



The Gates Scholar

University of Cambridge



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Gates Scholars' Council 2009-2010

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The Gates Scholars' Society includes all current and past holders of a Gates Cambridge Scholarship. Its membership is represented by two bodies: the Gates Scholars' Council and the Gates Scholars' Alumni Association.

The Gates Scholars' Council is the governing body of scholars elected by their peers. A conduit between the community of scholars, the alumni and the Gates Cambridge Trust, the Council represents the interests and needs of Gates Scholars in Cambridge.

The Gates Scholars' Alumni Association (GSAA) was created in 2005 to represent the needs of over 600 Gates Scholars who have left Cambridge. Through regional events and social gatherings, it strives to maintain communication between former scholars and the Trust while creating a worldwide network of former Gates Scholars.

Welcome!



Gazing at the mist rolling out over Lake Windermere on an autumn evening conjures warm memories. The first time I saw it, back in 2007, it was my first day as a Gates scholar and the first day of my life in the UK. At the time it was difficult for me to gauge how momentous the occasion was—my acquaintances would forever be good friends, each Orientation activity opened up new interaction and friendships, and all of my conversations with fellow Gates scholars were thought provoking and uniquely inspiring.

Two orientations later, and after many more stimulating discussions with other scholars, I am even more impressed by the diversity and liveliness of our society, and how new, creative ideas are put forward daily. We have grown exponentially since the council's inception seven years ago, and the beginning of the orientation program six years ago. With a myriad of Gates lectures, pub nights, UK excursions, online seminars, and cultural celebrations to choose from, more scholars are involved in our community's activities in more ways. This brings with it a new level of interaction and idea sharing, which is something that sets the Gates scholarship apart from any other funding body at Cambridge. Gates is more than a scholarship or a recognition of past achievement—it is an organic and vibrant graduate community where ideas are shared across dramatically diverse disciplines and backgrounds.

Fostering these interactions is at the heart of the work of the Gates Scholars' Council. Recognizing its importance, the council has introduced the Academic Officer position this year to facilitate academic communication amongst scholars by organizing research groups. Breeding professional collaboration is monumental when you consider the possible impact it might have on our respective fields. We all have unique, individual ideas, and putting our heads together on some of the world's greatest problems—in health care, world development, physics, philosophy, education and the arts—can equate to giant strides forward for science and society.

The evolution of *The Gates Scholar* itself, from a short newsletter in 2003, to a now polished cover-to-cover panorama of Gates life, has dramatically helped inter-scholar communication and networking, not least for linking our growing alumni network to the group of scholars in Cambridge. This issue brings forward a diverse range of material, from articles on computer science, Darwin, climate change, Victorian romance, medical philanthropy, creative writing, Orientation 2009, to the first fictional work to be included in the magazine, the short story "True Seeing". Future issues will also include collaborative articles, something that will likely come about initially from the great discussions brought forward through our Gates academic reading groups, and will grow into the alumni community hereafter.

The collaborative goals of the magazine and the community echo the conversations Bill and Melinda Gates shared with scholars on their visit to Cambridge in June 2009. The initial foundation of our scholarship is linked closely with the aims of the Gates Foundation, despite the fact that many of us study fields other than world health, world development or education. The Foundation investment in us as scholars rests largely in our creativity and ingenuity, and the hope that as we engage with each other, we might one day try to solve problems together. Thankfully, our community exemplifies diversity and creativity, and our everyday interactions epitomize these goals.

It has been an absolute honor for me to be a part of this society over the past two years, and as I prepare to leave Cambridge after my third year, I know that the Gates community and identity will not leave me. Over the next few years, I suspect that many new scholars will experience the uniqueness of our society throughout its longevity. Just as I did, they will look back fondly at Orientation on Lake Windermere as where it all started.

CAITLIN CASEY

Class of '07, PhD candidate in Astronomy
Chair, Gates Scholars' Council (2008-2009)

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The Gates Scholar is the publication of the Gates Cambridge Scholars’ Society. Articles and photographs may be submitted on any topic relevant to the Gates community. In keeping with the Society’s goal of representing current Scholars and Alumni from around the world, individual issues of the Magazine usually include articles on a variety of subjects from a number of authors.

Articles that offer a window into the lives and work of current or past Gates Scholars or articles that tackle large interpretive questions relevant to the Gates mission are particularly encouraged. Highly focused contributions are welcome, but preference will be given to submissions that are of interest to a diverse cross-section of readership in more than one discipline of study. Finally, because there is limited space in any one edition of the Magazine, contributors should understand that any article submitted for publication may be subject to editorial approval and/or truncation.

Generation Save Civilization

Youth Call for Climate Justice

At a conference in central London, UK youth get inspiring instruction in joining the global movement to save the future.

The Challenge

Kofi Hope, one of the key speakers at the Power Shift Conference held by the UK Youth Climate Coalition in London on October 9-12, narrated the following anecdote. In 1903, the great American intellectual W.E.B. du Bois wrote: “the problem of the Twentieth Century is the problem of the color line.” Few would have guessed at the time that colonialism would come to an abrupt end, that the Civil Rights movement would defeat the Jim Crow laws, that Nelson Mandela would lead his country to democracy, or that in 2008 Barack Obama would be elected the President of the United States.

