

# NAU GLOBAL

A Publication of the Center for International Education



NAU MUN Students at the 2014 UCLA MUN Conference. They include (from left to right): Spencer Troth, Connor Mullins, John Murphy, John Kelly, Nicholaus Schlegel, Claire Bergstresser, Caitlin Rynn, Sydney Cheifitz, Andrew Shepherd, and Jeremy Arnaud.

## *The Co-Curriculum, Model UN and Advancing Global Learning*

By Prof. Gretchen Knudson Gee

The spectacular success that students in NAU's Model United Nations (MUN) have enjoyed over the past two years may strike some as a happy but inconsequential development in the experience of undergraduate students. Yes, they compete against students from some of the most elite institutions in the United States and around the world. And yes, they win prestigious and often multiple awards from participating in these events. But what makes the MUN experience so special and distinctive? It is that they are deeply engaged in global learning, not in the classroom as we would normally expect, but outside the classroom. The MUN, it turns out, is a co-curricula activity that fosters global learning just as effectively as any regular course taught from a global perspective.

Solving the Russia/Ukraine conflict, mitigating the impact of climate change, or figuring out how best to help the Central African Republic, build a functioning state, for example, are all important global issues with consequences, in each instance, for the millions of people directly affected, but also for all humanity. For NAU students who are members of the Model United Nations Club, these questions are not just academic; they are personal. That's because taking part in MUN means actively engaging with some of the most pressing global issues of our time. Students in MUN take on the role of a state, and negotiate and debate with students representing other states and international entities. They step into the shoes of world leaders tackling current and historical problems, and use all of their knowledge and skills to try to resolve these problems.

The Model United Nations Club at NAU, housed in the Department of Politics and International Affairs, is a co-curricular organization that focuses on issues of international significance. Students train for and then compete

*taking part in MUN means actively engaging with some of the most pressing global issues of our time*

in conferences that tackle real world situations like the ones listed above. PIA as a department is committed to global learning, and the activities of the club compliment the student's curricular experiences, and prepare our majors to be effective global citizens. In particular, MUN supports the Global Learning Initiative by

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I use the words **skills, knowledge, and attitudes** quite frequently, and usually together in the order that they appear here.

They are part of the narrative that I (and others for that matter) use in describing the outcomes of global learning. Olsen, Green, and Hill (2006), for example, define global learning as *“the knowledge, skills, and attitudes that students acquire through a variety of experiences that enable them to understand world cultures and events; analyze global systems; appreciate cultural differences; and apply this knowledge and appreciation to their lives as citizens and workers.”*

When we talk about **skills**, we understand something that is fairly straightforward. Being able to operate an electron microscope as a biological sciences major, for example, or having the ability to assess the shortcomings of a stalled engine, for mechanical engineering majors, are skills that all graduates in these areas should possess. As for **knowledge**, that too is a given. Philosophy majors should have, at the minimum, a basic acquaintance with the writings of Aristotle, Plato, and Socrates.



## Skills, Knowledge, and Attitudes: The Case of Kayla Mueller

By Dr. Harvey Charles

Among the menu of competencies that students must have to lead successful personal and professional lives in our globalized world, holding values that facilitate success in this context is not only useful, but necessary. For instance, we want graduates who value

*The recent tragic death of NAU alumna Kayla Mueller was a forceful reminder to me of the kinds of values that can lead globally competent individuals to do heroic things.*

being comfortable in cross-cultural situations because such circumstances are increasingly a feature of our lives. We want graduates who adopt sustainable practices in their use of natural resources. We want

graduates who care about the peaceful resolution of conflict and do their part to contribute to and participate in a more equitable distribution of resources.

The recent tragic death of NAU alumna Kayla Mueller was a forceful reminder to me of the kinds of values that can lead globally competent individuals to do heroic things. Kayla worked at the Center for International Education for an entire year, and although I can't say that I knew her well, it was clear to me that she had much in common with many of the students who are drawn to positions at CIE. They value inhabiting cross-cultural communities, interacting with international students and visiting scholars, and sharing their experiences with students less traveled in order to encourage them to study abroad. What I have come to know about Kayla, however, has convinced me

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In the spring of 2014, a group of Northern Arizona University honors students were on hand to witness the historic rewatering of the Colorado River in Mexico and to participate in the restoration of threatened environments in the Colorado River delta. Our students observed binational cooperation between the United States and Mexico when both nations agreed to share water shortages, enhance infrastructure for water efficiency, and perhaps most important, release water for environmental flows in order to restore the environment in the delta.

## The Rio Colorado: Fostering International Collaboration and Environmental Restoration

By Ted Martinez

In March 2014, the U.S. began releasing water from the Colorado River behind Hoover Dam; it took several days for the water to arrive at our shared border with Mexico. A few days later, dignitaries from the two countries gathered on Morelos Dam in Mexico as the “pulse flow” reached the dam and gates were opened for the first time in many decades, allowing water to enter the dry Colorado River bed.

Champagne was poured and journalists snapped photographs as adventurers grabbed paddleboards and kayaks. Downstream, people waited for the arrival of the water: some were Mexican citizens, some were restorationists, and others were representatives from conservation organizations. They all had one thing in common: no knowledge about exactly what to expect once the water arrived.

The water release was part of Minute 319, an amendment to the seven-decade-old water treaty between the U.S. and Mexico. The amendment allows for wa-

*citizens gathered in unprecedented numbers to embrace and enjoy the new river that had formed, literally, overnight.*

ter releases for environmental restoration of the Colorado River delta ecosystem in Mexico and the reconnection of the Colorado River with the sea. The river water last reached the delta in Mexico in the 1950s. Since that time, the drying of the river has allowed for the encroachment

of invasive species such as tamarisk and the decline of native species of trees, including cottonwood and willow, as well as the decline of suitable habitat for migratory birds.

The goal of the five-year agreement is to restore 2,300 acres of habitat in the Colorado River delta in Mexico. Conservation organizations such as Pro Natura and the Sonoran Institute have begun the process by buying up water rights in order to supply the base flow for restoration projects and by planting hundreds of acres of native trees.

NAU students enrolled in HON-243, “Lower Colorado River: Life Blood of the Mexico Delta,” witnessed the pulse flow firsthand

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Johanna Statom does hands-on learning while planting Bull Rush on the banks of the Lower Colorado River near Yuma, AZ.



a segment of NAU Model United Nations students at a conference

### NAU GLOBAL

Harvey Charles, Ph.D., Editor  
Emma Holmes, Assistant Editor

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Northern Arizona University  
PO Box 5598  
Flagstaff, AZ 86011  
e-mail: cie@nau.edu  
web: http://international.nau.edu/

# Bioorganic Chemistry as an International Language:

## A Multinational Collaboration to Develop Novel Antibiotics

By Prof. Andrew Koppisch

**T**he threat of infectious disease faces all societies regardless of the lines drawn at our international borders. Dedicated scientists and physicians across the globe are tirelessly working to combat these maladies. The perspective offered by one's culture can be very valuable to a collective effort. Our team at NAU has been the beneficiary of such perspectives through collaborations with scientists across the globe.

Our team is engaged in antibiotic discovery with scientists in Brazil (through a program sponsored by the **Brazilian Scientific Mobility Program, or BScMP**) and Malaysia (facilitated through the **National Science Foundation-sponsored Minority Health International Research Traineeship program, MHIRT**) as well as other institutions within the United States.

Disease caused by infectious bacteria is a significant concern to human health and affects citizens of every country on Earth. Due to the emergence of antibiotic resistance in many pathogenic bacteria, the discovery and development of new antibacterial compounds is an increasing priority for society. In order to develop an effective antibiotic, one must design a molecule that is able to stop the action of a crucial enzyme used by bacteria but do so in a manner that does not affect any of the enzymes used by a human host. One example of this involves enzymes employed by pathogenic bacteria to acquire the mineral iron using small, metal-binding molecules termed **siderophores**. Iron is required for the growth of most bacteria and it is obtained from the environment with the aid of siderophores. Acquisition of this mineral by infectious bacteria is a significant determinant in the development of disease. If a pathogen is successful in obtaining iron, it will grow, become virulent, and ultimately cause an infection; if unable to successfully

*disease caused by infectious bacteria affects citizens of every country on Earth*



Icaro Simon at the International student graduation held last December at NAU

obtain this key nutrient, the bacteria are typically unable to persist and are eventually cleared by the host's immune system. The design of molecules that stop siderophore synthesis may help slow the uptake of iron by bacteria, and in turn provide the host's immune system a chance to prevail against the microbial invaders. Our team actively synthesizes new candidate molecules in the organic chemistry laboratory and tests them against the enzymes re-

sponsible for siderophore synthesis, as well as against bacterial cells themselves, in the biochemistry laboratory. Our ultimate goal is to discover new molecules that may serve as novel antimicrobial therapies.

