endeavors

Research and Creative Activity • The University of North Carolina at Chapel Hill
Spring 2011

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THIS IS A LIST OF THE PEOPLE WHO HAVE BEEN EXECUTED IN THE U.S. SINCE 1977, including (in parentheses) the names of their victims.

The list—and the story—continue on page 6.

endeavors
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On the cover: The death penalty was reinstated in the United States in 1976. One thousand two hundred and forty-three people have since been executed (as of March 10, 2011).

UNC RESEARCH

EDITOR'S NOTE

"Good people are always so sure they're right."

—Last words of Barbara Graham, executed at San Quentin, June 3, 1955

It's a curious fact that the government that provides for you, that builds schools and roads for you, that helps preserve your culture, that protects you on the job, and that ensures your health and safety in so many ways, can also end your life.

North Carolina has executed forty-three people since the current death penalty statute took effect: the first in 1984, and the most recent in 2006. That's somewhere between one and two people per year. As of this writing, there are one hundred and fifty-seven people on death row in North Carolina. One man has been there since 1985. The most recent arrived in November 2010.

Those are the numbers. But they don't mean anything to the victims of violent crimes that no execution can bring back. They don't mean anything to the child too young to understand how and why her father was executed by his government.

Does the death penalty deter? Is it applied fairly? Should the risk of executing innocent people preclude its use? Is retribution just, or does an eye for an eye really blind us all?

No matter our personal feelings toward capital punishment, it's safe to say that all of us who have the luxury of thinking about it in the abstract are happy to keep it that way. Would my views change if someone were convicted of killing a member of my family? Would yours? Are we sure we're right?

—Jason Smith

ENDEAVORS ONLINE

We have a new website. We don't expect that you'll drop everything and run have a look. In fact, given that you're holding this magazine, we'd much rather you *didn't* drop everything.

But we have added some neat stuff to the site. Web-only stories. Videos. Slide shows. A picture-of-the-week. Staff blogs. And all of it frequently updated.

We know there are all kinds of other things on screens big and small that are blaring for your attention, but stop by for a visit some time, would you? We're on Twitter and Facebook, too.

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Empty glasses frame, Brownsville, Texas, 2010, by Susan Harbage Page. Story on page 30.

overview

BIOMEDICAL ENGINEERING

Lock the door and close the gate

by Mark Derewicz

Mucus is our friend. It's the reason we don't always get sick when someone sneezes on us; it traps viruses before they wreak havoc.

Some bugs, though, don't get trapped. They infect us, and so we devise other ways to combat them. Most research dollars go toward that cause. But biomedical engineer Sam Lai is taking a step back. He wants to lend a little help to our friend.

"Mucus continues to be overlooked in infectious diseases," Lai says. "For instance, it wasn't even known how HIV penetrates vaginal secretions to establish infection until almost thirty years into the pandemic."

Lai studies how mucus fails to stop viruses and what can be done about it.

At the molecular level, mucus is a dense network of fibers called mucins that create a three-dimensional sticky mesh. "Similar to how a spiderweb can trap a variety of bugs," Lai says, "mucus can trap pathogens that are either larger than the pores in the mesh or that adhere to the mesh fibers." HIV is one of many viruses that can slip through the mesh and infect the body. If we could trap HIV in mucus, Lai says, then the mucus's natural clearance and degradative mechanisms would take care of the rest. "Most viruses die very quickly if they don't reach the cells they want to infect," he says.

In one experiment, Lai mixed HIV into normal cervicovaginal mucus and found that the virus could not break through the mucus. Lai thought that was because the mucus was naturally acidic. During sexual transmission, though, semen neutralizes the pH of cervicovaginal mucus. So in another experiment Lai altered the mucus so it was not acidic, and he found that HIV readily broke through the mucus, just as it does during intercourse.

But Lai realized that lactobacilli—bacteria found naturally in the vaginal tract—secrete lactic acid. That's what caused the mucus to trap HIV as long as semen was not present. "Our results tell us that if we can maintain the acidity of the vaginal tract with lactic acid during intercourse, we can likely trap the virus," Lai says.

Lai's unique take on strengthening our natural defense against infectious diseases earned him a $100,000 Gates Foundation Grand Challenges Explorations grant. If he shows progress at the end of a year, that amount could increase tenfold.

"Fighting viruses after they have reached their targets for infection is like trying to defend a castle by locking the interior doors but leaving the gate open," Lai says. "We could fend off viruses much better if we could just close the front gate."

Sam Lai is an assistant professor of molecular pharmaceutics in the Eshelman School of Pharmacy, and an adjunct assistant professor in the Department of Biomedical Engineering.

COMPUTER SCIENCE

A digital remake

by Mark Derewicz

They built Rome in a day. A digital Rome. Jan-Michael Frahm and his team of computer scientists used three million two-dimensional photos of Rome to create three-dimensional versions of landmarks throughout the city. The result is an interactive rendering of Rome. And should destruction befall that city or another—Frahm's team has also recreated Berlin—then such a rendering could be the road map to reconstruction.

Creating digital models of real-life stuff isn't anything new. But Frahm's method is.

He and his team created the model of Rome in less than twenty-four hours. They use images and video from websites to recreate city scenes at different times of the day and year, under various lighting and weather conditions.

The 3-D models could be embedded into common applications such as Google Earth to allow people to explore cities from afar or while traveling. Frahm says the technology could also be used as a building block for disaster-response software. For example, a government could send an aircraft to video the aftermath of a hurricane. The video could be meshed with Frahm's model of the city to assess damage from a remote location, saving time and money.

For the average user, though, the model could become a compass. If lost in Rome, you could take a picture of a monument with your cell phone. "Not only would you get information about that monument," Frahm says, "but it could also tell you your location more precisely than even GPS."

Jan-Michael Frahm is a research assistant professor of computer science in the College of Arts and Sciences. He collaborated with assistant professor Svetlana Lazebnik and Marc Pollefeys, a professor at ETH-Zurich and an adjunct professor at UNC. They received funding from the U.S. Navy, U.S. Department of Energy, National Science Foundation, Office of Naval Research, Lockheed Martin, and computer graphics firm NVIDIA.

JAN-MICHAEL FRAHM

CAROLINA FINDINGS

A molecule called Wnt1 can increase blood flow to organs that were cut off from circulation. Reef-building corals on the seaward side of Caribbean reefs may be more stressed by climate change and pollutants than are corals closer to shore. Between 1975 and 2007, among white women aged 18 to 44, the overall rate of tongue cancer rose 111 percent. Rates of the disease decreased in African Americans and other racial groups.

Yellowtail snapper. Juvenile fishes were abundant in the Gulf of Mexico four months after the BP oil spill. But long-term health and reproduction rates are still in question. Photo by Joel Fodrie.

AFTER THE SPILL

The fish are all right?

by Mark Derewicz

Chris Baillie hauled the net onto the boat and dumped its contents in front of Joel Fodrie. They spread out the soaked seagrass and spotted an angry stingray, spindly spider crabs, grunting pigfish, and thousands of tiny pinfish, pipefish, puffer fish, starfish, stargazers, mojarra, anchovies, white perch, snapper, trout, and grouper. To Fodrie's surprise, the fish looked fine. And his survey showed that there were millions of them, even in the wake of the worst oil spill in United States history. In fact, some species were more abundant than ever. But will this hold true over the long haul?

Fodrie has been studying seagrass habitats in the northern Gulf of Mexico since 2006, documenting the types of juvenile fish and their population levels each summer. When the BP oil spill happened in April 2010, he and others worried that billions of larvae that floated on ocean currents would be wiped out, devastating fisheries. "That didn't happen," Fodrie says. He checked fish populations in the seagrasses off the coasts of Louisiana, Mississippi, and Alabama in September 2010, and found higher numbers of fish for twelve of the twenty most abundant species than he'd found in the previous four years. He saw no increase or decrease in the other eight species.

"The spotted seatrout and gray snapper—there were millions of them," he says. "Around ten times more than usual." When Fodrie cut some trout open, he found shrimp. When he cut open snapper, he found shrimp, worms, crustaceans, and tiny fish. Everything looked normal. But that doesn't mean that the oil didn't harm any fish—even the species Fodrie studied—or that the future is definitely bright.

Fodrie says the oil may have killed off some unknown number of fish, but because the government shut down commercial fishing throughout the summer—and because some species are usually harvested before they spawn during the summer—there wound up being more juvenile fish present come autumn than in previous years.

What's clear is that the oil spill damaged other habitats, such as salt marshes, oyster reefs, and the seafloor. Marine scientist Pete Peterson says thousands of animals, such as seabirds, sea turtles, and jellyfish, were seriously injured or killed. But the big unknown, he says, involves long-term consequences. Microbes have processed and transformed massive amounts of natural gas and oil. Those organisms make up the bottom rung of the food chain. It's not clear what effect this might have on larger animals, including humans.

"The fish we studied got through the acute phase," Fodrie says. "But oil pollution and oil dispersants can have chronic impacts. They can reduce long-term growth, reproduction, and survivorship rates." For instance, if a fish stays smaller than usual due to oil toxicity, then it will produce fewer eggs. And that would mean fewer fish in the years ahead. "We just don't know yet," he says.

As the fish grow into adults, Fodrie will monitor various species, including species of red snapper, vermilion snapper, and mackerel whose larvae don't wind up in seagrasses. As of last fall, fishers have been filling their nets with some fish species and shrimp, selling them to local restaurants.

"I had seafood twice last September at Dauphin Island, Alabama," Fodrie says. "I know a couple of colleagues who ate cheap seafood all the time last fall. No regrets so far."

Joel Fodrie is an assistant professor in the Institute of Marine Sciences. Chris Baillie graduated from UNC with a biology degree in 2010. Pete Peterson is a distinguished professor of marine sciences at UNC.

If you don't have enough of an enzyme called DOT1L, you could be at risk for some types of heart disease. A protein called ERK is necessary for nerve fibers to be wrapped with an insulating substance called myelin, which allows messages to be sent from the brain to the peripheral limbs and back again. The molecule miR-29 could block the cascade of events that causes brain cells to break down and die. Marriage across racial and ethnic lines has doubled in the U.S. since 1980.

Flags of Libya, Egypt, and Tunisia at a rally in Cairo's Tahrir Square. JOEL CARILLET

DEMOCRACY AND ISLAM

Power to the people

by Mark Derewicz

No one knows what will happen in Tunisia, Egypt, or Libya. But history paints a hopeful picture of how things might go if democratic elections are allowed.

Sociologist Charles Kurzman and grad student Ijlal Naqvi studied eighty-six elections over the past forty years in twenty countries where at least one Islamic party was allowed to partake. "Voters in these places have overwhelmingly turned up their noses at such parties," Kurzman says. Most Islamic parties earned less than 10 percent of the vote. Eighty percent of the Islamic parties got less than 20 percent of the vote. These percentages have barely changed since 2001.

Islamic parties won elections in Algeria in 1991 and the Palestinian territories in 2006. But Kurzman says those are exceptions. "The freer and fairer an election is, the worse the Islamic parties do," he says. That has helped soften party platforms. In countries where more parties are allowed to partake, Islamic parties focus more on women's rights and democracy and less on Sharia and armed jihad. For instance, Morocco's Justice and Development Party and Jordan's Islamic Action Front no longer include Sharia in their platforms. In Egypt the Muslim Brotherhood has eschewed violence and condemned the attacks of September 11, 2001.

Kurzman says that the most radical Islamists don't believe in democracy. Egyptian jihadist Ayman al-Zawahiri has criticized the Muslim Brotherhood for abandoning revolutionary ideology in favor of electoral politics. In Iraq, Islamic revolutionaries have called for the assassination of anyone who participates in the political process.

"Despite threats from terrorists, more and more Islamic parties are entering the electoral process," Kurzman says. But voters still aren't buying what they're selling.

Charles Kurzman is a professor and Ijlal Naqvi is a graduate student, both in the Department of Sociology in the College of Arts and Sciences.

BRAIN SURGERY

Through the nose

By Lauren Russell

Maneuvering through the nose to reach the brain was nothing new in the neurosurgery world. Neither was clipping aneurysms. But when neurosurgeon Anand Germanwala and otolaryngologist Adam Zanation combined the two techniques, they performed the first successful ruptured-aneurysm treatment through a patient's nose in medical history.

In 2009 Afreda Cordero went to her local hospital complaining about the worst headache of her life. She was soon transferred to UNC and given tests confirming that she had two aneurysms, one ruptured. The aneurysms were in the middle of her head and pointing toward her nose.

An aneurysm is a bulge at a weak spot on an artery wall. If the bulge bursts, it can be fatal. "Aneurysms by themselves are pretty rare, and in this location even rarer," Zanation says.

Traditionally, there are two options for treating aneurysms: clips or coils.

Clipping involves cutting out a large portion of the skull and lifting the brain to access the aneurysm. It's the longer-lasting but riskier option, Zanation says. The position of Cordero's aneurysm would have made it difficult to clip using the tried-and-true craniotomy.

The coil option involves feeding a needle through an artery from the groin all the way to the brain. Wire coils fill the aneurysm and cut it off from the artery's blood flow. The method is less invasive than the clipping option but also less durable.

Zanation and Germanwala had worked together many times before to remove brain tumors by going through patients' nasal cavities. Germanwala thought they could access Cordero's aneurysm by removing skull bone behind the nose.

Making it clear that no one had ever done an aneurysm surgery this way before, Germanwala explained what he was thinking to Cordero. The surgery would be less invasive than a craniotomy, and it would use the permanent metal clip to patch up the artery. Cordero agreed to have the surgery.

Two years later, her aneurysms appear to still be in check.

Germanwala hopes the technique will show that there are other ways to cure aneurysms than the traditional craniotomy, as well as give surgeons insight into how to improve other brain surgeries. "We need to constantly challenge ourselves, as surgeons, to contribute to our field while maintaining safety for our patients," he says. "Every once in a while an opportunity presents itself, and we need to be ready for it."

Lauren Russell is a junior majoring in journalism and mass communication.

Adam Zanation is an assistant professor in the Department of Otolaryngology/Head and Neck Surgery, and Anand Germanwala is an assistant professor in the Department of Neurosurgery, both in the School of Medicine. Their study was published in the March 2011 issue of Neurosurgery.

The debilitating diarrhea that occurs as a side effect of the colon cancer drug Irinotecan can be prevented by blocking an enzyme found in our intestinal bacteria.

Sea turtles use the earth's magnetic field as a global GPS. A preventive dental program for preschoolers under age four administered by doctors instead of dentists effectively reduces the need for tooth decay treatment among young children. The size and reach of the online cigarette-sales industry have been reduced

FACULTY COLUMN

Faboosh, Obvi

by Connie Eble

Since 1972, Connie Eble has asked students in her undergraduate English classes to keep track of the slang words they use or encounter regularly. And each semester, Eble compiles a master list. She was kind enough to share her most recent list with Endeavors, *along with her thoughts about how and why slang works.*

Slang is the kind of vocabulary that people create and use to serve their social selves. Its purpose is to establish or strengthen relationships, to show who is *in* as opposed to who is *out*. Slang is filled with words and phrases that evaluate, that judge, that say (sometimes in clever ways) that someone or something is acceptable or unacceptable, valued or not valued, trendy or out-of-date, relevant or irrelevant. This overwhelmingly social function of slang for college students has not changed over the decades. Students' slang vocabularies live entirely apart from their academic pursuits. As a matter of fact, by reading through the list of slang that students are using in any given semester, an unsuspecting outsider may have a hard time recognizing that the main job of the users of these words is getting an education.

An outsider may have a hard time recognizing that the main job of the users of these words is getting an education.

A few slang items hang on for decades (sweet, for example). But most slang words and expressions are like trial balloons and don't last long. In general, the more colorful and clever terms do not have staying power (e.g., **dangling modifier:** a long earring; or **use up all my letters:** to show brilliance, an allusion to Scrabble).

Over the years, terms for sex and drunkenness have always loomed large. Specific drug terms have decreased, though this may simply mean that drugs have become ordinary and mainstream and not fodder for slang. Fraternities and sororities are still the targets that everyone loves to hate, and the image of sorority women in particular has gone from empty-headed husband seekers to promiscuous, calculating materialists. Gays and lesbians have a place in today's college slang that they did not decades ago. College social life is pictured as more raw and focused on short-term, sexual, uncommitted relationships than in the 1970s and 80s. And certainly, terms of fear and suspicion (for example, random, creeper, and stalker) are more prominent than they have ever been. Despite the fact that Carolina has had more female undergraduates than males for thirty years and that today's female students grew up with the benefits of Title IX and other legal advances for women, the image of females in college slang remains overwhelmingly degrading. Judged by their slang, students keep their intellectual and social lives in separate compartments. (Furthermore, faculty members and administrators do not exist and parents exist only to pay the rent.)

Connie Eble is a professor in the Department of English and Comparative Literature in the College of Arts and Sciences.

If it's been a while since you were in school, some of the words from Connie Eble's list of college slang might have you totes confused. But stay pressed: here are a few of our favorite terms from Eble's fall 2010 list.

Alltheist: *all + atheist.* Someone who purports to believe in elements of all religions.

A of all: first. *"A of all, she has no right to keep her food on my shelf."* Not necessarily followed by B of all.

Barley pop: beer.

Basic: ordinary, uncreative, unworthy of attention. *"Did you see her outfit? How basic."*

Bougie: *bourgeois.* Attempting to appear more high class than one is. *"That pocket square is bougie."*

Cake on: flirt with. *"Are you caking on Julie?"*

Chalked: completely exhausted, drained. *"I had two tests and a paper today. I'm chalked."*

Crustache: a thin, poorly groomed moustache.

D.T.R.: *defining the relationship.* Conversation between two people who have been keeping company to assess the future of the relationship. *"I think we need to d.t.r.."*

Faboosh: fabulous or very attractive, usually applied to clothing. *"She knows what flatters her body shape, so she always looks faboosh."*

First pizza place, second pizza place, third pizza place: pizza restaurants on Franklin St. designated by their order in proximity to the courthouse on the corner of Henderson Street. *"I'll meet you after class at the second pizza place."*

Friend crush: desire to be the friend of someone admirable. *"She's the best. I have the biggest friend crush on her."*

I smell what you're stepping in: I understand. *"I smell what you're stepping in, dude."*

Intexticated: *intoxicated + text.* Completely engrossed in texting and not paying attention to one's surroundings. *"She was driving while intexticated."*

Jeggings: *jeans + leggings.* Jeans that are skin-tight from hips to ankles. *"Those jeggings look gross. She does not need to be wearing them."*

N.B.D.: *no big deal.* Often used sarcastically after reporting something very good or very bad. *"I was late for work, missed my exam, and my boyfriend broke up with me. N.B.D."* or *"I just got Roy Williams' autograph. N.B.D."*

Obvi: obvious(ly). *"Pizza is my favorite food, obvi."*

Penalty box: the back of a car where there are no seats. *"Seven people squeezed into the car, and Josh and Jack were forced to sit in the penalty box."*

Shut the front door: I'm shocked. *"When I told Katie I had gotten a tattoo over the weekend, she shouted, 'Shut the front door!'"*

Skittle: a small colorful car, especially a Plymouth Neon.

Slash: spoken version of the written forward slash symbol (/). *"I don't like Julie. Slash. I want to rip her hair out."*

Snatch wigs: perform better than rivals. *"Nintendo continues to snatch wigs—Sony and Microsoft aren't ready."*

Stay pressed: pay close attention.

Totes: totally entirely, completely. *"I am totes ready to graduate."*

by bans on using credit cards to pay for cigarettes online and bans on commercial shippers delivering cigarettes. The number of attempted or actual terrorist acts by American Muslims dropped from forty-seven perpetrators and suspects in 2009 to twenty in 2010. Men are more willing to receive human papillomavirus vaccine when they learn it can prevent cancer. More than half of the nation's population growth during the past decade occurred in southern states.

Fredd, Albert Pearson, Kevin Kaiser, Kenny Faust, and Richard Boeck) Joe Gonzales (Donald Rains) Larry Gene Bell (Sherri Fay Smith and Debra Helmick) John Earl Bush (Frances Julia Slater) Larry Lonchar (Charles Sweat and Steven Smith) Doyle Cecil Lucas (Bill and Evelyn Reyfield) Ellis Wayne Felker (Evelyn Joy Ludlam) Ronald Bennett (Anne Keller Vaden) Frank Middleton (Shirley Mae Mack) Gregory Beaver (Leo Whitt) John Mills, Jr. (Les Lawhon) Larry Stout (Jacqueline Kooshian) Richard Zeitvogel (Gary Wayne Dew) Lem Tuggle (Jessie Geneva Havens) Ronald Hoke (Virginia Stell) **1997** Paul Ruiz (Marvin Richie and Opal James) Earl Von Denton (Marvin Richie and Opal James) Kirt Wainwright (Barbara Smith) Billy Wayne Waldrop (Thurman Donahoo) Randy Greenawalt (John, Donnelda, and Chris Lyons and Theresa Tyson) Eric Schneider (Richard Schwendeman and Ronald Thompson) Michael Carl George (Alexander Sztanko) Richard Brimage, Jr. (Mary Beth Kunkel) Coleman Wayne Gray (Richard McClelland) John Barfield (Cindy Rounseville) Pedro Medina (Dorothy James) David Herman (Jennifer Bums) David Spence (Jill Montgomery, Kenneth Franks, and Raylene Rice) Billy Joe Woods (Mabel Ehatt) Benjamin Boyle (Gail Lenore Smith) John Ashley Brown, Jr. (Omer Laughlin) Kenneth Gentry (Jimmy Dean Ham) Ernest Baldree (Homer and Nancy Howard) Walter Hill (Willie Mae Hammock and John and Lois Tatum) Terry Washington (Beatrice Huling) Scott Carpenter (A.J. Kelley) Anthony Westley (Frank Hall) Harry Moore (Thomas Lauri and Barbara Cunningham) Clifton Belyeu (Melodie Bolton) Richard Drinkard (Ladean Hendrix, Lou Ann Anthony, and Jerry Mullins) Clarence Lackey (Toni Dianne Kumpf) Bruce Callins (Allen Huckleberry) Larry White (Elizabeth St. John) Robert Madden (Herbert and Don Megason) Patrick Rogers (David Roberts) Kenneth Harris (Lisa Stonestreet) Davis Losada (Olga Lidia Perales) Dorsie Lee Johnson (Jack Huddleston) Henry Hay (Michael Donald) Earl Behringer (Daniel Meyer and Janet Hancock) Michael Elkins (Patrica Whitt) David Stoker (David Manrique) Eddie Johnson (David Magee, Virginia Cadena, and Elizabeth Galvan) Ireneo Montota (John Kilheffer) William Worakeck (Linda Leslie) Harold McQueen (Rebecca O'Hearne) Flint Gregory Hunt (Vincent Adolfo) Roy Bruce Smith (John Conner) Joseph O'Dell (Helen Schartner) Bobby West (Deanna Klaus) Eugene Wallace (Perry Kenneth Staton and Suzanne Staton-Ware) Ralph Feltrop (Barbara Ann Roam) Donald Reese (James Watson, Christopher Griffith, John Burford, and Don Vanderlinden) Carlton Jerome Pope (Cynthia Gray) Andrew Six (Kathy Allen) James Carl Lee Davis (Yvette, Tony, and Tyran Johnson) Mario Murphy (James Radcliff) Jessel Tumer (Charles Hunter) Sam McDonald (Robert Jordan) Benjamin Stone (Patsy Stone and Katha Lynn Van Coney) Johnny Cocrum (Eva May) Dwight David Adanandus (Vemon Hanan) Ricky Green (Steven Fefferman) Gary Lee Davis (Virginia May) Alan Bannister (Darrell Ruestman) Kenneth Ray Ransom (Roddy Harris, Arnold and Joerene Pequono, and Anil Varughese) Aua Lauti (Tara Lauti) Aaren Lee Fuller (Loretta Stevens) Earl Matthews (Lucia Aimar) Dawuud Mu'Min (Gladys Nopwasky) Walter Stewart (Thomas Paviopoulos and Dinalo Rodica) Durlyn Edmonds (Richard Lee Miller) Michael Eugene Sharp (Brenda Broadway and Christie Elms) Gary Burris (Kenneth Chambers) Charles Livingston (Janet Caldwell) Robert E. Williams (Catherine Brook, Patricia McGarry, and Virginia Rowe) Michael Lockhart (Paul Holsey, Jr.) Michael Satcher (Ann Borchesani) Thomas Beavers (Marguerite Lowery) **1998** Lloyd Wayne Hampton (Roy Pendleton) Jose Ceja (Linda and Randy Leon) Robert A. Smith (Michael Wedmore) Ricky Lee Sanderson (Sue Ellen Holliman) Karla Faye Tucker (Jerry Lynn Dean and Deborah Thornton) Steven Renfro (Rhena Fultner, Rose Rutledge, George Counts) Tony Mackall (Mary Elizabeth Dahn) Michael Edward Long (Sheryl and Andrew Graber) Terry Allen Langford (Ned and Celene Blackwood) Reginald Powell (Freddie and Arthur Miller) John Arnold (Betty Gardner) Jerry Lee Hogue (Jayne Markham) Douglas Buchanon, Jr. (Donald, Joel, Jerry, Geraldine, and Douglas Buchanon, Sr.) Gerald Stano (Cathy Lee Scharf) Leo Jones (Thomas Szafranski) Milton Griffin-El (Jerome Redden) Ronald Watkins (William McCauley) Judy Buenoano (James Goodyear) Daniel Remeta (Mehrle Reeder, Linda Marvin, Larry McFarland, and Glenn Moore) Angel Breard (Ruth Dickie) Glennon Paul Sweet (Russell Harper) Jose Villafuerte (Amelia Shoville) Joseph Cannon (Anne Walsh) Lesley Lee Gosch (Rebecca Jo Patton) Arthur Ross (James Ruble) Frank McFarland (Terri Lynn Hokanson) Steven Thompson (Robin Balarzs) Robert Anthony Carter (Sylvia Reyes) Pedro Muniz (Janis Carol Bickham) Douglas Gretzler (Michael and Patricia Sandsberg) David Cargill (Cheryl and Danny Williams) Clifford Boggess (Joe Hazelwood and Moses Frank Collier) Johnny Pyles (Ray Edward Kovar) Dennis Wayne Eaton (Judy McDonald, Jerry Hines, Walter Custer, Jr., and Ripley Marston, Sr.) Leopold Narvaiz, Jr. (Shannon, Jennifer, Martha, and Ernest Mann) Wilbur Henderson (Willa Dean O'Neal) John Platt (Betty Gardner) Thomas Thompson (Ginger Fleischli) Danny Lee King (Carolyn Rogers) Stephen Edward Wood (Robert Bruce Brigden) Zane Hill (Randy Hill) Lance Chandler (Billy Dix) Genero Ruiz Camacho (David Wilbum) Johnile DuBois (Philip Council) Delbert Teague, Jr. (Kevin Allen) David Castillo (Clarencio Champion) Kenneth Stewart, Jr. (Cynthia and Jonathan Stewart) Sammy Roberts (Bill Spain, Kenneth Krause, and Louis Cakley) Javier Cruz (Menard Neal and James Ryan) Roderick Abeyta (Donna Martin) Jonathan Nobles (Mitzi Johnson-Nalley and Kelly Farquhar) Jeremy Sagastegui (Kievan and Melissa Sarbacher and Lisa Vera Acevado) Dwayne Allen Wright (Saba Tekla) Ronald Fitzgerald (Coy M. White and Hugh Morrison) Tyrone Gilliam (Christine Doerfler) Kenneth McDuff (Melissa Ann Northrup) Kenneth Wilson (Jacqueline M. Stephens) John Noland (Andy and Troy Milton) Kevin Caldwell (Anthony Brown) Larry Gilbert (Ralph Stoudemire) J. D. Gleaton (Ralph Stoudemire) Daniel Corwin (Alice Martin, Debra Ewing, and Mary Risinger) Jeff Emery (LaShan Muhlinghaus) Tuan Anh Nguyen (Amanda and Joseph While) Louis Truesdale (Rebecca Ann Eudy) James Ronald Meanes (Oliver Flores) John Wayne Duvall (Karla Duvall) Andrew Lavern Smith (Christy and Corrie Johnson) **1999** John Glenn Moody (Maureen Louise Maulden) John Castro, Sr. (Beulah Grace Sissons Cox and Rhonda Pappan) Ronnie Howard (Chinh Thi Nguyen Le) Dobie Gillis Williams (Sonja Knippers) Kelvin Malone (William Parr) Jess James Gillies (Suzanne Rossetti) Troy Farris (Clark Rosenbalm, Jr.) Mark Arlo Sheppard (Richard and Rebecca Rosenbluth) Joseph Atkins (Karen Patterson and Benjamin F. Atkins) Martin Sauceda Vega (James William Mims) Darick Gerlaugh (Scott Schwartz) Sean Sellers (Paul and Vonda Bellofatto) Tony Leslie Fry (Leland A. Jacobs) Jaturun Siripongs (Packovan Wattanaporn and Quach Nguyen) George Cordova (Jose Hernandez) Danny Lee Barber (Janice Louise Ingram) Johnie Michael Cox (Marie Sullens and Margaret and Billy Brown) Andrew Cantu (Billy Mack and Gene and Helen Summers) Wilford L. Berry, Jr. (Charles Mitroff) James Edward Rodden (Terry Trunnel and Joseph Arnold) Norman Evans Green (Timothy Adams) Karl LaGrand (Kenneth Hartsock) Walter LaGrand (Kenneth Hartsock) George Quesinberry, Jr. (Thomas L. Haynes) Roy Michael Roberts (Tom Jackson) Andrew Kokoraleis (Lorraine Ann Borowski) Charles Rector (Carolyn Kay Davis) David Lee Fisher (David William Wilkey) James David Rich (Paul Gwyn) Robert Excell White (Preston Broyles, Gary Coker, and Billy St. John) Alvaro Calambro (Peggy Crawford and Keith Christopher) Marion Pruett (Bobbie Jean Robertson) Carl H. 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DEATHWATCH