Hope’s story is a powerful analogy for the challenge that faces this century and the generation that will have to confront it. Today the trajectory of our civilization to irreversible climate change, if not the denial of climate change, is taken for granted the same way the horrors of racial oppression were in du Bois’ time.

Our generation is faced with substantial scientific evidence that the earth’s atmosphere is approaching a ‘tipping point’ where the increase in temperature will lead to a series of consequences that will aggravate climate change to the extent of rendering our planet inhospitable to the kind of civilizations we have come to treasure. Indeed, if human activity increases the amount of carbon dioxide in the atmosphere to over 350 parts per million, as it is set to do, the world that our children will inherit *in our life time* will be one in which every social

problem is exacerbated to the extent of negating the struggles of the last few centuries for increased freedoms and social justice.

The Choice

The young people at Power Shift 2009 will not take the tragic outcome of climate change lying down. Over three days of workshops and speakers, the UK Youth Climate Coalition (UKYCC) presented a clear message: this future is not inevitable. What is needed is global pressure on politicians to deliver an agreement at the United Nation’s Framework Convention on Climate Change to be held in Copenhagen this December. This convention will commit countries to cut emissions to such a degree that CO₂ stays below the crucial level of 350 ppm. This will entail radical changes to our lifestyles and economies, and unprecedented international state-level cooperation. For this to be realised people around the world need to exert serious pressure on their government officials—we have only six years to make sufficient changes.

The Movement

In the UK, direct action and advocacy have recently led to significant victories: British Airports Authority (BAA) has cancelled plans for a third runway at Heathrow and the German-based energy company E.ON has cancelled the construction of a new coal-fired power plant. The organisers of Power Shift inspired the UK youth with stories of battles for ‘climate justice’ and trained them to convey their own stories with which to inspire and lead their generation to take charge of one of the greatest challenges humankind has faced. Power Shift participants were told, “*You are the first generation who has had the scientific knowledge to understand this situation, and you are the last that will be able to do anything about it.*”

Apart from leadership training, the conference delegates were assigned practical tasks, such as organising and contributing to campaigns with names



such as ‘How old will you be in 2050?’ or 350.org. There were also efforts to support national youth delegations headed to the upcoming conference in Copenhagen.

The final events of the conference were both symbolic and active. There was a synchronised flash mob dance outside the London Eye. This was followed by an unplanned performance outside Parliament in solidarity with the Greenpeace campaigners who had scaled the roof with a neon banner proclaiming, ‘CHANGE THE POLITICS, SAVE THE CLIMATE.’

Power Shift events have been held in the United States and Australia, and upcoming gatherings are scheduled to be held in Canada and India.

[For a great animation video explaining the climate tipping point, see http://www.youtube.com/watch?v=5T_3WJPPY9g (Leo Murray’s ‘Wake up, freak out – then get a grip’) and for an awesome video of Sydney’s Power Shift flash mob check out <http://www.youtube.com/watch?v=9S2T5vPHjS8>.]

SIMONE HAYSOM
Class of '09, MPhil candidate in
Environment, Society and Development



Teach for Argentina

Raising Achievement, Forming Leaders

Argentina's school system lags by nearly every standard. A promising avenue to raise achievement lies in improving teaching quality. A new initiative adapts the Teach for America model to lure top talent to education.

Education in Argentina is low-quality and highly unequal, and it has worsened in recent years. Argentina consistently ranks in the bottom third in global student achievement tests, even below its Latin American neighbors and countries of comparable development. Over half of high school Argentine students cannot perform basic tasks in math, reading and science, and even the best in the country lag far behind average performers in developed nations. Rich-poor achievement gaps are among the largest in the world, and poor students are far from reaching minimum competency levels. Finally, Argentina's relative performance to the rest of the world has declined in the past decade.

An Idea

We know that teaching quality makes all the difference in student learning. Studies have shown that if two students with the same ability are assigned to teachers with different levels of instructional quality at about age 8, by age 11, one of them will score at the top while the other one will score near the bottom.

No other intervention in education, such as increasing spending or changing the way schools are managed, has as dramatic of an effect on student learning as quality teaching. Yet a combination of low entry standards, a lack of evaluation and ineffective support has turned teaching into an unappealing profession in Argentina. Few efforts have succeeded in attracting the nation's top graduates into teaching, especially in areas where they are most needed. Thus, poor students—who need top teachers the most—rarely get them.

A Model

In early 2009, a group of three outstanding Argentine youth and I began thinking about what it would take to raise teaching quality in our country. We all came from different backgrounds, spanning the government,

private, non-profit and aid sectors. Yet we all saw the challenge as twofold. In the short-run, we needed great teachers who would be committed to ensuring all children excel. In the long-run, we needed a new generation of leaders in all sectors who would understand the problems in K-12 education in our country and who would share a sense of urgency to



Alejandro J. Ganimian (L) and Ramón Lanús (R), founding members of Enseñá por Argentina, at the Washington, DC office of Teach for America with CEO Wendy Kopp

tackle them. Instantly, our attention turned to Teach for America, the high-profile effort to recruit top college graduates to teach for two years in low-income communities in the United States. We looked at the research, visited corps members in action and started sounding the idea back home: Could we convince college graduates to “teach for” Argentina? The reaction: not a chance. We were told we would never persuade top graduates. Even if we did, teachers’ unions would never let us do this. Politicians and businesspeople would never back it.