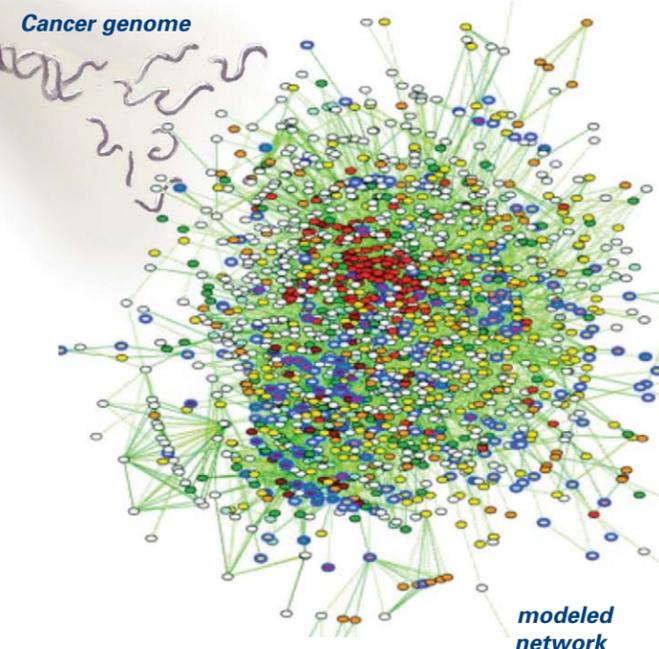
At NAU, the discovery and design of molecules that can halt siderophore biosynthesis is a significant focus of the research that Cindy Browder (chemistry) and I supervise. Our efforts at NAU have also benefited from long-standing collaborations with colleagues both domestic (David Fox at Los Alamos

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Tumor

Biopsied cells



Cancer genome

modeled network

By Prof. Richard Posner

**C**ancer is a global disease that strikes one in two men and one in three women during their lifetimes. This is an exciting time in cancer research and oncology. Our knowledge of cancer genetics has progressed to the point where we are now able to detect the mutations that drive many types of cancer.

In some advanced tumors, it is clear that particular mutations predominate, for example, BCR-ABL translocation in chronic myeloid leukemia, K-Ras mutations in pancreatic cancer, and B-Raf mutation in melanoma. We are entering an age of "cancer personalized medicine" in which patients undergo biopsy, and treatment is informed by the specific molecular abnormalities found in the tumor that drive the cancer.

As the cost of sequencing and other genomic profiling tests is rapidly decreasing, it will be only a few years before every cancer patient will have a complete genetic profile defined for their tumor at diagnosis. Future treatments will aim at killing the cancer cells by blocking the effects of

the tumor-specific mutations. The key cellular regulatory networks impacted by genetic aberrations and underlying cancer have been studied intensely for decades and drugs are becoming increasingly available that target specific molecules. However, it is still not clear exactly how best to interpret the results of these tests. For a given cancer phenotype, individual patients generally express a subset of a much larger set of genetic mutations found among the population of patients with this type of cancer.

We do not understand how many different combinations of mutations and other molecular aberrations lead to the same disease phenotype. The systems are complex and interwoven enough so that even if one identifies an oncogenic mutation that

drives the cancer and has a therapy designed to target the mutations, patient response is still highly variable, and development of resistance to single-drug therapy is the norm. New strategies, such as employing therapeutics in combination, are clearly needed, and would be a significant step toward advancing personalized patient care.

Our goal is to develop a predictive computational model that encompasses our knowledge of cancer cell genomics and signaling networks and can be applied to predicting response of an individual patient's tumor to targeted therapies.

We realize that this is a highly ambitious project. There is no single individual or group that has the needed expertise

# Fighting Global Disease with Predictive Computational Modeling

to tackle this challenge alone. We feel that we have assembled a core group that has the vision, capabilities, and commitment to make significant progress toward the goal of predictive computer models in cancer. It is essential to assemble a team with unique computational skills and one in which each member is able to cross boundaries in chemistry, physics, mathematics, and computer science to accomplish these goals. At NAU, we have developed novel computational methods and software for modeling large-scale reaction networks. These methods are capable of tracking the interactions of biomolecules at a level of resolution that has not been previously possible. We are excited to apply these methods to the study of a key cellular pathway that regulates cell cycle control and has been implicated in a variety of cancer types.

*it will be only a few years before every cancer patient will have a complete genetic profile defined for their tumor*

The international team assembled for this project includes: 1) Boris Kholodenko at University College Dublin, who pioneered the development of building computer models for cellular regula-

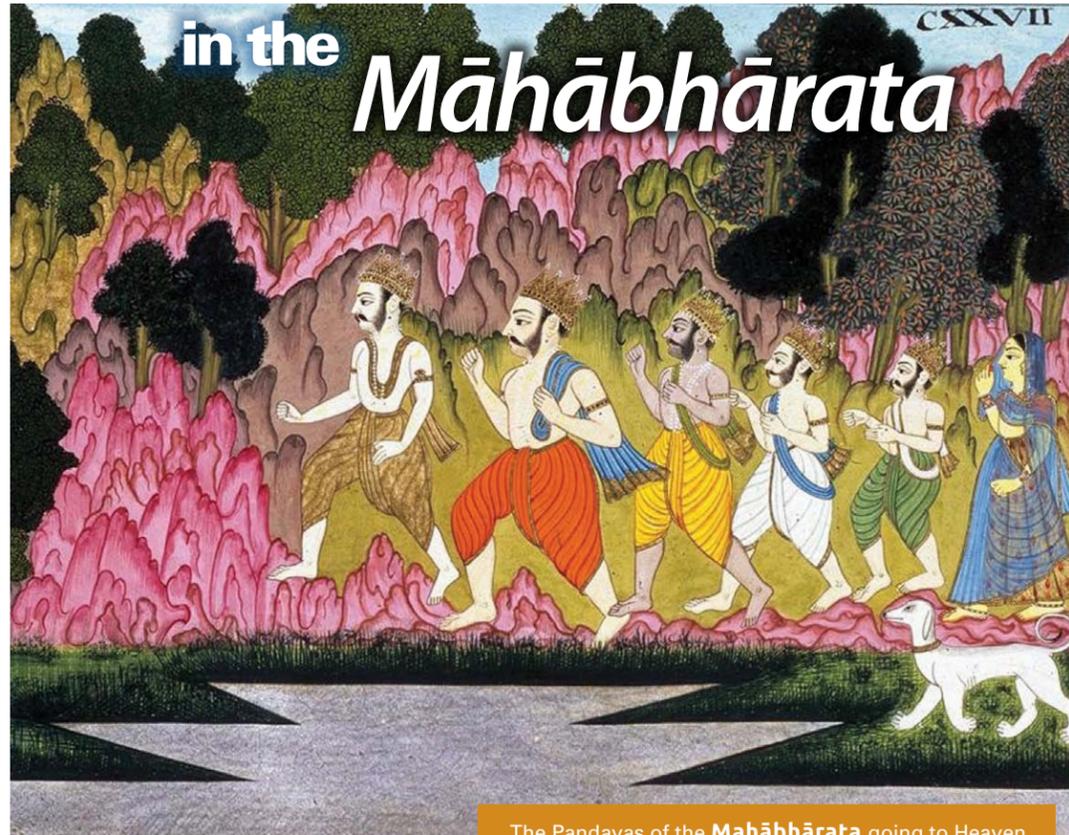
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# Ethical Implications of Environmental Concerns

By Dr. Geetesh Nirban

A postdoctoral fellowship, as awarded by the University Grants Commission, Government of India, brought me to Northern Arizona University to do research based on an ancient Hindu epic, the **Mahābhārata**. I chose NAU because I was looking for an opportunity to understand and interpret the epic from newer perspectives under the guidance of Professor Bruce M. Sullivan, whose scholarly work is a source of learning for academicians and researchers who study the **Mahābhārata**. NAU has been an appropriate destination for this work because environmental concerns and actions are deeply embedded in this institution's culture and values.