Are capital punishment's days numbered?

by Susan Hardy

"Are you in favor of the death penalty for a person convicted of murder?"

For the past decade, about two out of three people in the United States have said yes, they are. But at the same time, the death penalty has been on the decline. In 2000, 224 people were sentenced to death in the United States. In 2010, half as many were given death sentences.

On a basic level, the moral conversation about the death penalty hasn't changed. A majority of people think that death is the only just punishment for the most horrific of crimes. Others think exacting payment for a murder with yet another killing is moral nonsense.

It could be that neither of these two arguments will ever win out over the other. But the ethical stalemate may not matter as much as we think. While the debate goes on, researchers are finding out why the death penalty—right or wrong—is fading away. Capital punishment in the United States could disappear, they say, regardless of what anyone believes about an eye for an eye.

All through the 1990s, the number of annual executions in the United States was on the rise, climbing from twenty-three in 1990 to a peak of ninety-eight in 1999. Four of the prisoners executed in 1999 were from North Carolina, making the state sixth (tied with South Carolina) in number of executions carried out that year. Two of the men executed in North Carolina were white and two were black. But all five of the murder victims in those cases were white.

That same year, UNC law professor Jack Boger decided to find out if race was playing a role in death penalty cases in North Carolina. Before coming to UNC, Boger had litigated capital punishment cases—one of them, *McCleskey v. Kemp*, was heard by the U.S. Supreme Court. Warren McCleskey, a black man, had been convicted of killing a white police officer in Fulton County, Georgia, in 1978. In McCleskey's final appeal to the Supreme Court, Boger used a 1970s study showing that a Georgia defendant was much more likely to receive the death penalty if the victim in the case was white than if the victim was black, and that black defendants were more likely in general to receive the death penalty. The Supreme Court, split 5-4, upheld McCleskey's sentence because the defense hadn't proved that there were racial factors at work in McCleskey's particular case. In 1991, McCleskey was executed, thirteen years after the Georgia officer's murder.

But Boger didn't give up. He wanted another study like the one in Georgia, but this time in North Carolina and covering more recent cases. So in 1999 he brought the idea to Isaac Unah. Unah, a UNC political scientist, had never been involved with death penalty issues, but he had the training in data collection and analysis to head up a study of the almost four thousand homicide cases that took place in North Carolina between 1993 and 1997.

Eight new graduates from UNC's School of Law studied newspaper articles, visited courthouses, and interviewed defense attorneys and prosecutors all over the state about murder trials they had participated in. The group gathered data on everything from the evidence police had collected about crimes to the political leanings of the counties where the cases were tried to the dates when prosecutors were coming up for election.

Isaac Unah found that the main thing that mattered was the victim's race. Juries came down harder when the victim of a crime was white.

The goal, Unah says, was to find out whether and how race played a part at each stop on the road to a death sentence: the prosecution's choice to seek the death penalty, the plea bargaining stage, the trial itself, the verdict, and the sentencing. This was unusual; most studies of race and the death penalty had looked only at the final outcome.

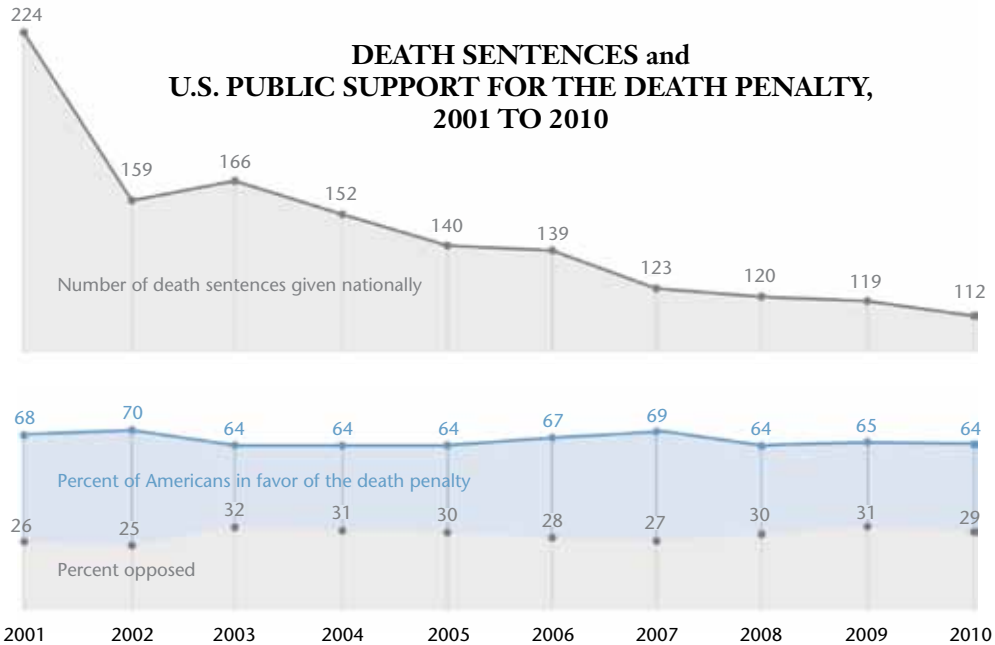
They found that a defendant's race sometimes does matter. The cases most likely to end in a death sentence were the ones where a black defendant was on trial for murdering a white victim. But the main thing that mattered was the *victim's* race. A defendant accused of killing a white person faced odds of getting a death sentence that were 3.5 times higher than those for a defendant accused of killing a nonwhite person. And it wasn't the prosecutors being racially biased—it was juries who came down harder when the victim of a crime was white.

After the study came out in 2001, some activists immediately called for a death penalty moratorium in North Carolina. Boger did as well. In 2002, the N.C. General Assembly considered the first version of a Racial Justice Act bill, backed by Unah and Boger's study. It failed, and it would fail whenever it was introduced for several years to come.

While all this was happening, Frank Baumgartner, also a political scientist, was studying how public policies change. Sometimes, he says, laws and government policies change slowly and steadily, but sometimes they can move so fast it seems like the change happens overnight. What he's most interested in is figuring out how the national conversation about a topic can suddenly take off in a new direction—not necessarily because the facts have changed, but because the issue is being talked about in a different way. This is what happened to the death penalty.

It's sort of like what happened with nuclear power, Baumgartner says. "In the 1950s and 60s, nuclear power was seen as having the potential to save humankind. It would produce so much energy so cheaply, it wouldn't be worth the cost to meter it." And then, just like that, around 1968 the public discussion flipped. "Suddenly," Baumgartner says, "it was all about mushroom clouds, danger, radioactivity, health risks to workers at the power plants and to people who lived near the plants."

In the 1990s, he says, capital punishment seemed unstoppable. More and more people were getting death sentences. Politicians were spreading the "tough on crime" message. Newspapers were full of uncritical accounts of death penalty cases, focusing on the lives of the victims and the horrific details of the crimes. When exonerations of



SOURCES: GALLUP'S ANNUAL CRIME SURVEY (NOVEMBER 2010) AND WWW.DEATHPENALTYINFO.ORG. GRAPHICS: JASON SMITH

convicted murderers happened, they weren't talked about much, Baumgartner says. "Back then, people who were working against the death penalty didn't want press coverage," he says. "They knew that what the papers said would be horrible for their clients. It was like opposing a freight engine—you might as well just get out of the way."

Then, one day in 2002, someone asked Baumgartner how to go about reframing public perception of the death penalty. It doesn't really work that way, Baumgartner told him. Framing can't be controlled by one person or one activist group—it happens when a lot of factors come together at once.

But the idea of studying the death penalty intrigued him. Unlike a lot of public policy issues, the death penalty has straightforward outcomes you can count: numbers of death sentences and executions. That appeals to someone who would rather point to hard data than sit around discussing theory.

Baumgartner got on the train at the right time: in 2002, public discussion about the death penalty had just flipped, the same way that nuclear power had. What once seemed a sure thing was now fraught with questions. Were innocent people being executed? Was race a factor in convictions? How could a defendant be found guilty beyond a reasonable doubt, only to be exonerated through DNA evidence years later?

In 2002, public discussion about the death penalty had just flipped, the same way that nuclear power had.

"A snowball effect happened," Baumgartner says. "When bad news started, it accelerated." There wasn't some meeting where activists against the death penalty got together and decided to change how the United States was talking about the death penalty, he says. But it happened anyway.

Baumgartner and an undergraduate student, Cheryl Feeley, started analyzing every *New York Times* article between 1960 and 2000 that had to do with the death penalty. This eventually turned into a book-length project, *The Decline of the Death Penalty and the Discovery of Innocence*, which traces the downward trend not to the activism of politicians, lawyers, or prosecutors, but to the way the issue is talked about in society at large.

Arguments about the morality of the death penalty have always dominated the discussion, Baumgartner says. But at the end of the twentieth century, other arguments started getting more air time in the media. (His team compared their *New York Times* data with ten other national publications, he says, and all of them had similar death penalty coverage.) New DNA evidence coming out of old cases made it crystal-clear that some people who end up on death row are innocent. Articles about the possibility of innocent inmates and the constitutionality of the death penalty showed up more and more often starting late in the 1990s. When a wrongful conviction was discovered, the media paid a lot more attention than before. An exoneration didn't just mean it was one convict's lucky day—it was a sign that something major wasn't working in the death penalty system.

These articles didn't have immediate effects on public opinion. But they did seem to have a huge effect on juries. Positive articles about the death penalty meant more death sentences over the next several years, and negative articles meant fewer death sentences. These framing effects were

Cornel Cooks (Jennie Elva Ridling) David Rocheville (Todd Green) David Long (Donna and Dalpha Jester and Laura Lee Owens) Bobby Lynn Ross (Steven Mahan) D.H. Fleenor (Bill and Nyla Harlow) James Beathard (Marcus Hathorn) Andre Graham (Sheryl Stack) Robert Atworth (Thomas Carlson) Sammie Felder, Jr. (James Hanks) **2000** Malcolm Rent Johnson (Ura Alma Thompson) David Ray Duren (Kathleen Bedsole) Douglas Christopher (Thomas James and Baxter and Kathy Wiseman) Earl Carl Heiselbetz, Jr. (Rena and Jacy Rogers) Gary Alan Walker (Eddie O. Cash) Steve Edward Roach (Mary Ann Hughes) Spencer Goodman (Cecile Ham) David Hicks (Ocolor Hegger) Larry Keith Robison (Rickey Lee Bryant, Georgia Ann Reed, Scott Reed, Earline Barker, and Bruce Gardner) Billy George Hughes, Jr. (Mark A. Frederick) Glen McGinnis (Leta Ann Wilkerson) James Moreland (Clinton Corbet Abbott and John Royce Cravey) Michael D. Roberts (Lula Mae Brooks) Anthony Lee Chaney (John B. Jamison) Terry Melvin Sims (George Pfeil) Cornelius Goss (Carl Leevy) Anthony Bryan (George Wilson) Betty Lou Beets (Jimmy Don Beets) Odell Barnes, Jr. (Helen Bass) Freddie Lee Wright (Warren and Lois Green) Ponchai Wilkerson (Chung Myong Yi) Darrell Keith Rich (Annette Edwards, Patricia Moore, Linda Slavik, and Annette Selix) Patrick Poland (Cecil Newkirk and Russell Dempsey) Timothy Lane Gribble (Elizabeth Jones and Donna Weis) Lonnie Weeks, Jr. (Jose M. Cavazos) James Henry Hampton (Frances Keaton) Kelly Lamont Rogers (Karen Marie Lauffenburger) Robert Lee Tarver, Jr. (Hugh Kite) Robert Glen Coe (Cary Ann Medlin) Ronald Keith Boyd (Richard Oldham Riggs) Christina Marie Riggs (Justin and Shelby Alexis Riggs) Tommy Ray Jackson (Rosalind Robison) William Kitchens (Patricia Webb) Michael Lee McBride (Christian Fisher and James Holzer) James Richardson (Gerald Abay) Richard Foster (Gary Cox) Charles Foster (Claude Wiley) James Clayton (Lori Barrett) Robert E. Carter (Bobbie, Nicole, Denitra, Lea, Brittany, Erin, and Jason Davis) James Robedeaux (Nancy Rose Lee McKinney) Pernell Ford (Linda Gail and Willie Griffith) Feltus Taylor (Donna Ponsano) Bennie Demps (Alfred Sturgis) Roger James Berget (Rick Patterson) Thomas Wayne Mason (Marsha Brock and Sybil Dennis) John Albert Burks (Jesse Contreras) William Clifford Bryson (James Plantz) Paul Nuncio (Pauline Farris) Thomas Provenzano (William Arnie Wilkerson) Gary Graham (Bobby Lambert) Bert Hunter (Mildred and Richard Hodges) Jessy Carlos San Miguel (Michael Phelan, Truong Nguyen, and Theresa and Frank Fraga) Michael D. Clagett (Karen Sue Rounds, Lam Van Son, Wendel Parrish, Jr., and Abdelaziz Gren) Orien Cecil Joiner (Carole Huckabee and Eva Marie DeForest) Gregg Francis Braun (Gwendolyn Sue Miller) Juan Soria (Allen Bolden) Brian Roberson (Lillian and James Boots) Oliver Cruz (Kelly Donovan) George Wallace (Mark McLaughlin and William Domer) John Satterwhite (Mary Davis) Richard Wayne Jones (Tammy Livingston) David Gibbs (Marietta Bryant) Dan Houser (Melanie Rodrigues) Gary Lee Roll (Sherry, Randy, and Curtis Scheper) Jeffery Caldwell (Kimberly, Gwendolyn, and Henry Caldwell, Jr.) Russel Burket (Ashley and Katherine Tafelski) George Harris (Stanley Willoughby) Derek Barnabei (Sarah Wisnosky) Ricky McGinn (Stephanie Flanary) Bobby Lee Ramdass (Mohammad Kayani) Jeffrey Dillingham (Caren Koslow) Kevin Dean Young (Dennis Hepler) Donald Miller (Jennifer Geudner) Michael Sexton (Kimberly Crews) Miguel Flores (Angela Marie Tyson) Stacey Lawton (Dennis Price) James Chambers (Jerry Oestricker) Tony Chambers (Carenthia Bailey) Dwayne Weeks (Gwendolyn Weeks and Craig Williams) Garry Miller (April Marie Wilson) Daniel Hittle (Gerald Walker) Christopher Goins (Robert Jones) Edward Castro (Austin Scott) Claude Jones (Allen Hilzendager) David Johnson (Leon Brown) **2001** Jack Wade Clark (Melisa Ann Garcia) Eddie Trice (Ernestine Jones) Robert Glock (Sharilyn Ritchie) Wanda Jean Allen (Gloria Leathers) Floyd Medlock (Katherine Busch) Alvin Goodwin (Douglas Tillerson) Dion Smallwood (Lois Frederick) Mark Fowler (John Barrier, Rick Cast, and Chumpon Chaowasin) Billy Ray Fox (John Barrier, Rick Cast, and Chumpon Chaowasin) Caruthers Alexander (Lori Bruch) Loyd Lafevers (Addie Hawley) D.L. Jones (Stanley Buck, Sr.) Stanley Lingar (Thomas S. Allen) Adolph Hernandez (Elizabeth Alvarado) Thomas Akers (Wesley Smith) Robert Clayton (Rhonda Timmons) Dennis Dowthitt (Grace Purnhagen) Willie Fisher (Angela Johnson) Gerald Bivins (William Radcliffe) Robert Massie (Boris Naumoff) Ronald Fluke (Ginger, Kathryn, and Sue Fluke) Tomas Ervin (Mildred and Richard Hodges) Jason Massey (Christina Benjamin and James King) Sebastian Bridges (Hunter Blatchford) Mose Young, Jr. (Kent Bicknese, James Schneider, and Sol Marks) David Goff (Michael McGuire) David Dawson (Madeline Kisner) Marilyn Plantz (Jim Plantz) Clay King Smith (Misty Erwin; Shelley, Sean, and Taylor Sorg; and Samantha Rhodes) Terrance James (Mark Berry) Samuel Smith (Marlin May) Abdullah Hameen (Troy Hodges) Vincent Johnson (Shirley Mooneyham) Timothy McVeigh (Mickey Maroney, Donald Leonard, Alan Whicher, Claude Medearis, Paul Ice, Cynthia Campbell-Brown, Paul Broxterman, and Kenneth McCullough) John Wheat (Lacey Anderson) Jay Scott (Vinney Price) Juan Raul Garza (Thomas Rumbo) Miguel Richardson (John Ebbert) Jim Lowery (Gertrude and Mark Thompson) Jerome Mallett (James Froemsdorf) James Wilkens, Jr. (Larry McMillan, Jr. and Rich Wood) Jerald Harjo (Ruth Porter) Mack Oran Hill (Donald Johnson) Jeffery Doughtie (Sylvia and Jerry Dean) Clifton White (Kimberly Ewing) James Elledge (Eloise Fitzner) Jack Dale Walker (Shelly Ellison and Don Epperson) Ronald Frye (Ralph Childress) James Roy Knox (Joe Sanchez) Michael Roberts (Mary Taylor) David Junior Ward (Dorothy Mae Smith) Christopher Beck (Florence Marks, William Miller, and David Kaplan) Alvie Hale (William Perry) Gerald Mitchell (Charles Marino) Stephen Johns (Don Voepel) Terry Mincey (Paulette Riggs) Jose High (Bonnie Bulloch) Terry Clark (Dena Lynn Gore) Fred Gilreath (Linda Gilreath and Gerrit Van Leeuwen) Jeffery Tucker (Wilton Humphreys) Emerson Rudd (Steve Morgan) John Hardy Rose (Patricia Stewart) Lois Nadean Smith (Cindy Baillie) Sahib Al-Mosawi (Inaam and Mohammad Al-Nashi) Byron Parker (Christie Ann Griffith) Vincent Cooks (Gary McCarthy) **2002** James Johnson (Les Roark, Pam Jones, Gharles Smith, and Sandra Wilson) Michael Moore (Christa Bentley) Jermarr Arnold (Christina Sanchez) Ronald Spivey (Billy Watson) Stephen Anderson (Elizabeth Lyman) John Romano (Roger Sarfaty) Windell Broussard (Dianna Broussard and Corey Harris) Randal Hafdahl (James Mitchell) David Woodruff (Roger Sarfaty) Michael Owsley (Elvin Iverson) John Byrd (Monte Tewksbury) Monty Delk (Gene Allen II) Jeffrey Tokar (Johnny Douglass) Gerald Tigner (James Williams and Michael Watkins) Tracy Housel (Jean Drew) James Patterson (Joyce Aldridge) Daniel Zirkle (Jessica Shifflett and Christina Zirkle) Paul Kreutzer (Louise Ann Hemphill) Jose Santellan (Yolanda Garza) William Burns (Johnny Lynn Hamlett) Gerald Casey (Sonya Howell) Alton Coleman (Marlene Walters) Rodolfo Hernandez (Victor Cervan) Richard Johnson (Bruce Smalls) Reginald Reeves (Jenny Lynn Weeks) Lynda Block (Roger Motley, Jr.) Leslie Martin (Christina Burgin) Ronford Styron, Jr. (Lee Styron) Johnny Martinez (Clay Peterson) Napoleon Beazley (John Luttig) Stanley Baker, Jr. (Wayne Walters) Walter Mickens (Timothy Jason Hall) Daniel Reneau (Kriss Keeran) Robert Coulson (Sarah, Mary, and Otis Coulson and Robin and Richard Wentworth) Jeffrey Williams (Barbara Pullins) Tracy Hansen (David Ladner) Randall Cannon (Addie Hawley) Earl Frederick, Sr. (Bradford Lee Beck) Richard Kutzner (Kathryn Harrison) T.J. Jones (Willard Davis) Javier Suarez Medina (Lawrence Cadena) Daniel Basile (Elizabeth DeCaro) Wallace Fugate III (Pattie Fugate) Gary Etheridge (Christie Chauviere) Anthony Green (Susan Babich) Toronto Patterson (Ollie and Jennifer Brown and Kimberly Brewer) Tony Lee Walker (Virginia and Willie Simmons) Michael Passaro (Maggie Passaro) Jessie Patrick (Nina Redd) Ronald Shamburger (Lori Baker) Rex Mays (Kynara Carreiro and Kristin Wiley) Robert Buell (Krista Harrison) Calvin King (Billy Wayne Ezell) James Powell (Falyssa Van Winkle) Rigoberto Sanchez-Velasco (Katixa Ecenarro) Aileen Wuornos (Richard Mallory) William Putman (Katie and David Hardin) Mir Aimal Kasi (Frank Darling and Lansing Bennett) Craig Ogan James Boswell) William Jones (Stanley Albert) William Chappell (Alexandra Heath, Martha Lindsey, and Elbert Sitton) Leonard Rojas (Jo Ann Reed, David Rojas) Ernest Basden (Billy White) Linroy Bottoson (Catherine Alexander) Desmond Carter (Helen Purdy) Jerry Lynn McCracken (Steve Smith, Tyrell Boyd, Tim Sheets, and Carol Ann McDaniels) James Collier (Gwendolyn and Timothy Reed) Jessie Williams (Karon Ann Pierce) Jay Neill (Jeri Bowles, Kay Bruno, Joyce Mullenix, and Robert Zeller) Anthony Johnson (Kenneth Cantrell) Ernest Carter (Eugene Manowski) **2003** Samual

much better at predicting death sentences than other factors social scientists have used to try to explain why people get sentenced to death. A rise in the national homicide rate, for example, is known to make juries more likely to give the death penalty. But the researchers found that the tone of media coverage was much more significant than how homicide numbers were moving.