Yet what few people know is that this is already being done not only in the United States but also around the world. Last year, Teach for America established the Teach for All Network, an organization to support entrepreneurs across the globe who want to conduct local adaptations of the “TFA model.” Currently,

eight countries are doing so: Australia, Chile, Estonia, Germany, India, Latvia, Lebanon and the United Kingdom. Seven more are exploring feasibility: China, Dubai, Egypt, Kenya, Nigeria, Peru and Romania. Entrepreneurs fund and own their initiatives 100%; Teach for All provides technical assistance to help accelerate their impact. This has given rise to a global network of entrepreneurs committed to expanding educational opportunity.

Implementation

Since we reached out to Teach for All, we have not stopped working to realize our vision of Teach for Argentina (or *Enseñá por Argentina*, as we have called it). We have developed a solid proposal, begun to secure funding, hired a team of bright, motivated and results-driven young people and formed a network of advisors that includes some of the foremost experts on education policy in Argentina. We are currently surveying the interest of college students and schools in the initiative and exploring partnerships with schools of education to certify our corps members, place them in

high-need areas and evaluate their impact. We plan to place our first cohort of corps members in 2011. Every day, we grow more convinced that *Enseñá por Argentina* is not only possible, but that it will infuse a force of human capital into the system where it is most needed and make a significant impact in creating opportunities for all students.

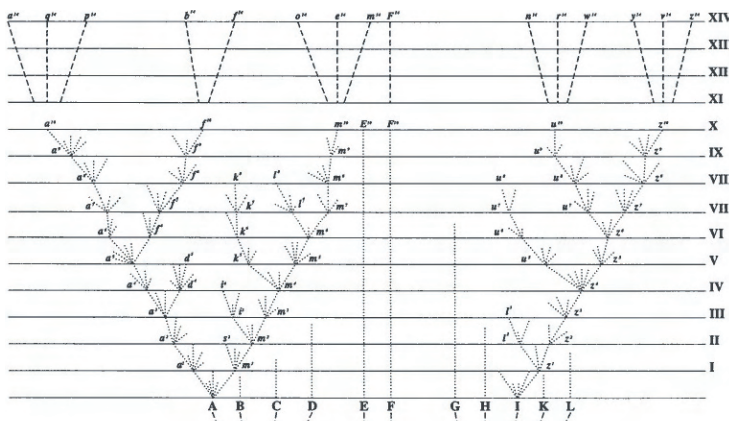
Will youth teach for Argentina? We don't know. But we sure are trying. If you want to learn more about our work or support our cause, visit www.ensenaporargentina.org or contact me at alejandrog@ensenaporargentina.org. Help us realize our vision that one day, all children in Argentina will have to access to a high-quality education.

ALEJANDRO J. GANIMIAN
Class of '06, MPhil in Education

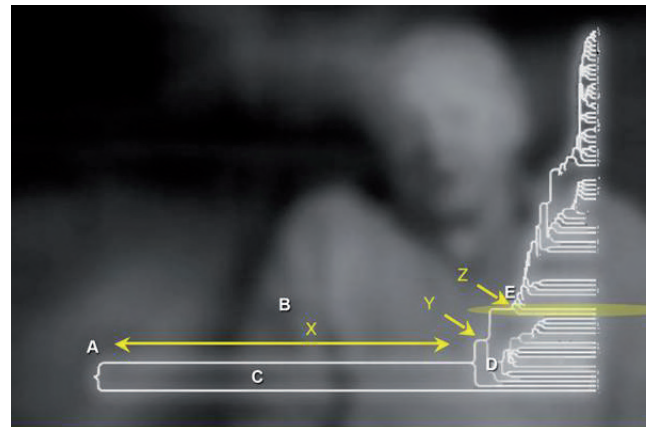
Finding Darwin's Voice

Seeds of Education in the Tree of Life

One hundred and fifty years after The Origin of Species, precious few believe in evolution and even fewer understand it. Can good science and good education help find Darwin's voice in the crowded world of ideas?



The only figure in The Origin of Species, a conceptual diagram of the tree of life



Using the Wellcome Trust Tree of Life to measure evolutionary relationships

A Powerful Voice

Soft-spoken as he was, Charles Darwin had the most powerful voice in science. He was one of the renowned geologists and zoologists of his time, and Science listened when he spoke. On November 24, 1859, he preached from this bully pulpit his trademark theory of evolution by natural selection. His ‘sermon,’ the 500-page *On the Origin of Species*, was at once thorough and clear, and the theory has not only survived but flourished in the ensuing 150 years. Scientists today are finding evidence for evolution hardly dreamt of in Darwin’s time: unearthed fossils of human ancestors, blind, cave-dwelling moles, and millions upon millions of DNA sequences showing unmistakable signatures of common descent.