In my research project, I propose to explore environmental issues in light of the **Mahābhārata** while analyzing it from an ethical perspective. This epic is an encyclopedia of multifaceted Hindu worldview, life, culture, and philosophy through the ages. With its gigantic size, rich vocabulary, and illuminating thoughts, the text is a perennial source of exploratory and scholarly interest. Though war and



The Pandavas of the **Mahābhārata** going to Heaven

violence are constant features of this Hindu epic, the ongoing study will elucidate how a large part of this long narrative unfolds in the forest—with natural, human, and superhuman worlds in constant interaction with each other—offering a Hindu philosophical worldview in which all subjects of creation stand interwoven, which leads to mutual dependency, sustainability, and sensitivity.

The characters of the **Mahābhārata** are beings with common human weaknesses. The situations presented in the epic resemble many issues that

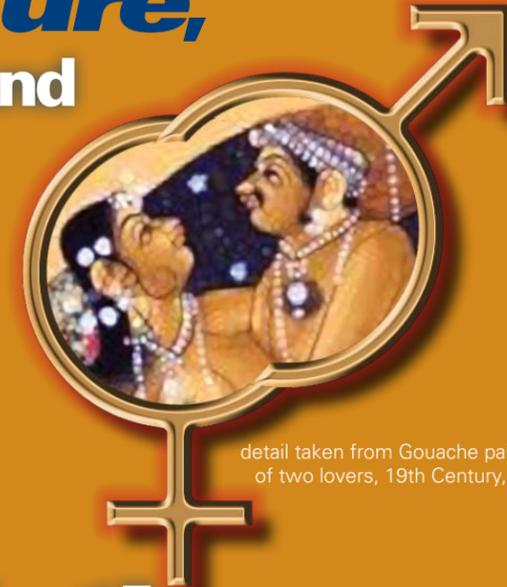
one faces even in the 21st century. The academic and timeless appeal of the epic has motivated me to search for philosophical insights in the text that can provide ethically resonating responses to environmental crises, a predicament that involves the changing relations between the natural and human world, with the latter focusing on domestication of the former and fostering the “forms of forgetting” that lead to cultural and ethical amnesia.

My ongoing study aims to develop the idea of ecological consciousness in the form of **eco dharma**. *Dharma* (righteousness),

the key element in the **Mahābhārata**, if given a distinctly green or ecological dimension, can awaken the ecological consciousness while revealing how the traditional notions of nature can be amended as the perceived cleavages between the natural and human realms are repaired. In fact, the breaches can even be eclipsed if each sphere manifests the spirit of *eco dharma*, the new, emerging element in environmental ethics from the Hindu perspective. With its interdisciplinary approach, the research I am pursuing will bring forth ideas pertaining to different

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# Rearranging **Sex, Pleasure,** and



detail taken from Gouache painting of two lovers, 19th Century, India

## Intimacy

By Prof. Sanjam Ahluwalia

The global is an organizing frame for my study of sexology in the 20th century. A focus on the global enables a number of intellectual maneuvers simultaneously. Instead of locking historical narratives within a narrow and singular self-contained geographical entity of a nation, my use of the global illuminates the multiple circuits within which knowledge, people, print capital, financial resources, and power circulate to create shared yet competitive and unequal communities.

It is only through the engagement of a global analytic that Bombay's participation within the sexological discourse in the 20th century becomes intelligible and that Bombay emerges as one of the sites for a global conversation on sex, pleasure, and intimacy. In the person of A. P. Pillay and his transnational publications such as *Marriage Hygiene* and *The International Journal of Sexology*, (IJS), it would be fair to argue that Bombay becomes a gateway for global sexological conversations, albeit for a fleeting historical moment. My research restores the

lost historical figure of Pillay from his marginalized global locality of Bombay. Through this retelling, I map a messier geographical trajectory, one that would make it difficult if not impossible to write neat self-referential Euro-American histories of sexual sciences of the 20th century.

Global locations such as Bombay, and historical actors such as Pillay, were neither external nor passive recipients of the modernist sexological project. If we agree that the modern world defies a singular identifiable location as the “original” source from which all ideas and power flows, then we would not only need to rethink our conceptions of the pure and uncontaminated locals, but we would also need to abandon any myth about a unidirectional flow of global materials and epistemological trajectories from the West to the rest. Pillay engaged the world from Bombay, writing and communicating with his

contemporaries in different parts of the world; raising funds globally for his ambitious sexological projects; and fostering and cultivating an intellectual platform for initiating research and dialogue on sex, pleasure, health, and reproduction across national boundaries.

As the managing editor for his global publishing project—the IJS—Pillay becomes a linchpin for making sexological ideas and debates available to a global audience located in such distant places as Aurangabad, Lucknow, Kanpur, Madras, Delhi, and Bombay in India; Karachi and Dacca in Pakistan; Tel-Aviv in Israel; Johannesburg in South Africa; Copenhagen in Denmark; Zurich in Switzerland; Suffolk, Cheshire, London, and Edinburgh in Britain; Berlin in Germany; Little Rock, Philadelphia, and New York in the United States; and Sydney and Melbourne in Australia. Editors, contributors, and readers from around

Sexology and the Global Governance of Sexuality from 20th-Century Bombay, 1930s–1950s

the world used the IJS to disseminate, exchange, learn, and question ideas about sex, bodies, and pleasures. It could be argued that the IJS operated as a print hub for the global discourse on sexuality in the 20th century. Ideas originating in Aurangabad in India bounced off a response from Melbourne in Australia; resources and centers for premarital and marriage counseling in places as varied as Czechoslovakia, Spain, Denmark, and India were made visible to readers not only within these locations but beyond; a female reader in London would mas-

*the modern world defies a singular identifiable location as the “original” source from which all ideas and power flows*

turbate using the materials that were collated and editorialized in the journal's Bombay office; graphs capturing and mapping women's and men's orgasmic ebbs and flows in tandem with their pulse rate, systolic and diastolic blood pressure, and respiratory arrhythmia were generated through research carried out in a university clinic in Jena, Germany, and made available to readers elsewhere to measure their own bodily responses within heterosexual intercourse. I could

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# Ecotourism Development and Engineering Design in Mexico and Suriname

By Prof. Dianne McDonnell

In December 2014, the Center for International Education (CIE) awarded Claudia Jurowski and me a small grant to implement an international engineering and ecotourism pilot project that combines community development, economic development, and sustainable design.

Specifically, we are piloting a program that uses ecotourism facilities as sustainable engineering education centers in Mexico and Suriname. Not only would these facilities provide safe and structured venues for student capstone projects, they would also support local in-country sustainable services (e.g., water, sanitation, solid waste, and energy systems for communities) as well as the design, manufacturing, and marketing of sustainable technologies.

## Co-Convening a Course for Juniors from Engineering and Hospitality

The pilot project is the beginning of a long-term effort that began by teaming engineering students with hospitality students and linking them to partners from Mexico and Suriname. Currently, students from my junior-level engineering writing course and from Dr. Jurowski's junior-level hospitality course on interna-

tional ecotourism form three strong teams that are working together toward a common goal. The two Suriname teams are focusing on the Brownsberg ecotourism center, with one group working on a bio-energy and wastewater management project and the other developing an education facility. The Mexico team is designing ecopods for an adventure tourism park within Copper Canyon National Park. I teach two additional writing courses limited to engineering students, and even though these students do not team up with their peers from hospitality, they are working on similar engineering projects and using the international partners to help them with the country context and client understanding.

## Visit by Project Partners

In late February and early March of this year, representatives from Mexico visited the NAU campus, followed by representatives from Suriname. Both delegations presented material on their regions and described the

existing ecotourism program. NAU students working on projects from each country had the opportunity to ask questions and better define client need.

The issues and needs described by both delegations were similar. They discussed the negative impacts of tourism, the need to build capacity and opportunities at the local level, and the lack of infrastructure to support tourism and community development.