"It's not that we think juries are sitting down and reading the *New York Times* or any one of these articles," Baumgartner says. "But we think those arguments find their way into the things that the juries are thinking about, the lawyers' closing arguments, how the prosecutors make their case. It gets out there."

Baumgartner looked at the effects of framing on public opinion of the death penalty, too. The influence was there and it went in the direction they expected—media coverage predicted public opinion much more strongly than public opinion predicted media coverage—but the effect was modest and slow. Changing public opinion is tough, Baumgartner says, because people hold on tightly to their moral beliefs.

North Carolina politicians might not really have changed their minds about the morality of the death penalty, Unah says. But after his and Boger's 2001 study of race and death sentences, more research started piling up.

Issac Unah (left) and Frank Baumgartner. "My results have been kind of unwelcome in the legal community," Baumgartner says. "Lawyers like to think that the law's the law—that it's about whether capital punishment is legal or not. But social framing matters." Photo by Donn Young.

"The one really consistent finding in all those studies," Unah says, "whether they're done in the South, in the North, in the East, using a large sample or a small sample, is that defendants who kill white people come out significantly worse." They are more likely to receive death sentences and more likely to have those sentences carried out. Eventually, he says, the weight of evidence for that conclusion convinced N.C. legislators to pass the Racial Justice Act in 2009.

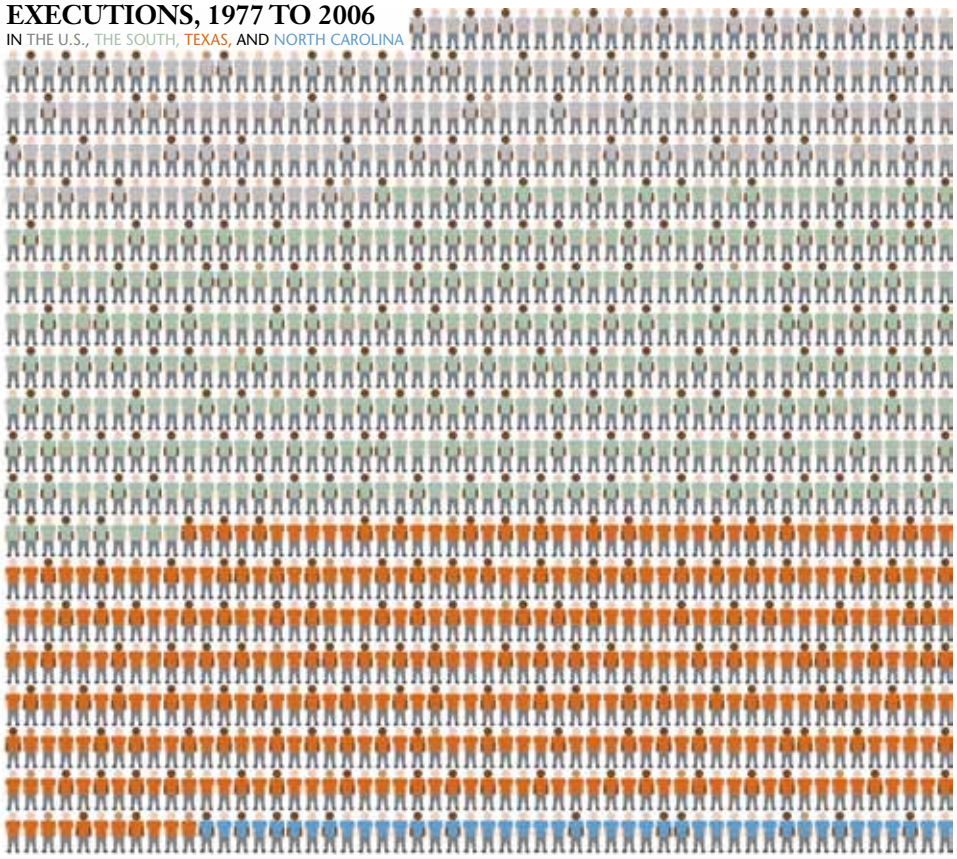
"I have always been a supporter of the death penalty," Governor Beverly Perdue said when she signed the act into law. "But I have always believed it must be carried out fairly."

Under the Racial Justice Act, inmates on North Carolina's death row can have their sentences reduced to life in prison if they can show that in North Carolina racial bias is involved in the death penalty. Almost all the inmates have appealed, and many of their lawyers have asked Unah for statistics.

Republican Party legislators elected in 2010 have said they'll try to repeal the Racial Justice Act. That might not affect the cases already under appeal. "Unless," Unah says, "the legislation is written in such a way that it puts an immediate stop to all appeals. There is precedent for that. A legislature can remove jurisdiction of a judge to make a decision on a certain case."

He hopes that won't happen. He thinks the Racial Justice Act is a first step in addressing the systematic problems underlying the death penalty in North Carolina. It starts long before a jury decides the sentence, Unah says. Studies show that when police are

EXECUTIONS, 1977 TO 2006
IN THE U.S., THE SOUTH, TEXAS, AND NORTH CAROLINA



EXECUTIONS, 1977–2006	TOTAL	% OF TOTAL	WHITES	BLACKS	OTHER RACES
United States	1,057	—	604 (57%)	360 (34%)	93 (9%)
The South (*including* TX and NC)	843	80%	463 (55%)	300 (36%)	80 (9%)
Texas	379	36%	183 (48%)	135 (36%)	61 (16%)
North Carolina	43	4%	29 (67%)	13 (30%)	1 (2%)

SOURCE: WWW.DEATHPENALTYINFO.ORG. ALL PERCENTAGES ROUNDED. GRAPHICS: JASON SMITH

investigating a murder, they gather more evidence if the victim is white. Killings of black victims aren't investigated as thoroughly. In turn, how much evidence there is and how compelling it seems influences whether a prosecutor will try for the death penalty.

But it isn't just about race. Prosecutors may not be influenced by race in itself, but they *are* influenced by politics. Unah and Boger found that when prosecutors are coming up for reelection, they are more likely to seek the death penalty, because being seen as tough on crime is popular.

"For the process to be fair," Unah says, "you'd have to remove the decision to seek the death penalty from the hands of prosecutors. You could set up an independent group made up of informed citizens who make that decision, completely and solely removed from politics."

When prosecutors are coming up for reelection, they are more likely to seek the death penalty.

As for crime investigation, Baumgartner says, the problem is that investigators work for the accusing side. The dangers of this setup became clear in North Carolina in 2010, when a review of the State Bureau of Investigation turned up more than two hundred cases in which the bureau had withheld or distorted evidence. "If we want a truly neutral system of justice," Unah says, "they would have to be working neutrally, unrelated to either the police or the defense." But that kind of shakeup of the criminal justice system in North Carolina would take a huge amount of money and time, he says, and the political will to do it just isn't there yet.

So what will happen to the death penalty on the national scale? Right now, the idea of innocent people getting executed still dominates the discussion. As long as that's the case, Baumgartner says, death sentences and executions are almost sure to keep declining. In order for the death penalty to make a recovery, the conversation would have to shift away from arguments about innocence and fairness. And there's nothing to say that that won't happen.

It's troubling to think that innocent people might be getting executed. But if the death penalty keeps declining, couldn't there eventually be a backlash, a point where people think: "It's great to know that we're not executing innocent people, but it's coming at the price of executing hardly any guilty people, either"?

"That could happen," Baumgartner says. "But there's another possible scenario. Say the number of death sentences declines and declines and declines, and there get to be more states like North Carolina that have long periods of history with no executions. At that point, a lawyer might be able to argue successfully that it's arbitrary to execute their client because no one's been executed in the last ten years. That would be the definition of unusual punishment."

Gallamore (Verle and Julianna Kenney and Adrienne Arnot) John Baltazar (Adriana Marines) Daniel Revilla (Mark Gomez) Robert Lookingbill (Adeline and Lorenz Dannenberg) Alva Curry (David Vela) Richard Dinkins (Katherine Thompson and Shelly Cutler) Granville Riddle (Ronnie Bennett) John Elliott (Joyce Munguia) Kenneth Kenley (Ronnie Felts) Henry Dunn, Jr. (Nicolas West) Richard Fox (Leslie Keckler) Bobby Joe Fields (Louise Schem) Richard Williams (Jeanette Williams) Amos King (Natalie Brady) Bobby Cook (Edwin Holder) Michael Thompson (Maisie Gray) Louis Jones (Tracie McBride) Walanzo Robinson (Dennis Hill) Keith Clay (Melathethil Varughese) John Hooker (Sylvia Stokes and Drusilla Morgan) Larry Moon (Ricky Callahan) James Colburn (Peggy Murphy) Scott Hain (Michael Houghton and Laura Sanders) Don Hawkins, Jr. (Linda Ann Thompson) Earl Bramblett (Anah, Winter, Teresa, and Blaine Hodges) Larry Jackson (Wendy Cade) Juan Chavez (Jose Morales) Gary Brown (Jack McGraw) David Brewer (Sherry Byrne) Kevin Hough (Ted Bosler and Martin Rubrake) Roger Vaughn (Dora Watkins) Carl Isaacs (Ned, Jerry, Jimmy, Mary, Chester, and Aubrey Alday) Bruce Jacobs (Conrad Harris) Newton Slawson (Glendon, Jennifer, Peggy, and Gerald Wood) Robert Knighton (Virginia and Richard Denney) Kenneth Charm (Brandy Hill) Kia Johnson (William Rains) Joseph Trueblood (Susan and William Bowsher and Ashelyn Hughes) Ernest Martin (Robert Robinson) Lewis Gilbert II (Roxanne Ruddell) Hilton Crawford (McKay Everett) Robert Duckett (John E. Howard) Christopher Black, Sr. (Katrease Houston and Gwendolyn and Christina Black) Riley Noel (Malak and Mustafa Hussain and Marcell Young) Bryan Toles (Juan and Lonnie Franceschi) Bobby Wayne Swisher (Dawn Snyder) Cedric Ransom (Herbert Primm) Jackie Lee Willingham (Jayne Van Wey) Allen Wayne Janecka (Kevin Wanstrath) Harold McElmurry III (Vivian and Robert Pendley) Tommy Fortenberry (Mike Guest, Wilbur Nelson, and Nancy and Bobby Payne) William Jones (Edward Peebles) Paul Hill (John Britton and James Barrett) Larry Hayes (Mary Hayes and Rosalyn Robinson) Henry Hunt (Jackie Ransom and Larry Jones) Joseph Bates (Charles Jenkins) Edward Hartman (Herman Smith, Jr.) John Clayton Smith (Brandie Kearns and Wayne Hoewing) James Willie Brown (Brenda Sue Watson) Joseph Timothy Keel (Johnny Simmons) John Daniels (Isabella Crawford) Robert Henry (Hazel Rumohr and Carol Arnold) Richard Duncan (Ruth and John High) Ivan Murphy, Jr. (Lula Mae Denning) Robbie Lyons (Stephen Stafford) **2004** Ynobe Matthews (Carolyn Casey) Charles Singleton (Mary Lou York) Raymond Rowsey (Howard Sikorski) Tyrone Darks (Sherry Goodlow) Lewis Williams (Leoma Chmielewski) Kenneth Bruce (Helen Ayers) Kevin Zimmerman (Leslie Gilbert Hooks, Jr.) Billy Vickers (Phillip Kinslow) John Glenn Roe (Donette Crawford) Johnny Robinson (Beverly St. George) Edward Lagrone (Shakeisha and Caolo Lloyd and Zenobia Anderson) Bobby Ray Hopkins (Sandi Marbut and Jennifer Weston) Norman Cleary (Wanda Neafus) Todd Willingham (Amber, Karmon, and Kameron Willingham) Marcus Cotton (Gil Epstein) David Jay Brown (Eldon McGuire) Brian Lee Cherrix (Tessa Van Hart) David Clayton Hill (Spencer Guerry) Hung Tranh Le (Hai Nguyen) Lawrence Colwell, Jr. (Frank Rosenstock) William Wickline (Peggy Lerch) Dennis Orbe (Rick Burnett) Jerry McWee (John Perry) Jason Byram (Julie Johnson) Kelsey Patterson (Dorothy Harris and Louis Oates) John Blackwelder (Raymond Wigley) James Neil Tucker (Rosa Lee Oakley) William Zuern (Phillip Pence) Robert Bryan (Mildred Bryan) Steve Oken (Dawn Marie Garvin) David Harris (Mark Mays) Robert Karl Hicks (Toni Rivers) Stephen Vrabel (Lisa and Susan Clemente) Eddie Crawford (Leslie English) Scott Mink (Sheila and William Mink) Mark Bailey (Nathan and Katherine Bailey) James Hubbard (Lillian Montgomery) Terry Dennis (Ilona Strumanis) James Hudson (Walter, Thomas, and Patsy Cole) Jasen Busby (Tennnille Thompson and Brandy Gray) Windel Workman (Amanda Holman) James Allridge (Brian Clendennen) James Reid (Annie Lester) Andrew Flores (John Moreno) David Hocker (Jerry Robinson) Edward Green III (Helen O'Sullivan and Edward Haden) Peter Miniel (Paul Manier) Sammy Perkins (Jo Jo Moore) Donald Aldrich (Nicholas West) Ademy Dennis (Kurt Kyle) Ricky Morrow (Mark Frazier) Charles Roache (Cora, Earl, Katie, Mitzi, and Eddie Phillips) Dominique Green (Andrew Lastrapes, Jr.) Lorenzo Morris (Jesse Fields) Robert Morrow (Lisa Allison) Demarco McCullum (Michael Burzinski) Frederick McWilliams (Alfonso Rodriguez) Frank Ray Chandler (Doris Poore) Anthony Fuentes (Robert Tate) **2005** James Porter (Rudy Delgado) Donald Beardslee (Patty Geddling) Timothy Don Carr (Keith Young) Troy Kunkle (Stephen Horton) Dennis Bagwell (Leona McBee, Reba and Libby Best, and Tassy Boone) Stephen Mobley (John Collins) William H. Smith (Mary Bradford) George Hopper (Rozanne Gailiunas) Donald Wallace, Jr. (Theresa, Lisa, Gregory, and Patrick Gilligan) William Powell (Mary Gladden) Jimmy Ray Slaughter (Melody and Jessica Wuertz) Stanley Hall (Barbara Jo Wood) Glen Ocha (Carol Skjerva) Richard Longworth (Alex Hopps and Todd Greene) Douglas Roberts (Jerry Velez) Bill Benefiel, Jr. (Delores Wells) Donald Jones (Dorothy Knuckles) Mario Centobie (Keith Turner) Lonnie Pursley (Robert Cook) Earl Richmond, Jr. (Helisa, Phillip, and Darien Hayes) George Miller, Jr. (Kent Dodd) Michael Ross (Robin Stavinsky, Leslie Shelley, April Brunais, and Wendy Baribeault) Bryan Wolfe (Bertha Lemell) Vernon Brown (Janet Perkins) Richard Cartwright (Nick Moraida) Gregory Johnson (Ruby Hutslar) Jerry Paul Henderson (Jerry Haney) Alexander Martinez (Helen Oliveros) Robert Conklin (George Crooks) Michael Pennington (Bradley Grooms) Kevin Conner (Steve Wentland, Tony Moore, and Bruce Voge) David Martinez (Kiersa Paul) George Sibley, Jr. (Roger Motley) Gary Sterling (John Carty) Kenneth Turrentine (Anita Richardson) Robert Shields (Paula Stiner) Timothy Johnston (Nancy Johnston) Frances Newton (Adrian, Farrah, and Alton Newton) John Peoples, Jr. (Judy, Paul, and Paul G. Franklin) Herman Ashworth (Daniel Baker) Alan Matheney (Lisa Bianco) Ronald Howard (Bill Davidson) Luis Ramirez (Nemecio Nandin) William Williams, Jr. (William Dent, Eric Howard, Alfonda Madison, and Theodore Wynn) Marlin Gray (Julie and Robin Kerry) Melvin White (Jennifer Gravell) Brian Steckel (Sandra Long) Arthur Wise (Charles Griffeth, David Moore, Leonard Filyaw, and Sheryl Wood) Charles Thacker (Karen Crawford) Steven McHone (Mildred Adams and Wesley Adams, Sr.) Robert Rowell (Raymond Mata and Irvin Wright) Shannon Thomas (Roberto, Victor, and Maria Rios) Elias Syriani (Theresa Syriani) Eric Nance (Julie Heath) John Hicks (Maxine Armstrong and Brandy Green) Kenneth Boyd (Julie Boyd and Thomas Curry) Shawn Humphries (Mendal Smith) Wesley Baker (Jane Tyson) Stanley Williams (Albert Owens, Yen-I Chang, Tsai-Shai Chen Yang, and Yu-Chin Yang Lin) John Nixon, Sr. (Virginia Tucker) **2006** Clarence Allen (Byron Schletewitz, Josephine Rocha, and Douglas White) Perrie Simpson (Jean E. Darter) Marion Dudley (Jessica Quinones, Jose Tovar, Audrey Brown, and Frank Farias) Marvin Bieghler (Kimberly and Thomas Miller) Jaime Elizalde (Juan Guajardo and Marcos Vasquez) Glenn Benner II (Cynthia Sedgwick and Trina Bowser) Robert Neville (Amy Robinson) Clyde Smith David Jacobs) Tommie Hughes (Foluke Erinkitola and Roxanne Mendoza) Patrick Moody (Donnie Robbins) Robert Salazar, Jr. (Adriana Gomez) Kevin Kincy (Jerome Harville) Richard Thornburg, Jr. (James Poteet, Terry Shepard, and Keith Smith) Willie Brown, Jr. (Vallerie Ann Dixon) Daryl Mack (Betty Jane May) Dexter Lee Vinson (Angela Felton) Joseph Clark (David Manning) Jackie Wilson (Lottie Rhodes) Jermaine Herron (Cody and Betsy Nutt) Jesus Aguilar (Annette and Leonardo Chavez, Sr.) John Boltz (Doug Kirby) Timothy Titsworth (Christine Sossaman) Lamont Reese (Anthony Roney, Riki Johnson, and Alonzo Stewart) Angel Resendiz (Claudia Benton) Sedley Alley (Suzanne Collins) Derrick O'Brien (Elizabeth Pena and Jennifer Ertman) Rocky Barton (Kimbirli Barton) William Downs (Keenan O'Mailia) Mauriceo Brown (Michael LaHood, Jr.) Robert Anderson (Audra Reeves) Brandon Hedrick (Lisa Crider) Michael Lenz (Brent Parker) William Wyatt, Jr. (Damien Willis) Darrell Ferguson (Thomas King and Mae and Arlie Fugate) David Dawson (Andrew, Monica, and David Rodstein) Richard Hinojosa (Terry Wright) Samuel Flippen (Britnie Hutton) Justin Fuller (Donald Whittington III) Eric Patton (Charlene Kauer) James Malicoat (Tessa Leadford) Derrick Frazier (Cody and Betsy Nutt) Farley Matchett (Uries Anderson) Clarence Hill (Stephen Taylor) Arthur Rutherford (Stella Salamon) Bobby Wilcher (Katie Belle Moore and Velma Noblin) Jeffrey Lundgren (Dennis, Cheryl, Trina, Rebecca, and Karen Avery) Danny Rolling (Sonja Larson, Christina Powell, Christa Hoyt, Manny Taboada, and Tracy Paules) Greg Summers (Gene, Helen, and Billy Mack Summers) Larry Hutcherson (Irma Gray) Donell Jackson (Mario Stubblefield) Willie Shannon (Benjamin Garza) John Schmitt (Shelton Dunning) Angel Diaz (Joseph Nagy) **2007** Corey Hamilton (Joseph Gooch, Theodore Kindley, Senaida Lara, and Steven Williams) Carlos Granados (Anthony Jiminez) Johnathan Moore (Fabian Dominguez) Christopher Swift (Amy Swift-Sabeh and Sandra Sabeh) James Jackson (Sonnie and Erica Mayes) Newton Anderson (Bertha and Frank Cobb) Donald Miller (Michael Mozingo) Robert Perez (Jose Travieso and James Rivas) Joseph Nichols (Claude Shaffer) Charles Nealy (Jiten Bhakta) Vincent Gutierrez (Jose Cobo) Roy Pippin (Elmer and Fabio Buitrago) James Clark (Catherine Crews) James Filiaggi (Lisa Filiaggi) Ryan Dickson (Carmelo Surace) Aaron Lee Jones (Willene and Carl Nelson) David Woods (Juan Palencia) Philip Workman (Ronald Oliver) Charles Smith (Tim Hudson) Robert Comer (Larry Pritchard) Christopher Newton (Jason Brewer) Michael Griffith (Deborah McCormick) Michael Lambert (Gregg Winters) Lionell Rodriquez (Tracy Gee) Gilberto Reyes (Yvette Barraz) Calvin Shuler (James Brooks) Jimmy Dale Bland (Doyle Rains) Patrick Knight (Mary Ann and Walter Werner) John Hightower (Evelyn and Dorothy Hightower and Sandra Reaves) Elijah Page (Chester Poage) Lonnie Johnson (Sean Schulz and Leroy McCaffrey, Jr.) Darrell Grayson (Annie Laura Orr) Kenneth Parr (Suzie Malek)

The death penalty *has* been ruled unconstitutional once before, in 1972, only to come back four years later. "Capital punishment is allowed under the U.S. Constitution," Unah says. "Will there ever be an amendment to the Constitution outlawing it? Probably not." But the death penalty could be outlawed by the Supreme Court on the grounds that it's just too hard to apply fairly and correctly. "And if state legislatures are unwilling to spend the money to make it better," Unah says, "then what would be the point of having the death penalty?