Regrettably, Darwin’s theory has not fallen upon such kind ears in the public arena. His most lasting message remains muffled by religious antagonism and—far worse, in my opinion—muddled up in a pervasive misunderstanding about what evolution really means. Less than 50% of Americans (and around the same proportion of Brits) say they believe in evolution. I would predict that far fewer, even among the professed believers, actually understand it.

Teaching the Tree

I focused my efforts on the “tree of life,” a fundamental concept in evolution and, notably,

the subject of the only illustration in Darwin’s book. Similar to the way we understand our recent ancestry by tracing back a family tree, evolution predicts that all life is related by an immense tree of life, clarifying the relationships between all living and extinct organisms. Understanding the tree of life is vital to understanding evolution. Furthermore, the past decade has seen explosive progress in the field, leaving decades-old school lessons light years behind the state of the art. Evolution is of course about much more than the tree of life, but this seemed like a good place to start.

First, I created two tree of life activities for the Cambridge Science Festival. A craft project allows kids to choose three of their favorite furry animals and create a hanging mobile showing their evolutionary relationships. An outdoor activity has children play the roles of different species on the tree of life. Holding on to a series of connected ropes representing the tree structure, they are shown how to arrange themselves to answer questions about evolutionary relationships between, say, bananas and chimpanzees.

More recently, I have been exploring the possibilities of computer-based activities and materials to help “teach the tree.” Earlier this year I worked with a Bristol-based team of animators on a Wellcome Trust funded project to create a scientifically accurate, three-dimensional model of the tree of life which became

the centerpiece of an online activity and a 5-minute video narrated by Sir David Attenborough. Despite the many compromises necessary in such a large collaboration, the project was a great example of using cutting-edge science to tell a beautiful and accessible story about the beginnings of life.

Survival of the Stubborn

Looking back after nearly two years of effort, I realize that education, like science, can be a rewarding yet painfully difficult undertaking. But in both cases the social need for progress is clear, and technologies such as the Internet are only increasing the potential impact of good science and education alike.

In the end, what inspires me to continue in my efforts is not the 150 years that Darwin’s theory has endured, but rather the surprisingly long 23 year period between his return from the Beagle and the publication of his book. It took this dedicated man over two decades to find his voice in science; surely I can persevere a little longer in helping him find his voice in the world.

Link to Wellcome Trust Tree of Life project: <http://www.wellcometreeoflife.org>

GREG JORDAN

Class of '07, PhD candidate in Molecular Biology

What's in a Name?

Maria Gonzalez, Juan Khan, and IT Security

Many security systems still rely on personal questions as a backup means of human authentication. A study of human naming patterns finds this is highly insecure and reveals fascinating trends in how people choose names.

I spent August, in Cambridge, poring over census data and lesser-known papers in information theory. My background is in computer science and math, but I have gotten used to searching out obscure bits of knowledge to see how real-world systems fail. While many Gates scholars are hyper-specialised, I've been cramming in economics, math, electronics, and sociology—and my supervisor has just handed me a thick psychology textbook. That's life as a PhD student in security engineering.

When Passwords Fail

Our field still struggles to authenticate humans. How does Amazon.com really know it's me authorising that £100 charge? Passwords remain the standard, but suffer many problems. Many of us write them down on post-it notes, enter them into the wrong places, and re-use them between high-security accounts and throw-away ones. The biggest challenge is that we forget them with alarming regularity. This is why most systems deploy automated backup authentication, usually by asking a personal question such as the archetypal "What's your mother's maiden name?" Researchers have already proved this easy to find using public records, and the growth of social networks has made it even easier.

As a result, many sites have turned to questions that yield answers that are easy to remember, but more difficult to find (e.g. "What was your kindergarten teacher's first name?"). Almost all of these questions solicit the proper name of a person, place, or animal. Empirically, this appears to be the only type of knowledge that is both memorable and easy to query; yet, we have no good measure of its security. How hard is it to guess a name?

Modeling the Problem

Answering this basic question required developing a formal security model for personal knowledge questions. Security people are good at this. We define whom we're defending against, what their capabilities are, and what we can do to stop them. In our case,

we're worried about a miscreant guessing likely names at the password reset interface of many users' accounts until he breaks one. In July, this was exactly the method used by a French hacker who gained access to a corporate email account at Twitter, leaking all of the company's internal documents to the web.

Such an attacker does not care who your mother is, only that her maiden name has a few very likely values. The attacker will probably guess "Smith," "Jones," and "Johnson," and then move on. If we know the distribution of names in the population, using results from "guessing theory" developed in the 1990s by information theorists, we can predict how secure these questions will be. After six dense pages of equations, I produced the formal security model necessary to reason about this attacker. Then it was time for the fun part: plugging in some real-world data values.

What is your oldest sibling's middle name?

Continue

Cancel

Names around the World

My colleagues and I sought out census data of all sorts: from lists of Norwegian surnames to the names of all dogs registered in Los Angeles. We searched through Facebook to get a corpus of 66 million first name/last name pairs. Data like that is hard to come by for privacy reasons, but was a goldmine for analysis.

Our data confirmed some common-sense patterns with hard numbers. Surnames are generally about twice as hard to guess as forenames. Naming patterns vary greatly around the world. The United States, with its diverse mix of cultures, has the greatest variety of names. South Korea, insular and homogeneous, has the lowest (nearly half of the population are named "Kim," "Lee," or "Park"). American surnames are 10 to 1,000 times more difficult to guess in different attack scenarios.