Both delegations are working toward building ecotourism that benefits their local communities. In the case of Copper Canyon in Mexico, the local community members are the Tarahumara Indians. In Suriname, the inhabitants are the descendants of runaway African slaves and members of various native Indian groups. These groups have unique cultural backgrounds. They seem to prefer their isolation and they may not appreciate large-scale tourism. The delegates explained that the tourism facilities are separate from the local communities in order to protect



the Tarahumara community

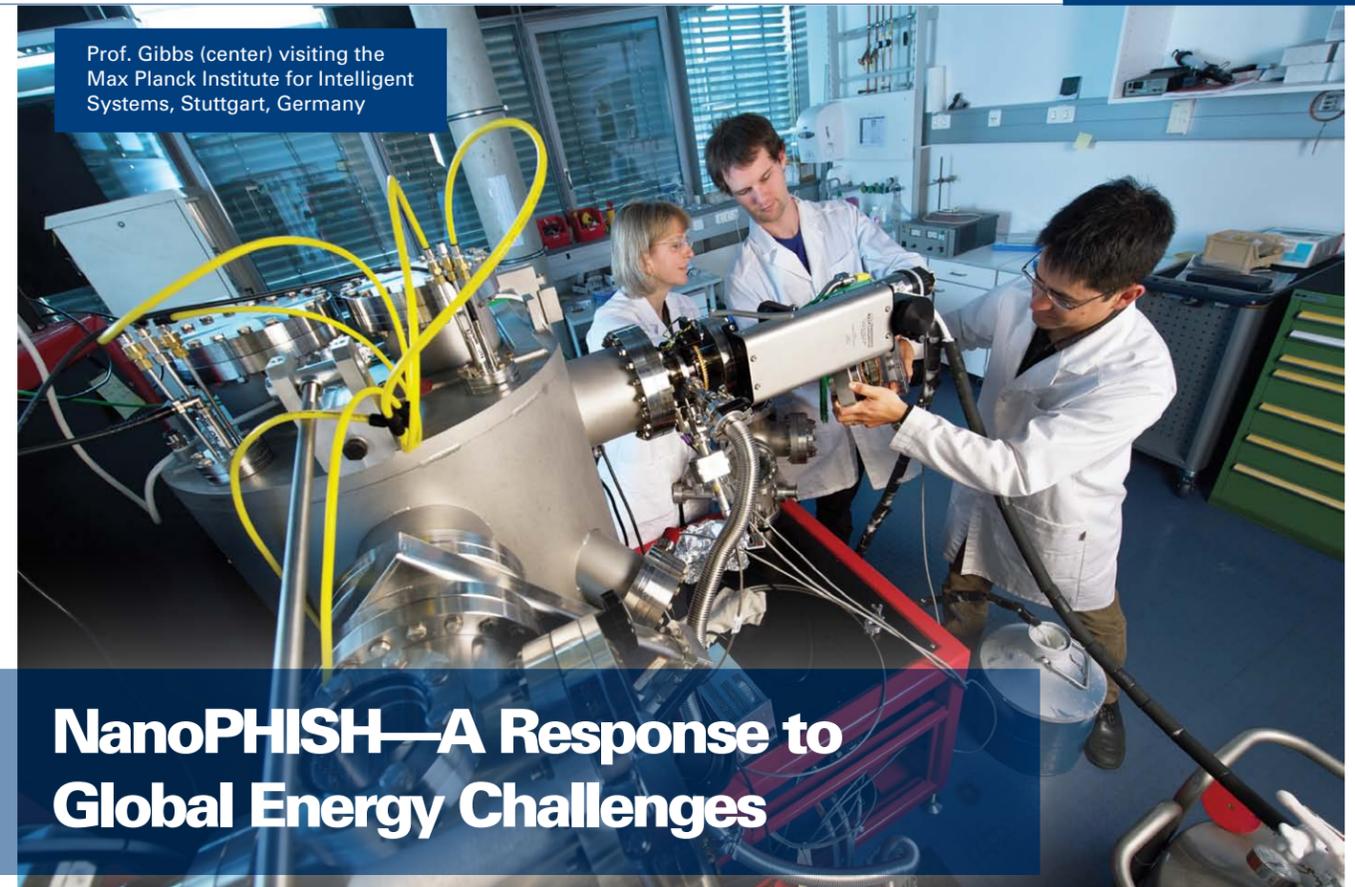
the local culture. In the case of Mexico, the facilities are located in the larger towns and in a national park. In Suriname, many of the ecotourism facilities are sited on islands in the middle of rivers.

Both delegations are using the local ecotourism program to help build capacity and opportunities. Lodging, arts and crafts, and various local activities provide most of the current income. However, the potential is there to bring in new ideas and technologies that could help improve infrastructure and provide new opportunities for the local inhabitants. Communities often lack adequate education or re-

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the Mexico delegation answering questions from NAU students.



Prof. Gibbs (center) visiting the Max Planck Institute for Intelligent Systems, Stuttgart, Germany

# NanoPHISH—A Response to Global Energy Challenges

By Prof. John Gibbs

Future energy shortage is a major pressing concern on a global scale. Since the newly industrialized nations of the world contain the largest populations, it is expected that energy demand will only increase over time, and it is expected to do so exponentially. Fossil fuels will not be able to sustain this demand from a practical, economic, or environmental point of view, and furthermore, the potentially irreversible changes to Earth's climate from the use of

nonrenewable energy sources could trigger disastrous consequences for all nations of the world. In this light, a renewable source of energy is clearly needed for the global society to progress into the mid-21st century and beyond in a healthy and prosperous manner.

The most obvious place to look for an effectively limitless abundance of energy is up. The quantity of energy striking the surface of the earth on a daily basis is more than sufficient to quench the global energy thirst; how this energy can be captured in an effective and economical manner is arguably one of the most important questions for scientists and engineers today. It turns out that plants have been achieving exactly this for more than 2

billion years in the process of photosynthesis. In fact, the fossil fuels that propel today's economies were produced by the slow and steady work our leafy friends have undertaken for millions of years to convert sunlight to condensed fuels. The time has come for mankind to move away from utilizing the limited underground supply of fuel to using our creativity and knowledge to produce the fuels that we need on our own.

NAU's John Gibbs is teaming up with a group of European researchers in the United Kingdom, the Netherlands, and Germany to tackle this global issue. The project will focus in particular on combining nanotechnology and sunlight to "split water," a process that leads to the products of hydrogen and oxygen gases, H<sub>2</sub> and O<sub>2</sub>, which can be recombined in a fuel cell to produce electricity. This reaction is truly clean, as the only byproduct is

water, and thus there is no emission of harmful greenhouse gases such as carbon dioxide. But in order to effectively produce hydrogen fuel this way, it is necessary to convert the sun's energy using specialized materials and devices. This is where the international team of experts steps in.

The international collaboration will include experts in each subcategory of the project so as to establish an effective and efficient division of labor. The research group in the physics and astronomy department at NAU, headed by John Gibbs, is able to manufacture a special type of nanomaterial that is hypothesized to greatly increase the efficiency of solar energy conversion. Two research groups, one at University College London headed by

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**Paul Wiener,**  
Associate  
Professor,  
School of HRM

- Coordinator of International Programs for SHRM
- Program Director, SHRM Summer Study in Europe, faculty member 2016
- Faculty Exchange with colleague from NHTV, Breda, The Netherlands, Fall 2013



**John Cauvin,**  
Executive in  
Residence,  
School of HRM

- Organizing the first international food and beverage study abroad trip to France set for Summer 2016.
- Building a relationship between SHRM and L'Ecole Hoteliere de Lausanne in Switzerland to establish a professor exchange program.



**Galen Collins,**  
Professor,  
School of HRM

- Presentations at professional meetings around the world
- Taught HRM course at NHTV University of Applied Sciences, the Netherlands
- Conducted training for hotel staff in the Caribbean
- HLC consultant to assess HRM program in Switzerland



**Wanda Costen,**  
Executive Director  
& Associate  
Professor,  
School of HRM

- Fulbright Scholar at the Mona School of Business & Management, University of the West Indies
- Conducted study on Jamaican women's experiences in tourism and their career progression.
- Speaker at the Inaugural Trench Town Social Entrepreneurship Fair



**Mark Molinaro,**  
Executive Chef,  
School of HRM

- Organizing the first international food and beverage study abroad trip to France set for summer 2016.