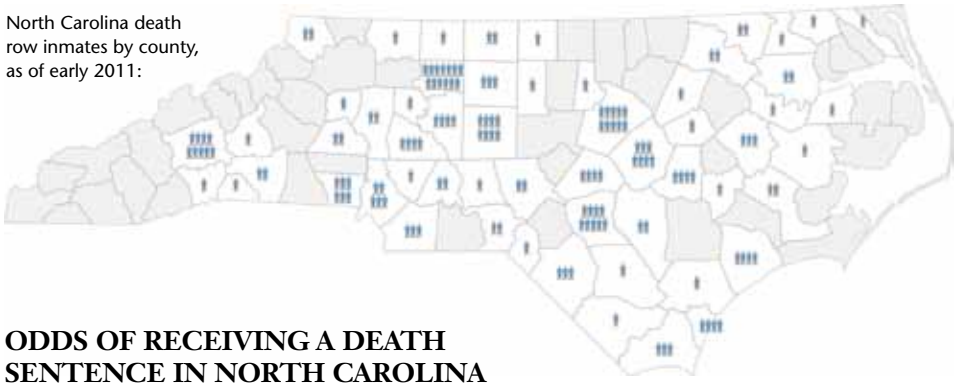
Frank Baumgartner is the Richard J. Richardson Distinguished Professor of Political Science in the College of Arts and Sciences at UNC. He conducted his research with Suzanna De Boef, a professor of political science at Pennsylvania State University, and Amber Boydstun, now an assistant professor of political science at the University of California, Davis. The three wrote The Decline of the Death Penalty and the Discovery of Innocence, *published in 2008 by Cambridge University Press. Isaac Unah is an associate professor of political science in the College of Arts and Sciences at UNC and John Charles Boger is dean of the School of Law. Their study was funded by the Common Sense Foundation.*

DEATH ROW IN NORTH CAROLINA

Number of inmates on death row in North Carolina as of early 2011:

Number who have appealed their sentences under the Racial Justice Act of 2009, as of early 2011:

North Carolina death row inmates by county, as of early 2011:



ODDS OF RECEIVING A DEATH SENTENCE IN NORTH CAROLINA

When compared to a white defendant convicted of killing someone of another race in North Carolina, 1993–1997:

When the defendant was	and the victim was	the odds of receiving a death sentence were:
black or another race	black or another race	1.3 times higher
white	white	3.7 times higher
black or another race	white	8 times higher

SOURCES: NC DEPARTMENT OF CORRECTIONS (N.C. DEATH ROW STATISTICS), UNC'S ISAAC UNAH AND JOHN BOGER, 2001 (SENTENCING CHART). GRAPHICS: JASON SMITH

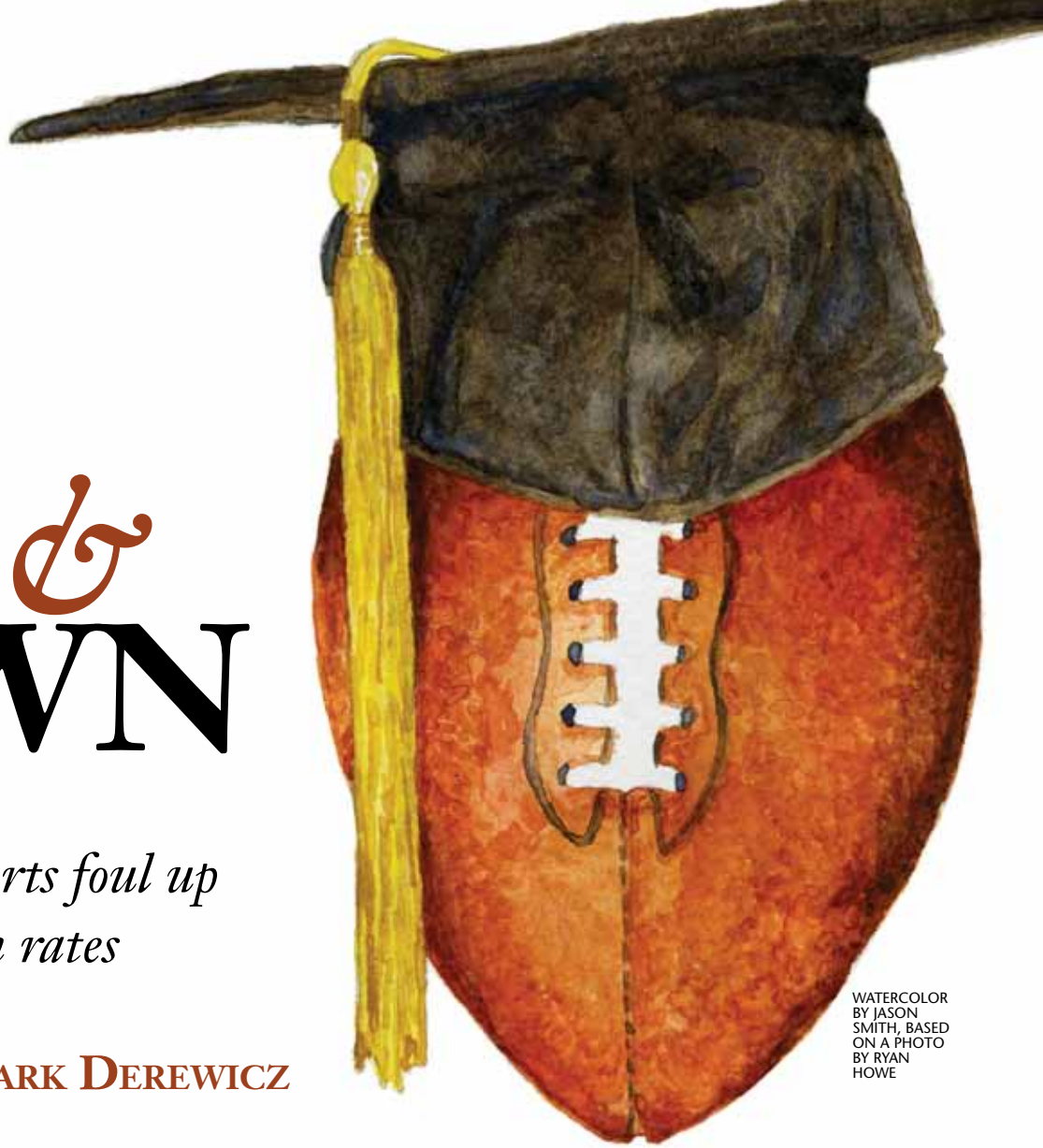
Frank Welch (Debra Stevens) Johnny Conner (Kathyanna Nguyen) Luther Williams (John Kirk) DaRoyce Mosley (Patricia Colter) John Amador (Reza Ayari) Tony Roach (Ronnie Dawn Hewitt) Daryl Holton (Steven, Eric, Brent, and Kayla Holton) Clifford Kimmel (Rachel White, Susan Halverstadt, and Brent Roe) Michael Richard (Marguerite Dixon) **2008** William Lynd (Ginger Moore) Earl Berry (Mary Bounds) Kevin Green (Patricia Vaughan) Curtis Osborne (Arthur Jones and Lisa Seaborne) David Hill (Jimmy Riddle, Josie Curry, and Michael Gregory) Karl Chamberlain (Felecia Prechtl) Terry Short (Ken Yamamoto) James Reed (Barbara and Joseph Lafayette) Robert Yarbrough (Cyril Hamby) Mark Schwab (Junny Rio-Martinez) Carlton Turner (Tonya and Carlton Turner, Sr.) Kent Jackson (Beulah Mae Kaiser) Dale Leo Bishop (Marcus Gentry) Derrick Sonnier (Melody and Patrick Flowers) Christopher Emmett (John Langley) Larry Davis Michael Barrow) Jose Medellin (Elizabeth Pena and Jennifer Ertman) Heliberto Chi (Armand Paliotta) Leon Dorsey IV (James Armstrong and Brad Lindsey) Michael Rodriguez (Aubrey Hawkins) Jack Alderman (Barbara Alderman) William Murray (Rena Ratcliff) Richard Henyard (Jamilya and Jasmine Lewis) Jessie Cummings (Melissa Moody) Richard Cooey (Dawn McCreery and Wendy Offredo) Alvin Kelly (Devin Morgan) Kevin Watts (Hak Po Kim, Yan Tzu Banks, and Chae Sun Shook) Joseph Ries (Robert Ratliff) Eric Nenno (Nicole Benton) Greg Wright (Donna Vick) Elkie Taylor (Otis Flake) George Whitaker III (Shakeitha Carrier) Denard Manns (Michelle Robson) Gregory Bryant-Bey (Dale Pinkelman) Robert Hudson (Edith Kendrick) Marco Chapman (Cody and Chelbi Sharon) Joseph Gardner (Melissa McLauchlin) **2009** Curtis Moore (Roderick Moore, LaTanya Boone, and Henry Truevillan) James Callahan (Rebecca Howell) Frank Moore (Samuel Boyd and Patrick Clark) Darwin Brown (Richard Yost) Reginald Perkins (Gertie Perkins) Virgil Martinez (Veronica, Joshua, and Casandra Fuentes, and John Gomez) Ricardo Ortiz (Gerardo Garcia) Steve Henley (Edna and Fred Jackson) David Martinez (Carolina and Erik Prado) Dale Scheanette (Wendie Prescott) Wayne Tompkins (Lisa DeCarr) Danny Joe Bradley (Rhonda Hardin) Johnny Ray Johnson (Leah Smith) Edward Bell (Ricky Timbrook) Luke Williams (Linda and Shaun Williams) Willie Pondexter (Martha Lennox) Kenneth Morris (James Adams) James Martinez (Sandra Walton and Mike Humphreys) Robert Newland (Carol Beatty) Luis Salazar (Martha and Erick Sanchez) Michael Rosales (Mary Felder) Jimmy Lee Dill (Leon Shaw) William Mize (Eddie Tucker) Derrick Johnson (LaTausha Curry) Thomas Ivey (Thomas Harrison) Willie McNair (Ella Foy Riley) Donald Gilson (Shane Coffman) Michael Riley (Wynona Harris) Dennis Skillicorn (Richard Drummond) Terry Lee Hankins (Devin Galley and Ashley Mason) Daniel Wilson (Carol Lutz) Jack Trawick (Stephanie Gach) Michael DeLozier (Orville Bullard and Paul Morgan) John Fautenberry (Joseph Daron, Jr.) Marvallous Keene (Joseph Wilkerson, Danita Gullette, Sarah Abraham, Wendy Cottrill, and Marvin Washington) Jason Getsy (Ann Serafino) John Marek (Adela Marie Simmons) Stephen Moody (Joseph Hall) Christopher Coleman (Danny Giraldo, Hurtado Prado, and Jose Garcia) Max Payne (Braxton Brown) Mark McClain (Kevin Brown) Reginald Blanton (Carlos Garza) Khristian Oliver (Joe Collins) Yosvanis Valle (Jose Juco) John Muhammad (Dean Meyers) Larry Bill Elliott (Dana Thrall) Danielle Simpson (Geraldine Davidson) Robert Thompson (Mansoor Rahim) Cecil Johnson, Jr. (Bobby Bell, Jr., James Moore, and Charles House) Bobby Wayne Woods (Sarah Patterson) Kenneth Biros (Tami Engstrom) Eric Wrinkles (Debra Jean Wrinkles and Natalie and Mark Fulkerson) **2010** Vernon Smith (Sohail Darwish) Kenneth Mosley (David Moore) Gerald Bordelon (Courtney LeBlanc) Gary Johnson (James Hazelton and Peter Sparagana) Julius Young (Joyland and Kewan Morgan) Mark Brown (Isam Salman) Martin Grossman (Peggy Park) Michael Sigala (Kleber Santos) Joshua Maxwell (Rudy Lopes) Lawrence Reynolds (Loretta Foster) Paul Powell (Stacie Reed) Franklin Alix (Eric Bridgeford) Darryl Durr (Angel Vincent) William Berkley (Sophia Martinez) Samuel Bustamante (Rafael Alvarado) Kevin Varga (David Logie) Michael Beuke (Robert Craig) Billy Galloway (David Logie) Rogelio Cannady (Leovigildo Bonal) Paul Woodward (Rhonda Crane) Gerald Holland (Krystal Dee King) Darick Walter (Stanley Beale and Clarence Threat) John Alba (Wendy Alba) Thomas Whisenhant (Cheryl Lynn Payton) George Jones (Forest Hall) Melbert Ford (Martha Matich and Lisa Chapman) John Parker (Elizabeth Sennett) David Powell (Ralph Ablanedo) Ronnie Lee Gardner (Michael Burdell) Michael Perry (Sandra Stotler) William Garner (Deondra Freeman, Richard Gaines, Markeca and Mykkila Mason, and Denitra Satterwhite) Derrick Jackson (Forrest Henderson and Richard Wrotenbery) Joseph Burns (Mike McBride) Roderick Davie (Tracey Jefferys and John Coleman) Michael Land (Candace Brown) Peter Cantu (Jennifer Ertman and Elizabeth Pena) Holly Wood (Ruby Gosha) Cal Brown (Holly Washa) Teresa Lewis (Julian and C.J. Lewis) Brandon Rhode (Steven, Bryan, and Kristin Moss) Michael Benge (Judith Gabbard) Donald Wackerly (Pan Sayakhoummane) Larry Wooten (Bessie and Grady Alexander) Jeffrey Landrigan (Chester Dyer) Phillip Hallford (Eddie Shannon) John Duty (Curtis Wise) **2011** Billy Don Alverson (Richard Yost) Jeffrey Matthews (Otis Short) Leroy White (Ruby White) Emmanual Hammond (Julie Love) Martin Link (Elissa Self-Braun) Michael Hall (Amy Robinson) Frank Spisak (Horace Rickerson, Timothy Sheehan, and Brian Warford) Timothy Adams (Timothy Adams, Jr.) Johnnie Baston (Chong Mah)

EXONERATED FROM DEATH ROW: Each of these 140 people was convicted and sentenced to death. In each case, one of the following two conditions applied: 1) the defendant's conviction was overturned and a) the defendant was acquitted at retrial, or b) all charges were dropped; or 2) the defendant was given an absolute pardon by the state's governor based on new evidence of innocence. **1973** David Keaton **1974** Samuel A. Poole **1975** Wilbert Lee, Freddie Pitts, James Creamer, Christopher Spicer **1976** Thomas Gladish, Richard Greer, Ronald Keine, Clarence Smith **1977** Delbert Tibbs **1978** Earl Charles, Jonathan Treadway **1979** Gary Beeman **1980** Jerry Banks, Larry Hicks **1981** Charles Ray Giddens, Michael Linder, Johnny Ross, Ernest Shuhaa Graham **1982** Annibal Jaramillo, Lawyer Johnson **1985** Larry Fisher **1986** Anthony Brown, Neil Ferber, Clifford Henry Bowen **1987** Joseph Green Brown, Perry Cobb, Darby Williams Tillis, Vernon McManus, Anthony Ray Peek, Juan Ramos, Robert Wallace, Richard Neil Jones **1988** Willie Brown, Larry Troy **1989** Randall Dale Adams, Robert Cox, Timothy Hennis, James Richardson **1990** Clarence Brandley, John C. Skelton, Dale Johnston, Jimmy Lee Mathers **1991** Gary Nelson, Bradley P. Scott, Charles Smith **1992** Jay C. Smith **1993** Kirk Bloodsworth, Federico M. Macias, Walter McMillian, Gregory R. Wilhoit, James Robison, Muneer Deeb **1994** Andrew Golden **1995** Adolph Munson, Robert Charles Cruz, Rolando Cruz, Alejandro Hernandez, Sabrina Butler **1996** Joseph Burrows, Verneal Jimerson, Dennis Williams, Roberto Miranda, Gary Gauger, Troy Lee Jones, Carl Lawson, David Wayne Grannis **1997** Ricardo Aldape Guerra, Benjamin Harris, Robert Hayes, Christopher McCrimmon, Randall Padgett, James Bo Cochran **1998** Robert Lee Miller, Jr., Curtis Kyles **1999** Shareef Cousin, Anthony Porter, Steven Smith, Ronald Williamson, Ronald Jones, Clarence Dexter, Jr., Warren Douglas Manning, Alfred Rivera **2000** Steve Manning, Eric Clemmons, Joseph Nahume Green, Earl Washington, William Nieves, Frank Lee Smith, Michael Graham, Albert Burrell, Oscar Lee Morris **2001** Peter Limone, Gary Drinkard, Joaquin Jose Martinez, Jeremy Sheets, Charles Fain **2002** Juan Roberto Melendez, Ray Krone, Thomas Kimbell, Jr., Larry Osborne **2003** Aaron Patterson, Madison Hobley, Leroy Orange, Stanley Howard, Rudolph Holton, Lemuel Prion, Wesley Quick, John Thompson, Timothy Howard, Gary Lamar James, Joseph Amrine, Nicholas Yarris **2004** Alan Gell, Gordon Steidl, Laurence Adams, Dan L. Bright, Ryan Matthews, Ernest Ray Willis **2005** Derrick Jamison, Harold Wilson **2006** John Ballard **2007** Curtis McCarty, Michael McCormick, Jonathon Hoffman **2008** Kennedy Brewer, Glen Edward Chapman, Levon Bo Jones, Michael Blair **2009** Nathson Fields, Paul House, Daniel Wade Moore, Ronald Kitchen, Herman Lindsey, Michael Toney, Yancy Douglas, Paris Powell, Robert Springsteen **2010** Anthony Graves.

GAP & GOWN

How big-time sports foul up college graduation rates

BY MARK DEREWICZ



WATERCOLOR BY JASON SMITH, BASED ON A PHOTO BY RYAN HOWE

Tim's schedule is full. He's at the gym by 6:00 in the morning. Class from 9:00 to noon. He eats lunch, gets taped, dresses for football practice, and then watches game film from 2:00 to 3:30 before practicing for two hours. He showers, eats dinner, and ends his day at study hall.

On Fridays, things get trickier. He's at Kenan Stadium at 10:30 in the morning for a quick practice, catches a 1:00 flight to Tallahassee, and arrives at the hotel by 4:00. He eats dinner and settles in for three hours of team meetings before bed. On game day he's at Doak Campbell Stadium by 10:30 in the morning. Kickoff's at 1:00. Three hours later he's back in the locker room, game over. Off to the airport and back to Chapel Hill. Tim's in bed by eleven. Trainers check his bruised knee first thing Sunday morning. He watches game film for a few hours and then practices for a couple more. On the seventh day, Monday, there's no football (per NCAA rules).

All told, Tim dedicates more than forty hours a week to football. He plans on graduating, but the NFL might come calling. Or once his athletic eligibility is up, he might return to his hometown a couple dozen credits shy of graduating. He might get injured, lose his starting job, and transfer to another school. He might fail out.

From 1998 to 2001, the Atlantic Coast Conference graduated football players at a rate of 62.5 percent—20 percentage points lower than the graduation rate for the ACC's general male student population. That's the fourth-largest graduation gap in any athletic conference. In basketball, the ACC graduated 41.5 percent of its players—41 points lower than the general graduation rate, and the largest gap of any conference.

That sounds bad. That sounds like players from other conferences are better students than ACC athletes are. But that's not exactly fair, Richard Southall says. His group at UNC's College Sport Research Institute crunched the numbers that paint the ACC in such a bad light. Their results explain what the graduation gap really means.

First, the ACC's athlete graduation rates look low because the conference's general student graduation rate is high—82.5 percent. That's higher than the general graduation rate in any other conference.

The academic standards at ACC schools are higher than in the SEC and other major sports conferences. "The ACC has three re-

ally good private schools—Boston College, Duke, and Wake Forest." Southall says. The only private school in the Southeastern Conference, by comparison, is Vanderbilt. Throw in very strong public schools in the ACC—UNC and UVA—and the difference is even greater. The numbers bear this out. The graduation rate of the SEC's general male student population is 68.3. For basketball players, the SEC graduation rate is 37.4, lower than the ACC's. But the graduation *gap* for the SEC is 31 percentage points. The ACC's is 41.

Southall says that most universities have lower admissions standards for athletes, especially for those who play basketball and football, the two sports that bring in the most revenue through ticket sales, television contracts, and apparel deals. Those student athletes would never have been admitted if not for their athletic talents and a special admissions process. Some struggle to meet academic standards at schools with strong athletic *and* academic traditions.

The ACC is hardly alone in this. For basketball, the Pacific 10 Conference's graduation gap is only three percentage points better than the ACC's. The Pac-10 also has schools with very high academic standards—UC Berkeley, UCLA, Stanford. Southall found that all major basketball conferences have graduation gaps of at least twenty percentage points. For football, it's at least ten percentage points.

It's no secret some kids come to college to play sports first and earn a degree second. Many people blame the players. But Southall points his finger at the system.

Basketball season runs from November to March. "Players are forced to juggle full-time course loads around practice schedules, conditioning, film study, media requests, games, and travel," Southall says. "Something has to give. Our study reveals that what's giving is the graduation rate."

Also, Southall says, big-time college sports are big-time business. Huge amounts of money exchange hands, largely from television contracts, some of which force basketball teams to play on weeknights at 9:00. (There are now college football games on television nearly every night.)

Southall isn't convinced this is how we should run collegiate athletics. But under the system as it is, he wonders if it's fair to compare these players' graduation rates to those of full-time students who don't have all the extra demands and don't work full-time jobs.

"They're just not students in the same way," Southall says. Instead, he says it would be better to compare student athletes to students who also work jobs—for instance, part-time students.

So then why would Southall compare them? Because the federal government and the NCAA already do. The federal graduation rate measures the percentage of student athletes who graduate within six years from the same school they attended as freshmen. Southall says that's a measurement of retention, not graduation. The NCAA's graduation success rate doesn't include transfers and other students who leave school early in good standing. But the NCAA does include part-time students, who often take longer than six years to graduate. That means the NCAA winds up with lower graduation rates for regular students. That, in turn, leads to a smaller graduation gap between athletes and regular students.

Southall's method takes out the part-time bias to come up with adjusted graduation gaps, which compare the federal government's graduation rate for student athletes with the graduation rates of regular *full-time* male students. This makes Southall's adjusted graduation gaps larger than the NCAA's graduation success rates.

"Players are forced to juggle full-time course loads around practice schedules, conditioning, film study, media requests, games, and travel. Something has to give. Our study reveals that what's giving is the graduation rate."

—Richard Southall

Each year there's talk about how to keep players in school, which inevitably leads to someone saying we ought to pay basketball and football players. After all, they're the ones who are working these full-time jobs while going to school full time. Others dismiss such talk. They say that student athletes already get paid—free education, room, and board.

Southall sees problems with both views. Giving kids money—literally paying them cash—is anathema to the spirit of collegiate athletics. But he says that basketball and football programs create much of the revenue that helps pay for the lower-profile sports. What's more, field hockey and lacrosse players, for instance, get exactly the same full-ride scholarships that basketball and football players get.

Southall says that minority student athletes are more likely to play football and basketball than other sports, and they're more likely to be from lower-income families. Other researchers have put it in blunt terms—low-revenue programs make their living on the backs of low-income student-athletes. Southall's center is now looking into how race, class, and culture factor into graduation rates.

"These issues are uncomfortable," he says. "But we have to take a critical look at all this."

Unless the system is changed and student athletes aren't asked to work a full-time athletic job while going to school full time, Southall doesn't think the graduation gaps will decrease much.

"I'm not a policy wonk," Southall says. "I'm just a researcher. But there's one idea I think has merit." It's a sort of voucher system where student athletes could go to school part-time while they exhaust their athletic eligibility. They'd finish school and earn a degree later. Some student athletes already do this, but they pay for tuition themselves because their scholarships have expired.

"Students could have the option of enrolling in such a system," Southall says. "If they do, then they could go back to school when they have the time, inclination, and motivation to actually be students." e

Richard Southall is an assistant professor in the Department of Exercise and Sport Science in the College of Arts and Sciences. He's the director of the College Sport Research Institute, housed at UNC.

NOW WE'RE TALKING SYNTHS

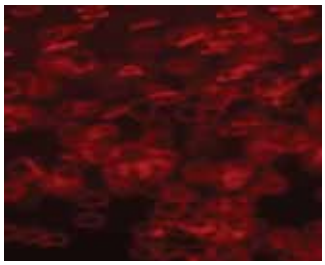
THREE STORIES ON SYNTHETIC CELLS, SUBSTANCES, AND SYSTEMS

A BLOOD BROTHER

WE'RE CLOSER THAN EVER TO CREATING SYNTHETIC BLOOD CELLS THAT REALLY WORK.

Scientists predict there will be a shortage of as much as four million units of donor blood in the United States by 2030. And although researchers have been trying for years, no one has ever managed to develop and manufacture a substitute for blood, says chemist Joe DeSimone. But he and his research team are getting close.

Natural red blood cells are flexible and can contort themselves to pass through all the blood vessels and microscopic channels throughout our bodies. The cells stay in circulation for about a hundred and twenty days, carrying oxygen from our lungs to various tissues and organs, before the cells wear out and our spleens remove them. The synthetic red blood cells scientists have created over the years are far too rigid to squeeze through the same tiny openings, DeSimone says. Imitation particles are always quickly filtered out of circulation by one organ or another.



These particles mimic the size, shape, and flexibility of red blood cells. Here they're shown releasing from an adhesive film into a drop of solvent. Image courtesy of Timothy Merkel and Joseph DeSimone.

Now DeSimone and his colleagues have created a particle that's not only the same size and shape as real red blood cells, but also has the same flexibility. And it can stay in circulation up to thirty times longer than the synthetic red blood cells of the past.

"PolyHeme and other synthetic blood products carry oxygen, but they don't work just like real blood," says Tim Merkel, DeSimone's graduate student and lead author of their study. "This is why they haven't been approved by the FDA. These products have taken and modified hemoglobin so that it's not toxic and isn't cleared from circulation too quickly. But in doing so, they changed the way that hemoglobin binds and releases oxygen and other gasses in the blood. This actually made the synthetic more dangerous for patients who had lost blood than simply administering saline, which replaces lost blood volume but doesn't carry oxygen. Our approach has been to mimic the red blood cell as a whole to replicate its behavior in circulation."

The research team used a powerful nanomolding technique, which was developed in DeSimone's lab at UNC, to create disk-shaped molds for the particles (the same shape as true red blood cells). Then they filled the molds with a hydrogel solution and experimented with nanoparticles in various degrees of stiffness. Each nanoparticle was only six micrometers in diameter—one-fifteenth the diameter of a human hair.

When DeSimone's team tested the particles in mice, the more-rigid imitation cells were filtered out of circulation within hours. Some worked their way as far as the lungs before they got stuck. The more-flexible ones, though, made it all the way to the spleen, the same place real red blood cells end up.

A truly functional synthetic blood would not only solve all our blood shortages, DeSimone says, it could also be a game-changer for the future of nanomedicine. If we could create particles that act the way red blood cells do—could go where they go, carry things the way they carry oxygen—these particles could be loaded with disease-fighting medicines and set loose to transport them throughout patients' bodies. We're not there yet—the new particles can't carry oxygen, and they don't stay in circulation for quite as long as real red blood cells.

"One of our next steps will be to carry oxygen with these or similar particles," Merkel says. He and DeSimone want them to carry hemoglobin in its natural, unmodified form, along with other proteins and enzymes found in true red blood cells. If the particles could do that, Merkel says, they would be even more like the real thing.

—Margarite Nathe

CLOSE TO THE BONE

SYNTHETIC BONE MATERIAL COULD TURN DENTAL IMPLANTS INTO A ONE-DAY AFFAIR.

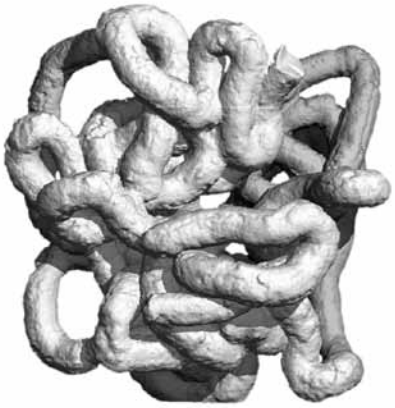
If you've ever had a tooth knocked out or lost one to decay, you might have had to endure a dental implant. These can take months—or even over a year—to complete. But Ching-Chang Ko wants to use his new biomaterials to make dental implant surgeries faster and less painful. "We could shrink it from a year to a one-day procedure," he says.

Dental implants are necessary for all kinds of reasons—failed root canals, gum disease, congenital defects, wear and tear. The main reason the implants take so long, Ko says, is that they're always cementless. Most other prostheses, including knee and hip replacements, use petroleum-based cements to stabilize the implants. Cement can't be used in any kind of facial procedures, Ko says, because the residue may be toxic to the brain, the nerves in teeth, or the sinus cavity.