We also found some curious results. In most societies we studied, female names are twice as hard to guess as male names. Perhaps parents devote more time searching for a beautiful name for a baby girl than for a baby boy—although dog names are still a bit harder to guess! Looking at baby registration data from the US Social Security administration over the last 60 years, we found that human forenames are steadily becoming more diverse. Previously uncommon names like "Madison" and "Aiden" are becoming more popular than "Joseph" and "Mary."

Maria and Juan

The most interesting data analysis was correlating first and last names. For security analysis, it's important to realize that they are not picked independently from each other. "Maria Gonzalez" is the most common name on Facebook, despite "Maria" and "Gonzalez" not being close to the most popular names independently. Those would be "David" and "Smith," although there are 50% more people named "Maria Gonzalez" than there are named "David Smith." Why is that? Well, it's partly a matter of culture. For similar reasons, "Juan Khan" is a highly uncommon name, and is conspicuously absent from the data set. Despite the two names both being popular, they are a cultural mismatch.

When designing security systems, we must fully expect an attacker to exploit these statistical anomalies. However, one may not need to. Across the board, human-generated proper names provide terrible security, far lower than commonly thought. There are just too many women named "Maria Gonzalez" and too many dogs named "Lucky." As a result of this research, the demise of personal knowledge questions may be accelerated. The security community is already hard at work on practical replacements.

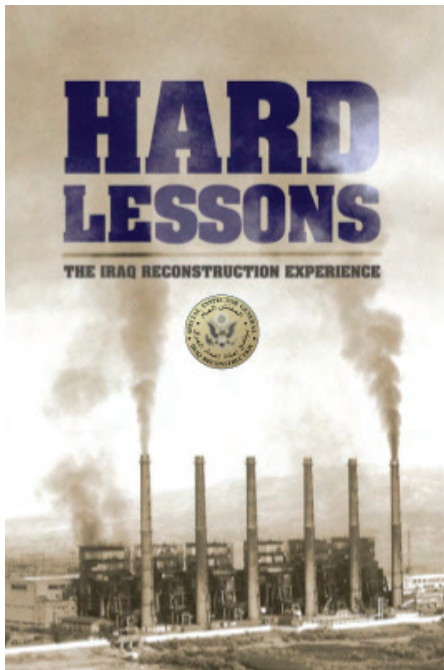
JOSEPH BONNEAU

Class of '08, PhD candidate in Computer Science

Hot off the Press

New Writings from Gates Alumni

Gates alumni provide fresh insights on the Iraq reconstruction experience, the psychology of creative writing, and the path from clandestine romance to courtroom celebrity...



Special Inspector General for Iraq Reconstruction. *Hard Lessons: The Iraq Reconstruction Experience*. Arlington, VA: Special Inspector General for Iraq Reconstruction, 2009.

The White House Situation Room is not a place I imagined setting foot in while a Gates Scholar. Yet one week after President Obama's inauguration, I sat opposite the White House Deputy Chief of Staff and members of the National Security Council to relay the findings of *Hard Lessons: The Iraq Reconstruction Experience*. This 367-page official history chronicles the U.S. occupation of Iraq from prewar planning through the surge. I served as its lead writer.

Hard Lessons was commissioned by the Special Inspector General for Iraq Reconstruction, a joint office of auditors and inspectors reporting to the U.S. Departments of State and Defense. During the three-year leave I took from Cambridge to help write it, our research team visited outposts in Western Iraq, safe houses in Baghdad, and the archives of three government departments in Washington. We conducted over 600 interviews with officials at every level,

from Colin Powell and Donald Rumsfeld to Iraqi district council members, soldiers, and foreign contractors at work across Iraq.

At my side nearly the whole time was Hunter Keith '01, an Arabic-speaking Gates Scholar who served as our team's lead researcher. Scholars B Thomas '02 and Roman Martinez '01 have also worked in Iraq in separate capacities.

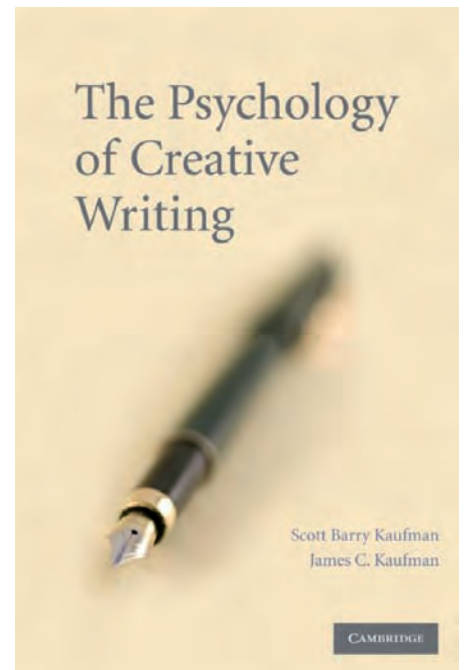
Hard Lessons begins by tracing the war-planning process from its inception in the fall of 2001 to the President's decision to invade Iraq in January 2003. It ends by relating the struggle of an Iraqi family even as the surge reduced violence across Iraq in 2008.

