pulled off the sea ice and moved to the successful captain’s yard. These feasts are typically accompanied by goose soup. Spring goose makes a good soup and hunting geese at this time has long been both ecologically sound and economically necessary for the townspeople, like eating bread if you live in the Dakotas. Butler notes that the missionaries followed the commercial whalers to Barrow in the late 19th century, and the result is a very religious community — the distribution of the frozen, crispy chunks of muktuk is accompanied by lots of prayer and praise.

A parent himself, Butler pays attention to young people. Two high school girls collected data on midge emergence for several weeks after his late June departure. He in turn is fascinated by the cultural linkage to whaling (the school team is the Whalers) and how the young integrate their new modern high school and their iPods with their traditional culture. For example, one sees fewer of the traditional parkas now, Butler recalls with some sadness. The older women’s coats are beautiful derivatives of the original parka, from which came all others. They are sewn of bright calico with colorful ribbon work, edged with frost-free wolverine and silky arctic wolf furs. Butler clicks through his pictures, back and forth in time. There are fewer women dressed in traditional garb. Younger women like latest fashions, not their grandma’s fur and flounces.

Butler’s big wish is to be in Barrow on a day when a whale is landed. His other big wish is to have the little Chironomidae recognized for their contribution to the arctic ecosystem, and potentially as important responders to climate change; in short to take their rightful place in the ecological pantheon. Perhaps just a bit of the glory of the charismatic megafauna may rub off on the midge, and people will appreciate what this tiny species have to teach.

—Laurie Baker

DAD

essay MICHAEL J. OLSEN



photographer Alf T. Olsen
Courtesy of NDSU Archives

Not sure what killed Tim Farley's parakeet, but there we were on June 20, 1957, reviewing the body that had been stashed in a shallow grave near the edge of the slough. I'm date certain on this, as the moment was captured in time by Alf T. Olsen and his twin-lens reflex camera.

You wouldn't have known it looking at the front page of The Fargo Forum the next morning. There was my Dad's photo alright, a picture of a huge black cloud of impending doom. But the kids in the foreground had been cropped out. And cropped out for the next fifty years – every time the paper ran a commemorative story on the '57 tornado. This bugged the heck out of the Olsen sibs, but don't know if it bothered Dad or not. He died in 1970. Too young at fifty. Wish I could ask him now. Wish I could ask him a lot of things.

But how the photo ended up in the paper didn't really matter much back at the moment it was snapped. Oblivious to the changing atmosphere and approaching storm, but somewhat fascinated with the mysteries of life and death, Tim's brother Terry, my brother Patrick, the Betz girls Carol and Barbie, and I poked around at the dead bird's grave. It had only been a few weeks earlier that across the road Georgie Heck proved that people really do eat frogs' legs. He had stunned one on the pavement, cut off the legs with a pocket knife, built a little fire of twigs, roasted the legs for a few minutes, and then popped them in his mouth. Took his time chewing, too.

Dead things turned up a lot at the slough — birds, frogs, field mice, and when the water was high in the spring, dead carp. It seemed to be a natural turn of events, but I'd always wondered if the dead things had a soul and where that soul might end up. Natural fallout from a Catholic education I suppose. I remember asking Father Anderson if the dinosaurs were killed in the flood of Noah. And if they were, were they now in heaven? It didn't seem to be in the catechism, and Father A. wouldn't venture a guess.

Dad's guess was that they were probably hanging out somewhere with Tim's dead parakeet. He was an afterlife kind of guy, but didn't want to get too technical with me. He did say that they were likely long gone before the flood hit, or we would have seen a couple of Tyrannosaurus Rex on the foredeck of the Ark. Dad seemed to know everything, and the older I got the more I was sure of it.

He was a member of what Tom Brokaw calls The Greatest Generation. Not sure if they were, but Dad was pretty great. He didn't live long enough to feel comfortable talking about the war — his war — the one that's back in the spotlight these days. But he did talk about right and wrong, standing up for your beliefs, and doing the right thing. When I was old

enough to get it, he made a deal with me. He said he would never lie to me, if I would never lie to him. Near as I can tell, we both kept the promise.

I made the same deal with my kids. And only came close to breaking it once. After shaking hands with my young daughter on the "not lying" thing, she paused a second, then asked if there was a Santa Claus. After ten minutes of hemming and hawing about the spirit of Christmas, I finally said no. It's what Dad would have done.

I've spent a good deal of my life trying to do what Dad would have done.

Born in Norway, Dad grew up a young immigrant in Brooklyn where he learned English and a fairly rough and tumble version of the American Dream. When I got old enough to ask him about it, rather than talking about himself, he told me to read The Knute Rockne Story. Rockne was the legendary coach of Notre Dame from 1918 to 1930. He was born in Norway, raised in Brooklyn, converted to Catholicism, and also died young. According to the book, being a Norwegian kid, learning English and how to act and fit in on the tough Brooklyn streets was no picnic.

When I asked Dad about the war, he had me read Catch 22. Catch 22 is Joseph Heller's historic WWII novel about the absurdity of war. Its main character is a bombardier in a B25 trying to make sense of it all. He's stationed on an Island just off Italy, flying and surviving bombing missions over southern Europe. Dad was a bombardier, only in a B24, stationed in Italy, and flying some of the most dangerous bombing missions of the war.

I read The Knute Rockne story when I was about thirteen, and Catch 22 when I was twenty, the year Dad died. They gave me an idea of what he'd been through, what helped shape his view of the world, but not really who he was. Wish I could ask him now. Wish I could ask him a lot of things.

Our review of Tim's dead parakeet ended with Dad's appearance on the scene. Mom had taken her only vacation alone that I can remember, and was off visiting her mother in northern Minnesota. Dad was in charge. Patrick and I were on our little field trip to the grave site, and my older sister was back at the house with my baby brother.

Out of breath at the edge of the slough, camera in hand, Dad snapped an award-winning photo, threw his kids in the car and pointed the Pontiac in the opposite direction of the storm. In other words, he did it all — his job and the protection of his family from imminent danger. I'm date certain on this, as the moment was captured in time by Alf T. Olsen and his twin-lens reflex camera.

NORTH DAKOTA STATE UNIVERSITY
Box 5167
Fargo, North Dakota 58105

Non Profit Org.
U.S. Postage
PAID
Fargo, N.Dak.
Permit No. 818