Here's how dental implants work: first, the doctor makes a surgical incision in the patient's gums where the tooth used to be and uses a series of larger and larger drills to make a hole in the underlying bone. Then the doctor inserts the implant—usually a screw made out of titanium—and stitches the patient's gums up over it to keep them from growing into the hole over the next three to six months. (That's about how long it'll take the patient to heal.) Then it's back to the doctor, who uncovers the implant and builds a temporary crown onto it to sculpt the gums into the right shape. Then more

time for healing.

"Before you can put the permanent crown on, some people have to wait months, a year—sometimes more," Ko says. But it's definitely better than leaving the toothless space empty. If nothing replaces the lost tooth, Ko says, the bone beneath it will atrophy and shrink over time, weakening the jaws. Eventually you might have a hard time chewing at all, Ko says. An implant can replace the tooth and help keep the jawbone strong by giving tissue a structure to grow around.



Microcomputed tomography image of Ko's formula for bone cement. His new materials could be used for all kinds of prosthetics. Image courtesy of Ching-Chang Ko.

Ten years ago, when the field of tissue engineering was just getting off the ground, Ko had already spent years studying how natural bone generates, degenerates, and remodels itself over time. And he'd seen scientific papers that described how apatite, a phosphate mineral and major element in natural bone, could be crystallized and made bone-like in the lab. But scientists have never been able to make materials strong enough to work. Even now, most researchers in the bone tissue engineering field focus on polymers, Ko says, which aren't as strong as bones are. So Ko started creating and testing substances made from apatite, collagen, and other materials found in natural bones. He wanted to engineer a tissue that mimicked real bone and could actually take part in the generating and remodeling processes.

In 2009 Ko and Duke business professor Jon Fjeld founded Ironwood Material Science, Inc. based on the biomaterials Ko developed, called biomimetic nanocomposites. These could become the first effective synthetic bone materials, Ko says. His bone cement, Gemosil, has already been shown to work in small mammals. But the real challenge will be to make it work in larger animals, namely humans. Eventually, he hopes to prove it safe for dental and craniofacial implants.

"This material mimics the nature of bone ingredients," he says. The two main ingredients are hydroxide and gelatin—both of which are found in natural bone. When Gemosil is used on an implant in the lab, the real bone that surrounds the stem of the implant recognizes the cement's composition and grows into the new porous surface, locking the two together. "It's almost like the natural remodeling process," Ko says.

—Margarite Nathe

THE SYNTHNODE

COULD AN ARTIFICIAL, INJECTABLE LYMPH NODE TEACH YOUR BODY HOW TO IDENTIFY PATHOGENS?

Carla Hand and Steve Meshnick have created a tool that could revolutionize vaccines: a synthetic lymph node. Their device, called the Synthnode, has the potential to help develop new vaccines, make current ones more effective, and bring rare vaccines to more of the people who need them most.

Antigens—foreign bits of viruses, bacteria, and parasites—are what trigger the body's immune response. The antigens are shuttled out of circulation and into lymph nodes, where they're destroyed. But first the antigens are used to educate immune cells on what invaders look like. Vaccines take advantage of this immune cell "learning" by introducing an antigen so the immune system will recognize it if it shows up again. But sometimes it's difficult to stimulate an immune response to the antigen of interest. Enter the Synthnode.

The Synthnode is roughly the width of a matchstick, and half the length. It can be loaded with a vaccine or a combination of vaccines and injected under the skin, where it degrades after one month. Structurally, it's similar to a 3 Muskeeters bar with microscopic holes punched in the chocolate. The spongy yet dense inner layer stores tiny antigen bits where they can be accessed by larger immune cells, but can't get out into circulation. The porous outer layer allows immune cells the freedom to enter and exit, just as they do with real lymph nodes. The difference is that the preloaded antigen hasn't been diluted by circulating around the body. And it's stuck in one place, so more immune cells learn what it looks like, leading to a more robust immune response.

Many vaccines that have been proven effective for use in animals aren't available for use in humans. In animal vaccines, an adjuvant is included to create a stronger immune response and stronger future immunity. Unfortunately, adjuvants can have severe side effects, so they aren't used in human vaccines. Here the Synthnode can help as well. In trials the tool has already proven to be more effective than some animal adjuvants, and it's safe for human use. The Synthnode is so good at provoking an immune system response that it doesn't have to use as much antigen as a vaccine normally does. This means that vaccines that are rare or expensive could be stretched to immunize more people.

Hand and Meshnick won a Grand Challenges Explorations grant to fund their research, and they will conduct preclinical trials with other recipients of Gates Foundation grants. They hope their invention will help to combat the spread of infectious diseases, especially malaria and dengue fever. "No vaccines exist for these diseases now," Hand says. "We hope that the Synthnode may make development of these vaccines easier."

—Noor White

Noor White is a research technician in the Department of Biology at UNC.

Timothy Merkel is a graduate student in the Department of Chemistry. Joseph DeSimone is the Chancellor's Eminent Professor of Chemistry in the College of Arts and Sciences. Their synthetic blood study was published in Proceedings of the National Academy of Sciences *in January 2011. The team used PRINT (Particle Replication in Non-wetting Templates) technology to create the nanoparticle molds. Their work was funded by an American Recovery and Reinvestment Act stimulus grant from the National Heart, Lung and Blood Institute.*

Ching-Chang Ko is an associate professor of orthodontics in the School of Dentistry. His work is funded by the National Institutes of Health, the North Carolina Biotechnology Center, and Carolina KickStart.

Carla Hand is an assistant professor and Steve Meshnick is a professor, both in the Department of Epidemiology in the Gillings School of Global Public Health.


STAR-STU

Galaxies, dwarfs, and a question of astronomical proportions

by Susan Hardy

Through a telescope here on Earth, it looks like any other star. But an ultra-compact dwarf might be made up of two or three billion stars, millions of light-years from the Milky Way and grouped together so closely that they appear as a single point of light.

For hundreds of years, no one could tell that these "stars" weren't single objects. Then, around the end of the twentieth century, scientists built powerful spectrographs that let them conduct surveys of all the frequencies of light coming from some of the universe's brightest, most dense clusters of galaxies. Among these galaxies, they discovered the groups of stars that they now call ultra-compact dwarfs. The "dwarf" part is shorthand for "dwarf galaxy," but astronomers have been debating for a decade about whether ultra-compact dwarfs are really galaxies or just super-dense clusters of stars. But UNC astronomers Mark Norris and Sheila Kannappan say they have the answer now.

The trouble with ultra-compact dwarfs, Norris says, was that they didn't fit into the way astronomers had understood galaxies and groups of stars for several hundred years. There were supposed to be two things: galaxies and globular clusters. Galaxies were massive systems of stars and other matter many thousands of light-years wide. Globular clusters were balls of stars maybe a hundred light-years wide, orbiting way out from the main mass of a galaxy. They sprang up around galaxies billions of years ago, when the galaxies were young.

Astronomers have been debating for a decade about whether ultra-compact dwarfs are really galaxies or just super-dense clusters of stars.

"A globular cluster is about a million times the mass of the sun," Norris says. "And galaxies are at least ten or a hundred times more massive than globular clusters. There was this clear size gap between the two." Ultra-compact dwarfs messed up that picture. They weren't anywhere near as big as galaxies, but they were more massive and took up much more space than the biggest globular clusters. So what exactly were they?

Some people thought ultra-compact dwarfs were just globular clusters that were unusually large, maybe because they had merged with other clusters when they were young. Others suspected that the dwarfs were remnants of galaxies; they'd been larger once, but then they were drawn too close to other galaxies and had most of their stars ripped away by gravity. "It's like the galaxy was a dandelion puff someone blew on," Kannappan says. "All you're left with is the seed head in the middle."

Left: The Sombrero Galaxy is orbited by an unusually high number of globular clusters: spherical collections of stars with a high density of stars at the core of the clusters. One of these globular clusters is so big that astronomers wondered whether it might be something else. Image by NASA and the Hubble Heritage Team (AURA/STScI).

Astronomers had been leaning toward what seemed like the simpler explanation, Kannappan says: that ultra-compact dwarfs were giant globular clusters. But she wasn't so sure. Part of the reason why the dwarfs seemed like globular clusters was that they were the right age: eight or ten billion years old, about the same as their neighboring galaxies. The problem was, the galaxy clusters where astronomers have been studying ultra-compact dwarfs stopped growing a long time ago—*everything* in those regions is eight or ten billion years old.

So Norris started searching outside the denser areas of the universe. He went through archives of Hubble Space Telescope data, looking—literally eyeballing each telescope image—for ultra-compact dwarfs around galaxies that weren't near lots of other galaxies. If these dwarfs were about the same age as their host galaxies, they might be giant globular clusters. But if an ultra-compact dwarf were a totally different age from its neighbor galaxy, that would be good evidence that it had been born as its own galaxy and was pulled into another's orbit later on.

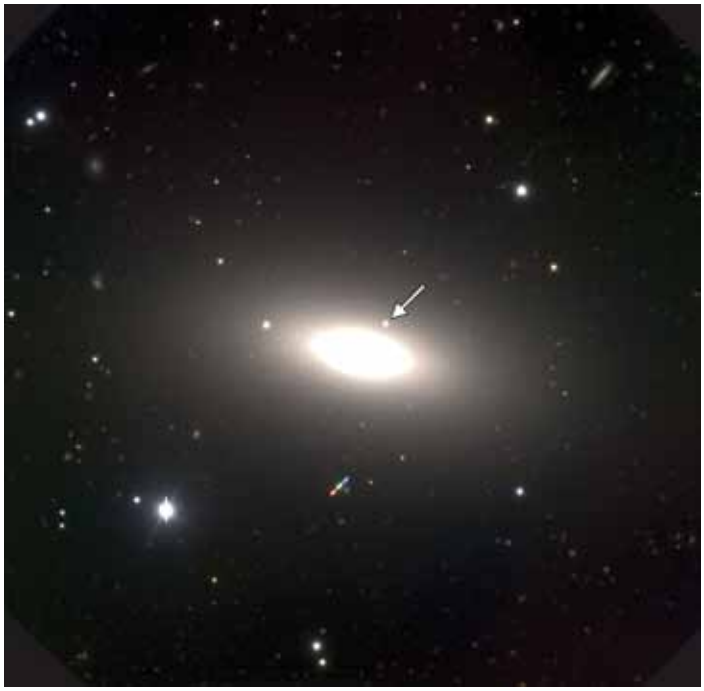
Norris found some candidates that no one had identified as ultra-compact dwarfs before. They look like stars when seen through a telescope on Earth, but in images from Hubble they appear with a very un-star-like fuzzy halo. He and Kannappan used data from the SOAR telescope in Chile, controlled from UNC, to confirm that the fuzzy stars near two large galaxies were really groups of stars in the size range between globular clusters and galaxies.

By chance, it turned out that another research team had high-quality spectroscopy data on one of these dwarfs, taken when the group was studying a large galaxy nearby. The spectrum of light coming from this ultra-compact dwarf shows that it's about 3.4 billion years old—billions of years younger than the galaxy, NGC 4546, that it hangs out next to. This dwarf, Norris says, is the first clear example of an ultra-compact dwarf that's a former galaxy. Not only is it too young to be a globular cluster, it's also far more massive than clusters normally are around a galaxy the size of NGC 4546. And the ultra-compact dwarf is near a stream of gas extending into the host galaxy but rotating in the same direction as the dwarf—a remnant of the matter that got torn away when the smaller galaxy came too close to the larger one.

Norris went through Hubble Space Telescope archives, looking for ultra-compact dwarfs around galaxies that weren't near lots of other galaxies. If an ultra-compact dwarf were a totally different age from its neighbor galaxy, that would be good evidence that it had been born as its own galaxy and was pulled into another's orbit later on.

Around the other galaxy, Norris and Kannappan found ultra-compact dwarfs that have the right age, size, density, luminosity, and other traits to be giant globular clusters. The next step is to look deep into both kinds of dwarfs to find the differences their analysis suggests must be there. "Even though there are two ways of making what looks to us like almost the same object, there's a big difference between them," Kannappan says. "One type of ultra-compact dwarf is, at heart, a galaxy. It's had a lot its outer stars torn off, but most of its dark matter won't have been torn off. A globular cluster won't have that."

Dark matter is still mysterious to scientists, but they know well enough how to tell that it's there. "The way it was first discovered was that the orbital motions of stars and gas in galaxies were moving too fast to hold together given the amount of mass you could see,"



The bright dot just above the NGC 4546 galaxy is an ultra-compact dwarf. Viewed through a ground telescope, it looks just like any other star, but it's really the remnant of a galaxy, still containing many millions of stars. Image by Mark Norris.

Kannappan says. "This would be the exact same thing. We'll look to see whether the internal motions of these ultra-compact dwarfs are too fast to hold together given the matter we can see."

Until not long ago, trying to detect the orbital motions in an object so small, especially one so close to a big, bright galaxy, was hard to do with anything less than one of the world's biggest telescopes. But they'll be able to do it with the smaller SOAR Telescope, thanks to its powerful spectrograph built by Carolina astrophysicist Chris Clemens. (*See* Endeavors, *Fall 2004*, "*Star Power.*")

They're also going back to the Hubble archives to identify more ultra-compact dwarfs and sort out how many were once galaxies and how many are globular clusters. Knowing what ultra-compact dwarfs are will help astronomers learn the histories of galaxies, Kannappan says. When there are a lot of globular clusters around a galaxy, it's evidence that the galaxy was once two large galaxies that merged, compressing clouds of gas as they collided and triggering star formation.

The fact that some ultra-compact dwarfs are globular clusters while others are former galaxies should stop some of the back-and-forthing between scientists.

Says Norris: "It's nice to be able to tell them, 'You can stop arguing, because both of you are right.'" e

Mark Norris is a postdoc and Sheila Kannappan is an assistant professor, both in the Department of Physics and Astronomy in the College of Arts and Sciences. Their paper, "The Ubiquity and Dual Nature of Ultra-Compact Dwarfs," has been accepted for publication by Monthly Notices of the Royal Astronomical Society *and is available on Kannappan's website at www.physics.unc.edu/~sheila.*

INTROVERTS UNITE!


YURI SCHIPAKIN

The extroverted visionary doesn't always make the best leader.

by Mark Derewicz

Extroverts, the academic literature will tell you, make the best leaders. There's Virgin Group CEO Richard Branson: brash, adventurous, visionary. There's Steve Jobs: talkative, innovative, demanding. And there's Oprah Winfrey: motivated, personable, fun-loving. Classic extroverts and famous leaders, all of them.

But there are more introverted leaders than you might expect. David Hofmann wanted to find out how both styles work.

Hofmann surveyed 70 managers and 374 employees of pizza delivery franchises that are all part of one company. He asked managers to rate themselves on a scale of one to five on such descriptors as introverted, bold, reserved, and talkative. He asked employees to rate behaviors found in their workplaces. For instance, did fellow employees try to improve work procedures, correct faulty practices, solve problems? Did they feel free to communicate their opinions? Then Hofmann looked at each store's profitability over seven weeks, controlling for things such as store location and size. (A larger store near a college campus would obviously do more business than a pizza joint in the middle of nowhere.)

Hofmann found that extroverted leaders were successful, operating highly profitable stores, but only if their employees were team players who didn't try to change things or offer ideas. Conversely, stores were also profitable if they had introverted leaders who were willing to listen to their extroverted employees. The least profitable stores were those with introverted leaders *and* passive employees. Hofmann expected that. But stores also faltered when both managers and their employees were extroverted. "We thought there must be a power struggle in those stores," Hofmann says. "We assumed leaders were not accepting suggestions from employees. And that would have a negative effect on motivation and commitment to their leader. But we didn't know that for sure."

So Hofmann's team, which included professors Francesca Gino and Adam Grant, set up an experiment. It involved 163 UNC students divided into dozens of teams with assigned leaders. Their goal: to fold T-shirts like a GAP employee as fast as they could. The prize for winning: iPods.

A lot of evidence suggests extroverts will emerge as leaders. And they **are** more likely to be **seen** as leaders. But that's not the only way to lead.

But before the folding commenced, half of the leaders were told: *Scientific research now shows that behaving in an extroverted manner is the key to success as a leader. Like John F. Kennedy, Martin Luther King Jr., and former General Electric CEO Jack Welch, great leaders are extroverted: their behavior is bold, talkative, energetic, active, assertive, and adventurous. They communicate a strong, dominant vision that inspires followers to deliver results.*

The other team leaders were told the opposite: *Scientific research now shows that behaving in an introverted manner is the key to success as a leader. Like Mahatma Gandhi, Abraham Lincoln, and Socrates, great leaders are introverted: their behavior is quiet, shy, reserved, and unadventurous. This enables them to empower their people to deliver results.*

The researchers then planted two confederates on each team. These two individuals offered a suggestion halfway through the folding exercise, saying, "I wonder if there's a faster way to do this." And the other confederate would answer, "I have a friend in Japan who says they have a much faster way of folding T-shirts. I think there's a video on YouTube."

Sure enough, the leaders who were primed to be extroverted were less receptive to the suggestion. At least, that's how their employees viewed them. The team became less motivated and productivity slipped. Meanwhile, the leaders who were primed to be introverted seemed much more receptive, and motivation increased.

"There's a lot of empirical evidence that suggests extroverts will emerge as leaders," Hofmann says. "And extroverts are more likely to be *seen* as leaders. But I think we've shown that that's not the only way to lead. Quiet leaders can really be effective, too."

There are some good examples—most you've never heard of. Because, well, they're introverts. But you've heard of at least one. "Bill Gates," Hofmann says. "I'd say he's introverted. He's surrounded himself with really smart, proactive employees whom he seems to listen to. And I'd say he's created a fairly successful business." e

David Hofmann is a professor in the Kenan-Flagler Business School. Francesca Gino is now an associate professor at Harvard University and Adam Grant is now an associate professor at the University of Pennsylvania.

Of the strange notes and scribbles she found in the city archives of Cuzco, Peru, Kathryn Burns says: "I started fixating a long time ago on the fascinating weirdness of the archives. What we have as a record of the past, to build our histories of the past out of—those sources are selective and are contoured by the forces of history." Photo by Donn Young.

INTO THE ARCHIVES

HISTORIANS COUNT ON THEM TO TELL THE TRUTH ABOUT THE PAST. BUT NOT ALL ARCHIVES OPERATE BY THE BOOK.

BY MARGARITE NATHE

Samples of the doodles and notes left by Spanish notaries and their apprentices in the archives of Cuzco, Peru. Photos by Kathryn Burns.

The city archive in Cuzco, Peru, was under an eviction notice when historian Kathryn Burns arrived to do some dissertation research. Documents were stacked everywhere inside the rented apartment—"precious stuff that was centuries old," Burns says. There were heaps of papers piled in the hallways and even stashed in the shower stall in the bathroom. There was never any toilet paper. This troubled Burns as she looked at the loose documents stacked next to the commode.

That was in 1990. Since then, Burns has gone back again and again to follow a paper trail left by Spanish notaries that wanders through centuries of conquest in Latin America. Historians from all over the world have long tracked it for their research. In Cuzco's archives, while Burns was researching her first book—*Colonial Habits*, on Peruvian convents—she noticed some bizarre things about those records. Namely, many of them were missing. Once, she turned up evidence that an eighteenth-century notary's apprentice—a kid named Palomino—had made some side money by selling documents to one of the local convents, which presumably was filling holes in its own archive.

There were other things, too. Strange doodles. Forms that were blank except for a cluster of signatures on the bottom. "I thought it was just a little notarial malfeasance around the edges," she says. "But it wasn't."

And then in 2004, while Burns was working in the archives on her new book, *Into the Archive: Writing and Power in Colonial Peru*, one of the archive's underpaid employees tried to sell her a document from the collection. Of course, it wasn't his to sell. But for the equivalent of about five dollars, he was offering her a centuries-old, one-of-a-kind record that, for all he knew, would become part of a private collection somewhere and never be seen again.

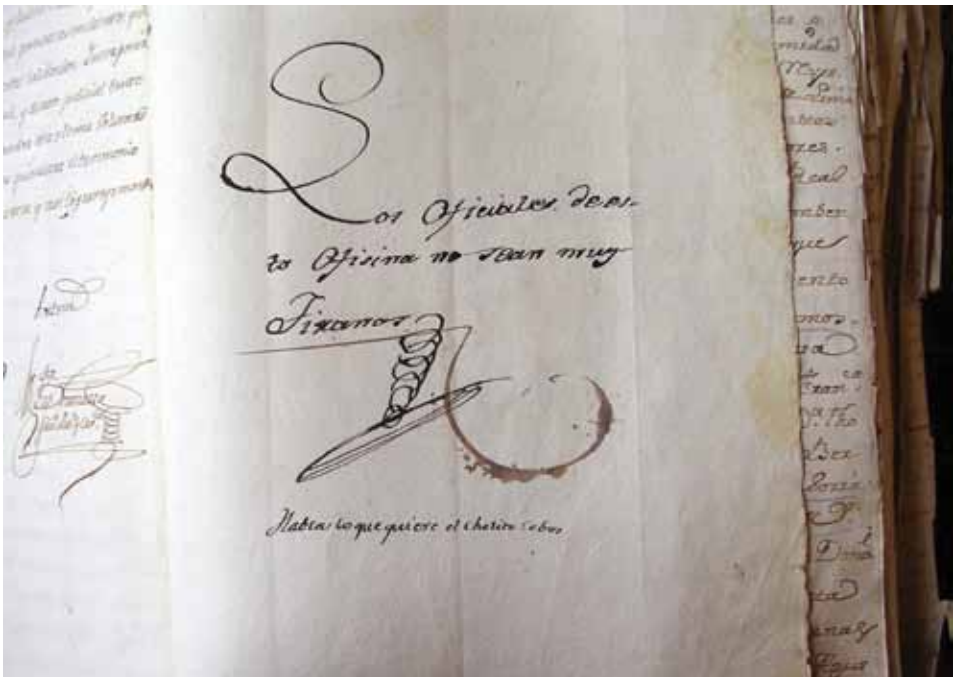
"Over time I realized the archive isn't this straightforward thing," she says. "There's a kind of cloak-and-dagger element to it. And people have been ripping it off for centuries."

While Spain was laying claim to South America and feverishly filling galleons with gold and silver bound for Europe, Spanish notaries in Latin America were busy documenting everyday land sales, lawsuits, wills, property disputes, and deathbed confessions. Cuzco was a bustling place. Almost everyone was a merchant of some kind, and so almost everyone had to work with notaries occasionally. The Spanish notarized practically everything, Burns writes in *Into the Archive*. For them, power was all about getting their words into writing, the only form that carried the weight of the law (*see "Native Archives," page 23*). And notaries were the only ones who had the power to make words and documents legally true.

"Notaries were the gatekeepers to the archive that we still use," Burns says. "But these sources were made in the midst of all kinds of juicy, fascinating colonial power plays."

Maybe it was because notaries knew all about their clients' private business. Maybe it was because many bought their positions. Or maybe it was because they had a reputation for being greedy and conniving. Whatever the reason, notaries were generally detested. They were the butt of casual jokes, Burns writes, lampooned even in novels at the time. (In *Guzmán de Alfarache*, for example, a priest speculates about what heaven's angels might say if a notary were to approach the gates: "A notary in heaven? That's new, that's new.") Burns lists some old common sayings: "Notaries, whores, and barbers: all pasture together and follow the same path." "Between a notary and a dead man, there's no difference." And on and on.

But really, Spanish notaries had gone to



Much of the archive was written by very young apprentice notaries, who often poked fun at one another directly in the records: one wrote *Los Oficiales de esta Ofisina no sean muy Tiranos,* meaning "The assistants in this workplace should not act like tyrants." Directly below that, another wrote "Cobos says whatever he wants." Photo by Kathryn Burns. Photo of Burns by Donn Young.

Cuzco for the same reason every other Spaniard had: to make their fortunes. They were hired directly by the king and were expected to be professional, unbiased, and of the highest moral caliber. But they were a long way from home. Mostly, they were left to be their own supervisors and make a living however they could. Plenty cut corners to get ahead. In those days, Burns writes, everything was for sale—"even the sworn, documented truth produced by notaries."

Many of the notary's daily duties were mind-numbing—there were endless forms to be filled out—and those were usually relegated to apprentices who started training from childhood. "The notary and his trusted right-hand guy might go off and take down a piece of business, but someone back in the office would then have to fill it in," Burns says. "The archive we have today is basically a gigantic homework assignment for all these kids, who were the actual writers."

The apprentices were ordered to follow strict protocols—they used specific kinds of paper, filled in only a certain number of lines on each form. They powered the whole industry. But their bosses spent a great deal of time away from the office, and Burns found some evidence of how the kids spent their unsupervised time. Doodles, insults, bits of poetry, unflattering caricatures of the bosses, practiced signatures, and fragments of text in Spanish and Quechua can be found throughout some old notarial records, particularly on blank endsheets of volumes bound together. Burns and her colleagues in the archives would call each other over whenever someone came across a particularly funny one.

"Notaries were the gatekeepers to the archive that we still use," Kathryn Burns says. "But these sources were made in the midst of all kinds of juicy, fascinating colonial power plays."

While the apprentices were doodling and occasionally stealing and selling documents (property deeds were especially popular), the bosses were cutting their own deals, Burns says. Merchants who were literate and had money to spend knew how to work the system. If properly persuaded, some notaries were happy to massage the facts and wording to create whatever loopholes and ambiguity their clients wanted. Their creativity when it came to the official record was incredible. "Notaries were very good at producing the best truth money could buy," she says.