In the history, we deliberately move beyond an accounting of money disbursed and infrastructure constructed to an evaluation of the many strategies the U.S. employed in its attempt to quell violence and rebuild the Iraqi state. While the history uses the government's own paper trail to document mistakes and misjudgments that pervaded the U.S.-led effort, it also charts the learning that occurred as Americans and Iraqis worked increasingly together in the occupation's later years. On account of examining both successes and failures, *Hard Lessons* is as much an analysis of the limits of U.S. power as its reach.

The opportunity to chronicle what became the largest foreign aid mission in U.S. history, and to have one's analysis considered at the very highest level, was an extraordinary privilege. As with my service on the Space Shuttle Columbia investigation in 2003, it affirmed my conviction that scholarship in service of public policy is among the highest of callings, and that there is a great need for it inside government.

As a member of the inaugural class of Gates scholars in 2001, I am graduating a few years later than my classmates. I would like to think, however, that my own experience demonstrates one need not finish the Gates Cambridge Scholarship before fulfilling its aims.

CHRISTOPHER KIRCHHOFF
Class of '01, PhD in Social and Political Sciences



Kaufman, Scott Barry, and James C. Kaufman, eds. *The Psychology of Creative Writing*. Cambridge: Cambridge University Press, 2009.

Psychology and the arts have a very unequal relationship. Psychology takes its materials and subject matter from the arts, but does not provide in return many particularly welcome or suitable insights. As a researcher fascinated by the depths of imagination and creativity of which humans are capable, I wanted to even up the scale a bit. To separate fact from fiction, I called upon top creativity scholars to write about their research and to muse on key issues surrounding the psychology of creative writing. The result is my first book (co-edited with James C. Kaufman), *The Psychology of Creative Writing*.

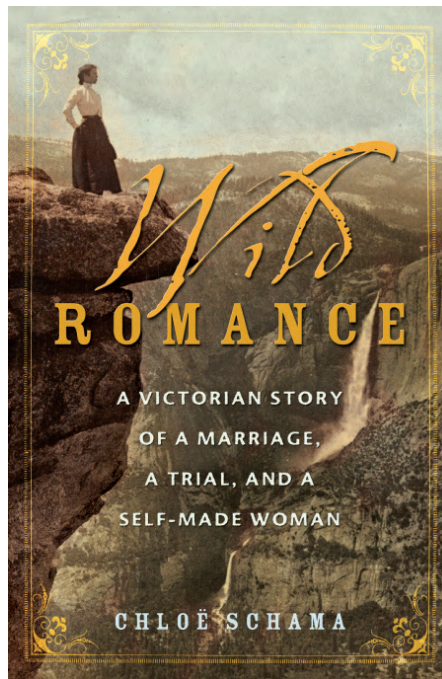
On one level, we wanted to understand the psychology of the creative writer. Freud once remarked how "we laymen have always been curious to know . . . from what source that strange being, the creative writer, draws his material, and how he manages to make such an impression on us with it." Looking at the

creative writer offered some fresh insights on the link between creative writing and mental illness. For instance, in one sample, 50% to 80% of the creative writers suffered from a mood disorder. This is quite striking, considering only roughly 1.5% of the general population have bipolar disorder, and roughly 10% have a unipolar mood disorder such as depression. In another study, creative writers with bipolar disorder tended to write during the long periods *between* episodes, rather than during the highs and lows, suggesting that it may not be the psychopathology *per se* that is contributing to the creative writing. In fact, research shows that certain aspects of psychopathology, such as the ability for divergent thought and loosened associations, may be beneficial to creativity. Therefore, *milder* forms of psychopathology may be conducive to creative writing. A look at the writer also offered insight into the traumatic backgrounds of many creative writers, and the personality traits of creative writers, including comedy writers and screenwriters.

At another level, we wanted to understand the psychology behind the actual text. How can the printed word evoke such strong emotions in readers? At a third level, we wanted to learn more about the process. What is the creative writing process? Are there certain processes that lead to more success in creative writing? At a fourth level, we wanted to look at the development of the creative writer. How can creative writing be used to help people cope with stress, traumatic events, or mental illness? Finally, we looked at the teaching of creative writing in schools and workshops. What are successful creative programs like?

It is my sincere hope that *The Psychology of Creative Writing* will appeal to a large audience—psychologists interested in creativity, writers who want to understand more about the magic behind their talents, and educated laypeople who enjoy reading, writing, or both. From scholars to bloggers to artists, the book has something for everyone.

SCOTT BARRY KAUFMAN
Class of '05, MPhil in Experimental Psychology



Schama, Chloë. *Wild Romance: A Victorian Story of a Marriage, a Trial, and a Self-Made Woman*. London: Bloomsbury Publishing, 2010.

In the summer of 2004 I was awarded a grant to travel and conduct research for my undergraduate senior thesis. I was spending long days in the British Library; most of my interactions took place in hushed reading rooms where voices seldom rose above a whisper and emotions surfaced only if you stole someone's desk. I had come to London to research sensation novels, a late Victorian literary genre, but ended up focusing on a trial. An English woman from the manufacturing classes had sued her aristocratic husband for bigamy after he abandoned her and married another woman. The atmosphere in the reading room might have been sedate, but the trial transcripts and the lovers' secret correspondence were alive with passion and betrayal. The trial, which evolved into four different trials over the course of the 1860s, became an occasion for observers to debate everything from women's legal rights to the plight of unmarried women.