**Claudia Jurowski,**  
Professor,  
School of HRM

- Teach HRM courses with global focus
- Visited HRM programs in Macau, the Netherlands and China
- Publish with and serve as mentor for Chinese scholars
- Organized student trip to Canada

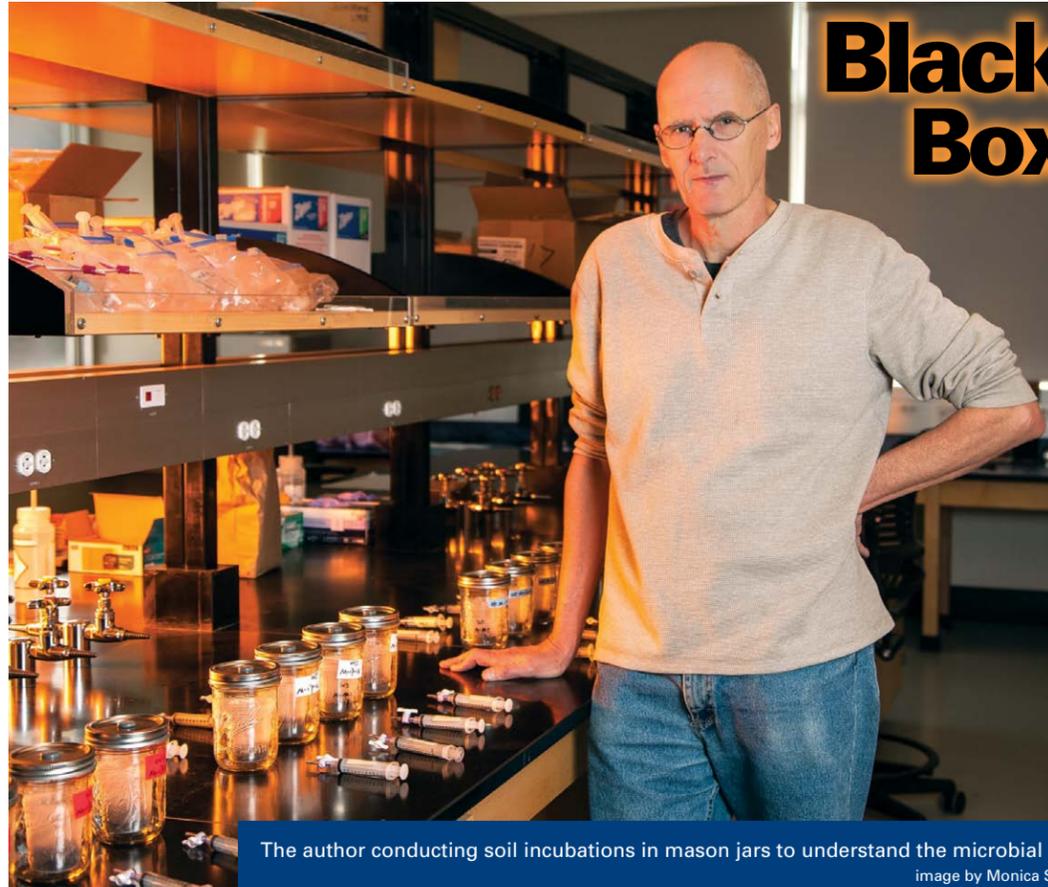


**Wallace Rande,**  
Associate Professor,  
School of HRM

- Taught HRM course at NHTV Breda, the Netherlands
- Participated in 4 Italian food and wine tours with students sponsored by Banfi Vintners
- Taught portion of summer studies program in Europe

# a Crack in the Microbial

## Black Box



The author conducting soil incubations in mason jars to understand the microbial metabolic processes  
image by Monica Saaty, NAU IDEA Lab



the goal: to understand a complex microbial community as its working parts (below), rather than only as a whole (top). image by Victor Leshyk

By Prof. Paul Dijkstra

**M**ost microbes live in communities.

These communities can be relatively simple, as found under extreme temperatures or high salinity, but can also be incredibly species-rich. Many of these microbial communities are important for human society.

There are 100's of bacterial species in a human's intestinal system. Many of them are essential for human health, defend the body from diseases and may even contribute to a solution to the obesity epidemic in affluent

countries such as the US. Similarly, a handful of soil contains 1,000's of microbial species, many of them unknown to science. Some of these microbes defend the plant against soil borne pathogens and stimulate growth. By understanding how the beneficial species behave in these communities, we may be able to boost agricultural production, improve restoration of natural ecosystems, fight invasive species, and benefit human health. Although scientists can nowadays identify what species are present in a microbial community, they still cannot measure what all these species are doing, how fast they are growing, how they interact etc. This is the so-called 'black-box' dilemma that the microbial ecologists

have been struggling with for decades; they can measure the outside of the box, but can't look inside it.

However, this may no longer be the case. Recent breakthroughs in microbial techniques by students, postdocs, and faculty, spearheaded by **Egbert Schwartz** and **Bruce Hungate**, part of NAU's new **Center for Ecosystem Science and Society (ECOSS)**, may have breached the black box. By combining stable isotope labeling with the molecular tools of community analysis, these researchers took an existing technique in microbial ecology (stable isotope probing or SIP) and turned it into a quantitative probe (aptly named q-SIP) to study the ecology of the

individual species that make up the microbial community.

With this new technique, and adaptations of it, we can suddenly see a future, when the behavior of hundreds or thousands of microbial species can be revealed with a single measurement. This may answer many of the existing questions that have eluded an answer because of the complexity of the microbial community. What species are growing and how fast? Are all microbial species dying at the same rate? What are non-growing microbes doing? What do the microbial species eat and how efficiently do they use these substrates to grow and survive? How do species interact in complex communities? How can we

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# NAU Scientists Help Understand



## the Hidden World under Our Feet

By Prof. Nancy Johnson



left (L to R): Kara Gibson, Nancy Johnson, Matt Bowker, Kyle Doherty and Anita Antonika on a crust-finding mission in Sedona.

habitat requirements and are found only in a few isolated locations.

**Kitty Gehring** and **Tad Theimer** study how animals that eat plants can have both negative and positive effects on mycorrhizal fungi. Animal herbivory may reduce the amount of sugar that plants can provide to their symbiotic fungi. Alternatively, animals can help plants by eating the "mushrooms" produced by beneficial fungi and spreading their spores to new locations. Gehring and Theimer have studied this interaction in the Australian rainforest. Fences that excluded animals like cassowaries, bandicoots, and wallabies resulted in lower numbers and reduced diversity of beneficial fungi in the soil. Over time, the number and kinds of plant species in the fenced plots also changed. This project has been under way for more than a decade, and Gehring and colleagues are now using modern molecular methods to better describe the changes in mycorrhizal fungal populations that occur when animals are removed and to conduct experiments to determine the consequences of those changes for plants. Gehring hopes that studies of complex interactions like those in tropical Australia will help us to better understand the importance of soil organisms and the consequences of the loss of animals to forested ecosystems.

**Matthew Bowker's** research group is studying communities of biological soil crusts (biocrusts). These

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**S**oils provide habitat for a staggering abundance and diversity of living things. Only a small fraction of soil organisms can be seen without the aid of a microscope, and even the most powerful microscopes fail to reveal the vast diversity hidden below ground. Researchers at NAU are at the forefront of exploring this diversity and understanding its importance for ecosystem functioning.

It is important to understand patterns in soil biodiversity at a global scale because soils are the foundation of terrestrial ecosystems, and the organisms living in soils are critical players in the cycling of elements between the land and air. Soil microorganisms are game-changers in the global carbon cycle and climate change. Inadequate understanding of soil organisms remains a major uncertainty in predictions of future conditions on Earth.

Soil biologists around the world are working together to help fill this knowledge gap. The first step is to complete a global inventory of soil organisms. NAU's **Nancy Johnson** is participating with the **Global Soil Biodiversity Initiative** (<http://www.globalsoilbiodiversity.org/>).

Last year, this international group of soil biologists met in Ispra, Italy, to draft the *Global Soil Biodiversity Atlas*, which will be published later this year by the European Union's Joint Research Council. The famous statement about microorganisms that "everything is everywhere, the environment selects" is not true for mycorrhizal fungi that form symbioses with plant roots. Johnson's research group is studying the diversity and functioning of mycorrhizal fungal communities in grassland and agricultural sites throughout the world. Their studies in the U.S., Venezuela, Mexico, Tanzania, China, Sweden, and the Czech Republic indicate that although some species of mycorrhizal fungi are cosmopolitan and appear all over the globe, many more species have unique

## Kayla Mueller

(continued from page 2)

that she was a globally competent NAU graduate who was determined to make a difference in the world. She wanted to be of service overseas, but more importantly, she felt increasingly compelled—the more she was exposed to the global environment—to do all that she could to help alleviate human suffering.