And they weren't above certain illegal time-saving measures. "For example," Burns says, "a lot of documents start off something like, 'We here witness this and our signatures below attest that we were Johnny-on-the-spot when this was sold or conveyed or rented or whatever.' You read a bunch of that and you just assume that someone is writing this while observing an action. But their practice itself didn't work the way they said it did." Some notaries, she eventually discovered, made a habit of convincing clients to sign their names to pages that were yet to be filled in. These *cartas blancas* were made to be sold, she says, and filled in later with who-knows-what.

"We think of archives as transparent windowpanes on the past," Burns says. "But what if they're not? The sources themselves are selective and are contoured by forces of history." To get the most from the archives, she writes, historians have to know the rules of the game, read between the lines, and be able to recognize sleight of hand. "For example,

we don't expect our mortgages to be the record of what actually happened in our house transactions. We need them because we want to attest that we own something and certain things happened, but a mortgage is very templated. Is everything in the document true? We might say, 'I don't know, but my lawyer told me to sign it.'"

Over time, Burns learned to understand and work around those aspects of the archives, and *Into the Archives* is the result.

But she kept thinking about all those documents that have vanished during the past few centuries. She'd often come across stubby paper edges in bound records that showed where pages had been razored or torn out. That's usually the work of autograph hunters, she says, "but there's just no way to know if that was yesterday or that was hundreds of years ago. It could have happened any time for any number of reasons. It could just be that something came unstitched and fell apart. But a lot of the colonial stuff is in remarkably good condition."

Other documents have disappeared entirely. Papers that should be in the collections—that are clearly referenced in other materials—are simply no longer accounted for. Land records and deeds are especially apt to walk off, Burns says. "And there's not a handy-dandy catalog that we can just look at. There's no good way of keeping track in an archive if it's not cataloged. This is why things can disappear so easily."

Today's keepers of Cuzco's archives don't always know what their collections contain. Disorganization makes theft especially easy, and that's a problem libraries, archives, and museums around the world struggle with. Most employees in Cuzco can't even read the older documents, Burns says. "But they know they're important and that there are some important peoples' signatures in there."

"Sometimes knowing about how the archive is made and unmade affects your interpretation in very important ways," Kathryn Burns says. "We need to recognize that the archive itself is a historical artifact."

The last time Burns visited the Cuzco archives, the director's assistant, who was retrieving documents for Burns, casually asked her for a loan. Could she give him twenty *soles*?

Burns politely told him no, she couldn't lend him the money, and then went back to her work. Later in the day she requested another document, a seventeenth-century record of sale. The assistant motioned for her to join him in a quiet corner, away from anyone who might be listening. He murmured, "Would you like to *buy* it for twenty *soles*?"

Burns had heard of this happening to researchers before, but she was still shocked. She thrust the money into his hand—"Here, just take it," she said—and rushed back to her seat, leaving him with the document.

The whole episode left her shaky. Negligent apprentices, corrupt notaries, oblivious archivists. How are we supposed to trust the only records we have left of the past, she asks, if even mundane, everyday documents are so susceptible to manipulation? "Sometimes knowing about how the archive is made and unmade affects your interpretation in very important ways," she says. "We need to recognize that the archive itself is a historical artifact." This doesn't mean that Cuzco's archive is worthless to us. In fact, understanding these things—who made the archive, how they did it and why, and how they used the records—makes the collection an even *richer* resource for historians.

Today Cuzco's archive is housed at a local university, where it's safer than it was in its former apartment home. Locals use it on a daily basis. Indigenous groups often search for materials during land disputes to find proof that their land has always belonged to them, back to the oldest records in the city. "But rumor had it that communal land titles to a local indigenous community were fairly recently entrusted to the archive in Cuzco, and then got lost," Burns says. She frequently overheard heated conversations about it, often in Quechua.

"A lot of this stuff in the archives, one way or another, has disappeared over the years," Burns says. "And we'll never know their stories." e

Kathryn Burns is an associate professor of history in the College of Arts and Sciences.

NATIVE ARCHIVES

When the Spanish arrived in the Americas, they were surprised to find that the Inca natives did not live a lawless existence. In fact, the Inca had various bureaucracies of their own. But their documents came in the form of complex, colorful textiles, Burns says—a kind of writing without words. Some Andean groups even used knotted cords called *quipus* to record their information. This technology was intriguing but incomprehensible, the Spaniards declared, and inferior as a form of record-keeping.

Eventually Spanish notarial practices began to rub off on the Americans, who were soon producing the kinds of documents—land titles, loans, wills—that the Spanish recognized as official. A Spanish viceroy in the sixteenth century felt the situation was getting out of hand and prohibited native Andean mayors and notaries from writing lengthy legal petitions, saying indigenous lawsuits should be conducted through oral argumentation. One Spanish priest even declared the Andean natives were using their considerable linguistic skills "to penetrate our usages, the better to resist us."

Still, the Andean natives produced piles of documents in both Spanish and Quechua for use in their own communities. These were never allowed to be gathered and stored in the big Spanish-run archive in Cuzco. Any documents that survive are scattered and stowed away in local archives across Latin America, Burns says.

"I'm interested both in the archives we do have and the massive archives that we *don't* have," she says. "What might be out there, or might *have been* out there? Is the archive we have today just the record that powerful people felt comfortable having because they could pay for it? And what does that mean for historians?"

—Margarite Nathe

New Songdo City, an aerotropolis built from scratch on a man-made island thirty miles southwest of Seoul, South Korea, is the best example of how airports are now the linchpin to urban development around the world. Photo courtesy of Gale International and TK/PR Public Relations.

CITIES FLOURISHED AS SEAPORTS. TOWNS SPROUTED AROUND RIVERS. RAILROADS OPENED THE HINTERLANDS, AND HIGHWAYS CONNECTED SUBURBS. NOW, THE FASTEST-GROWING CITIES IN THE WORLD ARE AIRPORT CITIES. BEIJING AND DUBAI AND BRISBANE HAVE ALREADY STARTED LISTENING TO A UNC BUSINESS PROFESSOR NAMED JACK KASARDA, WHO SAYS THAT

OUR NATION'S FUTURE IS UP IN THE AIR.

WELCOME TO THE AGE OF AEROTROPOLIS

BY MARK DEREWICZ

Downtown Detroit is a ghost town. Skyscrapers loom empty. Abandoned factories and warehouses skirt the Detroit River. Two million people lived in Motor City in 1950; fewer than 790,000 live there today. There are no jobs. Foreclosures have skyrocketed. You could buy a house for a thousand bucks, though it's likely already been gutted by vandals or swallowed by weeds.

There have been different plans to save the city, but only one has gained traction: to save Detroit, build another city twenty-five miles west of downtown, between Detroit Metro Airport and Willow Run Airport. This new city already has a name: Detroit Aerotropolis, an airport city, the future economic engine for all of southeastern Michigan. Express trains and wide roads would connect the airports with clusters of corporate headquarters, manufacturing outposts, residential areas, hotels, conference halls, retail stores, and entertainment centers. All this would provide tens of thousands of jobs, a huge infusion of tax money, and billions of dollars in economic activity.

Maybe it sounds too grand, too good, or even too disconcerting to become true. But our global economy is inextricably linked to air travel. Aerotropolises have sprouted up around airports in Dallas, Amsterdam, Dubai, Beijing, Hong Kong, Kuala Lumpur, and elsewhere. And Jack Kasarda's fingerprints are all over them. A sociologist turned global business guru, Kasarda has helped dozens of cities around the world transform airports into economic juggernauts. They've taken his ideas—actual blueprints in some cases—and invested billions of dollars to build new cities for a globally connected age.

Kasarda's research shows that the goods we send now from country to country are 3.5 times more valuable than the goods we sent three decades ago. The stuff we send by jet is 14 times more valuable. We're now loading 747s with expensive medicine, computer components, fresh fruit and flowers, digitized car parts, microelectronics, jewelry, and anything else that isn't too heavy to let a jet freighter rise from the runway.

Jack Kasarda, 2006, at Brisbane Airport in Australia, where he helped create an aerotropolis. Brisbane is on a long list of cities that Kasarda has advised. Photo courtesy of Brisbane Airport.

Boats used to carry nearly all of our traded goods. But now, according to Kasarda's research, more than a third of the total economic value of all goods shipped internationally is sent by jet. Companies have lined up next to airports to save time and cut costs. They've created millions of jobs, but they've also sometimes created immense urban sprawl. Kasarda's idea is to plan aerotropolises for smart growth instead of letting airport cities unfold willy-nilly.

The Detroit Aerotropolis is one of his projects. No one knows if it will save the Detroit region. But no one knows its chances—or how to build it—better than Jack Kasarda.

The man with the plan

In the late 1970s, as chair of UNC's sociology department, Kasarda saw Detroit's demise coming. He found that companies were no longer bound by waterways and railroads. Factories moved to the uncongested suburbs, transporting products by truck instead of train or boat. Detroit hitched its fortunes to the auto industry and then watched the Big Three—Ford, Chrysler, and General Motors—leave for the suburbs and then for Mexico and overseas.

Kasarda consulted for the Carter administration, arguing that to try to reindustrialize inner cities was a waste of time. Those days were over; the factories weren't coming back. Instead, he said cities should shift to information processing, administrative work, and knowledge-based jobs. The government should help unemployed workers leave inner cities for the suburbs, where there were more lower-skill jobs. "You'd have thought I was the devil incarnate," Kasarda says. The Carter administration wanted no part of thinning out cities, even if it would reduce unemployment and the number of people on welfare.

Kasarda turned out to be right. As Detroit withered away, Pittsburgh, once shackled to the steel industry, rebounded because it slowly rebuilt around health care, higher education, and high-tech industry. But other towns weren't so visionary or lucky. Wilkes Barre, Pennsylvania, (Kasarda's hometown) was a failed coal mining town. King Coal left when the Susquehanna River flooded the mines in the late 1950s. The town was never the same.

As a teen, Kasarda worked at a factory assembling grenade launchers bound for Vietnam, and then attended Cornell University to study economics and business. He loved his sociology courses most, even though he clashed with professors who told him that human beings had an innate ability to shape the world. They taught that circumstances didn't matter that much. Kasarda didn't believe them. What choice had the Wilkes Barre coal miners really had?

Kasarda thought that competition between cities and how their economies were structured mattered much more than individual will. His professors compared him unfavorably to Amos Hawley, a UNC professor who had created the field called human ecology—the study of people and their natural, social, and constructed environments. Kasarda took the jab as a compliment and came to Carolina in 1968 to study under Hawley.

Panatropolis: This city doesn't exist yet. But it will be built over the course of several decades near Panama City's Tocumen International Airport. Planners took Kasarda's ideas and designed an aerotropolis that will rival New Songdo City in South Korea. Photo courtesy of Panatropolis Ltd.

"I was looking at cities as not just concentrations of people but as economic enterprises," Kasarda remembers. He thought the primary function of cities should be to generate jobs for their inhabitants and competitiveness for the nation.

As a young professor at the University of Chicago, Kasarda thought that multinational companies would play a major role in determining which cities and regions would succeed or fail. And a lot would depend on how companies organized their supply chains—from corporate headquarters down to the mines for raw materials—and how efficiently those chains operated.

When Hawley retired in 1976, Kasarda took his place and in 1980 became chair of UNC's sociology department. In the mid-1980s, Kasarda traveled to Bangkok and Hong Kong, where he saw airports wedded to industry. Kasarda called them transparks—industrial developments where manufacturing plants merged seamlessly with airport taxiways. Kasarda realized that these transparks were helping cities create lots of jobs. And they could be built anywhere, even in North Carolina or Michigan. He studied and wrote about how transparks functioned and how they could best be built. By the end of the 1980s, Kasarda had written enough; he wanted to help a city *build* a transpark.

Global TransPark

In 1990, the year Kasarda left the sociology department to head up UNC's Kenan Institute of Private Enterprise, he got a call from North Carolina Governor James Martin. The two spoke at length about what a transpark in North Carolina would look like. Kasarda rattled off his ideas: a pair of runways, each 2.5 miles long, would allow the largest jet freighters to land. Manufacturing plants would abut taxiways so products could be loaded onto planes the same way coal is loaded onto freight trains. Computerized conveyor systems would connect manufacturing plants to jet freighters (kind of like how passengers funnel onto planes from terminal gates). High-speed vehicles would connect factories to central distribution terminals. Freight would be weighed automatically. Kasarda's list went on and on. But what really got Martin excited was Kasarda's research showing that a transpark—if properly built and located—could create thirty thousand jobs.

Martin was sold. The state chose to build it in Kinston, even though Kasarda had told planners that Kinston's airport lacked access to highways and larger cities.

The Global TransPark wasn't finished until 2001, and for the next seven years Kinston was passed over as companies put factories near other airports. The first major multinational company to call Kinston home was a Boeing spin-off called Spirit AeroSystems in 2008. Today, critics call the Global TransPark an expensive failure. Some blame Kasarda. Still, ten companies and four state agencies call the park home. Progress has been slower than expected, but Kasarda still says, "It's eventually going to work."

His prediction is based on precedent. The global economy is now all about just-in-time manufacturing—make products, ship them, use them right away. Inventory is a waste of space, which means it's also a waste of money. A network of complex computer systems and the internet make just-in time possible. But, as Kasarda points out, "the internet can't move a box." We need airports. Good airports. A network of airports. "The physical internet," as Kasarda calls it.

Just like a website, a transpark should be efficient, tidy, and attractive. But during the 1990s this physical internet had already caused urban sprawl around cities such as Memphis, Chicago, and Newark. Like the first websites, the physical internet's original transparks were cobbled-together, sloppy, and ugly. Kasarda set out to fix that. He drew up his own designs for how industries should build near airports.

In 1995 Federal Express, which had helped create a vast urban development and thousands of jobs in Memphis, used Kasarda's transpark model to build a new Asian hub in the Philippines. Two years later the Subic Bay Freeport Zone, as it's called, had twelve Taiwanese computer component factories. Within ten years, more than one hundred companies had moved to Subic Bay, investing $2.5 billion and employing seventy thousand people. Exports rose from $24 million to $1.3 billion.

While Kinston's Global TransPark was mired in delays, Subic

Detroit Metro Wayne County Airport is turning into an aerotropolis. Those woods in the distance will disappear. In their place will rise distribution centers, hotels, and other job-creators—the centerpieces, Kasarda says, of Detroit's long-awaited revival. Photo courtesy of Aerotropolis Development Corporation.

Bay took off. Airport authorities in China, Thailand, Southern California, and Dallas-Fort Worth wanted Kasarda to help them deal with the deluge of companies moving in next to their runways. It was during those meetings in the 1990s when Kasarda realized that "transpark" wasn't the right word for what he was talking about. Airports weren't just conduits for transporting cargo and people. Kasarda found that the number of airline passengers had increased from 13 million to 500 million between 1950 and 1989, and over half of them were business travelers. As a result firms were relocating corporate headquarters and other offices near airports, and corporate employees were building houses in nearby developments.

Kasarda began reworking his transpark idea. He sketched what an airport city could look like, complete with hotels, conference centers, residential areas, manufacturing hubs, and elements of his transpark idea. While explaining his new scheme to Chinese government officials, Kasarda heard one of them whisper to another, "It's an *aero*tropolis."

The fifth wave

In a pair of articles in 2000, Kasarda laid out a concise history of the five waves of urban development and explained why we should pay close attention to the fifth one.

First, modern cities developed around seaports (Boston, Charleston, New York). Second, towns sprouted up along rivers and canals (Buffalo, Pittsburgh, Detroit). Third, railroads opened up inland areas to manufacturing and distribution (Atlanta, Omaha, Kansas City). Fourth, integrated highways dispersed people and companies throughout suburbia. The fifth wave is cresting right now: airports as the primary drivers of urban growth, international connectivity, and economic success. Speed now matters most.

"The economy is no longer about individual companies battling it out with other companies," Kasarda says. "It's about supply chains versus supply chains." Twelve companies in twelve countries might make different computer components, and a thirteenth might assemble the computers and ship them to retailers around the world. It's crucial, Kasarda says, that none of those thirteen links in the supply chain be slow, inefficient, or expensive.

Kasarda came up with a short list of aerotropolis themes:

1. Developments should cluster together—manufacturing in one place, corporate offices in another, homes in a third, etc.
2. Manufacturing, warehousing, and trucking should be separate from other business areas and passenger flows.
3. Green space should separate developments.
4. Strip developments, such as strip malls, should be limited.
5. Expressways and express trains should connect the airport with major business and residential areas.
6. Truck-only lanes in busy areas would reduce traffic congestion and improve safety.
7. Businesses that use the airport the most should be closest to it.
8. Noise and emission-sensitive commercial and residential areas should lie outside high-intensity flight paths.

In those same articles, Kasarda showed how airport developments had already helped many cities. In 1995, Los Angeles International Airport generated $14.7 billion in business just in the vicinity of the airport. But LAX has no room to grow. The economic

impact of Dallas-Fort Worth's airport on the North Texas region was $8.4 billion a year in 1995; now it's $39 billion. Airlines generate a third of that total. Surrounding commercial development, land leases, and hotels generate the rest. More than two thousand companies moved to Las Colinas, an instant city four miles from DFW Airport, full of companies, restaurants, hotels, and neighborhoods with tree-lined roads. But there's no more land to develop near DFW; developers are now focusing on the six thousand acres of open land inside the airport's fences.

In a single year, $130.5 billion in freight moved through JFK airport, accounting for 130,000 jobs. JFK can't expand. Chicago's O'Hare International Airport area is the second-largest office market in the Midwest, but it has little room to grow. Dulles's airport area registers more retail sales than any other U.S. "city" except Manhattan. In Memphis, Federal Express moved next to the airport, attracting hundreds of companies, creating 220,154 jobs, and helping to infuse $29 billion into the region annually.

And Detroit? The Jones Lang LaSalle real estate firm has estimated that after twenty-five years of construction, the Detroit Aerotropolis would generate $10 billion in annual economic activity, $171 million in annual tax revenue, and 64,000 jobs. Although other cities and airports have a massive head start on Detroit, Kasarda points out that Detroit Metro Airport has nearly sixty thousand acres of developable land, one of the most prized possessions of the Instant Age.

Up in the air

Kasarda found that land near airports, which had long been some of the cheapest real estate, has become some of the most desirable and expensive acreage on the planet. And not just for industries. Homes—mansions, in some cases—are lining up near airports.

Consider Denver. Stapleton Airport was built far from residential neighborhoods in 1929. By the time the airport closed in 1995, neighborhoods had surrounded it. Some people complained about the noise and traffic. The city built Denver International Airport in the middle of nowhere twenty-five miles northeast of the city. Seven times the size of Stapleton, DIA set aside fifty more square miles for future runways. Still, residential neighborhoods—really nice ones—have encroached on DIA's fences. Will it or should it become an aerotropolis? Denver's leaders are moving in that direction.

Amsterdam Airport Schiphol, twenty minutes from downtown Amsterdam, is now its own city. According to Jack Kasarda, it's efficient, well-designed, attractive, and better than any of the aerotropolis prototypes in the United States, including Memphis. Photo by Maurits Schaafsma and Liesbeth Noorman.

Detroit is trying to move faster. Its economy is a shambles. Detroit Metro Airport is one of the only major assets the region has other than the University of Michigan. The Wayne County officials who oversee Detroit's two airports read Kasarda's papers and asked for his help. He drafted three reports detailing how Detroit Metro had the hallmarks of a future aerotropolis. Then Wayne County CEO Bob Ficano had to convince civic leaders from other municipalities to go along. And he needed Michigan's legislators to commit to special incentives, given the dire state of the Detroit region.

As Ficano tried to assuage skeptics and build consensus, Kasarda waited. And waited. Meanwhile, he continued to hone his ideas and watch as the business of building aerotropolises boomed. Business travel alone is now a $261-billion industry in the United States and nearly a $1-trillion industry around the globe. This is why conference centers near airports are so popular and why residential areas have taken shape under flight paths. People who travel a lot aren't afraid to live near airports. "On the contrary," Kasarda says, "many people are drawn to them."

It wasn't supposed to be like this. People said air travel would decrease with the rise of the internet and newfangled telecommunications such as videoconferencing. But that didn't happen.

Technology has made business and trade easier, but few people will sign major contracts without first looking the other person in the eye, Kasarda says. People like face-to-face contact. They like to meet, hash out ideas, eat together, get to know each other. In fact, Kasarda's research shows that high-tech workers—some of the same people who created our new communications reality—travel by air 400 percent more often than the rest of us. "Every time we've had an advance in telecommunications," Kasarda says, "we've seen an increase in air travel."

Corporate executives, managers, analysts, consultants, high-tech workers, conference organizers, accountants, and marketing specialists have all clustered near airports. Kasarda found that one out of every six U.S. citizens works within a short drive of the twenty-five busiest airport hubs in the country. There are four hundred thousand jobs within a five mile radius of Dallas-Fort Worth's terminals. He also found that aerotropolises near Chicago, Washington, D.C., and Dallas-Fort Worth are growing much faster than the cities and suburbs that spawned them.

The aerotropolist's bible

It seems it's the fate of airports to be loathed and loved, unwanted and desperately needed. Recognizing this, Kasarda's plan is simple. We will build and live near airports; why not plan for it? Why not make airport cities function properly so that they are economically efficient, attractive, and environmentally sustainable?

"China, India, and Middle Eastern countries view airports as the primary infrastructure necessary to compete in the twenty-first century," Kasarda says. "We view them more as nuisances and environmental threats to be controlled. And therein lies our chal-

lenge and our peril. If we continue to view airports that way, then we've already capitulated. We're already out of the game."

China is building one hundred airports, to be completed by 2020. Dozens will be aerotropolises. In Taiwan, the government spent $8 billion for one airport project based on Kasarda's designs. In comparison, the U.S. allocated $9 billion for all transportation infrastructure as part of the 2008 stimulus package; a tiny fraction went to updating airports. "Thirty years ago we had the best airports," Kasarda says. "Not anymore."

Dubai's aerotropolis is the world's largest, situated perfectly between the East and West. India took so well to Kasarda's ideas that he had to write an op-ed piece telling them to slow down; not every town in India can or should be an aerotropolis. Still, India wants to build five hundred airports in the next decade. In China, Guangzhou's new airport, where FedEx has a major hub, is becoming an aerotropolis based on Kasarda's designs.

President Obama, in his 2011 State of the Union address, said we need to boost employment by doubling our exports in the next five years, which means improving our trade infrastructure. "But the president only mentioned the internet, high-speed rail, and highways," Kasarda says. "None of that will increase exports that much. He gave little mention to airports and their surrounding infrastructure. *That's* where we need investment."

Kasarda has written ten books, including *Global Airport Cities*, which is for industry insiders, airport developers, and scholars. His latest book, *Aerotropolis: The Way We'll Live Next*, is for the rest of us, including politicians. It was cowritten with business reporter Greg Lindsay.

Made in Michigan

In a chapter titled "Aerotropolis or Bust," Lindsay writes about his trip to Amsterdam in 2007 to check out Schiphol International Airport and its aerotropolis, which Kasarda had told him was one of the best in the world. With Lindsay were two dozen delegates from southeastern Michigan, including Wayne County's Bob Ficano. All had come to hear Kasarda and to see Schiphol in action. Ten of the delegates were already on board to build the Detroit Aerotropolis. By the end of the trip, all twenty-four were in agreement to build it.

They saw Kasarda's point that Detroit Metro Airport could be the key to southeastern Michigan's future. It's one of the newest, most efficient, most passenger-friendly airports in the country—and one of the best airports in the world because of its new terminals, Delta hub, and better connections to Asia than any other U.S. city. From Detroit Metro, companies can reach 60 percent of the U.S. population overnight and have immediate access to Canada, our biggest trade partner. About 80 percent of that trade flows through Detroit.

In 2008, on Ficano's invitation, the Chinese auto company Tempo Group opened an engineering center near Detroit Metro Airport. It hired several American engineers to test brakes and steering gear. Then Tempo hired a few dozen more. And then several hundred. All had worked for the Big Three at some point. Tempo is now one of five Chinese automakers reopening factories and warehouses that U.S. auto companies left vacant. The Wanxiang Group, China's second-largest private company, bought a former Ford plant and moved it to the aerotropolis to build electric cars.

Hong Kong International Airport, the hub that makes Hong Kong hum as a manufacturing and business leader. Photo courtesy Hong Kong International Airport.

In *Aerotropolis*, Lindsay writes that the auto industry is heading to the East, and Detroit's aerotropolis will be the bridge to the West—a key node on the world's physical internet. It's ironic that Detroit Aerotropolis got its start testing and building Chinese cars. But Ficano is focused on jobs first and diversification second.

Later in 2008, Ficano flew to Beijing for the China International Auto Parts Expo. While CEOs of the Big Three were in D.C. begging Congress for mercy during the financial crisis, Lindsay writes, "Ficano took to the podium in the enormous Exhibition Center and invited everyone present to colonize his corner of Michigan." So far, twenty companies have moved near Detroit Metro Airport. And that was before Michigan legislators passed a bill making it easier for companies to develop land and do business near the airport.

Things could unfold as slowly in Wayne County as they have in Kinston. Or the aerotropolis could transform southeastern Michigan into another American high-tech hub, or at least a revitalized mecca for manufacturing. It's too soon to tell. But in 2009, Detroit got good news. General Electric announced plans to open its Advanced Manufacturing and Software Technology Center at the Detroit Aerotropolis. It's the kind of anchor Ficano had hoped for. If the history of aerotropolises means anything, then other companies will follow GE's lead.

