

acumen

A Briefing on Research and Its World Impact • Fall 2011

Anonymity in Literature

Mongolia's High Topography

Defining Globalization

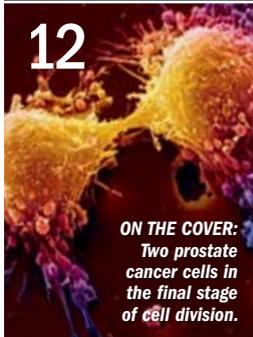
Artistic Impressions of Voodoo



DANGEROUS
DIVISIONS

LEHIGH UNIVERSITY

COLLEGE OF
ARTS AND SCIENCES



ON THE COVER:
Two prostate cancer cells in the final stage of cell division.

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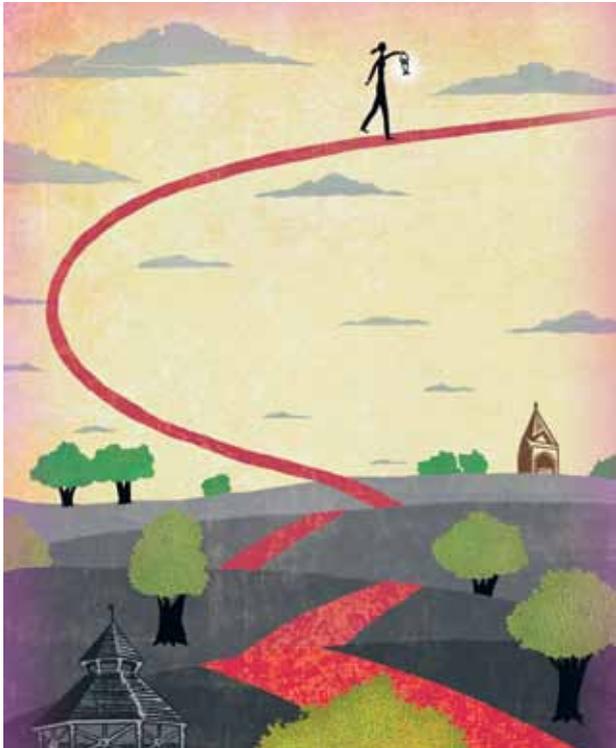


3,766 lbs ghg emissions not generated
4 barrels fuel oil unused

this amount of wind energy is equivalent to

not driving 3,727 miles
256 trees being planted

Message from the Dean



Broadening Perspectives

Faculty scholarship offers students a new way to see their world.

Over the past few months, it seems every news channel and website has been filled with stories about the profound social and financial challenges we face at home and across the globe. Struggling economies, clashing cultures, increasing poverty and famine, and the growing gap in economic disparity confront us in all of their complexity.

This constant flow of stories should remind us of the important role universities play in addressing and solving social challenges. The College of Arts and Sciences is committed to the growth and development of research that integrates work in the arts, humanities, social sciences and natural sciences. We believe that good research affects the work we do in the classroom and that, hopefully, our work broadens our students' perspectives on the world and the frameworks in which they live.

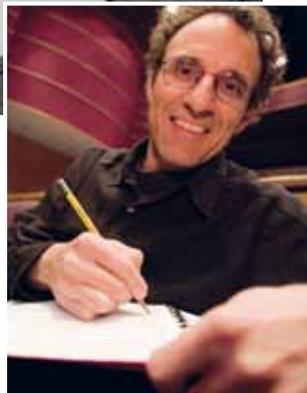
In this issue of *Acumen*, we explore the research that impacts some of today's most pressing issues. Our cover story focuses on research taking place within the college to explore the inner workings of cells and illustrates the implications our research has on fighting diseases. This issue also offers stories centering on the rich history of 18th-century Moravian Bethlehem; the historical, social, religious, cultural and political influences created by globalization; and the inspiration of voodoo on a professor's art. Shared among this broad collection of stories lies a single theme—a commitment to making important contributions to the various disciplines and strengthening civil discourse.

Research is an essential component of today's universities. It takes us down exciting paths of discovery that spur the conversations and collaborations so important to improving and enriching our lives. Research is vital to the life of any premier university and our discoveries have lasting impacts on the world beyond our campus. As noted in the globalization story, the world is experiencing major changes that cross borders and cultures, and our research and scholarship helps people recognize and embrace these changes. Faculty scholarship shapes and informs teaching, and students are direct beneficiaries of our research as we integrate our work in the classroom with opportunities for experiential learning. It is through faculty research and creative work that our students discover a passion for learning that lasts their lifetimes.



Enjoy this issue of *Acumen*. I look forward to sharing our contributions and accomplishments with you, and welcome your thoughts and comments.

Donald E. Hall
Herbert and Ann Siegel Dean



The Dick Van Dyke Show inspired Paul Salerni's opera.

Music

The Life and Love of Joe Coogan

Paul Salerni, professor of music and National Endowment for the Humanities Distinguished Chair in the Humanities, put an operatic twist on a television classic last fall when he premiered his latest work, a one-act opera titled *The Life and Love of Joe Coogan*, at Lehigh University's Zoellner Arts Center.

Recently added to the prestigious Thomas Presser catalog, Salerni's opera is an adaptation of a 1964 *Dick Van Dyke Show* episode by the same name. Teaming with renowned librettist, lyricist and poet Kate Light, Salerni created an operatic interpretation of a script written by Carl Reiner. It originally unfolded as Rob strikes up an acquaintance with Joe Coogan while playing golf at his country club. Relaying this news to Laura, Rob is surprised by his wife's nervous reaction. It turns out that Joe had once been Laura's boyfriend, and that she still keeps a shoebox of

poems he wrote to her. What neither Mr. nor Mrs. Petrie realize is that Laura's old flame is now a priest.

Salerni's composition stays true to Reiner's script and Salerni says the script and its use of a sonnet as the central plot motivator made this episode an excellent choice for transformation into music. Another impetus for translating television to the stage lies with his love for the *Dick Van Dyke Show*.

"My wife and I are big fans of the show," Salerni says. "We have the entire DVD collection. I had been thinking about a companion to my last opera, *Tony Caruso's Final Broadcast*. One

night we were watching one of the DVDs and the Coogan episode came on. This just seemed to be perfect for what I wanted to do."

The original script had been written by Reiner—also an avid supporter of opera—and when Salerni contacted the renowned writer, Reiner threw his full support behind the project.

"When Carl heard about the idea of converting the episode into an opera, he gave it his blessing," Salerni says. "We spent quite a long time talking about opera, about the connections he saw between the episode and what I wanted to do."

In 2007, Salerni met Reiner and played part of his piece, which proved critical to its development.

"He has this incredible understanding of how words work," Salerni said. "He made suggestions on how some of the sentences could be improved, word choices, things that hadn't occurred to us. It was an incredible afternoon and was instrumental in the creative process."

Salerni was not only the composer; he was also the producer and the conductor for the premiere. Assuming three duties is not something he says he wants to attempt again.

"If you are the composer, you get to a certain point and you can step back. You're finished. As producer and conductor, I'm constantly dealing with the myriad business and musical matters associated with mounting a performance. For now I think I'd rather just enjoy that process of creating."

Art, Architecture and Design

Endless Imagination

It's easy to go through life paying little attention to furniture. You might sit in a chair, eat at a table or write on a desk and think nothing of it. But Amy Forsyth sees things differently. That's because

Forsyth, associate professor in the Department of art, architecture and design, is a furniture designer.

Forsyth's work is often whimsical and evokes natural and biological



Amy Forsyth creates whimsical furniture like the "Men at Sea" table (above) and the basket table (right).

forms. The top of her "Heartbreak Table" is shaped like a shield or a heart. Two of the table's legs are stationary, but the third is a mason's rake that can roll. The "Basket Table" looks like a traditional circular side table, but the bottom of it is filled with strips of wood bent into the shape of an egg or a bird's nest. The bottom of the "Men at Sea Table" is sanded to resemble rolling waves and stained blue like the ocean. The table also features a glass bowl that represents a bottle floating in the water or a navigational instrument.

Forsyth works almost exclusively in wood. She likes the versatility of the material—every variety of wood has different properties and it can also be bent, carved, shaped and painted. She also likes its unpredictability. She embraces its uncertainty and the resulting improvisation is essential to her design process. She rarely makes the same thing twice. Instead of fully designing her projects before beginning construction, she leaves pieces unplanned and allows the project to develop on its own.

This practice also influences

her teaching philosophy.

"I prefer projects that encourage students to find their own voices, even while incorporating the basics," Forsyth says. "I believe in the potential of endless imagination, that there is always the capacity for surprise, for some new meaning to emerge from all the experiences a student can bring to a project."

Originally trained as an architect, Forsyth is interested in the relationships among architecture, furniture and music. She sings and plays the violin and her recent projects incorporate her love of music.

"Art works best when it reminds you of a lot of things," she says. "I'm interested in things that happen in between other things and how there's overlap between some of the ideas that you can explore in furniture and the ideas you can explore in music, such as structure, space and composition."

Forsyth is also exploring furniture that moves and makes sounds. For her next project, she's planning to build a large frame in the

barn on her Pennsylvania property where she often performs with friends. The frame will have different sound-making objects that a musician can activate by dancing.

"To me, furniture is a really intimate thing and it starts to be able to invade your space," she explains. "I don't like furniture to behave itself; I want it to have a life of its own. I want it to engage you the way art projects engage you."

Theatre

Walden Comes to Life

On July 4, 1845, Henry David Thoreau moved into a cabin at Walden Pond in Concord, Mass., as a statement of personal independence. Nine years later, Thoreau published *Walden* about his life at the pond, and after more than a century, his crowning masterpiece continues to draw attention. In June, Thoreau's manuscript about longing for truth, freedom, beauty and love came to the stage as an



adaptation under the direction of Augustine Ripa, professor of theatre.

Opening at the Abbey Hill

Theatre in Easton, Pa., *Walden* uses Thoreau's masterpiece as a backdrop to portray the writer's social experiment and journey of spiritual discovery. Ripa helped bring to the stage a story of an innocent soul, troubled by his times, who retreats to the woods to understand the full meaning and test the validity of the many assumptions about living that society takes for granted. While there, Thoreau has many adventures and encounters with his natural surroundings and slowly comes to understand the ultimate frustration and joy of his quest.

Walden was originally adapted 17 years ago by Lehigh alumnus Bill George, founder and ensemble member of Touchstone Theatre in Bethlehem, Pa. Originally written as a two-act work, George brought in Ripa in 2009 to sharpen and revise the script. Ripa decided that, like the book, the script also needed to be personal.

"The book is poetic with powerfully florid and sometimes thick language. It has so many things going on in it," says Ripa, who is also associate dean for undergraduate programs in the College of Arts and Sciences. "Part of my contribution was to seek the portions that can be staged. This is an intimate script. It's about a man talking about what he went through in the woods. We made it a single act of communicating

Author Henry David Thoreau's Walden continues to inspire new works.

everything Thoreau would need to tell an audience. The actor maybe relived some of his recollections from the woods, but basically is always being aware in a Brechtian sort of way that I'm here to make you understand."

The script is well-suited for small venues where the audience can be part of the production. Thoreau's urge to communicate his experience is the impulse of the play, says Ripa. Like the book, there are many images in the play about being awake, how one should treat life as though it is an awakening.

"One of the directorial points I brought to the project was to take the piece to the audience, to remind Bill that the reason he is doing everything is the same reason Thoreau wrote the book, to make you 'get it' in the audience. The urge to perform should be identical to the urge to write in the first place. This is a very presentational style. We seek to play the material, what is being said and why it's being said in order 'to awaken.'"

For Ripa there was a personal connection to the material. "I grew up in New England," he says. "I can palpably relate to when he speaks of springtime, the pollen from the pitch pine like sulphur all over the pond. I've been in that stuff and I know what he's talking about."

Walden continues as a Touchstone Theatre touring



The Humanities

Modern Languages and Literature

Constructing Gender in Fiction

For decades, academics of literature and feminist and gender studies have accepted that what it means to be a “man” or a “woman” differs with time and cultures, and that these roles are in large part social constructs. The literature of a specific time and place not only gives us words to take pleasure in, stories to imagine and worlds to dream about, but most importantly, it can challenge gendered roles, cast them as problematic and undermine their status as social fact.