Kayla could have stayed in Arizona and pursued a career in her field of study that would have provided a steady income and a stable life. She could have stayed in close proximity to family, friends, and a familiar community. Instead, she left the U.S. to perform volunteer aid work in India and Palestine, and after a brief stint in France as an au pair with the goal of improving her French in order to perform aid work in Franco-phone Africa, transitioned to volunteering with aid agencies in Turkey and then in Aleppo, Syria (Sherlock, R., 2015). There is no question that Kayla had acquired strong skills and a depth of knowledge matched to the depth and breadth of her experiences. In fact, Sherlock (2015) says that

*“in the space of a few short months, her enthusiasm and talent had gotten her noticed by some of the most respected charities, including the Danish Refugee Council.”*

What made the difference were her attitudes and values—they led her to eschew money or a traditional career and pursue a path to alleviate suffering among the most vulnerable, destitute, and desperate. She felt quite deeply about this work, naming her blog *“Imbued with Hope.”* The tragedy of her death was not a result of rash decision-making on her part or a willful disregard

for her safety, but rather reflected a strong and informed focus aimed at leveraging her values and her profound commitment to her responsibility to serve those who, regardless of nationality, and through no fault of their own, are in greatest need.

*There is no question that Kayla had acquired strong skills and a depth of knowledge matched to the depth and breadth of her experiences*

Notwithstanding the tragic ending to her rather brief life, her deeds illustrated values of service and caring. Not every NAU graduate will want to pursue the path that Kayla did. Indeed, those who gravitate to aid work do so in the hundreds, not the millions, notwithstanding the overwhelming need. But many more Kaylas can be ushered into the world after an NAU education, making their own contributions in their own ways if, as faculty, we remain intentional about preparing our students not only with strong skills and a depth of knowledge in their respective disciplines, but also with the kinds of attitudes and values that would propel them to help heal our dysfunctional world.

Olson, C. L., Green, M. F., & Hill, B. A. (2006). *A handbook for advancing comprehensive internationalization: What institutions can do and what students should learn*. Washington, DC: American Council on Education.

Sherlock, R. (February 10, 2015). *Kayla Mueller: Profile of an American aid worker kidnapped by Isis*. *The Telegraph*. Retrieved at: <http://www.telegraph.co.uk/news/worldnews/middleeast/syria/11397219/Kayla-Mueller-profile-of-American-aid-worker-kidnapped-by-Isil.html>

## Rio Colorado

(continued from page 3)

and helped in environmental restoration efforts in Mexico. At Colonia Miguel Alemán, students observed a barren landscape of sand and irrigation pipe. Prior to their arrival, the area had been cleared of tamarisk and was being prepped for the planting of native mesquite trees. Our students were the first to plant trees on the site, eagerly setting hundreds of trees into the dry ground. When restoration staff turned on the pump, Colorado River water flowed, providing life-giving water to the new plantings and the environment.

NAU students learn about community restoration at a tree nursery in Colonia Miguel Aleman during the “pulse-flow” experiment.



Cameron Butler carefully planting a Mesquite tree at Colonia Miguel Aleman, Baja California.

Students then witnessed something unexpected. Under the San Luis Bridge over the Colorado River, citizens gathered in unprecedented numbers to embrace and enjoy the new river that had formed, literally, overnight. Children frolicked and laughed, while bands played music and a couple took their vows and hosted their wedding reception by the water's edge.



What was taking place was the restoration of the human spirit and the reconnection of humans to the environment. Although sustainability can be defined by acres restored and number of species conserved, it can also be characterized by how it creates connections between people and their environment as well as by how it strengthens a sense of community. Indeed, this may be the most profound outcome of the pulse flow in Mexico. And our NAU students were there to witness the restoration, not only of the environment but of the human spirit as well.

Ted Martinez is a lecturer in the University Honors Program.

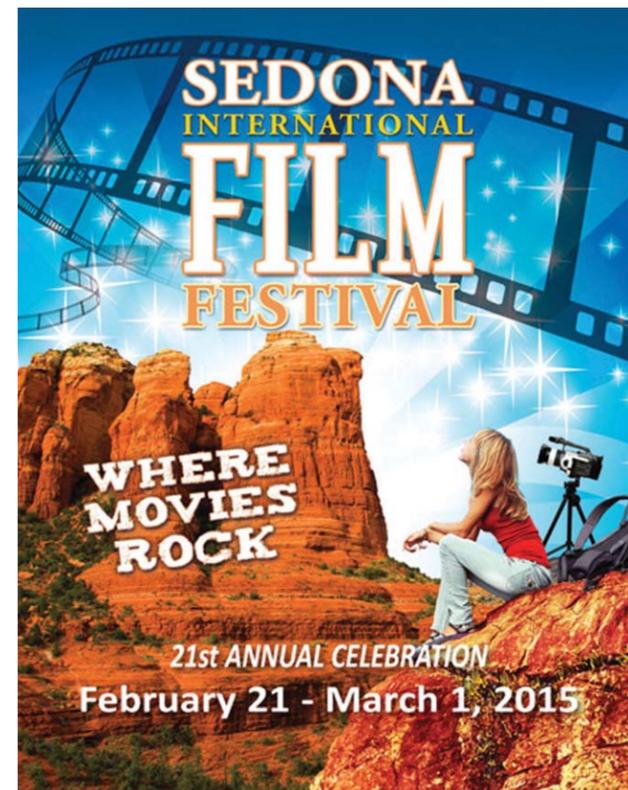
# Film as a Means of Global Exploration

By Prof. Andrea Houchard

NAU's Center for International Education and the *Sedona International Film Festival* partnered this year to offer faculty-led discussions about films focused on global issues. One of the things festival goers treasure are the conversations they get to have with the filmmakers. For many international films, however, travel prevents filmmakers from attending. This creates an ideal opportunity for a partnership that brings faculty expertise to bear in the community in an accessible way.



Björn Krondorfer at the event



This pilot partnership between NAU's Center for International Education and the Sedona International Film Festival resulted on 5 conversations about three different films and involved 5 NAU faculty.

The CIE-sponsored discussions helped people come to grips with international issues that they may be unfamiliar with or not understand. A film festival provides a unique opportunity to spark people's interest in international issues. Films, usually more so than other media, succeed at getting people's attention and piquing their curiosity. It is easier to stimulate people emotionally than it is intellectually. However, once a person's emotions are triggered, she may become more curious about intellectual questions she may not have considered otherwise. This definitely happened when NAU faculty led discussions after films at the 2015 Sedona International Film Festival.

Björn Krondorfer, Director of the Martin-Springer Institute, led a discussion on *Gett: The Trial of Viviane Amsalem*, which is about an Israeli woman's difficulty in obtaining a divorce. Without the husband's full consent, Orthodox rabbis will not sanction the dissolution. This was a deeply challenging and disturbing film, and Dr. Krondorfer led intense discussions afterward about Jewish and Israeli culture.

Geetesh Nirban, a visiting scholar and professor of philosophy from the University of New Delhi, was available to help audience members understand the challenges and rewards of rural life in India after the screening of *1,000 Rupee*. Note. Professor Nirban could speak directly to the differences between urban and rural life that were highlighted in this film, and that showed how money, rather than being a panacea, can bring as many problems as it solves.

Immigration is an international issue that affects all of us, especially in Arizona. Luis Fernandez, Director of Sustainable Communities; Raymond Michalowski, Regents' Professor of Criminology and Criminal Justice, and Robert Neustadt, Professor of Spanish, were on hand for different screenings of *The Hand That Feeds* and the accompanying short film, *The Walk*—a film that dramatized crossing the border into Arizona. Fernandez said, “the film festival was a good place for scholars to reach out to the general public and engage them in civic discourse.”

The Sedona International Film Festival is an intellectually stimulating 10-day program that provides a wonderful avenue for NAU to connect with the larger Arizona community. It also helps the Center for International Education fulfill its mission “to establish strong ties with the local community that will support the global agenda at Northern Arizona University.”

Andrea Houchard is an Instructor in the Department of Philosophy and Director of the Philosophy in the Public Interest Program

## Predictive Modeling

(continued from page 5)

tory pathways; 2) **Hans V. Westerhoff** and colleagues at Vrije University, Amsterdam, who are expert in bioinformatics and applying data mining to identifying components and perturbations in computational models; and 3) **Andrew Clayton** in the engineering school at Swinburne University of Technology, Melbourne, Australia. Clayton is an expert in biophysical measurements designed to elucidate the wiring diagrams of living cells.