The GE plant hired fourteen hundred people to create next-generation wind turbines, smart grids, CAT scanners, and jet engines. It's the kind of knowledge work Kasarda knew would be our future, even back when he was sparring with the Carter White House. And those American knowledge workers have set up shop not in downtown Detroit, not in the suburbs, and not in a foreign country. They go to work at the aerotropolis.

John D. Kasarda is director of the Frank Hawkins Kenan Institute of Private Enterprise at UNC. Greg Lindsay is a freelance writer whose work has been featured in Time, Fast Company, BusinessWeek, *and* Advertising Age. *Their book*, Aerotropolis: The Way We'll Live Next, *was published in March 2011.* New York Magazine *ranked it number eight on a list of the most anticipated books of 2011. Kasarda's aerotropolis was one of* TIME *magazine's "10 Ideas that will Change the World" (see the March 28, 2011, issue).*

Cast Aside, Left Behind

Susan Harbage Page walks the border to photograph things abandoned by immigrants in search of a better life.

Left: Argyle sock, Brownsville, Texas, 2007. "The border isn't the end of the journey," says Susan Harbage Page. "It's the beginning of a really uncertain future." Images in this story are from the U.S.-Mexico Border Project, by Susan Harbage Page.

Entrance into the U.S. from the Rio Grande, Brownsville, Texas, 2008. "That's the first view some people have of the United States," Page says. Beyond the riverbank is a road used by the Border Patrol and an eighteen-foot wall ("I've seen people climb it in thirty seconds," she says). "I imagine myself having to go up through that hole and what it would feel like. Maybe it's night, and you're scared the Border Patrol is going to be there. You might have your kids with you."

Homemade flotation device, Brownsville, Texas, 2008. Someone used these empty plastic bottles strung together with rope to float a baby or small child across the river, Page says. "This just never left me. So I started doing more and more research."

Susan Harbage Page was walking along the Rio Grande on the United States-Mexico border when she found a wallet abandoned on the riverbank. "There was a photo and a passport and a name," she says. "He was nineteen. I had a son who was nineteen at the time."

She was standing in the spot many immigrants first see when they cross the southern border into the States. They swim across the river, sometimes ferrying babies and small children on homemade floats. Then they toss away their wet clothes and identification and do their best to disappear.

"This person was from Honduras, so we know he had to cross the southern border of Mexico—which is even more perilous than our border—and then come all the way north. At that point, his ID was going to do him more harm than good. He probably ditched it so that if he did get picked up by the Border Patrol, he would only get sent back across the border instead of all the way to Honduras."

The wallet was one of the first objects Page photographed for her project, Walking the Border, which documents the detritus of a massive migration north through Mexico into the United States. Since then she's photographed and preserved hundreds of items—river-muddy clothes, mangled flotation devices, spent bullets. "It's really powerful when you see it and you realize what it is," she says. "You realize that someone was going north. And they gave up a lot to do that."

Page sometimes chats with the Border Patrol while she's walking. Sometimes they're friendly, she says, sometimes not. Some have threatened to arrest her or followed in helicopters. "It's really become a no-man's-land," she says. "It's becoming more and more dangerous."

After every trip, Page adds to the archive she's building. Hairbrushes, detention center bracelets, undergarments, aftershave lotion, eye shadow—intensely personal items that you'd usually only see if you were close to the person who owned them. "When was the last time you saw a toothbrush on the street?" she asks.

—Margarite Nathe

Susan Harbage Page is a lecturer in the Department of Art in the College of Arts and Sciences. Her work is funded in part by UNC's Center for the Study of the American South and a North Carolina Arts Council Fellowship. She hopes to find a local organization to house the archive she's building.

Striped clothes, Brownsville, Texas, 2008. Back when the border wasn't so sharply defined, Page says, people used to have birthday parties and picnics on the riverbanks. "Now that's all gone."

White shirt, Brownsville, Texas, 2007. “These items bring up all these questions,” Page says. “Where did they come from? Where are they going? Those empty clothes, those shoes, the backpacks. Often I’ll find kits tied to the backpacks, a black plastic bag with dry clothes in it.”

Top: Wallet, Brownsville, Texas, 2008. **Bottom:** from the U.S.-Mexico Border Anti-Archive. "I found this wallet while it was still wet," Page says. In it were identification, some coins, and emergency phone numbers. "They say that during the journey north, parents have their kids memorize the phone numbers."

Top: Clothing and red bra, Brownsville, Texas, 2010. **Bottom:** from the U.S.-Mexico Border Anti-Archive. "A lot of kids are coming north to find their parents," Page says. "There are stories out there now about ten-year-old kids coming north to find their moms, because their moms came north to make money. We don't think enough about why somebody's willing to do this."

If you have a heart attack, stroke, or a brain injury, Laurence Katz wants to make sure you're

CHILLED TO THE BONE

by Margarite Nathe

The winter ice had just melted on a lake in the Alaskan interior, where a floatplane was humming across the water for takeoff. Inside were a pilot, a seven-year-old boy, and a thirty-one-year-old woman we'll call Ann.

It happened fast. Water rushed into one of the floats. The plane rolled. Ann and the little boy toppled into the icy water and disappeared. The pilot dove in after them. Eventually he pulled up the little boy. Five or ten minutes of CPR revived him.

Ann was harder to find. The pilot had to dive in again and again. No one's sure just how long she was in the water—at least thirty minutes, the pilot said, maybe sixty. He gave her CPR for an hour after he'd found her. Eight hours passed before a helicopter got her to a hospital. Her body temperature was only eighty-seven degrees Fahrenheit, but she was making small, jerking movements and her pupils responded to light.

Being without oxygen for half an hour is almost always a death sentence. "When a person drowns, they stop breathing, run out of oxygen, and then the heart stops," says professor of emergency medicine Laurence Katz. "When the heart stops, blood flow to the entire body—including the brain—stops." The brain becomes inflamed.

At the same time, the blood starts to accumulate toxins. If CPR can get the person's heart started again, those toxins immediately flood the brain, causing catastrophic and irreversible damage. In fact, most of the brain damage occurs *after* blood flow is restored. Introducing blood that's depleted of oxygen and full of high concentrations of acids is like pouring gasoline on a smoldering fire, Katz says. Near-drowning victims who are resuscitated often spend the rest of their lives in a vegetative state.

On the other hand, Katz says, the survival rate of coldwater drowning victims is oddly high. There are plenty of case studies: The four-year-old found drifting under the clear, thin ice of a lake, who was revived and fully recovered. The sixty-nine-year-old crane operator who tumbled from a bridge and spent some forty-five minutes without a heartbeat before going back to work. There are some people who've been dead for over an hour, Katz says, who go on to lead normal lives.

It wasn't until the 1980s that scientists made the connection. The sudden drop in temperature that causes hypothermia decreases the brain's demand for oxygen. Because its need for oxygen is cut off, the brain doesn't have a chance to suffocate. "Hypothermia is like an extinguisher," Katz says. "It puts out the fire." For decades now, doctors have used ice baths to cool patients down from the outside in, to put them into

a kind of hibernation. But, Katz says, why couldn't we do this from the *inside out*?

Two weeks after the pilot fished Ann out of the water, her doctors were running test after neurological test. All were coming back normal.

Katz was an undergrad when he wrote a letter to a scientist he greatly admired, a man named Peter Safar. Safar was the anesthesiologist who had introduced the world to CPR and founded the United States' first intensive care unit and modern ambulance service. He was also one of the first to suspect that hypothermia could buy time for doctors in the emergency room. Safar had found that in treating acute brain injuries, lowering the patient's body temperature by just a few degrees dramatically reduced the chance of neurological damage. Safar invited Katz to work with him in his lab at the International Resuscitation Research Center in Pittsburgh. Katz stayed there for years, working his way up from a technician to a faculty member, and helping Safar to bring therapeutic hypothermia out of their labs and into hospitals everywhere.

The survival rate of coldwater drowning victims is oddly high. There are some people who've been dead for over an hour, Laurence Katz says, who go on to lead normal lives.

But even though Katz and other scientists have spent thirty years refining the treatment, he says, the technique is still crude.

For example, say doctors in an ER are using the therapy to treat a man who's had a heart attack. The doctors give him a hefty dose of Fentanyl, a narcotic, and strap him into the modern version of an ice bath—a machine called the Arctic Sun, which pumps frigid water through pads wrapped around the patient's torso and legs. The man's body immediately starts fighting the cold, Katz says. It shivers, increases its metabolism, and sends blood up to the skin's surface to help him retain heat. The docs use a chemical called vecuronium to paralyze his body and keep him from shivering. But paralysis also keeps the patient from breathing on his own, so in comes the breathing machine.

This goes on for between twelve and twenty-four hours. (Any less, and the benefits are only temporary.) All the while, the patient is in a delicate state of hibernation. The doctors have to be careful not to cool him too much or too fast, Katz says, or lower his blood pressure too much. When they return his temperature to a normal 98.6°F using heating pads and warm water, they have to be precise—overheating him could cause fever or brain damage.

Before 2007, when Katz created the hypothermia program at UNC, heart attack patients who were brought to UNC Hospitals comatose (but still with a pulse) had less than a 5 percent chance of leaving the hospital alive. Today, 50 percent go home without any neurological damage.

Everyone knows this therapy works, Katz says. Therapeutic hypothermia has been clinically proven to help patients who've been resuscitated after cardiac arrest—there are some 250,000 of those a year. But the method is far from perfect. It takes too long and it's too complicated. Only a few hospitals across the country have the resources and expertise to do it.

Katz wants to change that. There's a good chance the therapy could help more than just 250,000 people a year, he says. It could help *millions*. Therapeutic hypothermia may actually work for *all* acute brain injuries, including traumatic brain injuries (1.7 million a year), strokes (795,000 a year), and spinal cord injuries (12,000 a year).

Katz has spent the last ten years looking for a better way to use therapeutic hypothermia, one that's less traumatic for patients and faster and easier for hospitals. There has to be a way to lower body temperature without using an Arctic Sun or plunging into a lake like Ann did, he says: a way to fool the brain into cooling the body.

No one knows exactly how it happens, but every winter, bears manage to lower their body temperature when they hibernate, from 98.6°F to 93°F. Their bodies cool, their metabolisms slow down, and they snooze comfortably—without the shivering and other signs of resistance doctors see from therapeutic hypothermia patients. Bears and humans—and all mammals, from elephants to field mice—maintain about the same body temperature, Katz says. And they regulate that temperature in similar ways. So he started studying all the data he could find on bears, thinking that if he could simulate their hibernation mechanism in humans, he might find the key to a better treatment.

Katz theorized that bears can reset their brains' thermostats using a chemical that occurs naturally in their bodies. When it comes time for the bear to hibernate, the chemical triggers a reaction in the bear's brain that convinces it that 93°F is the normal body temperature. "So their bodies do everything they can to reach that new temperature," Katz says.

Now he's working to figure out what that chemical is. Certain chemicals in bears' brains increase during hibernation, he says, and so he began by testing compounds that had a similar chemical structure. He's found some likely suspects, and has developed two different drugs that induce a hibernation-like state in small animals, lowering their body temperatures and even protecting them from brain injuries. The drugs are going through the patent process.

Just think, Katz says: Paramedics could administer a rapid infusion of the meds even before the ambulance gets to the hospital. Hospitalization times could plummet, and so could the costs of rehab after heart attacks and strokes. Therapeutic hypothermia could save billions of dollars.

In 2010 Katz formed Hibernaid, a company dedicated to creating new drugs for therapeutic hypothermia, testing them on humans, and getting them on the market. He and his partners are looking for funding to start clinical trials. It could take up to ten years before the drugs are available, Katz says, but he hopes to move fast. Hibernaid could save hundreds of thousands of lives in hospitals everywhere, he says. Even in remote pockets of the Alaskan bush.

Ann was released from the hospital eighteen days after she fell in the lake. She'd suffered kidney failure, depression, and sinusitis so severe it required surgery. But her brain was fine. She had absolutely no neurological damage.

Going so long without oxygen did leave her with some temporary amnesia. At first she couldn't remember the accident itself. She could barely muster memories from six weeks before that. But slowly it came back to her. She eventually remembered details, she said, such as being outside her house the morning of the accident and briefly locking eyes with a passing grizzly bear. e

Laurence Katz is an associate professor of emergency medicine in the School of Medicine and codirector of the Carolina Resuscitation Research Group. His work is funded by the National Institutes of Health.

RON BLEKICKI

Outside Tarangire National Park, Tim Baird (right) collects a GPS coordinate with Isaya Rumas (center), while Gabriel Ole Saitoti (left) records information about the surrounding area. They'll use the data to piece together how the park affects the environment and the Maasai people. Photo by Tim Baird.

THE PEOPLE AND THE PARK

Before the borders of the Serengeti and Tarangire national parks were drawn, the Maasai of northern Tanzania were nomadic herders. Now they plant crops. They wear digital watches. They text. Is there a way to balance their needs with those of the wildlife that call the plains home?

by Beth Mole

While Brian Miller and Tim Baird were making sandwiches on the hood of their Land Cruiser, they joked about Tanzania's lack of snakes. For years they had been visiting villages to understand how the people living near conservation parks were affected by those parks. Miller and Baird's local research assistants, Gabriel Ole Saitoti and Isaya Rumas, were well aware of the area's deadly snakes. But Miller and Baird had yet to see one and they were becoming skeptical.

They joked too soon. Mid-sandwich, the group heard villagers in a nearby field yelling, "*Nyoka*!" Saitoti translated: "Snake!"

By the time they got to the field, a spitting cobra—which can shoot venom up to six feet to blind any animal that threatens it—had unfurled its hood and reared up to its full height. A handful of Maasai villagers had encircled it, throwing rocks and clamoring for its death.

Without hesitation, Rumas jumped in to help kill the snake. After all, the village was not far off, and there were children and livestock around. Saitoti, on the other hand, stood back. He felt that if you left a snake alone, then the next time one crossed your path it would leave you alone. "Almost like snake karma," Miller says.

Miller and Baird knew about the two different snake philosophies, so Rumas's and Saitoti's responses came as no surprise. But these were just the types of decisions Baird, Miller, and anthropologist Paul Leslie had come to Tanzania to understand. Their goal: to find a win-win situation for the wildlife and the people who call the Serengeti home.

The Maasai are well known for their elaborate beadwork and ornamentation, as well as for favoring red clothing. Their reputation as nomadic warriors can make it hard for them to find jobs because some employers presume they're unreliable. Photo by Brian Miller.

Above and below: The Maasai struggle to preserve their culture along the Tarangire National Park's borders even while outsiders try to conserve northern Tanzania's awe-inspiring landscapes and ecosystems. Photos by Brian Miller.

Below: On the park's borders, some Maasai have embraced modernity. Here, a man walks between villages while texting on his phone. Photo by Brian Miller.

After the wet season's rains, the plains of Serengeti National Park are lush for grazing. This appealing feast drives the migrations of herbivores such as zebras and wildebeest. Photo by Brian Miller.

Spanning northern Tanzania and southern Kenya—and part of a cluster of parks, reserves, World Heritage sites, and some of the earliest records of the human genus—are the wild, unforgiving Serengeti and Tarangire-Manyara ecosystems. They're home to the world's largest migrations of hungry vegetarians: elephants, zebras, wildebeest, gazelles, and buffalo continually chase the rains and sprouting savannah grass in and out of the parks.

The region is also part of Maasailand. In past centuries, the Maasai lived as seminomadic herders, fearlessly intermingling with the predators of the plains and earning a reputation as fierce warriors. "They moved from one place to another because they needed to bring their cattle to where rain had fallen and grass had grown," Baird explains.

They set up temporary homes and considered the plains communal land. "Their pastures had no boundaries, no titles or deeds," Leslie says. A boy became a man when he killed a lion. Their diet consisted mostly of milk, meat, and occasionally blood. That is, until the Maasai started farming.

For the past two decades or so, local governments, international conservation groups, and researchers have been following the transition of the Maasai from herders to crop growers. Some Maasai have taken up home gardens, while others have gotten involved in commercial farming. Now maize meal is a staple in the Maasai diet. Men have left their herds, migrating to cities to earn money for their farms.

"If you're putting a maize field in the middle of grasslands, you're obviously changing the environment," Leslie says. Widespread farming alters resource use and availability; it creates topsoil erosion, reduces pasture land, requires precious water, and could block the paths of migratory wildlife. "It could really disrupt the ecosystem," Leslie says. So, the big questions are: Why are the Maasai changing their livelihood? What are the consequences for their health? For their culture and social organization? For the environment?

In the 1950s the Tanzanian government created the Serengeti National Park and the indigenous Maasai were moved to the highlands. They were no longer allowed to bring their livestock to the park, even during the wet season when the area was lush for grazing. The idea was to preserve the wildlife and regulate hunting, particularly of lions. Herds of tourists followed. In the following decades, more parks and conservation areas were established, including the Tarangire—which had been a drought refuge for the Maasai—in 1970. "This whole area of Tanzania is called the 'northern circuit,'" Leslie says. "It's the prime tourist destination."

"Anybody who studies the social dynamics of conservation has, at one point, said that parks can be terrible for poor people," Baird says. "Parks kick them off the land, take away their resources, don't share profits." In some places, park boundaries are obscure or contested, and people have built farms right up to the edges. Park rangers are often heavy-handed in enforcing park rules and have cut down whole crop fields that seemed to them a little too close. The past decade also brought a string of droughts that have devastated wildlife, crops, and people.

You could guess a lot of reasons the Maasai might pick up farming in the midst of conservation efforts: an additional food source, better nutrition, a way to make a little money. But as Leslie, Miller, and Baird are finding, the Maasai's responses and decisions aren't that simple. "At first we thought it was because of poverty and population growth," Leslie says. "To some extent that's true, but if

Baird interviews a group of Maasai men. Instead of embracing Swahili, Baird says, the Maasai have maintained their own traditional language. The team relies on Saitoti and Rumas to translate. Photo by Tim Baird.

The team's campsite is situated in a rented pasture between villages and contains a thatched-roof cooking pavilion and a concrete latrine. It's convenient for getting to villages, but the team has to bring in food, firewood, and fuel from several different locations, some of which are hours away. Photo by Tim Baird.

As the sun sets, the team usually cooks chicken or goat on sticks over the campfire before heading to the tents for the night. Photo by Brian Miller.

that were the case you would have agriculture only being taken up by the poorest people." That's not what's happening.

Leslie went to Tanzania in 1998 to figure out exactly what was going on. Knowing that parks spur broad change, he started by looking at demography, land use, and economic activity in the villages. One of the first things he and his team found was that each village was worried about the same things—access to resources, being cut off from land and water—but all had slightly different strategies. Cultivation was the single common trend.

Some villages made up land titles for farming to try to block the government from expanding neighboring parks. "They feel threatened by the park, and when they cultivate the land it's like branding, like they would brand their animals," Baird says. Some villages decided where to plant crops and build structures, such as secondary schools, in order to block the migrations. "The villagers think if the migrating wildlife aren't there, the government is not going to be interested in taking their land," Leslie says. "It's basically preemptive cultivation." Still other villages have started their own conservation efforts; they've given up areas otherwise used for farming and herding so that wildebeest can come to calf.

The trouble is that these strategies may not work. For instance, branding land with cultivation could trigger stronger conservation efforts. And putting fields in the middle of migratory paths may just lead wildlife to tromp through and destroy crops. Giving up the most nutritious grasses to wildebeest and other wildlife means the Maasai's herds won't have enough food, so neither will the Maasai. "These are political strategies and economic ones," Leslie says. "They're all experimenting, really. It's all in flux."

"For every type of natural resource management, any type of intervention, there will be a response," Baird says. "If we can understand it, if we can predict what that response is going to be, then we can design the management strategy more effectively."

While the Maasai test new methods, Leslie and his team are following their decisions, their logic, and what those mean for the ecosystems and Maasailand. "Ultimately," Miller says, "our goal is to find some balance there. A good starting point is understanding how people are generating their income and what effects they may be having on the local ecosystem" (*see "SLURP?" page 43*).

In the past thirteen years, Leslie's team has been in the Serengeti/Tarangire region almost constantly, surveying the villages and lands in flux. "You can't just go there for a year and say, 'Well, this is what it's usually like,' because things fluctuate so much," Leslie says. They set up a permanent, thornbush-enclosed camp outside of Tarangire. Luckily, lions and hyenas treat tents like rocks. "They don't know that they have a soft chewy center," Leslie says. But the team takes precautions just in case. They hire villagers to help them out—a guard at the campsite, for example. It's like a small business, Miller says: "We call it the Company."

After looking at big-picture demographic and land-use changes, Baird came back from an eleven-month trip with a big finding. "In Western-speak, I investigate the banking and insurance sectors of Maasai culture," he says. While the Maasai don't usually open checking accounts or buy insurance, they have economic systems in place that provide the same safety nets. Baird found that their economic choices are indicators of how well the village is developing—how much health care, education, and access to water they have. "My

The Tarangire River is the lifeblood of Tarangire National Park. During the dry season and droughts, wildlife flock to it—and so, therefore, do tourists. The Maasai are not allowed to use the park as a water resource for their families or their herds. Photo by Brian Miller.

hypothesis was that development was going to be lower closer to the park," Baird says. After all, the park introduces constraints to the Maasai way of life. But he found that the park actually seemed to catalyze the Maasai's development and prosperity. It changed their investment decisions, too.

"Tarangire National Park is forty years old," Baird says. "The Maasai don't just remain victims forever. They adapt. They come up with new strategies." In the past, the Maasai used cattle restocking and animal loans as insurance, which provided a way to mitigate risk. If a Maasai's cattle were killed by drought or disease, villagers would each donate an animal or two to help him restock. If a Maasai needed extra money for, say, a hospital visit, he might ask for a loan in the form of an animal to sell. The borrower would eventually have to pay back the animal, usually with a more expensive one to incorporate interest.

"A loan is only extended if you have a problem. The same with restocking," Baird says. "Gifts are different." Gifts of animals are used to forge friendships and connections in happier times. These connections are central to the villagers' culture and way of life.

"I found villages far from the park using lending and restocking all the time," Baird says, "which means they're having problems." The villages closest to the parks aren't, at least not to the same degree. In fact, the closest villages found ways to build schools, recruit outside help to drill wells, build dams, and get hunting companies to pay for stuff, Baird says. Since the villagers see the park as a risk, they have diversified and embraced modern techniques to mitigate that risk. Instead of relying on old insurances, they developed new ways around problems. Now they use gifting as their primary transaction. When they do use loans, they use them to capture opportunities, such as paying for school. The villages far from the park certainly aren't doing that.

Unfortunately, it's not all good news. "The concern is that development outside of the park is harmful to the long-term integrity of the ecosystem," Baird says. Some conservation groups are actually paying villagers not to develop land or plant crops. "In southern Africa, it's more often a matter of policy to try to get local communities to benefit from conservation," Leslie says. That way

After Maasai villagers killed this spitting cobra, they burned its carcass using sticks, oil, and rags. Westerners agree that conservation is worthwhile, says Paul Leslie. "We like to see these animals. We're convinced that there's value in preserving species diversity." But we'd likely not think about conservation and preservation if we found spitting cobras in our own back yards. Photo by Brian Miller.

people living nearby are less threatened by the park and less likely to negate conservation efforts. "We started doing comparative work to see what works," Leslie says.

Miller is working on a model to understand the relationship between conservation interventions, social responses, and positive outcomes. He's starting with the villages outside of Tarangire, where the Tanzanian guide Rumas is from. Once the model is done, he'll test it out. "Ideally, I would go to different parts of Tanzania or different parts of the world and see if it holds up," Miller says. That somewhere different might be the northern region where Saitoti is from and where conservation efforts and park rangers have been the most aggressive. "People have been thrown in jail or beaten, or had animals confiscated," Leslie explains.

"Perceptions of conservation are very different there," Baird says.

When Rumas jumped in to help kill the spitting cobra, one of the villagers grabbed a shuka—a traditional red dress cloth. "The villager was holding it up almost like a bullfighter to distract the cobra," Miller says. The cobra shot its venom at the shuka while other villagers killed it with rakes. Because they believed that even the bones could kill, they brought oil and rags to burn the carcass. "They were very serious about disposing of it," Miller says. "It was kind of sad to watch, actually."

"Everybody agrees that conservation is worthwhile," says Paul Leslie. "But this is a Western value. We like to see these animals. We're convinced that there's value in preserving species diversity. We can construct arguments about why this is a good thing, and I agree with almost all of them. The real problem is that conservation is, to a large extent, on the backs of local people who don't typically benefit from it."

Beth Mole is a postdoc in the Eshelman School of Pharmacy.

Paul Leslie is a professor and chair of the Department of Anthropology in the College of Arts and Sciences. He received funding from the National Science Foundation (NSF). Brian Miller is a doctoral candidate in the Curriculum for the Environment and Ecology and is funded by the Center for Global Initiatives and NSF. Timothy Baird is a doctoral candidate in the Department of Geography in the College of Arts and Sciences and is funded by a Fulbright-Hays fellowship and NSF. All three are members of the Carolina Population Center.

SLURP?

Since severe droughts in 2000 and 2009 devastated the Maasai's crops and herds, Brian Miller has been researching how fluxes in land use and social dynamics have affected water. "When you talk to the Maasai about their main concerns, they say that water availability and access is huge," Miller says. In the past, they would get their water from the park area, which is now off-limits. "In dry seasons and droughts, that's where the wildlife and tourists are," he says. "So the Maasai can't just sneak in and go to the river." When rain does fall, it's in unpredictable spurts; one patch can be well watered, while a patch two hundred yards away can get no water at all.