Marie H el ene Chabut, professor of French and chair of the department of modern languages and literature, takes this approach to understanding the construction of gender in fiction. Chabut studies 18th-century French literature,

specifically a set of women writers who, she says, have been “rediscovered and reevaluated” in the past few decades.

Despite significant scholarly activity on authors such as Charri ere, Riccoboni, Cottin and Duras, Chabut says that much of the activity focuses so much on the construction of womanhood and women’s space that it neglects analysis of the female construction of masculinity. Through her recent research and book project, *Under the Female Gaze: Imaginary Masculinities of the French Enlightenment*, Chabut takes as her premise the idea that gender construction in a given historical period and culture can only be understood in all its complexity when the cultural understanding of femininity is considered against, and in conjunction with, that of masculinity.

To accomplish that linkage is a tall order considering the small body of work available on constructions of masculinity in 18th-century French fiction. Chabut’s

research emphasizes close textual analysis and centers around several French novels written by women between about 1750 and 1820. She investigates how these



Marie H el ene Chabut

novels both reflect and critique the evolution of the concept of masculinity throughout.

Embedded in the formulations of masculinity in the novels, says Chabut, is the emergence of positive, complex male characters who “participate in a broad questioning of gender roles, gendered definitions of the masculine and the feminine, and reason.” These characters, who contradict traditional male novelistic types of the period, are at the heart of her research. In a way, she says, “these male characters almost become the women writers’ voices.”

“Politically, the period coincides with an era when women’s voices were progressively suppressed,” she says, “so these novels imagine alternate models of masculinity that resist society’s and literature’s appropriation of the feminine but at the same time critique them from inside.”

Chabut says that adding layers of nuance to our understanding of gender construction and critique in the 18th century is a way of showing that gender categories have little to do with physiological difference, but rather with the ways in which a specific society at a specific time distributes roles. “To study a specific culture, especially through literature, is to try to discover all of its tensions and contradictions,” she says.

Chabut understands that tensions and contradictions are characteristic of all societies, and that uncovering them is a process that can be translated across history. Then as now, the world was globalizing, and issues of identity, difference and diversity were an important part of intellectual dialogues. “Today’s Western gendered identities are still very much influenced by Enlightenment thought. It is important to be aware that even then female voices were trying to make themselves heard, and were inventing alternative models of femininity and masculinity that are extremely relevant today.”

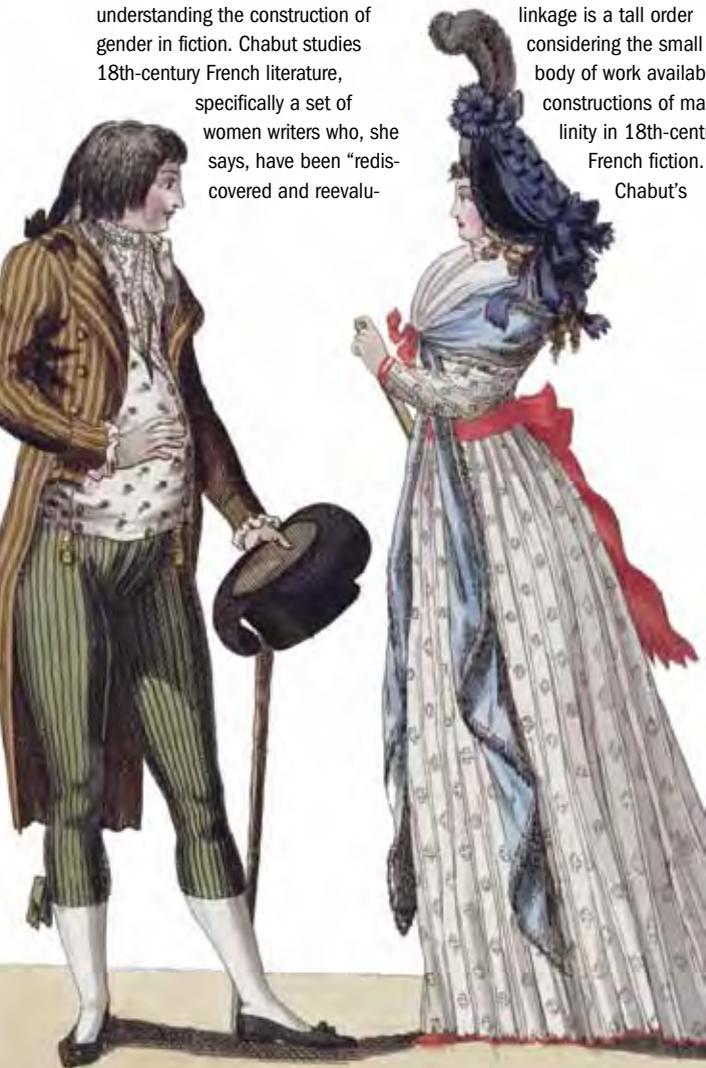
Philosophy

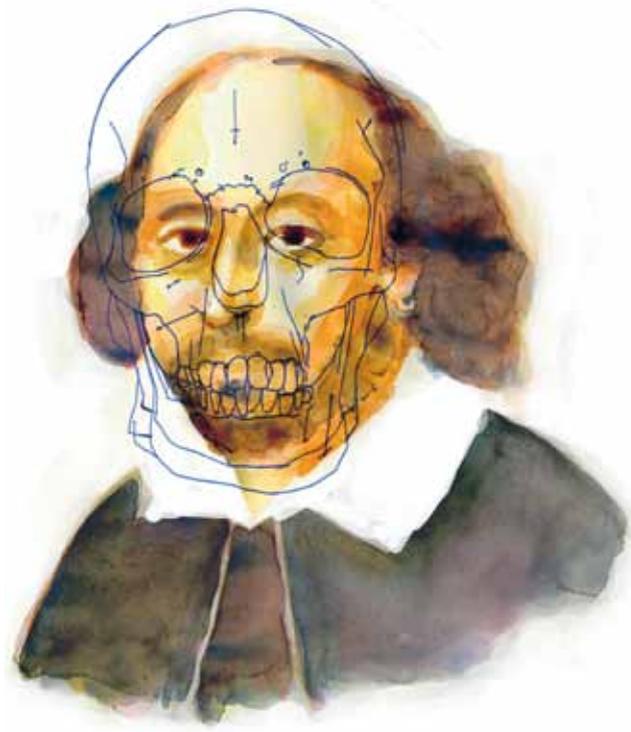
Plato’s Two Paradigms

Republic, Plato’s dialogue on justice and on the character of the just city and the just man, was written in Athens in the fourth century BCE. Of all Plato’s works, *Republic* is perhaps the best known and the most studied. Even centuries since it was penned, scholars continue to debate its meaning and lessons.

Roslyn Weiss, Clara H. Stewardson Professor of Philosophy and chair of the philosophy department, offers a new view on the Greek philosopher’s work. In her forthcoming book, *Philosophers by Nature/Philosophers by Design: Two Paradigms in Plato’s Republic*, she identifies in *Republic* two paradigms of the philosopher and considers what the presence of two competing models might reveal about the intent and message of *Republic* as a whole.

In *Republic*, Plato finds a place for philosophers as rulers of his utopian city. Only philosophers must rule because only they understand the true and unchanging nature of justice, nobility and goodness, having beheld with their mind’s eye





Anonymous texts, common in Renaissance England, pose many challenges.

the eternal and purely intelligible Forms of the Just, the Noble and the Good. Scholars have traditionally regarded the city described in *Republic* as Plato's ideal, yet a minority of scholars has begun to suspect that the social order that Plato proposes is one of which he actually disapproves. If this is so, however, Weiss says, "the whole dialogue becomes a puzzle: Why would Plato develop from scratch a city of which he disapproves? Why would he construct an 'ideal' city that is in fact far from his ideal?"

"I had always found the philosophers in the *Republic* to be rather distasteful," she says. "They are self-interested men (and women) who must be *compelled* to rule in the new republic because, left to their own devices, they would spend their time contemplating the Forms and would utterly neglect their fellow citizens. It struck me as odd that Plato would put at the helm of an ideal city people who are unattractive in this way."

After studying *Republic* for many years and still being uncertain as to which scholarly camp makes the stronger case, Weiss noticed a shift in the dialogue in Plato's portrayal of the philosopher. In the first portrait, philosophers are distinguished by their natural yearning to "see" the higher realm of the pure Forms; in the second, as the famous allegory of the Cave vividly shows, philosophers must be forcibly dragged

from the material world of pleasure to the austere realm of the intellect. It is the latter that are then put in charge of Plato's ideal city.

In the end, Weiss concluded, "The philosophers Plato designs to rule his republic are, in fact, unsavory in his own eyes, and one is *supposed* to be repelled by them. But if there is an alternative set of philosophers in *Republic*, perhaps there is another city as well, and perhaps it is these of which Plato secretly approves.

"If my readers are persuaded that *Republic* does indeed contain a second paradigm for the philosopher, that could start a revisiting, a rethinking, of *Republic*. It would be very exciting if such a thing were to happen."

English

What's in a Name?

For centuries, works of literature have been published anonymously. "Anon" or no mention of an author was acceptable on the title page for many years. But modern readers place much importance on who authored a work. An author's name lends credibility and promotes the importance of a text, but a new collection of essays, focusing on anonymity in Renaissance England, examines what happens to works without authors.

Barbara Traister, professor of English, contends that studying authorship and anonymity in the early modern period is critical because at that period in England, authorship suddenly became very important. The essay collection, *Anonymity in Early Modern England: What's in a Name?*, examines authorship, attribution, anonymity and their ethical ramifications.

Traister and Janet Wright Starnes Ph.D. '98, an associate professor at Wilkes University, argue in their introduction to that scholars need to rethink their critical approaches

to early modern texts. The 16th and 17th centuries are filled with anonymous works that are often neglected by modern critics because they don't know what to do with a text that has no named author. They suggest that different perspectives may be required to analyze and interpret authorless work.

"It's frustrating to try to teach an anonymous text," says Traister. "You go to the bibliographies to look for critical material and you discover that no one has written articles on the text because many traditional ways to approach a text are impossible without knowing the author. We have built our expectations about literature around literature by a specific person. We don't know how to easily talk about literature that is anonymous. In fact, the most common critical work done on anonymous texts is to try to discover their authors."

One striking example of how anonymity breeds neglect is a list of Renaissance plays once attributed to Shakespeare, but later stripped of that association at the beginning of the 20th century. They are seldom staged, read or studied because they are now "anonymous."

By neglecting such texts, we overlook important information that could add to our growing knowledge of readers' practices,

and we cut ourselves off from the study of texts that were important in their own time, says Traister.

"Anonymity is a constant in our culture, and we have come to accept certain genres—advertising, editorials, Web posts—as anonymous. But literature isn't one of them. Since



Barbara Traister

authorship became important in the late 17th and early 18th centuries, we have expected literature to be associated with an authorial name.

"Foucault's famous query 'What is an Author?' (1970) challenged the significance of individual authorship, but despite Foucault, we still think in terms of authorship most of the time," Traister says. "As a result, we're losing a segment of early modern culture because it's anonymous. We don't know what to do with the anonymous work, so we don't teach it. If we don't teach it, nobody knows or writes about it,



Plato portrays two models of the philosopher in *The Republic*, says Roslyn Weiss.

Earth and Environmental Sciences

High Topography in Mongolia

Scientists from the department of earth and environmental sciences are in the initial phase of a five-year multidisciplinary research project in Mongolia.

Anne Meltzer, Peter Zeitler and Dork Sahagian, professors in the department, and Bruce Idleman, a senior research scientist, will join researchers from Stanford University, North Carolina State University, the Carnegie Institution for Science, the Mongolian University of Science



The high plateaus of Mongolia offer a new research direction for a team in earth and environmental sciences.

and Technology and the Mongolian Academy of Sciences in the venture.

Supported by a grant by the National Science Foundation, the researchers are examining high topography and how it is formed. The project is an evolution of the work Lehigh scientists have conducted in Tibet and Pakistan, but the topography in Mongolia offers a new direction for their research.

"We've moved from regions of active mountain building or plateau formation associated with continental collisions, to a continental interior," says Meltzer.

"There are a lot of regions in the world where, in the interior of continents, you have high topography and it's not known why."