Working together, we are confident that we can achieve our aim of producing a mechanistic model of cancer pathways that can be used to predict drug response and rank treatment strategies. If we are successful in reaching our goals, we expect that model-based studies of cancer pathways will become routine in the future.

**Richard Posner is professor in the Department of Biological Sciences.**

## Novel Antibiotics

(continued from page 4)

National Laboratory, and Rico Del Sesto at Dixie State University) and international (Kinya Hotta at the University of Nottingham, Malaysia Campus).

In 2014, **Icaro Simon**, a student from Brazil, joined our research team during a one-year institutional exchange from his home university (Federal University of Rio Grande do Sul, or UFRGS). Over the course of several months, Simon was able to identify numerous molecules capable of inhibiting a key siderophore synthesis enzyme. Further, through Simon, our group began a collaboration with Paulo Netz at the Institute of Chemistry at UFRGS. Netz is an expert in molecular modeling and has aided our inhibitor design by generating detailed computational models that predict potential interactions of molecules with the active site of the siderophore enzymes. Recently, results obtained through this multinational effort were accepted for presentation at the American Chemical

Society's national conference in spring 2015. Simon will travel from Porto Allegre, Brazil, to Denver, Colorado, to present the results of his exceptional work to the scientific community at this meeting.

Our work simply would not have developed in the same way had it not been for support from forward-thinking agencies such as the BScMP (which facilitates the undergraduate exchange program to NAU for the purpose of international scientific outreach) and the MHIRT program (which will be sending two NAU undergraduates to Malaysia in June 2015), and through assistance from the Global and Interdisciplinary Research and Teaching Fund sponsored by the Center for International Education.

**Andrew Koppisch is assistant professor in the Department of Chemistry and Biochemistry.**

the Suriname delegation answers questions from NAU students



left: Upper Suriname



## Ecotourism

(continued from page 8)

sources to build or maintain the typical technologies that well-meaning international organizations establish.

Even though communities require continued support that NAU students cannot reliably deliver, multidisciplinary NAU teams, through the efforts of local organizations, can provide training and introduce options that could lead to long-term sustainable development.

### Progress

The student groups have begun to develop an understanding of the power behind multidisciplinary approaches. In the combined hospitality and engineering teams, the hospitality students bring a much-needed business and tourism-sector perspective that the engineers lack. I recently asked my engineering students what they were missing from their understanding of the project; many stated that they did not fully grasp what ecotourism meant. The students in the combined class do understand that ecotourism is about sustainable community development. And the collaboration offers hospitality students an additional benefit: In the past, hospitality students could only design a virtual ecotourism facility, but now the engineering students bring the skills that could lead to a real venture. In fact, we expect that some of the current efforts will become student capstone projects. In the near future, we hope to include many more disciplines in this project to create a truly multidisciplinary international development program.

**Dianne McDonnell is Assistant Professor of Practice in the Department of Civil Engineering**

## NanoPHISH

(continued from page 9)

**Tung-Chun Lee**, and the other headed by **Peer Fischer** at the Max Planck Institute for Intelligent Systems in Stuttgart, Germany, are experts at the characterization of nanomaterials that will be made here at NAU. Clear and unambiguous understanding of the material makeup and morphology of these materials is essential in optimizing the solar energy conversion efficiency. These two laboratories, each with its respective expertise—chemistry being the focus of Lee's group and physics and materials science being the focus of Fischer's group—will undertake this aspect of the project.

The fourth laboratory involved, and essential to the project's success, is headed by **Wilson Smith**, a leading expert on solar water splitting and hydrogen generation. He heads an advanced laboratory on solar fuels at the Delft

University of Technology in Delft, Netherlands. This group's contribution is integral to the work, since they will undertake the characterization of the water-splitting capabilities of each new material fabricated at NAU, and the combination of skills in this team is critical to the project's completion.

The ultimate aim of this international collaboration is to make a positive step forward in the quest to find renewable sources of clean energy. The potential global consequences of the project's outcomes could be profound for all nations, providing the opportunity for an international team to tackle a problem of truly

**John Gibbs is assistant professor of physics.**



clockwise from upper left: John Gibbs, Tung-Chun Lee, Wilson Smith, and Peer Fischer.

## Ethical Implications

(continued from page 6)

domains of academics, such as the environment, the **Mahābhārata**, and ethics, while making contributions to frontiers of knowledge in a way that sheds light on "rightful human response" to violent environmental reactions. I will address issues on the environment presented in the **Mahābhārata**, with attention on deontological ethics in contrast to teleological ethics, thus putting forward an action-oriented philosophy as a moral human action and reaction to the environmental concerns of this century.

Through the retellings of certain narratives of the epic, my research will focus on the interconnectedness between human and nature as

portrayed in the Hindu tradition. The study will further explicate how understanding ethical concepts of **sreyas** (desirable) over **preyas** (pleasurable) leads to moral self-reformation. This state is initiated through self-will and by understanding the significance of "need-based" activity over "greed-based" desire, which ultimately portrays that **karma** (actions), when guided by

*(the Mahabarata offers) a philosophical worldview in which all subjects of creation stand interwoven, which leads to mutual dependency, sustainability, and sensitivity*

**dharma** (righteousness), can lead to environmental well-being.

Reading and understanding the epic in the Western academic milieu of NAU is helping me grasp the varied cultural and ethical nuances of the **Mahābhārata** and enabling me to see up close its universal appeal. I am extremely indebted to Professors Bruce Sullivan, Alexandra Carpino, and Andrea Houchard for their guidance and support.

**Geetesh Nirban is a visiting postdoctoral fellow in the Department of Comparative Cultural Studies (2014–15) and an assistant professor of philosophy at Kamala Nehru College, University of Delhi, India.**

## Model U.N.

(continued from page 1)

curricular experiences, and prepare our majors to be effective global citizens. In particular, MUN supports the Global Learning Initiative by providing students with co-curricular opportunities to analyze and evaluation of the interdependence of people on a global scale, to acquire skills and knowledge to understand the importance of environmental sustainability and its links to economic development, and to develop an understanding of how diversity both alters and is altered in a world characterized by increasing global interaction.

Before the conference, students do a great deal of research to fully understand who their state is, what it wants, who its allies and enemies are, and how it has behaved in the past. Then, at the conference, the students dive in to negotiation sessions, modeled after the workings of the United Nations. They attempt to build coalitions, influence other states, and write resolutions that can be passed by a majority of the states in their committee. They use public speeches, private conversations, influence peddling and all manner of diplomatic tools at their disposal to faithfully represent the interests of "their" state.

These conferences are tremendously fun for the students. However, they also provide these students with extremely important and meaningful skills and opportunities. The students gain a tremendous amount of knowledge as they research their state and understand its background and interests. By taking on the role of a state actor, the students are forced to

step outside of themselves, and see the world and its complexities through the eyes of a state with its own history, culture, needs, and desires. They also practice the skills of negotiation and diplomacy, and must hear the concerns of other states while continuing to push for the interests of their country. These experiences are incredibly beneficial for students who will someday become leaders in our globalizing world. Understanding different perspectives and broadening one's outlook is critical to engaging in a meaningful way in our diverse world. Learning how to negotiate and compromise, while still standing firm on one's principles, is a necessary skill for success in every area of life. Participation in MUN prepares students to be intelligent, informed, and attuned citizens of our world.

NAU's Model UN team has been tremendously successful in the past few years. The club has grown from a group of 4 students who attended 1 conference a year to a group of over 40 students who attended 5 domestic and 1 international conference in the 2014-2015 school year. The team has been ranked in the top 50 of the collegiate teams in North America and has won numerous awards, including the highest award of Outstanding Diplomacy (for the second year in a row) from the 2015 World Model United Nations conference, held in March 2015 in Seoul, South Korea. NAU MUN teams have also competed in conferences in Melbourne, Brussels, San Francisco, New York, Chicago, Seattle, Los

## Rearranging Sex

(continued from page 7)

list the examples of global dissemination endlessly, and generate a dense and tedious quantitative study to make my case. But that is not my intention in this project.

*Equally important in my work is the acknowledgment of the limits of sexological knowledge*

In line with current scholarship, my argument in this study opens the understanding of the global not simply as a celebration of connections but as a revisionist intervention. Instead of suggesting a seamless world, I use the global as a lens in my work to illuminate its acute underlying tensions and contradictions. For instance, even as the IJS brought together sexologists and readers from

Angeles, Santa Barbara, and more. They have represented states as diverse as Lebanon, South Korea, Tonga, the US, Russia, the Maldives, and dozens more. And, they have gained invaluable experiences and knowledge as a result.