Miller will be in Tanzania for eight months this year to find out how the Maasai have adapted. He'll interview villagers, water management councils, village officials, and clan elders to figure out where and how people are getting water and what effect that has on the environment. He's focusing on four rivers outside of Tarangire that have different management strategies and levels of development. Villagers told him that the most remote river is pristine, while another, downstream of a recent deforestation site, is a useless trickle. Miller will record the shape of the river channel and evaluate sediment-supply changes and water discharge levels to verify the villagers' reports.

Water access depends on socioeconomics. Water managers and NGOs have drilled boreholes to pump water up from aquifers, for which they often charge fees. Villagers have dug wells by hand in the riverbed—possibly disrupting water and sediment flow—which they regulate using traditional rules that favor clan members. Miller wants to know what's driving their choices.

"I'll take some satellite imagery that'll tell me about where the vegetation is most productive, and then on top of that I can stack the conservation data, and then I can also stack a layer for agriculture development," he says. He'll use those data to build a model of the consequences of changes in resource access.

He'll walk a fine line between drawing suspicion from the Maasai or from the park officials. "The park authority is leery of social scientists in general, since they tend to write about the raw deal that people are getting," Paul Leslie says. If they think Miller's causing trouble, they could revoke his research clearance. But if the Maasai think that he's working with a conservation group, they might not tell him what's going on. So his team goes by the name "Savanna Land Use Project."

"It's not conservation. It's not human development. It's generic," Leslie says. If only there were an "R" in it, he jokes, they could call it SLURP.

—Beth Mole

NO FOOD IN CLASS

If we are what we eat, why aren't more medical schools teaching nutrition?

by Mark Derewicz

In 1998 my skin turned as yellow as a school bus, I broke out in a horrific rash, and I was bedridden with back spasms. The ER doctors asked me a bunch of questions, ordered blood tests, and sent me down the hall for a chest x-ray. A rash like the one I had, they said, could signal chest cancer. That was a very long hall.

Every test came back negative except one: I had a strange, severe case of mononucleosis that had compromised my liver. The doctors left my side, and a young intern told me I should rest; I'd be back to normal in about a month.

I asked if there was anything I should or shouldn't eat to help my liver. The intern said, "Um…Don't eat chocolate?"

The next day, an herbalist told me to avoid a long list of foods that make the liver work hard. I took her advice and felt well enough to return to work a week later.

Two months later another doctor checked my bilirubin—the stuff that turned me yellow. It was nearly back to normal, so I asked him if I could drink a beer or two.

He said, "If I were you, I wouldn't drink alcohol again for a long time." He added that any time liver function is that compromised, you don't want to mess around. And nothing taxes the liver like alcohol. He rattled off a list of foods I should avoid.

I didn't understand why *this* physician had such a stronger opinion than the ER doctors. But Martin Kohlmeier could've told me. His research shows that at most medical schools, teaching nutrition isn't a priority. Not even teaching how diet relates to common illnesses or conditions. Students and doctors have to seek out such training on their own. In fact, medical students receive less nutrition training today than five years ago, even though, as Kohlmeier says, patients are clamoring for guidance from their physicians. Part of Kohlmeier's job is to make sure nutrition training is available to all who want it.

The National Academy of Science's Institute of Medicine recommends that medical students receive a minimum of twenty-five hours of nutrition training. That's not a lot, Kohlmeier says, but schools rarely meet that threshold. Kohlmeier, who is an MD, and dietitian Kelly Adams surveyed 109 medical schools—86 percent of all U.S. med schools—and found that only 25 percent of them met the institute's recommendation. That was down from 40 percent in 2004. They found that nutrition education was optional at four schools, and one school offered no training at all.

Since the 1990s, medical instructors have been telling Adams that they've switched to an integrated curriculum where courses such as biochemistry and physiology are interspersed with lectures and commentaries on other subjects, including nutrition. Adams' survey backed that up. It revealed that most schools use integrated curriculums. "When that happens, there are so many competing demands for professors," she says. "Nutrition seems to get squeezed out." Just 26 out of 105 schools had whole courses dedicated to nutrition.

Adams says surveys show some doctors don't feel comfortable teaching nutrition because they haven't been trained to teach it. Nutrition doesn't have a departmental home at most universities, she says, so there's no budget for teaching it.

Students, meanwhile, don't have time to study everything. But Kohlmeier says they should make time for nutrition. "We doctors keep saying that more than half of our illnesses are directly related to nutrition," he says. "Not having nutrition as part of the physician's toolkit is kind of bizarre. It's like a computer programmer not knowing programming languages."

Adams and Kohlmeier are tackling this problem. They run UNC's Nutrition in Medicine program, which has two missions: to figure out what's happening in nutrition education at medical schools and to provide an online curriculum to help medical students, residents, fellows, and other doctors get the nutrition coursework they need. The Nutrition in Medicine team of physicians, dieticians, and nutrition educators create and update the curriculum content, which is based on established nutrition guidelines and covers everything from nutrition during infancy to dietary management for diabetics.

"We're trying to give students and doctors tools right down to specific phrases," Kohlmeier says. For instance, the curriculum's advice about breastfeeding a newborn is unequivocal: start immediately, sleep in the same room as your baby, don't give other fluids, don't use a pacifier, feed often, evaluate progress, see a pediatrician, give vitamin D drops.

"Sometimes it's just a thirty-second counsel, but you have to learn that somewhere," Kohlmeier says. "Everyone

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assumes surgeons master technique. Well, they don't learn it on their own; they learn it as part of a program."

On average, students who use the Nutrition in Medicine curriculum wind up with twenty-four hours of nutritional training during their first two years of med school. Students not using the curriculum average fewer than fourteen hours. "What we count as nutritional training is fairly generous," Kohlmeier says. "For instance, when a biochemistry professor talks about vitamins, that counts toward nutrition education even though that's still really biochemistry."

As of February 2011, between 25 and 30 percent of all U.S. medical students were using UNC's Nutrition in Medicine curriculum. They can complete each online unit in under an hour. For residents, fellows, and MDs, the units are much shorter. "The idea is that a doctor can do a unit and walk across the hall and treat a patient," Adams says. "We're not trying to teach doctors to become registered dietitians." In fact, the curriculum makes clear which patients should be referred to dietitians. "Doctors don't have an hour to counsel patients on nutrition," she says. "We understand that, but patients are asking doctors questions."

Sometimes, Adams says, doctors should bring up nutrition before anything else. "If you're diagnosed with hypertension," she says, "and the doctor never mentions diet, then what impression does that give you—medication or nothing? Some dietary interventions are as effective as medication."

In 2005 I had a different dilemma. Nearly every day, an hour after breakfast, I'd feel weak, shaky, and tired. My belly hurt after lunch and dinner. A physician prescribed an antidepressant.

"But," I stammered, "I'm not depressed."

"Well," the doctor said, "antidepressants have been known to help people with digestive problems."

"So I'd take this drug for how long?"

"We'd just see how it worked."

"What about the weakness and lethargy?" I asked. He said, "Try eating some bacon with your cereal."

Eating salty strips of greasy pork every day seemed like suspect advice. I crumpled up the prescription and saw a second doctor, who didn't think diet had anything to do with my digestive problems. Antidepressants could help, he said.

Was this a conspiracy? Diet had nothing to do with how I felt? What I really needed was an antidepressant with a bacon chaser?

I've since learned how antidepressants can help people with digestive problems. So might biofeedback and hypnosis (*see* Endeavors, *Spring 2007*, "*More than Meets the Mind*"). A third doctor, though, had no doubt that diet was a likely culprit in my case. He had just hired a naturopath, a non-MD practitioner who finds the least invasive measures to relieve symptoms or return the body to its natural state of health.

The doctor deferred to the naturopath. She asked about my diet. She said I should stop eating bread, sugar, and cheese for a while. White bread, she said, turns into sugar during digestion. And sugar feeds the bad bacteria in our intestines (*see* Endeavors, *Winter 2011*, "*The Good, the Bad, and the Unknown*"). She also said I should eat a lot more vegetables and fruit. I changed my diet, and a few days later I felt like a new man. The naturopath told me her recommendations were based on her training at a school for naturopathy, her own experience with patients, and research studies.

"We doctors keep saying that more than half of our illnesses are directly related to nutrition," says Martin Kohlmeier. "Not having nutrition as part of the physician's toolkit is kind of bizarre. It would be like a computer programmer not knowing programming languages."

UNC dietitian Suzanne Havala Hobbs, author of *Being Vegetarian for Dummies* and *Living Dairy-Free for Dummies*, says there's overwhelming evidence that limiting sweets and junk food and eating a lot of fruits, vegetables, grains, legumes, seeds, and nuts are the best ways to maintain health, including digestive health. As for specific gastrointestinal symptoms, Hobbs says advice should be individualized. But she does advocate for the elimination diet—cutting out specific foods to see which ones might be causing symptoms. Three other UNC researchers recommend the same thing.

Medical doctor William Heizer and dietitians Susannah Southern and Susan McGovern reviewed 175 research studies about the role of diet in irritable bowel syndrome (IBS)—a group of gastrointestinal symptoms that have no known cause. Clinical studies have shown that changing diet or taking supplements such as soluble fiber, turmeric, and peppermint oil helps some IBS patients but not others. That makes sense when you consider that IBS symptoms vary widely from person to person.

Southern suggests keeping a food journal and writing down symptoms that follow meals or snacks. She says this has helped her patients figure out which foods, if any, are causing problems. Patients can eliminate suspected trouble foods and see if that makes a difference. For me, those foods were bread, cheese, and sugar. "Wheat contains fructans and galactans that are poorly absorbed in most people," Southern says. "Some people are fructose intolerant, just like some people are lactose intolerant." Galactan is a carbohydrate also found in legumes, cabbage, and other gas-forming vegetables.

Maybe my third doctor shouldn't have referred me to a naturopath. But he felt that the naturopath knew more than he did about diet-related digestive problems. To Martin Kohlmeier, a doctor deferring to a naturopath is "a sad testimony" on the state of nutrition in traditional medical practice. "I find it very interesting that you had that experience," he told me. "It should not be up to patients to seek out nutritional counseling. It should just be part of the package patients get when they visit their physician."

Kohlmeier says that most patients probably wouldn't expect their physicians to give them elaborate explanations about nutrition as it relates to certain conditions and diseases. "Probably a few words would've helped you," he told me. They did. And they still do. e

Martin Kohlmeier is a research professor and Kelly Adams is a research associate, both in the Department of Nutrition in the School of Medicine and the Gillings School of Global Public Health. *They receive funding from the National Cancer Institute and the National Institutes of Health.* *Susannah Southern is a registered dietitian in the UNC Outpatient Nutrition Clinic, and Suzanne Havala Hobbs is a registered dietitian and clinical associate professor in the Gillings School of Global Public Health.*

POETRY OF LOSS

If we told such things

by Jason Smith

Poor-Mouth Jubilee: poems. By Michael Chitwood. Tupelo Press, 80 pages, $16.95.

Michael Chitwood wrote the poems that would become *Poor-Mouth Jubilee* to help him live with the deaths of his brother-in-law, of a friend and fellow poet, and of his father. Chitwood's father was a hunter, and hunting was their way of bonding. He shot his first squirrel with his father when he was six. "I wasn't really strong enough to hold the shotgun up," he says, "and he had his arms around me, bracing me for the shot." In "Dead Reckoning," Chitwood remembers believing that his father possessed a particular kind of magic. The poems in *Poor-Mouth Jubilee*, Chitwood says, are about "exploring the idea of mourning and celebrating in the same breath. Grief is a weird and interesting emotion. It's not something that you can look at face-on. You almost have to look at it slanted. It's a very visceral emotion that I think poetry is uniquely capable of dealing with."

Michael Chitwood is a lecturer in the Department of English and Comparative Literature. Poor-Mouth Jubilee *is his seventh book of poetry.*

"Dead Reckoning" and "Now Not Now" are from *Poor-Mouth Jubilee,* published by Tupelo Press, copyright 2010 Michael Chitwood. Used with permission. Photo by Sylvana Rega.

Dead Reckoning

I used to think he willed the rabbits to be
just where he looked.
In the fields he paid fierce attention,
would see them sitting in their tight tucks
under honeysuckle before they spooked.

He said you had to look for their eyes,
the black blaze of their watching,
his hot search for their gaze.

Then he would take their heads off clean
with his 12 gauge.
You probably don't know how hard that is,
a gun that could make a hole the size of a bowling ball
and he could, close range, take their teacup heads off
and leave their bodies unmarred.

Children with good parents get a false idea of God.
They misunderstand prayer and believing and practice,
the roar of the gun, the plush limp bodies.
I would carry them in my hunting coat,
the last warmth of them in the pouch at the small of my back.

Now Not Now

It's our personal mythology
that we know the moment our son was conceived.
We could tell you if we told such things.

It's a fact
that I know the exact moment my father died.
The four of us at his bedside.

If I told such things
the sparrows this morning seem to be ransacking the boxwood,
little handfuls of flutter spurting in and out
of the fragrant shrub.

Mythical creature the two of us made,
half one thing, half another.

A vein pulsed weakly in his neck
even when the ICU nurse said, "He's gone."

Afterwards, we heard deer grazing
through the screen windows of the tourist cabin.
It sounded like whispering.

The day after the murder of Martin Luther King, Jr., Howard Fuller (hands clasped, foreground) led a protest on Main Street in Durham. "Howard Fuller," said a former chairman of the Durham Housing Authority, "is the single person most responsible for there not being riots in Durham." Photo copyright Billy E. Barnes.

CIVIL RIGHTS

Change comes knocking

by Susan Hardy

To Right These Wrongs: The North Carolina Fund and the Battle to End Poverty and Inequality in 1960s America. By Robert R. Korstad and James L. Leloudis. The University of North Carolina Press, 448 pages, $24.95.

In the early 1960s, Durham, North Carolina, was undergoing its first wave of urban renewal. Properties in the inner city were bought up, razed, and redeveloped, displacing black residents. Many of them ended up in overcrowded rentals owned by white landlords who ignored their complaints about rats, leaky roofs, and dangerous electrical wiring.

Into this racially tense situation walked a young community organizer named Howard Fuller. He went door-to-door in Durham's poor areas, recruiting people to serve on neighborhood councils and confront the landlords. When the city housing authority wouldn't back up the black residents, the residents started demonstrating and marching. And the local Ku Klux Klan started demonstrating right back.

Scenes like these played out all over North Carolina in the 1960s. In *To Right These Wrongs*, Robert Korstad and James Leloudis tell some of those stories: how activists supported by Governor Terry Sanford's North Carolina Fund went into the state's poorest communities and shook things up. The North Carolina Fund was like nothing any other state had tried before. It started out modestly as a nonprofit that financed experimental antipoverty projects, but it ended up getting money from the federal government and creating programs that were the blueprints for Head Start and for VISTA, the domestic Peace Corps.

The North Carolina Fund ran literacy programs, built parks, tutored kids, organized craft cooperatives, and helped towns apply for state and federal grants. But the fund also dealt with suspicion from local governments and prejudice from residents who didn't like to see black and white volunteers living and working together. To many whites, community organizers like Fuller were just making trouble and being paid by the fund to do it. Others thought the situation in Durham was so bad, there would have been rioting and violence if Fuller hadn't emerged as a leader and insisted on peaceful, nonviolent demonstrations, even when armed Klansmen came out to demonstrate alongside the blacks' marching route.

When the fund ended in 1968, as it had planned to from the beginning, it left behind a network of organizations across North Carolina that are still fighting against poverty and for education. But the tone of activism isn't the same as it was in the sixties, says Leloudis.

One N.C. Fund volunteer wrote: "I think to be able to help others is more than an opportunity; it is a duty that is part of the democratic form of government which we have." Perhaps because the United States was under threat from communism, some Americans were examining whether their way of life was justifiable if it led to a significant number of people living in poverty.

"One of the things we lost after 1968 was a moral language for talking about poverty," Leloudis says. "We lost an ability to talk about and act on poverty as an ethical challenge in a democratic society."

James Leloudis is a professor of history and director of the James M. Johnston Center for Undergraduate Excellence at Carolina. Robert Korstad is the Kevin D. Gorter Professor of Public Policy and History at Duke.

Forty years after the North Carolina Fund ended, some of its key figures appeared in a documentary, Change Comes Knocking: The Story of the North Carolina Fund. *Hear what Howard Fuller and other activists (as well as some of the fund's critics) have to say about it now. A DVD of the film is included with* To Right These Wrongs. *Visit www.torightthesewrongs.com.*

HISTORY

Native Americans in the Tar Heel State

by Jason Smith

Native Carolinians: The Indians of North Carolina (2010 revised edition). By Theda Perdue and Christopher Arris Oakley. North Carolina Office of Archives and History, 101 pages, $10.00.

In the 1860s and 70s, a Lumbee Indian named Henry Berry Lowry fought against the Confederacy, raided prosperous plantations, and eventually became a legendary rob-from-the-rich, give-to-the-poor renegade, the most hunted outlaw in North Carolina's history, and the object of what came to be known as the Lowry War. His story is just one of the tales you can find in *Native Carolinians* by Theda Perdue and Christopher Arris Oakley. The book—which covers the history, lifestyles, and cultures of the people who lived in the region before Europeans arrived—was originally published in 1985 and has been revised and updated for 2010.

The Lowry War started after the Confederacy tried to conscript the Lumbee Indians of Robeson County for cheap labor to build forts along the lower Cape Fear River. The Lumbees resented this, and many of them took to hiding in the swamps. Also hiding there were some Union soldiers who'd escaped from a Confederate prison, and many of the Lumbee became pro-Union sympathizers.

In 1864, Lowry, then sixteen, allegedly stole some hogs from a wealthy planter, took them to his father's house, and shared them with some escaped Union soldiers. The planter then ratted Lowry's family out to Confederate conscription officers. Soon, Lowry and his brothers had ambushed the planter, killed the local conscription officer, and fled to the swamps, from which they began conducting the raids that would make them folk heroes in the eyes of poor Indians, blacks, and whites in the region.

In the spring of 1865 a Confederate militia raided the home of Lowry's father, found the gold head of a cane that had been stolen from a wealthy planter, gave Lowry's father and brother a kangaroo-court trial, and executed both of them. Lowry, predictably, continued his rampage. Even after the war, he continued to ambush militias, to steal food, and to melt into the swamp whenever a militia thought it was close to capturing him. He even murdered the presumed leader of the local Ku Klux Klan.

In July 1871, after rounding up some of the wives of the Lowry gang for use as hostages, eighteen militiamen stopped for a break at Wire Grass Landing on the Lumber River. One of them noticed a man in a canoe making his way across the river toward the militia. It was Henry Berry Lowry. The men opened fire. Lowry hit the water, flipped the canoe for cover, and started swimming and shooting. The militia retreated. Later, they released the hostages when Lowry threatened to round up white women and take them to the swamps.

Lowry disappeared for good after robbing a Lumberton store in February 1872. This time, his gang took more than food: they made off with $22,000 from the store's safe. Lowry was never seen again, and to this day, no one knows what happened to him.

Native Carolinians contains chapters on the origins of human settlement in the Americas, Indian-white relations, the Cherokees, the Lumbees, and more. For this new edition, Christopher Arris Oakley expanded several of the chapters to include topics and developments that have come up since the book was originally published just over twenty-five years ago. It now covers everything from the Bering Strait land bridge to economic development.

"In 1985 the revitalization of North Carolina's Indian communities was well underway," Theda Perdue says, "but few non-Indians had much interest in them or in other native peoples. Today, UNC has an American Indian Studies academic program and the American Indian Center, which enhances the intellectual climate on campus, encourages research, and acts as liaison to the state's tribes. That marks substantial change."

Theda Perdue is a distinguished professor of American Studies and the Atlanta Distinguished Professor of History in the College of Arts and Sciences. Christopher Arris Oakley earned his undergraduate degree in history from UNC-Chapel Hill and is now an assistant professor of history at East Carolina University.

Henry Berry Lowry. By 1872, his band of renegades had gained nationwide attention for its exploits. Lowry disappeared later that year, and the secret of his whereabouts died with the members of his band.

Test your Native acumen

Q: Why did many Europeans believe that Native American men had no facial hair?
A: Native Americans plucked their whiskers with clamshell tweezers.

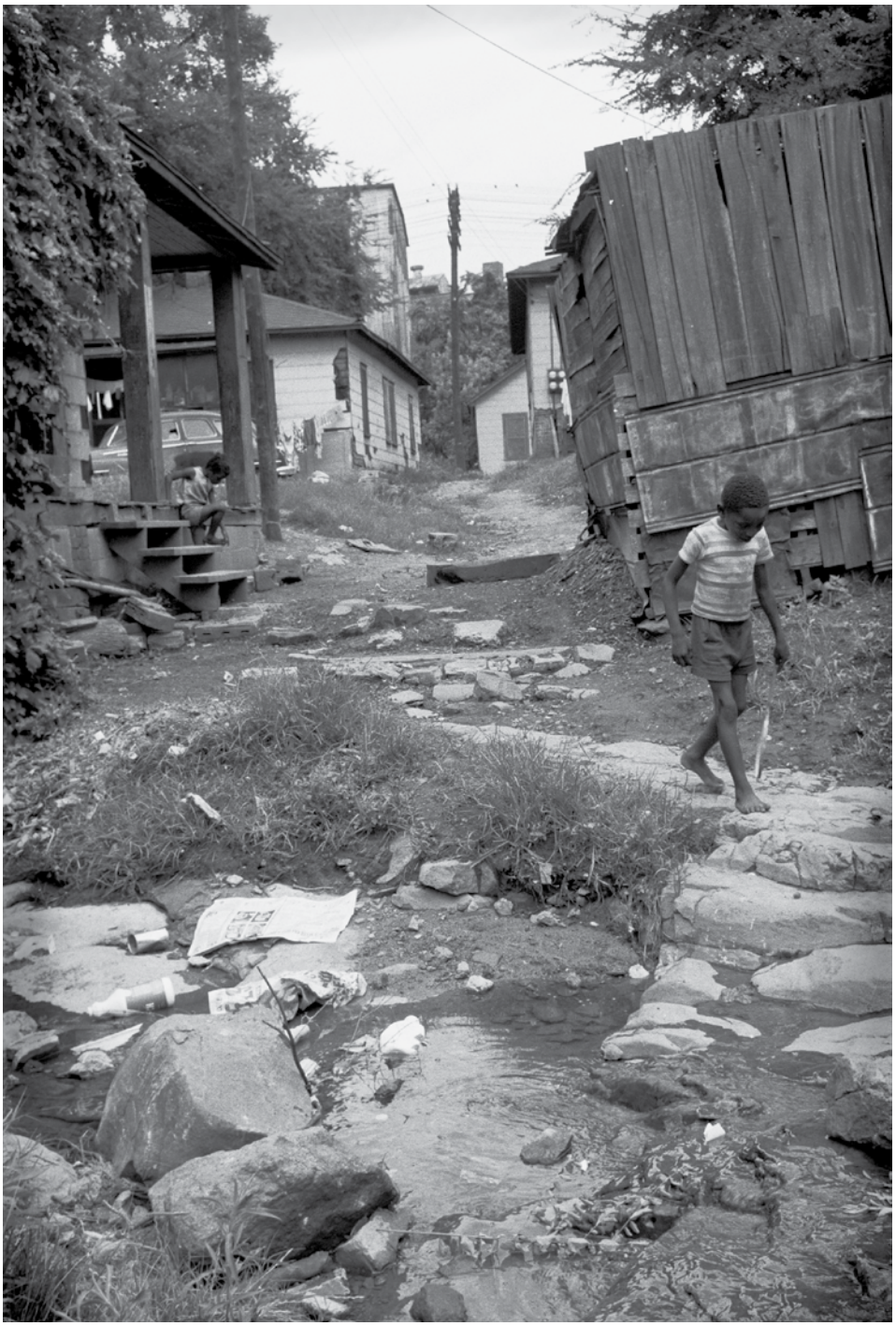
Q: Why would a Native American man build a small fire on wet sand inside a dugout canoe?
A: Fish would be attracted to the firelight; the man could then spear them.

Q: How long did Moravian missionaries preach before converting the first Cherokee to Christianity?
A: Ten years.

Q: What group did Lumbee Indians drive out of Robeson County one January night in 1958?
A: The Ku Klux Klan. Afterward, the Lumbees burned the Klan's grand wizard in effigy.

Q: In the early 2000s, what percentage of Native Americans in North Carolina lived below the poverty line?
A: About one-fifth.

endview



All-black neighborhood in Durham, North Carolina, July 1965. Photo copyright Billy E. Barnes.

HOUSING INEQUALITY

In the mid-1960s, the Research Triangle Park and Duke University Medical Center were taking off, and Durham County had the seventh-highest median family income in the state. But at the same time, the city of Durham still had houses without plumbing and streets without pavement. Antipoverty activists encouraged the residents of poor neighborhoods to present a united front to the Durham Housing Authority and demand better low-income housing *(see "Change Comes Knocking," page 47).*

Billy Barnes, public relations director for the North Carolina Fund, documented in photographs what was happening in Durham, from the poor conditions in the neighborhoods to the heated public meetings and the protests that followed. Between 1964 and 1969, Barnes took thousands of images from places throughout the state where the N.C. Fund was fighting poverty and racial inequality. See more photographs from the Billy E. Barnes Collection at www.lib.unc.edu/dc/barnes/.

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endeavors

Each time Paul Leslie, Tim Baird, and Brian Miller return to Tanzania, they reconnect with field assistants, Maasai villagers, and the chameleon that lives in the thornbushes encircling their campsite. Story on page 38. Photo by Tim Baird.