When I handed in my thesis I did not think that I would ever read it again. I put it away and shipped it, along with my other belongings, down to Washington, where I had taken a job at a magazine. Two years later, after becoming an "expert" in a new topic each week for the purposes of fact-checking and line-editing, I was hungry to return to more intense study. I pulled out the thesis and began to trim it into a writing sample for graduate school applications. I thought I had settled upon a topic for my dissertation, but as I revised my thesis, it struck me that I wasn't finished with this story. The elements that had initially grabbed me were still arresting; the story was too good to leave alone.

At Cambridge I studied in the Criticism and Culture program within the English Faculty, but when I wasn't trying to dissect theory, I sat in the back of undergraduate lectures on women's suffrage and Elizabeth Gaskell's *Mary Barton*. I wrote a little each morning, and gradually formed something like a book. When I left Cambridge, I dedicated myself to organizing the materials I had gathered in the U.K., and I was lucky enough to secure a contract with Walker Books in the U.S. and Bloomsbury in the U.K. The book will be published as *Wild Romance: A Victorian Story of a Marriage, a Trail, and a Self-Made Woman* this spring.

Despite the origin of this research in sensation novels and the somewhat sensational title (picked from the protagonists' correspondence by my editor), the story has implications that go beyond titillation. It illuminates the personal dimensions of social conditions and political struggle, the distinct conditions of a previous era, and the human affections that persist in our own. The story also shows how one "ordinary" forgotten figure intersects with historical movements and figures that loom larger in our consciousness. The woman at the center of the story eventually left England and traveled to America, where she befriended John Muir and visited the Mormons in Utah. What happened to her in the end? It's too good a story to spoil.

CHLOË SCHAMA
Class of '07, MPhil in English

Learning at the Zoo

Visualizing and Learning about Animals

A first look at results from a two-year evaluation project on the impact of zoos on scientific learning and conservation values

I have recently begun a two-year evaluation research project at London Zoo Education Department, funded by the Greater London Authority (GLA). London Zoo Formal Learning programme provides free school visits and animal education lessons at the zoo or an outreach visit to schools. The evaluation project will empirically assess the extent to which zoos can promote scientific learning and conservation values. This is the first study of its kind at a UK zoo.

I was selected as evaluation consultant for the Formal Learning programme after a competitive bidding and interview process. Running through March 2011, this research

remembering. In all cases, the fundamental principle of the microgenetic method is the same: *the researcher focuses on single cases and their change over time to explore the emergence of new phenomena*. As opposed to simple outcome measures based on aggregate statistics, this method provides a *dynamic display of processes* involved in the change—i.e. the ability to track the emergence of new ideas and understandings as they are occurring.

Preliminary Results

Figure 1 demonstrates a student's development of more sophisticated knowledge of camels after attending an educational presentation at the zoo.

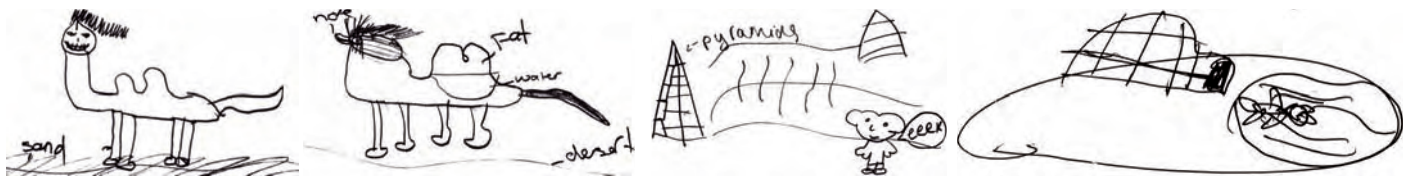


Fig. 1: Pre- and post-presentation (L and R) drawings of a camel by a male pupil, age 10. Fig. 2: Co-existence of pyramids and desert landscapes. Fig. 3: Unspecified animal in an igloo.

project is employing innovative new social scientific methods to investigate the impacts of London Zoo's educational and outreach activities, as well as the impact of 'self-guided' zoo visits for pupils at London schools. I will be giving a presentation on the preliminary results from this project at the British and Irish Zoos and Aquaria Association conference in November in Liverpool.

Microgenetic Evaluation Method

Working with cultural psychologist and fellow Gates scholar Brady Wagoner in an early phase of this research, drawings were used with primary school pupils to elicit data on the development of their thinking throughout their visit to the zoo. This research connects to Brady's work on the microgenetic method. Indeed, the microgenetic method (e.g. Wagoner, 2009), employed in this study, is being piloted for its first ever use in an evaluation context. This method was first developed in research on perception and was later appropriated to the study of thinking and

Indeed, it is clear from primary school pupils' drawings that they developed new knowledge and refined existing knowledge about animals in their habitats as a result of participating in London Zoo educational activities. Overall, this preliminary microgenetic evaluation study showed significant impact on the quantity and quality of pupils' knowledge about animals in their habitats.