The Model UN is only one co-curricular activity that can be effective in advancing global learning. Its success should encourage more faculty to pursue global learning, using other co-curricula opportunities, be they student organizations like [Engineers Without](#)

around the world, dynamics of race, class, gender, nation, and religion determined the recognition of epistemic authority among and within this global community. Equally important in my work is the acknowledgment of the limits of sexological knowledge. Even as sexual science tenaciously sought to domesticate and adjudicate normative sexual expressions, the multiplicity of bodily expressions that slid over, beneath, and past categories defied all attempts at quick and easy resolutions. Ultimately, through the study of the past, my project aims to illuminate the ahistoricity of recognizing the West as a singular architect of sexual modernity, and simultaneously enables us to imagine a future unfettered by artificially imposed sexual categories and labels.

**Sanjam Ahluwalia is associate professor of history.**

[Borders](#), field trips, films or service learning projects. A commitment to global learning in the co-curriculum provides faculty with one additional site to advance this work. This kind of exposure ensures that students become so immersed with global perspectives that by the time they graduate, they have the skills, knowledge and attitudes to successfully negotiate a globalized world.

**Gretchen Gee is Senior Lecturer and Model United Nations Club Advisor**

## Microbial Black Box

(continued from page 12)

manipulate the hundreds of species to improve protection of natural ecosystems, develop environmentally clean industrial processes, and increase human well-being? However, these are too many questions for one research group to answer.

*"Two know more than one" and "a fool can ask more questions than one wise man can answer."* This is why scientists (fools and wise men) need to talk to each other face-to-face, especially when communicating across disciplinary borders. To fully exploit and expand this new qSIP technology, we need to work together with specialists in microbial ecology, soil C cycling modeling, DNA and RNA analysis, computer sciences, and isotope and mass spectrometry technologies. Some of the technologies that may be desirable may not yet exist or are not yet available for research. So, we need help from colleague scientists. With the funding received from NAU, Bruce Hungate and I will travel to Germany and Sweden and talk with scientists in Göttingen, Jena, Marburg and Lund about organizing a series of meetings on the topic of "soil phenomics". Soil phenomics is a catch-all phrase for phenotyping all microbial species in undisturbed communities using high throughput technologies. With the contacts developed during this trip, we will seek additional funding from the National Science Foundation and Department of Energy to bring together experts from universities, national laboratories, and industry to discuss new ways to study microbial communities and map the future of microbial ecology.

CO<sub>2</sub> released from position-specific <sup>13</sup>C-labeled glucose is captured in syringes, analyzed on an isotope spectrometer, and used to reconstruct the processes of glycolysis and TCA cycle in soil microbial communities



photo: Monica Saaty, NAU IDEA Lab

## World Under our Feet

(continued from page 13)

collections of cyanobacteria, mosses, lichens, and a host of other soil microbes form a "living skin" on dryland soil surfaces, protecting them from erosion while harvesting water, conducting photosynthesis, and enhancing their fertility. The diversity in colors and shapes in these fascinating communities—which indicate biodiversity—likens them to "coral reefs of the desert." Along with colleagues in Spain and Australia, Bowker uses these communities as model systems to help learn about general ecological principles. The identity and diversity of the species comprising these biocrusts differ from place to place. One of Bowker's recent research themes has been studying the functional consequences of having biocrusts with different assortments of species. His research team has repeatedly found that the more species are present in a biocrust the more they can conduct important ecological functions such as nutrient cycling. Furthermore, having more species also means that

biocrusts can sustain more distinct ecological functions at the same time. Bowker believes that these findings reveal general properties of ecosystems made visible by a fascinating miniature community.

We have long known that soil microorganisms drive the global cycles of carbon, nitrogen, and oxygen as well as the cycles of many other elements. With the molecular revolution, we now also know that microorganisms in soils make up the most biodiverse and complex ecological communities on Earth. Yet we do not know what 99.9 percent of these soil microorganisms do, and we have not had the tools to find out. For more than 15 years, it had been a dream of **Bruce Hungate** to overcome this problem by combining two powerful new tools: microbial genetics and stable isotope analysis, which enables combining the genetic knowledge of "who's there" with insights from isotope tracers about "what are they doing." **Egbert Schwartz** shared this dream but took it a step further by figuring out how to combine these tools. Now, Hungate and Schwartz and their team of researchers at NAU's **Center**

**for Ecosystem Science and Society** ([www.nau.edu/ecoss](http://www.nau.edu/ecoss)) are combining genetics and isotopes to probe the microbial ecology of soil, including interactions between plant material and rocks, soil biodiversity as a driver of the carbon cycle, and effects of soil microorganisms on climate change. And **Greg Caporaso's** team brings the latest in computer science and bioinformatics to help synthesize the masses of data and figure out what they mean. This work relies on two grants from the National Science Foundation and another from the U.S. Department of Energy, as well as collaborations with scientists at the Lawrence Livermore National Laboratory in California and at the Translational Genetics Research Institute (TGen) in Flagstaff.

**Nancy Johnson is professor in the School of Earth Sciences and Environmental Sustainability, Kitty Gehring is professor of biological sciences, Matthew Bowker is assistant professor in the School of Forestry, and Bruce Hungate is professor of biological sciences.**

# International Visiting Scholars at NAU Spring 2015



## Visiting Scholar

## Department

## Host Faculty

## Home Institution

CESPEDES GONZALEZ, Blanca	Forestry	Peter Fule	University of Castilla-La Mancha (Spain)
CUI, Feng	Geography, Planning and Recreation	Alan Lew	Nanjing Agricultural University (China)
DE ALBUQUERQUE, Fabio	Forestry	Paul Beier	N/A (Brazil)
DENG, Hong	Biological Sciences	Alison E.M. Adams	Shaanxi Normal University (China)
FENG, Huyuan	Earth Sciences	Nancy Collins Johnson	Lanzhou University (China)
GAO, Hongyan	Geography, Planning and Recreation	Alan Lew	Guizhou University of Finance and Economics (China)
HAN, Guosheng	Geography, Planning and Recreation	Alan Lew	Shandong University of Weihai (China)
HE, Jingming	Geography, Planning and Recreation	Alan Lew	Zhejiang University of Technology (China)
HERRERO MENDEZ, Asier	Forestry	Thomas Kolb	University of Pais Vasco (Spain)
HUANG, Enwu	School of Communication	Christopher S. Johnson	Fujian University of Technology (China)
JOO, Ji Hyuk	School of Communication	Peter Friederici	Far East University (South Korea)
KANG, Xilai	Health Sciences	Roger Bounds	Shaanxi Normal University (China)
LEI, Zhen	College of Education	Norbert Francis	Shaanxi Normal University (China)
LI, Hui	W.A. Franke College of Business	Chris Scherpereel	Harbin Institute of Technology at Wei Hai (China)
LI, Zhifei	Geography, Planning and Recreation	Alan Lew	Hubei University (China)
LLAMA, Joseph	Physics & Astronomy	David Trilling	University of St Andrews (United Kingdom)
LU, Zheng	English	Karen Renner	Shanghai Dianji University (China)
MOMMERT, Michael	Physics & Astronomy	David Trilling	N/A (Germany)
NIRBAN, Geetesh	Comparative Cultural Studies	Bruce M. Sullivan	University of Delhi (India)
PENTEADO, Paulo	Physics & Astronomy	David Trilling	N/A (Brazil)
SONG, Xiaozhou	English	Luke Plonsky	Fujian University of Technology (China)
TIAN, Fengjun	Geography, Planning and Recreation	Alan Lew	Jiangxi University of Finance and Economics (China)
THIROUIN, Audrey	Physics & Astronomy	David Trilling	Andalusian Institute of Astrophysics (Spain)
WANG, Li	Geography, Planning and Recreation	Alan Lew	Anhui Normal University (China)
XU, Mingxiang	Forestry	Matthew A. Bowker	Northwest A&F University (China)
YANG, Minmin	English	Okim Kang	Huaqiao University (China)
ZHANG, Jiafan	Civil & Environmental Engineering	John Tingerthal	Xi'an University of Science and Technology (China)
ZHANG, Man	English	Douglas Bieber	Central China Normal University (China)
ZHAO, Yunge	Forestry	Matthew A. Bowker	Institute of Soil and Water Conservation (China)



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