Mongolia presents an interesting study in high topography. The country has broad plateaus that are enigmatic as to why they exist. The topography of Mongolia can dictate where storms form in the Northern Hemisphere, and there's a growing recognition that high plateaus are important features influencing global climate. Volcanic rocks dating from 30 million years ago to 5,000 years ago can offer information on the Earth's mantle and reveal the timing of events that shaped changes in topography. Even the genetics of a subspecies of fish in the region can provide clues to the timing of the uplifts.

"These types of areas are really interesting because they help us understand how the planet works," says Zeitler. "The work we do is fundamentally basic research."

"Understanding surface processes provides insights into not only how the Earth works, but how life has adapted to living on the Earth," adds Meltzer.

The team will combine methodologies and approaches from seismology, geochronology, geomorphology, geochemistry and genetics.

Meltzer, a seismologist, will deploy 65 instruments to record earthquakes at stations across a broad area of the country. Recording earthquakes will help the team image the Earth's structure beneath the high plateau using techniques similar to medical tomography. Recording earthquakes will also help them better understand earthquake hazards in Mongolia.

As geochronologists, Zeitler and Idleman will focus on dating volcanics. Zeitler is already conducting analyses on samples from a previous trip.

Sahagian will conduct work in paleoelevation by looking at

vesicles in lavas, voids formed when the lavas erupt. Vesicles can determine the atmospheric pressure at which the lavas erupted and offer a sense of elevation.

"I think there's a much more integrated picture of how the Earth works," says Zeitler. "The crust, the lithosphere and the mantle all interact and there are ideas of how you can generate these interior uplifts related to the Earth's dynamics."

The grant will also support the creation of a field school for American and Mongolian students in 2012 and 2013. Undergraduates, including students from Lehigh, can join the field school and work on interdisciplinary research projects.

Mathematics

Financial Modeling

Vladimir Dobric, professor of mathematics, is interested in modeling future random outcomes using random processes with memory. He has been studying financial markets for decades and believes he may have developed better financial models.

Besides models, the main tool in pricing financial instruments is stochastic calculus, a branch of probability that studies random events over time. Traditionally, the Black-Scholes formula for pricing financial options, based on the Black-Scholes stock model and stochastic calculus, is widely used by options-market participants and gives prices that are in most instances fairly close to the observed prices. But Black-Scholes' basic assumption is that returns on investments are independent of each other. Dobric says that is not true.

"The independent increments are not there," he says. "The returns are not independent. People know that. They get on the bandwagon while a stock is hot. How do you model that? One plausible

explanation is that returns are not independent at all times.”

To capture returns that at times may be dependent on the past, Dobric has developed a theory and models to accommodate those variations. Fractional Brownian motion models, which are currently used to capture dependent returns, allow only for constant dependence. Another drawback for those models is that standard stochastic calculus tools cannot be applied, which has serious consequences. However, stochastic calculus is a fundamental tool in Dobric’s models. The basic principle for this theory originated from his work on the connection between wavelets and stochastic processes.

Wavelets are designed to capture self-similarity. Certain stochastic processes are self-similar, like Brownian motion process, so there must be a connection, he argues. He started the work on that connection by identifying the best simulation method for Brownian motion.

“There are many ways to simulate Brownian motion, but we are interested in the most effi-

cient way to do it,” Dobric says. “Options prices need to be determined quickly, and that requires the best simulation method.”

In his work, he has shown that the best representation of Brownian motion can be obtained directly from the definition of Brownian motion. This representation turns out to be a wavelet expansion of the process and results in the fastest simulation.

Continuing with this line of work, Dobric has shown that the wavelet representation can be obtained for all the Gaussian-Markov processes, yielding the best simulation method for those processes. The most important continuous time processes belong to either to Gaussian-Markov family or to the family of fractional Brownian motions. The only process that belongs to both families is Brownian motion. Dobric’s models belong to the Gaussian-Markov family. In developing those models he has established new mathematical tools for propagating memories with different intensity into random future. Markets ebb and flow. His models accommodate that behavior. Surprisingly his models are very close to fractional Brownian motions—so close that,



Vladimir Dobric



Kai Landskron

for financial applications, the difference between them is smaller than the error in parameters estimation. Although it’s not possible to detect the difference between them, the entire stochastic calculus applies to Dobric’s models, but not to fractional Brownian motions.

Chemistry

Cost-Effective Gas Separation

Kai Landskron, assistant professor of chemistry, is primarily a synthetic materials chemist interested in porous materials at length scales from the nanometer to the millimeter level.

A major fascination of porous materials is that they allow for very high surface areas of up to several thousand square meters per gram of material. Simply put, high surface areas can be achieved because internal surface area is added to external surface area by “punching holes” into a block of a material. Many applications of porous materials rely on the use of this internal surface area.

“When you make the hole smaller and smaller, the surface area increases, provided the distance between the pores also shrinks,” says Landskron. “The extremely small pores maximize the surface area of the material, giving it a specific desired property.”

A major focus of Landskron’s research is the synthesis of periodic mesoporous silicas with crystalline channel walls. Since their origin in 1992, periodic mesoporous materials have become a vibrant arena of study in the field of chemistry.

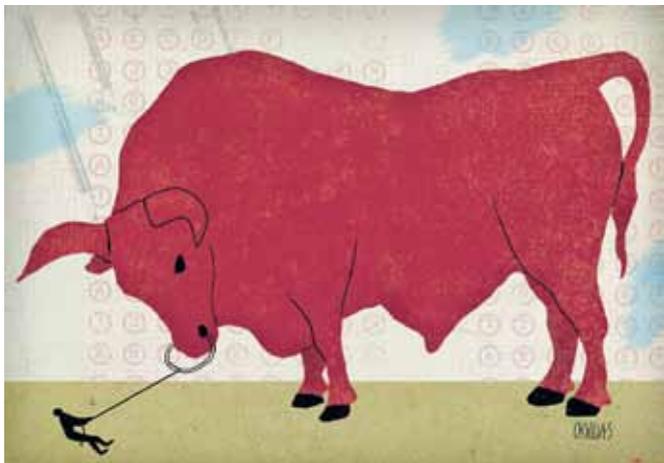
However, the application for which they have been invented—the cheaper transformation of crude oil into gasoline—has never been realized because the pore walls of these materials are not crystalline.

“Silicas are good glass formers,” he says. “They are difficult to crystallize, but silica materials with crystalline channel walls are desirable because they have desirable properties, such as high thermal stability, and you can expect high acidity, which makes them interesting for petroleum cracking applications.”

Landskron has developed a new synthetic method that uses high pressure as a means to achieve the crystallization of these pore walls. He uses his high-pressure techniques also for the synthesis of mesoporous diamond materials. Diamond is an extremely interesting material because it has several superlative properties. Landskron’s research aims to combine these properties with the properties of porous high-surface-area materials, which could find biomedical applications.

Landskron has also recently embarked on a collaborative project with David Moore, assistant professor of chemistry, that aims at the reversible modulation of the chemical nature of nanopores by electric biases.

“If we apply an electric bias to this nanoporous material, changing its electronic properties, thereby changing its gas absorption properties. That is remarkable. When we turn off the bias, the electrons flow out of the nanoporous material and the gas absorption properties are



KEN ORVIDAS/mepsot.com, PHOTOS BY DOUGLAS BENEDECT

reversed. We can absorb and desorb by controlling how electrons flow in and out of the nanoporous material.”

Landskron hopes that this effect can be developed into new, more cost-effective gas separation technologies and that gasoline will finally become cheaper due to his research.

Physics

Creating Fibers from Tellurite Glass

Since the early development of the low-loss silica fiber, most technological advances in fiber optics have been based on new fiber designs and optical technologies. To date, most applications have primarily been in the near-infrared

range of wavelengths (one to two microns), but new applications in the middle infrared (two to five microns) may become possible with the optical fibers being developed in the laboratory of Jean Toulouse.

Toulouse, professor of physics and a founding member of Lehigh's Center for Optical Technologies, studies optical nonlinearities—where the transmission process is not constant or simply proportional to the input—in glasses, optical fibers and planar optical waveguides. On a fundamental level, he is studying these optical nonlinearities in order to characterize them and understand their precise mechanisms in different situations. On an applied level, he is attempting to demonstrate optical effects based on these nonlinearities in new fibers or new waveguides, a type of optical conduit. He and his colleagues are interested in enabling new fiber-based technologies while advancing the science of glass on the materials side and how to manipulate light in fibers and waveguides on the optics side.

As part of his work, he has carried out an extensive study of Stimulated Brillouin Scattering in so-called “microstructured” or photonic crystal fibers with complex cross-sections. Brillouin Scattering occurs when light in a medium such as a crystal excites and then interacts with acoustic waves that change its frequency and path. Toulouse and his team have also demonstrated all-optical control of the propagation of light in photonic crystal waveguides through optical generation of carriers.

A major part of Toulouse's present work focuses on new fibers he developed from tellurite glass. Most optical fibers are currently made with silica. Silica fibers are extremely useful because they have been developed to a point where they can transmit light with very little lost at the output for a given input. As such, they are used in most

optical telecommunications networks and for the Internet. However, silica only transmits light up into the near-infrared and absorbs light at longer wavelengths. Tellurite fibers, on the other hand, can transmit light through the middle infrared. For any application that would lie in the



mid-infrared range, scientists and engineers need materials other than silica. Tellurite fibers are made from tellurium oxide glass, a glass that is similar to silicon dioxide (silica) and therefore very stable, but which also transmits light at longer wavelengths.

Glass fibers have many different applications, among them environmental applications to detect the presence of certain chemicals in the atmosphere. Certain molecules absorb light in the mid-infrared range, and tellurite fibers are very well-suited to detect them. Other applications include free-space optical communications, military (counter-measures and LIDAR, the analog of radar but with light) and medical (non-invasive surgery) uses where light can be transmitted at these mid-infrared wavelengths. These mid-infrared applications require not only fibers that can transmit light, but also laser sources and optical amplifiers at these wavelengths. Unlike fixed laser systems, optical fibers are flexible, making these new fibers useful in creating fiber lasers, fiber amplifiers or any fiber component that is needed to operate in this mid-infrared range. Toulouse has developed fibers that are very good at operating in this mid-infrared range of wavelengths.

Jean Toulouse (below) is using optical nonlinearities in new fibers (right).



The Social Sciences

Sociology and Anthropology

Buddhism and Agriculture

One glance at Professor Nicola Tannenbaum's office in Lehigh's Price Hall gives away her obvious passion for her field. Hundreds of books, volumes of field notes and stacks of photos line the walls and desks, and upon entering she immediately offers examples of her research, which revolves around small Buddhist communities in Northern Thailand.

For Tannenbaum, professor of sociology and anthropology and director of Asian studies, her research interest has become a central part of her life, and she returns as often as she can to the same village community in northwestern Thailand that she first visited in 1977. "When I first went to the village to do my disserta-



Nicola Tannenbaum (below, second from left) spent time in Thailand during a 2010 research trip. Tannenbaum also visited a temple (above) in the northwestern Thailand community she studies.

tion research, there were no paved roads, no electricity, no running water," she says. "Now, they call me a few times a year on cell phones." devoted Buddhists, the people there need enough to eat and enough to offer," she says. "That means that economics can't be a separate domain, because farming is a part of their whole world view." On a second extended visit to the village, she began focusing on the intersections of farming and religion, and their

common underlying ideas.

Since then, Tannenbaum has argued in her work that local variations in Buddhism are often adapted to the particular circumstances of an individual community, which helps explain the dozens of permutations of rituals and practices across Thailand

and its neighboring countries.

"Small farming communities like the one I study are often on the margins of the state," she says. "They live within a system of constraints, but ethnography can provide a sense of how people creatively live their lives, and that's what I'm interested in. You can't hold on to some of the romantic clichés about Buddhists or farmers because you are living face-to-face with people who are becoming increasingly real."

Last year, while on sabbatical, Tannenbaum taught international graduate students at the Thai Studies Center at Chulalongkorn University, the oldest university in Thailand. In spring 2012, she will

once again teach abroad at the School for Oriental and African Studies (SOAS) at the University of London as the Numata Visiting Professor in Buddhist Studies.

"I think teaching at SOAS will be a great opportunity to put some of the pieces of my research together for an audience that is immersed in the field," she says. She hopes to explore ethnographic methods for thinking about Buddhism and religion at large, the Shan Diaspora (many Shan people living in Thailand are refugees from Burma) and the role of emotion in Buddhism.

International Relations

Trouble in Turkey

On June 12, Turkey held parliamentary elections. Although much of the world took little notice of the event, and the outcome was predictable as

the ruling Justice and Development Party (AKP) won a majority of seats, these elections mark a crucial moment in Turkey's development and play an important role in evolution of the region, says Henri Barkey.

Barkey, Bernard L. and Bertha F. Cohen Professor in the department of international relations, argues that this election is at its core about domestic policy. Turkey's Prime Minister Recep Tayyip Erdogan has promised that a new constitution will now be developed. Barkey, author, co-author or editor of five books examining Turkey and the Middle East, notes that the AKP victory will influence the constitutional discussion.

"They desperately need a new constitution because the constitution they have was written by the military in 1982," he says. "It is a straightjacket. It is undemocratic. It can't resolve many of the domestic problems, particularly the most important one, which is the Kurdish problem. The real number-one priority is how you get your ducks in order to start working on a new constitution. It's a very tricky thing to write, and how it's managed or not managed will determine their relationship with the Europeans, the nation's internal stability because the Kurdish issues are on the verge



tion research, there were no paved roads, no electricity, no running water," she says. "Now, they call me a few times a year on cell phones."

Tannenbaum's initial research focused on farming and what she calls "agricultural decisionmaking." The emphasis was primarily economic, looking at how subsistence-level farmers make rational decisions based on planning and forethought. But spending more and more time in the village, which is largely populated by the Buddhist Shan minority, helped Tannenbaum realize that agriculture in a place like Thailand is even more complicated than she originally thought.

"As subsistence farmers and

of boiling over, and how they are perceived in the Arab World.”

The Kurds, who comprise approximately 20 percent of the Turkish population, will demand constitutional changes that will recognize their place in society, notes Barkey. Turkish policy has historically been driven by a fear that conceding to Kurdish demands will lead to the breakup of Turkey. Erdogan must manage these demands as he struggles to establish a presidential system, and ideally he would like this done before potential presidential elections in 2012.

The most important challenge now facing Turkey is the continuing unrest in Syria. The Arab Spring, especially the developments in Libya and Syria, revealed the basis of Turkey’s self-touted “zero

the refugee flows will further strain relations with the Syrian authorities, who have refused to heed Ankara’s advice. With the regimes in these countries collapsing, Turkey has had to pivot its foreign policy.

“They establish good relationships with these autocratic regimes, then when the people revolt, they are caught flat footed,” Barkey says. “The big test of their policy is Libya and Syria, where the relations were close and a lot of money was involved. Trade and commercial relations are important to their foreign policy. Turkey has become a major exporter. The economy has done well. The GDP has tripled in 10 years because this economic policy has paid dividends. But that requires opening new export markets. This has created a new middle class and these people push the government to be conscious of this.”

The months following the election bear watching. While the results could be foreseen, Barkey says Turkey’s future will be tumultuous and interesting to watch.

Psychology

Reading to Children

Reading books to young children is not just an enjoyable activity. There are good reasons to believe that it promotes children’s language development, including their narrative skills—their ability to construct and comprehend stories—and in the process helps build foundations for the early mastery of reading and for long-term school success.

But in preschool classrooms, especially those serving low-income children, adult-child bookreading is increasingly crowded out by direct instruction in letters, numbers, vocabulary and the like. And even when teachers do read to children, the books they choose are not always best suited to match

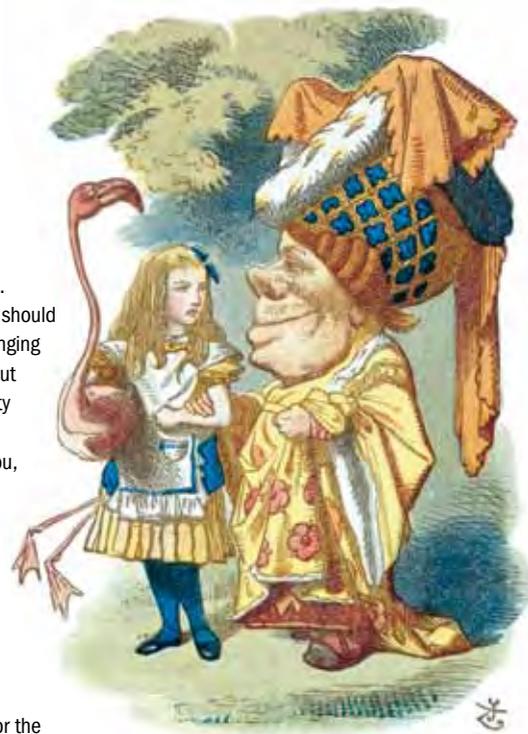
the children’s abilities and help them improve.

“Ideally, storybooks should be engaging and challenging for young children without going beyond their ability to comprehend them,” says Ageliki Nicolopoulou, professor and chair of the department of psychology. “But it’s less useful if the books are too difficult for children to understand. There may be too many characters or too many episodes, or the connections between them may be too complicated. For some children, the book may come across as just a series of disconnected scenes; it is only later that they can see how these scenes connect together into a coherent whole.”

A project headed by Nicolopoulou seeks to provide a more informed and illuminating framework for assessing children’s books in terms of their levels of complexity, sophistication and overall difficulty. This will help parents and teachers choose books that are most appropriate for children at different ages and levels of development, and organize the reading of these books in the most beneficial sequences.

“On the one hand, we need a clearer and deeper picture of how children actually understand the stories that are read to them and what they take from the experience,” she says. “On the other hand, we need a more systematic picture of the kinds of books being read to children and better ways to assess their challenges and benefits. Both sets of questions have been insufficiently studied for the preschool years.”

This project grows out of several



decades of research Nicolopoulou has conducted on play and narrative and their role in young children’s development, socialization and education. One focus has been on storytelling and story-acting practice that can be integrated into the regular preschool curriculum. Each day, children can choose to dictate a story to the teacher, who transcribes the story as the child tells it. Later that day, each of the stories is acted out for the entire class by the child/author and other children whom she or he chooses. This public performance helps generate narrative sharing and cross-fertilization.

A multi-year federally funded study by Nicolopoulou found evidence that this practice can promote

young children’s school readiness in the mutually reinforcing domains of oral-language skills, emergent literacy and social competence.

But this storytelling and story-acting practice works most effectively when it is complemented by appropriate adult-child interactions, including shared bookreading.

Nicolopoulou hopes that her current



Elections in Turkey mark a crucial moment in the region’s development.

problems with neighbors” policy to be one of “zero problems with neighboring regimes.” In Libya, Turkey had \$15 billion in investments and 25,000 workers. Syrian refugees have crossed into Turkey and if events deteriorate further,



project can help enrich preschool bookreading interventions and increase their effectiveness, especially, though not exclusively, for children from low-income and otherwise disadvantaged backgrounds. It also has broader implications for research on story comprehension, cognition, emergent literacy and the interplay among them.

History

Fulton's Torpedoes

Robert Fulton, usually remembered for his steamboats, also developed other technical systems, including one entailing underwater naval weapons. This system included experiments with what he called "torpedoes," which he considered more important than the steamboat.

Two of Fulton's original colored drawings of his torpedoes reside in the Lehigh Library's Special Collections and are the focus of research by Steve Cutcliffe, professor of history, and Kimberley Fabbri, a Ph.D. student in history. Drawn in 1804, one drawing depicts a "Great Torpedo" measuring 20 feet long that contained combustible balls and one ton of powder. The "Small Torpedo" was seven feet long, containing correspondingly fewer explosives.

Unlike today's self-propelled torpedo, Fulton's was more of a slightly submerged underwater mine. He envisioned their use either by anchoring the devices across a harbor mouth to prevent enemy ships from entering or by floating them down on the tide to contact the hull of an anchored ship well under the water line. A flintlock firing device connected to a clockwork mechanism detonated the torpedo.

"The naval weapons system was, from Fulton's perspective, his big idea,"

says Cutcliffe. "He was a real manipulator. He tried to sell it to everybody—the French, the British, the Americans, the Russians."

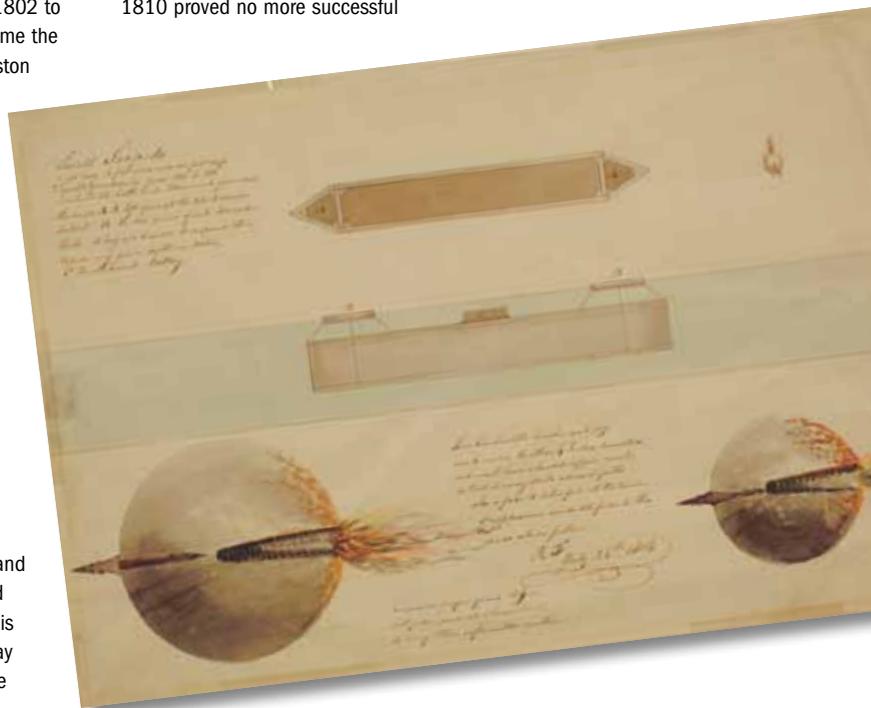
Fulton carried out his first torpedo experiments in France, then at war with Britain, in the early 19th century. Following the Peace of Amiens in early 1802, the French lost interest in Fulton's weaponry. Paris is where Fulton met Robert Livingston, who arrived in 1802 to negotiate what would become the Louisiana Purchase. Livingston had acquired a 20-year steamboat monopoly on the Hudson River, providing he could build a boat capable of moving 4 mph upstream. The two men formed a partnership and Fulton tested his first steamboat on the Seine in 1803.

France and Britain were soon again at war, but now Britain showed interest in Fulton. Fulton went to England in April 1804. On July 20, Fulton and the British Admiralty signed an agreement to develop his torpedoes. This was one day prior to the execution of the first of the Lehigh drawings. Cutcliffe and Fabbri speculate Fulton was wary of revealing details of his system prior to finalizing the agreement. They further believe the Lehigh drawings were the actual working drawings for the construction of torpedoes to

be tested against the French navy then massed in Bologne, France. Fulton's British experiments were only marginally more successful than those in France. Limited technical success, return of peace at the end of the year and pressure from Livingston to return to America to meet monopoly deadlines led Fulton to leave England in late 1806.

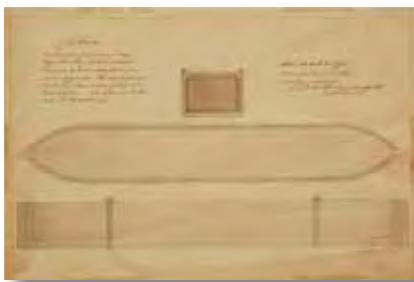
American trials in 1807 and 1810 proved no more successful

scientific pursuits," the torpedo.



Two of Robert Fulton's drawings of his torpedoes, shown here, reside in Lehigh's special collections.

than had those in France and England. What did prove successful, however, was Fulton's North River Steam Boat. The crucial component was a Bolton and Watt steam engine exported from England, which allowed him to achieve the required speed for the monopoly. Fulton obtained the export right, denied to him in France as part of his 1804 torpedo agreement. The age of commercial steam-boating was now underway in earnest, with an indirect connection to the inventor's failed, but "favorite offspring of [his]

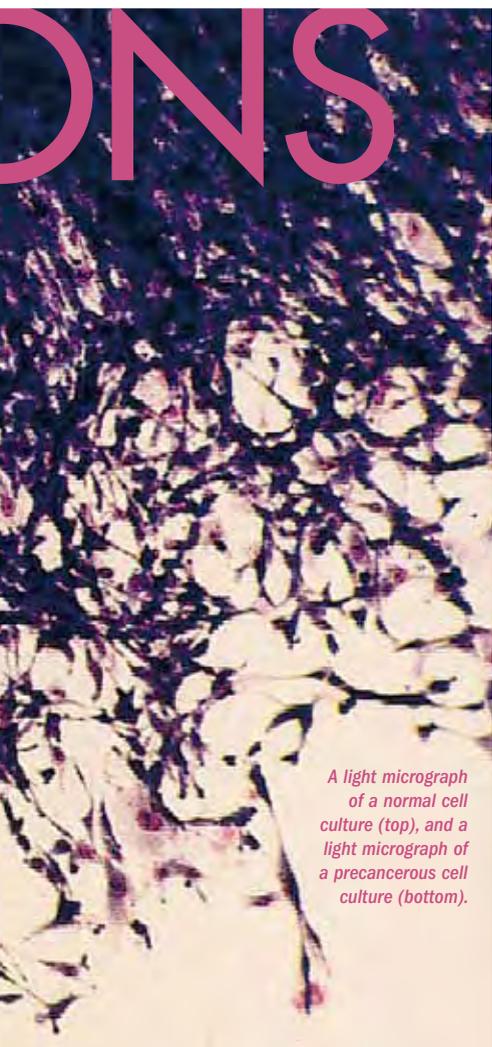
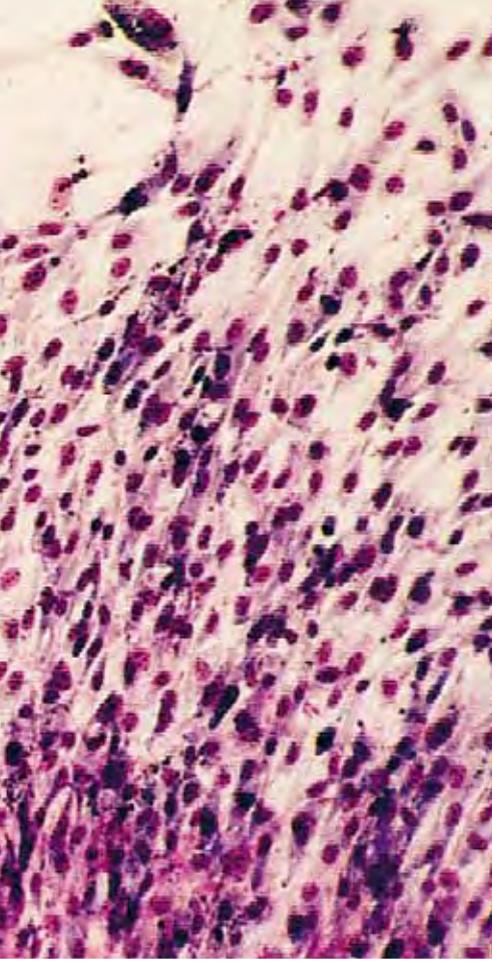


Feature

DANGEROUS

BY AMANDA
MACMILLAN '04

DIVISIO



A light micrograph of a normal cell culture (top), and a light micrograph of a precancerous cell culture (bottom).

Some of the biggest breakthroughs in modern medicine have come from studying the tiniest building blocks of life. In Lehigh's biological sciences department, three faculty members' research on cell replication and differentiation may affect the cancer treatments, genetic testing and antibiotics of the future.

Cell theory, one of the founding principles of biology, states that all new cells are created from existing cells that divide in two. New cells arise from this growth and division of a pre-existing cell into two new daughter cells. The cell replication process underlies growth of all multicellular organisms and allows our bodies to heal after injury. In order for an organism to grow, mature and repair itself after injury, its cells must divide and form new cells; in eukaryotic cells (those that contain a nucleus), this process is known as the cell cycle.

When the cell cycle is operating correctly, cells divide on schedule and organisms develop as they should. When something goes wrong, however—when cells begin to divide uncontrollably or incorrectly—problems such as birth defects and cancer can develop.

The answers as to what goes wrong when cell division runs amuck, and how it can potentially be stopped, are coming to light in the laboratory of Lynne Cassimeris in the department of biological sciences. For nearly three decades, Cassimeris, professor of cell biology, has focused her research on the cell's internal skeleton—specifically the bundle of fibers known as the mitotic spindle that helps facilitate the process of cell division, or mitosis.

The mitotic spindle is constructed of thousands of subunits of the protein tubulin that can come together very rapidly to form microtubules (picture lots of little Lego blocks connecting into one long chain). Tubulin can also dissociate from microtubules, allowing for old microtubules to disassemble and for the formation of new microtubules. This process allows cells to reorganize and build new structures. Changing microtubule structures is central for cell division and cell motility and in adapting cell shape to external stimuli.

“What we're really interested in,” says Cassimeris, “is how proteins regulate when and where the skeleton is assembled or disassembled into different structures.”

Microtubules within the mitotic spindle are often the targets of chemotherapy treatments: When a drug is able to block microtubule formation, it can halt out-of-control cell division that causes cancer to spread. But this type of treatment also comes with side effects: The drugs attack and cause damage to healthy cells as well, limiting the amount and frequency that they can be used.

“A long-term goal is to understand all of the proteins that interact with tubulin,” says Cassimeris. “But ultimately, we may uncover

Cancer cells have lost a lot of this self-control; they've stopped listening to the cues telling them to stop, which is why they continue to undergo cell division.

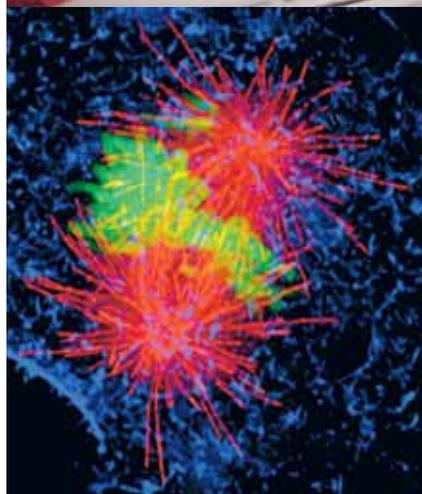
more specific targets for chemotherapy that might more specifically target cancer cells.”

Recently, researchers in the Cassimeris lab (and in a handful of labs around the world) have made a discovery that seems to do just that. The new findings focus on a protein called stathmin that helps regulate assembly of the mitotic spindle. From a microtubule standpoint, stathmin makes microtubules less stable. The group has found that about half of all cancer cells need stathmin to survive; without it cells undergo apoptosis, or cell suicide.

On the other hand, cells do not appear to need stathmin to survive. Previous research has shown, for example, that mice engineered to lack the gene for stathmin undergo a mostly normal development, although they do have some aging-related issues and minor neural defects.

Before the process of mitosis begins, cells go through checkpoints to ensure that everything is ready for cell division and that there are no errors in their genomes that could be passed on to their daughter cells. If DNA has been damaged in any way, says Cassimeris, a “check engine” light of sorts goes on. The cell stops what it’s doing, evaluates the situation and decides whether it can repair the damage and then proceed, or—if the problem is not fixable—it commits cell suicide.

Cancer cells have lost a lot of this self-control; they’ve stopped listening to cues telling them to stop, which is why they continue to undergo cell division. Many chemotherapy drugs, in fact, are aimed at turning on such a check engine light. When cancer cells are depleted of stathmin, Cassimeris’ group has noticed, they experience a delay during one of these interphase checkpoints—and eventually, they die. “We don’t know what exactly the cell is seeing that’s wrong, but we know that this relatively minor change is somehow setting off bells and causing the cell to say,



Lynne Cassimeris, professor of biological sciences, and her research group are studying how the protein stathmin affects cell division. Seen here, the immunofluorescent light micrograph of a cancer cell during the prometaphase of cell division.



“Something is wrong—I need to pause and not move forward.”

Now, with the help of the College of Arts and Sciences’ New Directions Fellowship and a grant from the Pennsylvania Department of Health, her lab is focusing on the tough questions: How do cells first notice a change in stathmin levels? What exactly are they sensing that turns on their check engine light? What are they doing, once they sense the change, to jump-start the process of apoptosis? And why does the absence of stathmin cause such irreparable damage in cancer cells but not in normal cells?

“If we can figure out why, it will tell us these fundamental things about the skeleton that we haven’t noticed before, and it will help identify an Achilles’ heel in cancer cells that differentiates them from healthy cells,” she says. “It could allow us to target and kill off cancer cells without harming healthy cells and carrying certain side effects.”

The future development of drugs to mimic stathmin depletion holds the promise to kill cancer cells without producing side effects in normal tissues. Cassimeris has in recent years collaborated with colleague Robert Skibbens on projects related to increasing our understanding of the mechanisms that may lead to cancer. While Cassimeris focuses on stathmin, Skibbens, associate professor of cell biology in the department of biological sciences, works in a different cellular venue as his lab focuses on the multiple steps required for cells to properly segregate chromosomes into newly forming daughter cells. However, Skibbens focuses on processes that occur long before mitosis—during the time called S-phase (synthesis phases) when chromosomes are replicated.

Skibbens describes the chromosomes as the cell’s instruction manual for growth and development. When a chromosome is replicated, two identical sister chromatids are created—as if someone made a photocopy of each page in

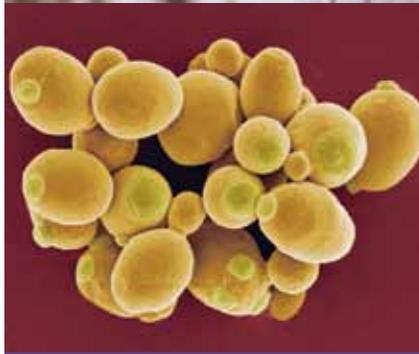
the manual. The Skibbens lab studies how cells identify over time chromatids as sisters. If the cellular “pages” aren’t identified correctly, the manual won’t be assembled correctly—it may have duplications of one page but lack others. In cells, this is termed aneuploidy and is a hallmark of cancer cells.

Skibbens’ lab studies yeast as a model organism; it’s quick and easy to grow and genetically manipulatable, and human and yeast cells share the fundamental processes needed for chromosome replication and mitotic cell division.

Skibbens is particularly interested in how cells recognize chromatids as sisters (the products of chromosome replication). When chromosomes are replicated to give rise to sister chromatids, each pair is tethered together by glue-like protein complexes in a process called cohesion. When a cell is ready to divide, the glue is inactivated, allowing the sisters to separate. Cassimeris’ mitotic spindle is responsible for eventually separating the sister chromatids into the newly forming daughter cells. In recent years, Skibbens and other researchers found that cohesion complexes are not only critical for proper chromosome segregation, but also play a major role in helping cells decide which gene sets to turn on—an important part of determining cell function.

“They’re not only important for cell identity, but they’re also an important factor in human diseases caused by genetic mutations,” says Skibbens.

Understanding the process by which chromosomes become improperly segregated during cell division has particular application in cancer research. Breast and ovarian cancers dramatically impact the lives of affected women, but the underlying causes remain obscured. Skibbens and his team study the connection between errors in chromosomal segregation and breast cancer. Under funding from the Susan G. Komen Foundation for a Cure, they focus significant efforts on BRCA-1, a gene that, when working properly, helps repair damaged DNA. When this gene



In the lab of Robert Skibbens, associate professor of biological sciences, researchers are using yeast (above) to study the replication of chromosomes (top).



contains mutations there is an increased risk of cancer. Up to 40 percent of women with hereditary breast and ovarian cancer, in fact, have a mutation in BRCA-1. Using yeast cells, the Skibbens lab is studying how other regulatory proteins interact with BRCA-1.

Ultimately, the team is testing models that BRCA-1 mutations relate back to errors in chromosome segregation, and to learn more about what proteins are causing those errors. “We want to know to what extent BRCA-1 involves the cohesion pathway,” Skibbens says.

Just as incorrect or out-of-control cell division can result in genetic disorders and disease, so too can inappropriate cell differentiation. Similar work takes place with bacteria in the laboratory of Amy Camp. Her work is not so far removed from that of her colleagues. While Cassimeris and Skibbens center their efforts on division and segregation, Camp is studying the process of cell differentiation—how one type of cell transforms into another type.

While Camp, assistant professor of microbiology in the department of biological sciences, studies these bacterial cells, the broader questions her research seeks to answer about cellular communication and transformation are applicable to all types of cells, she says, including human. “The big questions I’m asking are, ‘How do cells reinvent themselves under appropriate conditions? What are the mechanisms that allow a cell to change its identity from Type A to Type B?’”

Whether it is shape, function, behavior or the genes they’re expressing, the ability for a cell to change in response to external stimuli is really critical for survival in nearly every aspect of biology, she adds. “But at the same time it’s also very dangerous, because if cells change inappropriately, it can lead to things like cancer.”

In her lab, Camp and her research assistants study a rod-shaped bacterium called *Bacillus subtilis*. The cells of *B. subtilis* have the ability to transform into spores—metabolically dormant cells with tough outer shells—that can survive for thousands or even millions of years in very harsh conditions.

“Sporulation is a really wise strategy for a bacterium that finds itself in a poor environment or runs out of nutrients,” Camp explains. “It hunkers down and reinvents itself as a cell type that can wait out the hard times and survive things that would kill a cell that is actually growing and dividing. It waits until conditions improve and then resumes a normal pattern of growth.”

Scientists can cause sporulation in a lab setting by withholding nutrients and essentially starving bacterial cells. Sporulation is easy to study and observe, but the process is also analogous, she says, to other types of cell transformation: a stem cell converting to a muscle cell or neuron, for example, in the human body, or,

a mature spore. Eventually, the mother cell dies off completely.

Camp’s research focuses specifically on how these two cells communicate with each other during sporulation. Traditionally, biologists thought that bacteria acted independently of one another; now bacteria are known to interact extensively.

In particular, her lab is exploring the idea that these two sporulating bacterial cells form a physical connection so that the mother cell can feed nutrients and metabolites to the forespore, which becomes unable to support itself.

“We’ve discovered a channel made up of proteins that actually bridge the two cells,” says Camp, “and we call this channel a feeding tube.”



“We’re developing techniques that have not been applied to this type of research before, so it’s risky but very exciting.”

—Amy Camp

alternatively, a healthy normal cell converting to a cancer cell.

The process of sporulation takes about eight hours and requires hundreds of genes that are turned on in several different waves. It also requires two cells to create one spore. Initially, at the start of sporulation, these two cells line up side-by-side. One cell, called the mother cell, helps to turn on the genes required to transform the other cell, or “forespore,” into

Camp published her theory on the existence of this type of channel with co-author Richard Losick of Harvard University, using the term “feeding tube” for the first time.

“This was a very unexpected finding, but it helped to explain a lot of previously unexplained results,” she says. “And it allows us to ask really basic questions about how cells can cooperate during a developmental process. It appears that they’re reinventing themselves

PHOTOS BY DOUGLAS BENEDICT; PHOTO COURTESY OF AMY CAMP

not in isolation, but as part of a community—whether that’s in a developing sporangium (comprised of the mother cell and forespore), a bacterial colony or in the human body.”

The feeding-tube theory could also have implications for our understanding of how bacterial cells communicate in medical and industrial settings. Researchers now know

another,” she says. “We have strong but indirect evidence for this model, but now the objective for my lab is to actually watch it happen.”

This will require tricky experiments, however. Individual molecules are too small to see moving back and forth, even under a microscope. Instead researchers are hoping to use microscopy to observe populations of

Assistant Professor of Microbiology Amy Camp (right) looks at *bacillus subtilis* (below) to see how cells reinvent themselves under certain conditions.



that, instead of living independently, bacterial cells form intricate and elaborate communities on surfaces called biofilms; in the health-care world, this surface could be a prosthetic limb or a catheter, for example.

In a biofilm, bacteria can collectively survive treatments—such as antibiotics—that would otherwise kill single cells. “This can cause major problems, and major opportunities for research,” says Camp. “If you’re trying to build something and it becomes contaminated, you’re going to want to know as much as possible about what these bacteria are, how they form and how you can prevent their growth in the future. Maybe what I’ve discovered in my system will have implications for breaking down the communication, and the antibiotic resistance, of these biofilms.”

Now that Camp has published her theory of the feeding-tube model, the next step is to prove it. “We have not actually seen small molecules being transported between one cell to

molecules—engineered to be fluorescent—moving from the mother cell to the forespore.

“We’re developing techniques that have not been applied to this type of research before, so it’s risky but very exciting,” says Camp.

An offshoot of the research, about which Camp is excited and Cassimeris and Skibbens can agree, is the degree to which students have gotten involved with the department’s research.

“It’s a real pleasure,” she says. “Since I arrived at Lehigh a year ago, I already have undergrad students helping me pursue my research, and we’re making really great strides.”

The work done in these labs will impact the work of other scientists and has the potential to affect future treatments and drug development. The societal and economic impacts of health problems such as cancer are enormous, and the personal tolls are also stark. It is through such research that science advances our understanding of the cellular causes and improves survivorship, reducing the burden of disease. ●

Feature



City on a Hill

Three professors are inspired
by a community that offers
one of the richest portraits of

18th century
America: Moravian Bethlehem.

by Tricia Long

Seth Moglen (left) and Scott Paul Gordon (right) in the Colonial Industrial Quarter.



DOUGLAS BENEDICT/ILLUSTRATION BY MARY KATE MCCREVITT

Lehigh University in Bethlehem, Pa., was founded in 1865 by industrial pioneer, entrepreneur and philanthropist Asa Packer. The university, situated on a sloping mountain along the Lehigh River, stood witness to the rise of America as an industrial power. Packer's Lehigh Valley Railroad gave way to Bethlehem Steel, which even after its closing left a powerful mark on America's history.

But Bethlehem's historical relevance goes far deeper and is more significant than its place in industrial history. Three Lehigh professors, each inspired by the history of the town in which they live and work, have shifted their research to focus on a community that offers one of the richest portraits of 18th-century America: Moravian Bethlehem.

"The founders of the city of Bethlehem were the spiritual heirs—and in some cases, the actual descendants—of a revolutionary movement that emerged in 15th-century Moravia and Bohemia, the part of the world that today we call the Czech Republic," explains Seth Moglen, associate professor of English.

In the middle of the 18th century, Bethlehem served as a model Moravian community and the center of the church's international outreach. Today, as one walks through the city's historical downtown, the Moravian Church's long history is still widely evident, primarily because the original buildings are still in use by the descendants of this religious community.

"I've never lived in a place where the historical density was greater," says Moglen, who has primarily studied the relationship between literature and politics. "As an Americanist, I find Bethlehem fascinating. I feel a deep historical resonance throughout the city and see American modernity built into the land."

Interest in the Moravian community has increased in recent years, says Scott Paul Gordon, professor and chair of the English department. "The Moravians have become a very hot topic and I think people are realizing that to write about 18th-century America, Moravian sources offer incredible materials," Gordon says. "People are also much more interested in religion since 9/11, and writing about religion has been popular in all the disciplines. The Moravians were an important transatlantic missionary group."

Equitable Communities

Moglen's interest in the Moravians stems from a book project, currently titled *Bethlehem: American Utopia, American Tragedy*, that will explore the evolving structures of power that have shaped the city, from its Moravian founding to the present, as well as the egalitarian and democratic aspirations that have emerged in response to them.

Moglen is tracing the long arc of Bethlehem's 260-year history, drawing on the formal practices of the modernist writers he has discussed in his recent literary scholarship. He'll create a "historical mosaic," consisting of a chronological series of highly compressed vignettes, each of which will present a moment in the city's history during one of three distinct eras: Moravian Bethlehem, industrial Bethlehem and post-industrial Bethlehem.

In the first section of the book, Moglen will tell the story of Moravian Bethlehem as an exceptionally egalitarian community that also compromised and abandoned its most impressive social accomplishments.

"This was one of the most egalitarian places in 18th-century North America," Moglen says, "and the Moravians achieved things 250 years ago that most Americans today believe to be impossible. This should force us to reconsider both the origins of this country and the kinds of community we can build today."

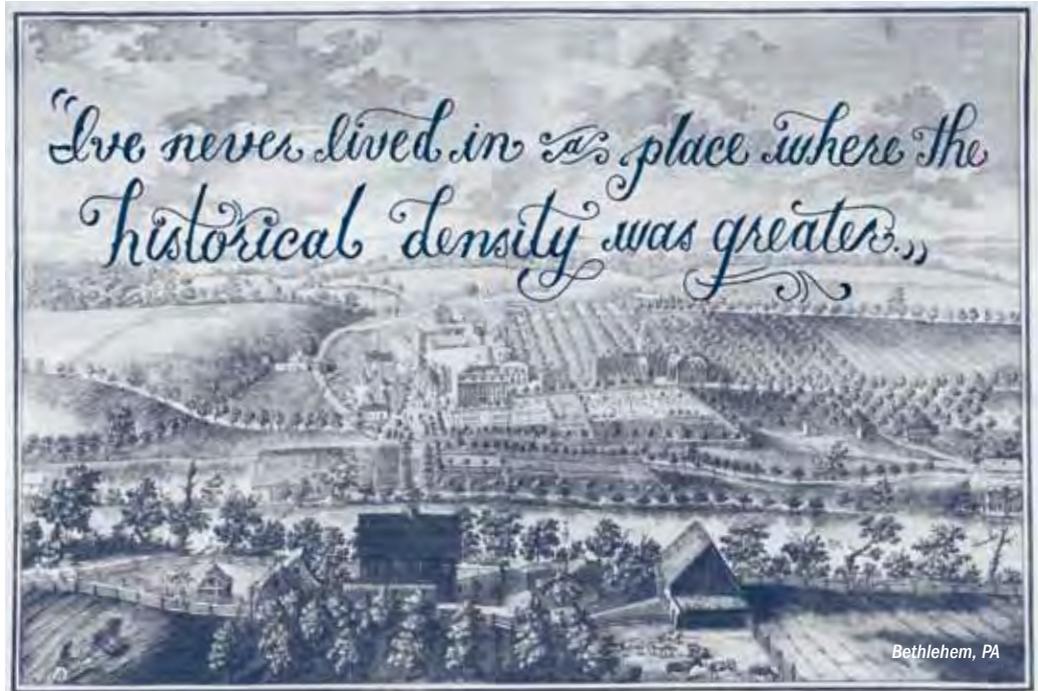
Between 1741 and 1762, the founding generation of Moravians created a socialist economic order in Bethlehem in which everyone worked for the community and received, in return, not only food, shelter and clothing, but also equal access to a fully socialized system of education, healthcare, child care and care for the elderly. Bethlehem's Moravians lived in communal choir houses, ate the same communally prepared food and dressed (with minor exceptions) in a similar manner. As a result, Moglen says that no one in 18th-century Bethlehem feared individual poverty or destitution in old age or illness.

"Everyone, male and female alike, received access to education (there was nearly universal literacy in 18th-century Bethlehem), and everyone knew that he or she would be cared for by the community from birth until the moment of death, when they believed they would pass into the arms of the Savior."

According to Moglen, Bethlehem was characterized by surprising forms of gender equality and racial integration. Childcare and domestic labor was socialized in Bethlehem in order to free women to exercise spiritual and social leadership roles. At the same time, this was a

communal economy was dismantled after one generation by church leaders in Germany—and the ensuing privatization of social and economic life led to the immediate collapse of both economic and gender equality," he says.

Moglen believes Moravian Bethlehem has



town in which Africans, Native Americans and Europeans speaking a dozen languages lived, studied, worked and worshipped together on terms of basic material equality.

"In contrast to the usual story of failed utopias and impractical idealism, the Moravians were also remarkably successful," he adds. "Moravian Bethlehem was prosperous and materially self-sufficient, and it was one of the most technologically advanced places in North America."

Moglen says the Moravians also undermined the egalitarianism of their own community in ways that are characteristic of America's broader history. "Bethlehem was also a slaveholding community: most of those literate Africans were also held as property by the church. It was a town built on land that had been stolen from the native people, the Lenape, in an especially cynical manner. And despite its prosperity and economic success, the

much to teach us both about the kind of just, equitable communities we could create today—and also about the fears and the forms of power that have prevented us from living according to our highest ideals.

An Important Patriot

While Moglen is looking at Moravian Bethlehem as a microcosm of 18th-century America, his colleague Scott Gordon is narrowing in on one family as an example of the influential, yet controversial role that Moravians who lived outside of settlement communities played in the country's earliest days.

Gordon became intrigued by William Henry, a gunsmith, inventor and merchant who lived in 18th-century Lancaster, Pa. Henry worked for more than a decade to climb the social ladder from mechanic to merchant, gaining considerable wealth along

the way. In 1765, Henry chose an unpopular path: to join the Moravian Church.

“This is an imprudent thing to do if you’re trying to rise in social status because Moravians were, as he said, ‘a despised people.’ In the 18th century, the Moravians were looked down on. People didn’t trust them because they had an unorthodox theology,” says Gordon. “They were also very good friends with Indian communities and, from the 1750s through the Revolution in Pennsylvania, the Indians who used to be thought of as friends start to be seen as enemies. For this man, joining the Moravians was a risky thing to do.”

Gordon’s work demonstrates how politics and religion began to intersect, and at times clash, for individuals such as Henry. When Henry became an important patriot, he put himself at odds with the church, which believed that withdrawing from politics and war was necessary to focus on spiritual matters.

“He joins the church and puts his business and social life at risk and then joins the Revolution and puts his church status at risk,” says Gordon. “But ultimately he becomes an important patriot, serving in the Pennsylvania legislature and the Continental Congress, and from these positions he protects the church.”

Ultimately, Gordon plans to publish a book about Henry, and about Lancaster, that explores class, religion and patriotism in the colonial and Revolutionary period.

An Incredible Depository

Gordon has traced Henry’s story through a treasure trove of documents that can be found in Bethlehem’s Moravian Archives, the official repository of Moravian records for the North Province since the 1740s. The archives hold over 1 million pages written in 18th-century German script, large amounts of English-language documents, more than 20,000 printed volumes and thousands of pamphlets, paintings, prints, maps and photographs as well as selected personal papers.

“This is the most incredible depository of unused resources about colonial America that one could imagine,” says Gordon. “The Moravians were just maniacal record keepers.

Throughout the 18th century and into the 19th century, every Moravian community—whether they were isolated, exclusive Moravian communities, like the ones who lived in Bethlehem or a Moravian church in an urban area, like New York, Lancaster or Philadelphia—kept a daily congregational diary. Some of it would be religious and some of it would be who came into town and who left town, but it would also talk about political events. So there is rich material about the American Revolution, and the French-Indian War, in these daily diaries.”

In order to read the documents, one must not only be well versed in the German language, but also trained to read the German script used by the Moravian community. The script was used to craft most documents prior to World War II, when the Nazi Party eventually phased out its use as a means of modernization.

A Study of Relations

Michelle LeMaster, assistant professor of history and historian of colonial British America, completed the archive’s two-week intensive script course last year that will allow her to translate German manuscripts dating from the 17th through the early 20th centuries for an upcoming research project.

“The archives are extensive and underutilized,” says LeMaster. “They are used more for Native American history than anything else.” Gordon agrees, adding that the Moravians lived among Native Americans in Pennsylvania and the Ohio Country. Because of their meticulous record keeping, the archives include daily diaries for 50 years of daily life in a Native American community.

LeMaster, whose research has focused on Native American tribes of the South and Native-white relations in the region, plans to use these records for her own research. She will continue pursuing her interest in how Native American-European relations worked in the 18th century, both positively and negatively.

Although still early in her research planning, she’ll move her focus north to Bethlehem, where she’ll examine the Moravian missionary movement that sought to evangelize the Native



The Moravian community kept all their records in an intricate German script, as seen in this document found in the Moravian Archives.

American communities. The Moravians were some of the most successful missionaries in the world, spreading their reach from Europe to America, south to the Caribbean and as far as Greenland. Yet Bethlehem always served as a central hub.

Gordon and Moglen, while published in scholarly journals, are using their research to make connections with their local communities. Moglen serves as co-director of Lehigh’s South Side Initiative, which brings together Lehigh faculty, students and staff with Bethlehem residents, government officials and community leaders in order to foster university-community collaboration and informed dialogue about the future of the city.

Gordon also served as director of the Lehigh University Press, which several years ago launched a series “Studies in Eighteenth Century America and the Atlantic World.” He hopes that volumes related to the Moravian community can ultimately be translated and published through the press.

“It’s a gift to work on a project where there are incredible unused archives in my backyard,” says Gordon. “It’s also exciting to work on local projects. By publishing things on this project, you can get an immediate response from the local community. Williamsburg is all fake, a re-creation of Colonial America. But Bethlehem is all real and is still used by the present-day Moravian community.” ●





GLOBAL

globalization has become a hallmark of the 21st century, but it's still difficult to define

BY TRICIA LONG

In a sense, September 11, 2001, was the first “global” tragedy that unfolded to the world in real time. Broadcast on countless networks, streamed live over the Internet and shared person-to-person through mobile devices, it was seen because the global communications infrastructure in place allowed the events in New York City, Washington D.C., and Pennsylvania to become a worldwide story in moments.

This is the age of globalization—mass media, international markets, global corporations, and even global tragedy. Globalization has become a hallmark of the 21st century. But assistant professor of journalism John Jirik, who describes the events of 9/11 as the “highest impact visual story ever,” says that



SEAN ADAM/REUTERS/CORBIS; ARTHUR MOLY/CORBIS; SALLIE FISCH/DEMOTIX/DEMOTIX/CORBIS; STRAUSS/COURTIS/CORBIS; STEPHANIE KEITH/DEMOTIX; KEN CEDENO/CORBIS PIVAL/ADHIKARY/EPA/CORBIS; AP/GETTY IMAGES; CORDULA DONHAUSER/DPV/CORBIS; AP/GETTY IMAGES

INFLUENCE

what globalization has really shown us is that we have little idea how things work. September 11 didn't show us more of the world, but it showed us more of the uncertainty.

“Communication distorts as much as it illuminates what we see of the globe,” says Jirik. “Anything communicated is such a small sliver of what’s really out there. We have to acknowledge that what we know of the world isn’t much. How can we ever really know what’s going on with 7 billion people in the world? And who actually matters when there are 7 billion of us?”

Social scientists first began using the term “globalization” in the 1930s, but it wasn’t until the 1980s that the term entered the mainstream dialogue, particularly in relation

to economics and the international markets. By the 1990s, globalization was cemented as a buzzword, used to explain the global interconnectedness of everything from politics to pop culture.

“Globalization has affected every field of study,” says Jack Lule, chair and professor of journalism and communication and director of the Globalization and Social Change Initiative (GSCI), who researches globalization and media, and international communication. “But people don’t always know how to find it, define it or explain it.”

Lule says there are three spheres of globalization: economic, such as trade, the markets and neoliberal policy;

political, such as nation relations; and cultural, which spans the gamut from religion to MTV. Through Lehigh's distinctive GSCI effort, Lehigh faculty like Lule and Jirik bring perspectives from numerous disciplines to help students better define globalization and adapt to a world that's constantly evolving. The program brings together research and teaching across Lehigh's four colleges on the economic, social, cultural and political impacts of globalization.

"For many people, globalization is understood primarily as an economic term," says Lule, whose forthcoming book is entitled *Globalization and Media: Global Village of Babel*. "But any discussion of globalization that doesn't talk about the cultural aspect misses the richest part of globalization."

"communication distorts as much as it illuminates
what we see of the globe." —JOHN JIRIK

Jirik tries to understand how particular conjectures of economic, political and cultural forces shape particular media sites and the possibilities of expression and representation associated with those sites.

"When we look at political, economic, technological or cultural contexts, it's communication that makes relationships between those contexts work," says Jirik. "All these things relate to one another through communicative processes."

These reductions of economic, cultural and social barriers have forever altered the interpersonal landscape. Satellites, he says, remove the national borders that can inhibit communication. Cellular phones have become a ubiquitous tool in Africa and connect people across the continent despite a lack of telecommunications infrastructure. And local television shows find global audiences when people discover programming online.

"The bottom line is that we don't know how globalization works, except in the broadest sense of the term," says Jirik. "What we can say about communication is that it is absolutely essential and a core component. It can be used for good and for bad. Technology has created fields of interaction and interdependence outside the inter-state system."

A global media

Jirik points to China and the United States as a comparative example. Both have access to much the same technology, and, broadly speaking, similar economic systems. However, the two nations operate under completely different political systems and with vastly different cultures.

"What you get in those four contexts enables and constrains communication in different ways," he says.

Jirik's own research has focused extensively on Chinese media. His most recent work draws on a case study of a Beijing newsroom at China's national TV network. He spent more than two years working at and observing CCTV-9, the

24-hour English-language news channel of China Central Television. He was one of two foreigners who served on a committee set up in 2003 to redesign CCTV-9 for its relaunch in 2004 as CCTV International. He plans to compare global news channels such as Al Jazeera, BBC, CCTV-9 and CNN going forward.

Jirik says that outside of news media, television has been influenced by the globalization phenomenon. In the early 90s, producers of television shows tried to look at what might make a particular television show attractive to people outside of the local market. Jirik says creators assumed they could use a "cookbook" to create a program that they believed would feel familiar to audiences throughout a larger, global market.

Broad generalizations about what would work in one market were applied to another market, assuming that certain things would work in any culturally "proximate" context. Jirik says there was an assumption based on the idea of a cultural cookbook that "The Office," for example, would work in post-British countries, such as the United States and Australia, because certain cultural nuances would resonate across nationalities. Jirik says, however, that this process fails as often as it succeeds, for reasons that are often unclear. The American version of "The Office" succeeded, but the remake of an Australian show, "Kath & Kim," failed. The success of the New Zealand underground hit "Flight of the Conchords" defies explanation in terms of a cultural cookbook. Globalization can give us a false sense of believing that we understand one another, if we use a term like a cookbook.

communicating social change

Outside of media, globalization is also creating other unintended consequences. Like her colleagues in the GSCI, Nandini Deo, assistant professor of political science and a faculty member in the GSCI, observes how ideas spread through globalization. Deo's focus is on social change and how ideas are spread through individuals and organizations rather than through mass media and communications, as Lule and Jirik examine.

"Part of globalization is widening people's horizons," says Deo. "It makes the far seem closer in both time and space and makes alternative lives feel closer and more attainable."

She points to how the spread of ideas has shaped how girls today have a wider set of options of what their lives might be like than their mothers and grandmothers. Although obstacles may exist, exposure to new ideas and new opportunities is a good starting point for social change. Deo offers beauty and body image as a simple example. "Women can have a broader idea of what beauty is because there are more examples of women in all shapes, sizes and colors," she adds.

As a political scientist, Deo's research shows how globalization connects women's activists from around the world, but notes that there are unintended consequences that result from this interconnectedness.

TOM FOX/DALLAS MORNING NEWS/CORBIS, JAMI TARRIS/GETTY, JAMI CHAPPEL/REUTERS/CORBIS, MITCHELL HASETH/NBC/ABC PHOTO BANK, IMAGE SOURCE/CORBIS

She looks at how global feminist ideas and discourses are translated through foundations and organizations into activism on the ground.

Deo conducted fieldwork with activists in India, Afghanistan and Sri Lanka to examine how they select and prioritize the issues they focus on. What she's discovered is that feminist priorities on the ground can be set by people far away. As a result, the issues these activists are addressing do not necessarily target the most critical issues for their respective communities.

Often at these conferences, says Deo, activists try to select "consensus" issues that affect women all over the world. Most often this is done as an attempt to promote unity.

"There is a wonderful side to these conferences for activists—they're exposed to ideas and involved in an exciting and empowering process," says Deo. "But there's a shift from sharing ideas to a monetized relationship of donors and NGOs and the effect of that has been depoliticizing."

Deo points to the 1990s, when much of the focus among feminist activists was centered on violence against women. As a result, economic concerns—an issue weighing heavily on many of women from developing countries—were not articulated. Everyone, says Deo, is well intentioned, but there are negative effects that come from following larger, global-consensus issues.

Deo notes that the process of globalization is shifting the balance of power and influence in sometimes surprising ways. "Under the old ways of globalization, we would've thought of the influence of Westernization," she says. "However, Indian feminists are very influential through their scholarship and participation in global conferences on women."

In addition to her research, Deo observes how globalization has brought change to the classroom as well. During one class assignment, Deo asks students to draw their own world map and fill in as many countries as they know. What she has found through this assignment is that a student's understanding of the world is heavily influenced by their personal experiences.

"This generation of students assumes that globalization is a fact," says Deo. "They don't study it just as theory. They have a real openness to studying the way others do things. They realize that their way of life may or may not be the best one."

Lule believes globalization has been going on since the very first humans set out to explore the world. "I do feel that there is a fundamental human impulse toward globalization," he says. "I believe there is an innate desire in people to wonder, to wander, to explore, to set out, to seek a better life, or perhaps just to find a different life. For me, globalization has been a part of humanity from its first steps." ●



Feature



A CABINET OF WONDERS

Brilliantly saturated color, densely layered surfaces, visual overload. These are the aesthetic values that inspire Anna Chupa's art.
by Emily Groff

An associate professor in the department of art, architecture and design, Chupa creates digital photo collages and mixed media installations. Her work ranges from abstract, kaleidoscopic collages to more literal documentary photography and video. From rich religious traditions that meld West African vodun with Roman Catholicism, to the intricately beaded costumes of Mardi Gras Indians, to elaborate St. Joseph's Day altars, Chupa is drawn to complex symbolism, which she incorporates into her work.

Chupa has several artistic interests, but most of them tie back to vodun, a traditional West African religion that centers on a hierarchy of spirits. She discovered vodun, also referred to as voodoo or voodoo, in graduate school, where she took a class that compared African textiles with Celtic interlace patterns, Mayan art and the work of Pablo Picasso.

Her interest in African and African-American art and religion eventually led her to study how vodun survived in the New World. It was brought to Haiti and New Orleans by African slaves, where it merged with indigenous religions and Roman Catholicism. Today, vodun altars feature many smaller altars to a variety of spirits, or loa, who can help followers, as well as to Catholic saints.

"I was really intrigued by the layering

in vodun, which made it possible for the Africanisms to survive under persecution during slavery," says Chupa. "Visually, the altars are so dense, and I'm drawn to art that has something new to see every time you look at it."

Chupa began her research in Haiti, but followed vodun to New Orleans. After researching the city for several years, she first visited New Orleans in 1996. There she met Priestess Miriam, the founder of the New Orleans Voodoo Spiritual Temple, which focuses on traditional West African spiritual and herbal healing practices. Priestess Miriam allowed Chupa to photograph in the temple during ceremonies and to take close-up photos of the altars.

Chupa uses individual details from the photos of the altars to create ornate collages and textile patterns that she prints on silk. She also makes her own vodun altars.

Although Chupa doesn't participate in vodun rituals, her altars do have religious significance.

"I don't attend ceremonies, I don't perform rituals in the way that they might be described in books," she explains. "But if you were to ask Priestess Miriam if I was initiated, she would say yes. I'm using these materials with that same meaning and intention."

She follows the same steps that traditional practitioners do, like "shopping for the spirits," who all have rich backstories and associated symbols. She chooses materials that she thinks the spirits will like, even if they don't fit her own tastes.

In her study of altars around New Orleans, Chupa came across Black Hawk, a vodun spirit whom she believes is tied to the Mardi Gras Indians. The Indians are groups of African-Americans who dress up in extravagant

costumes, or "suits," to celebrate Mardi Gras.

"They pay their respects to the indigenous cultures that enabled escaped slaves to survive during the mid-18th century," says Chupa. "They have a great deal of pride in African heritage, but don't acknowledge any connection to vodun."

She was drawn to the Indians because of the skill and dedication it takes to make their suits every year. Although they are not trained tailors or seamstresses, every Indian makes his or her suit by hand, sewing thousands of beads and feathers into lavish costumes inspired by traditional Native American designs and Caribbean culture. One suit can weigh up to 150 pounds and cost thousands of dollars to make and they are not reused. Chupa also likes how the making



Among other projects, Anna Chupa, associate professor of art, (above) photographs Catholic and vodun altars to create elaborate collages (left).

of suits is a community tradition, passed down from generation to generation.

Because the suits are so elaborate and colorful on their own, Chupa photographs them in a documentary style without adding anything to the photos or making collages from them. She has also interviewed Mardi Gras Indians and recorded video.

She incorporated some of this video into an

“I like art that has something new to see every time you look at it. My kaleidoscopic work is like a cabinet of wonders, and each piece means something to me, but I don’t want it to be obvious.”

—Anna Chupa

altar that she made in honor of New Orleans following Hurricane Katrina in August 2005. The altar also featured photographs she took of the city’s devastated Ninth Ward and other hard-hit areas of the city.

“It was a tribute to the continuation of the artistic spirit despite all the destruction and a call for the preservation of a culture,” Chupa says. “We can’t forget that there’s still a need for external help if what’s unique to New Orleans is going to survive.”

There are about 38 “tribes” of Mardi Gras Indians. In addition to masking during Mardi Gras, they also often come out on the Sunday closest to St. Joseph’s Day, the feast day that celebrates the husband of the Virgin Mary.

St. Joseph’s Day is a major celebration in New Orleans, thanks to a large influx of Sicilian immigrants in the 19th century. St. Joseph is

considered to be the patron saint of Sicily. He also sometimes appears on vodun altars in New Orleans.

In order to understand the significance of St. Joseph to Mardi Gras Indians as well as in New Orleans vodun and Catholic culture, Chupa began studying the festivities. Each year, individuals, families and parishes in New Orleans build St. Joseph’s Day altars and open their homes and parish halls to strangers for a feast.

The altars have three tiers representing the Holy Trinity, with a picture or statue of St. Joseph at the top, and a table spread with breads molded into religious symbols. In between the breads are pastel cookies and fruits and vegetables grown in Sicily, such as artichokes and lemons.

After a ceremony, the altar is broken and the breads and produce are served along with a large pasta dinner. The altars range from simple tables in individual family homes to elaborate spreads of food. The largest altar that Chupa has seen filled half a gymnasium and fed 5,000 people.

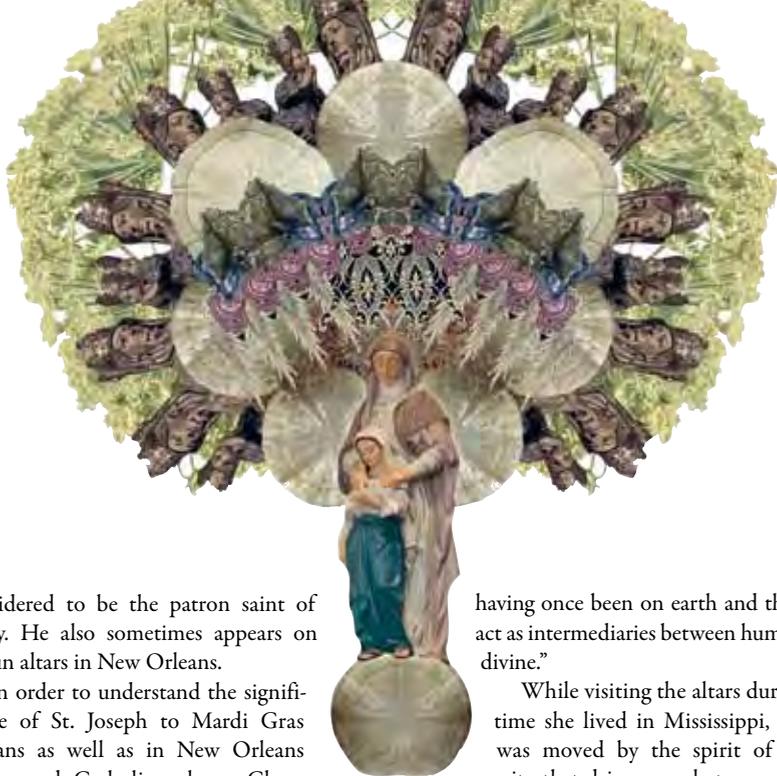
Whether it’s in honor of St. Joseph or vodun spirits, Chupa likes the idea of making an altar as a gift, and she sees similarities between the two traditions. “The saints are to the Catholic Church like the loa are to vodun,” she says. “They both have their stories of

having once been on earth and they can act as intermediaries between human and divine.”

While visiting the altars during the time she lived in Mississippi, Chupa was moved by the spirit of generosity that drives people to spend days baking bread and cooking food to feed strangers. She converted to Catholicism. She made the St. Joseph’s altar at her church for several years prior to moving to Pennsylvania. Since St. Joseph’s Day is not well-known in the Pennsylvania area where she now resides, she chose to create an altar for a Lehigh faculty exhibition.

She has also photographed altars and used the images to make collages similar to her work with the vodun altars. Her work is a way for her to educate people about the St. Joseph’s Day tradition, which is not widely practiced. Some of her collages are obviously religious and focus on prominent central images. Others are more abstract.

“I like art that has something new to see every time you look at it,” she says. “My kaleidoscopic work is like a cabinet of wonders, and each piece means something to me but I don’t want it to be obvious. I’m willing for it not to be decoded by the audience.” ●



Anna Chupa’s work includes documentation of Mardi Gras Indians (above), vodun ceremonies (right), and St. Joseph’s Day altars (far right).



Last Word

by Anne Meltzer

*Professor of Earth and
Environmental Sciences*

Universities play a distinctive role in society. They educate, inform, create, innovate and inspire. They are places of questioning and challenging, inquiry and debate, growth and development, exploration and discovery. Universities have both a responsibility and accountability to society at large to provide the expertise, skills and knowledge to help solve challenges while making the world a more equitable and better place in which to live.

Research, scholarship and creative work are essential to the educational enterprise. The integration of research and teaching keeps the curriculum dynamic, and informs what is taught and how it is taught. Gone are the days when faculty stood in front of a classroom and lectured to students, passing on content. We live in an age where Google is a verb and the world is increasingly flat, and information is readily available from any number of

sources. But how does one assess the quality of that information? How are conflicting information and perspectives resolved? How is information gathered from disparate sources and seemingly incongruent fields integrated to address questions, solve problems and advance our understanding of our world, our connection to it and our relationships with each other? How is content translated into knowledge and knowledge into action—action that is constructive?

Universities are dynamic institutions and are increasingly engaging students in experiential learning—helping students to acquire the skills and habits of mind they will need in a world where change is a constant. The classroom is no longer bound by four walls or even limited to a single campus, but rather extends to the world at large. Students are engaged directly in learning by doing, working in the laboratory, field, studio, and in communities, businesses, institutions and organizations both in the United States and abroad.

Colleges of arts and sciences play a distinctive role within universities. They are the crossroads where all students meet and learn the core skills that will serve them best

throughout their lives—as they change careers, as the demands of their jobs and careers change, and as they engage in their communities, both local and global. The breadth and diversity encompassed within colleges of arts and sciences are their strength and form the core of all great universities. The arts, humanities and social and natural sciences are fundamental to understanding who we are, how we relate to each other and how the natural world works. They also provide much-needed perspective over both time and space—how lessons from the past can help inform actions in the future, and how actions taken at the moment close by can have greater impacts, both long-lasting and far-reaching.

The world faces significant challenges and choices—populations continue to grow in a world with finite resources. Many argue that we've exceeded the carrying capacity of our planet and that current patterns of consumption across the world are not sustainable. Globalization increasingly brings diverse cultures into close contact, physically and virtually. The global environment and economy are intimately integrated and the ability to work and live constructively in a multicultural setting is critical. Many of the world's greatest challenges in health, environment and energy, and globalization are fundamentally challenges of education and will—choices we make about what to invest in, what we value and how we choose to live.

This is an exciting time to be part of a university and to invest in higher education—as a student, as faculty and staff, as a parent, or as a supporter. Universities play an important role in shaping the future. Today's students are tomorrow's leaders and decision makers in government, business and our communities. An educated population is essential for driving the innovation, creativity and judgment needed to advance society in ways that are sustainable and successful in creating a better world.

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DOUGLAS BENEDICT

“This was one of the most egalitarian places in 18th-century North America, and the Moravians achieved things 250 years ago that most Americans today believe to be impossible.”

see page 18