One interesting finding was that primary school pupils utilized a number of cultural resources to understand animals in their habitats—for example, Hollywood movies (e.g. *Ice Age*) and conventional images of the desert (e.g. with pyramids in the background). Sometimes information provided by these resources was replaced by new information from our presentations, while other times the two co-existed—for example, pyramids continued to show up in post-talk drawings of deserts (see Fig. 2).

As can be seen in Fig. 3, a number of pupils drew a picture (in the pre-talk questionnaire)

of a vaguely shaped animal next to an igloo and/or wrote "a cold habitat" or "ice". One pupil elaborated in his questionnaire, "saw it [a sloth] on the film *Ice Age* next to caves, woods". Indeed, many pupils seemed to be operating under a "hot" and "cold" distinction prior to their zoo visit when discussing animal habitats—the sloth belonging in the cold. This may be due in part to the influence of films such as *Ice Age*.

Related Research

Other dimensions of the evaluation research project will include analysing teacher feedback from questionnaires and focus groups,

conducting focus groups with pupils from Year 1 to A-level and undertaking a large-scale questionnaire study to investigate pupils' views directly drawing on a mixed qualitative and quantitative design. Results from this project are informing educational practice at London Zoo, and will be disseminated in the form of journal articles and conference presentations over the next few years.

Finally, this London Zoo research is related to an action research project I was involved in previously, called ISOTOPE (Informing Science Outreach and Public Engagement). Funded by the National Endowment for Science Technology and the Arts (NESTA), the ISOTOPE project investigated the practice of science engagement in the UK. On the basis of this research, we co-created a website with resources for science engagement practitioners: isotope.open.ac.uk.

ERIC JENSEN
Class of '03, MPhil & PhD in Sociology

Gates Family Comes to Cambridge

Strengthening Our Ideals, Renewing Our Purpose

Bill and Melinda Gates and William H. Gates Sr. meet with Gates Scholars

At the core of our identity as Gates Scholars is the desire to understand how our research pursuits fit into the broader context of society and how this work can be applied to tackling the challenges facing our world today. This shared sense of purpose can be traced back to the vision set forth by the benefactors and trustees of the Gates Cambridge Trust, namely Bill and Melinda Gates and William H. Gates Sr.

In June, Bill, Melinda, and Bill Gates Sr. came to Cambridge and met with Gates Scholars. Bill and Melinda's visit coincided with the Honorary Degrees Ceremony on 12 June, in which they both received Doctor of Law degrees from Cambridge in recognition of their work on global health and development initiatives. Bill Gates Sr. returned to Cambridge for his yearly visit and spoke with Gates scholars at the annual Gates dinner on 3 June. On these two visits, the Gates family shared their motivation for establishing the scholarship programme nearly ten years ago. Scholars also engaged in dialogue with them about how we fit into the overarching goals of their philanthropic work. Scholars asked an array of questions on topics ranging from the guiding principles of the Gates Foundation to the various ways in which we can give back to society during our time at Cambridge and beyond.

For many scholars, hearing directly from Bill, Melinda, and Bill Gates Sr. was a chance to reflect on the extraordinary opportunity that we have been given to study

at Cambridge. Bill Gates made a poignant remark by drawing attention to the humbling



Bill and Melinda Gates with members of the Gates Scholars' Council and the staff of the Gates Cambridge Trust

at Cambridge. Bill Gates reminded us that the \$210 million donated to fund our education



at Cambridge is money that could have been spent vaccinating countless children across Africa against life-threatening diseases like

polio and measles. He also explained that the Gates Foundation can measure the number of lives saved through vaccinations, however, there is no actual way of quantifying the contributions to society that Gates Scholars will make in the future. The hope in creating this scholarship is that we will take on leadership roles in our respective fields of study. As Melinda noted, "The incredibly interesting things you are studying will make an enormous contribution to society and will help to change the world." During his separate visit, Bill Gates, Sr. remarked how impressed he was by the rich diversity of ideas and experiences which shape our community of scholars.

The words of Bill, Melinda, and Bill Gates Sr. continue to resonate strongly, and I feel a renewed sense of responsibility that goes along with being a Gates Scholar. Their visits encouraged us, as students, to aspire towards a gold standard of excellence in all we do. In academia and beyond, we must never lose sight of the people living in our communities at home and abroad who stand to benefit most from the research we undertake. As we advance in our careers, it is vital that we approach our work with a large degree of humility. Above all, a deep engagement with communities on local, national, and international levels must underline our actions as Gates Scholars, as we seek to model the efforts of our benefactors in our daily lives and future aspirations.

LINDSAY CHURA
Class of '08, PhD candidate in Psychiatry

Global Scholars' Symposium

A Meeting of Minds

Lectures, workshops, food and fun: Gates Scholars welcome again other international scholarship students to Cambridge for a symposium on the intellectual history of Cambridge and the value of interdisciplinary dialogue

One sunny and summery afternoon in late June, the Gates Scholars hosted a group of international graduate students for the second annual Cambridge symposium of scholars. In all, the event brought together UK scholars from the Gates, Commonwealth, Marshall, Rhodes, Churchill, Fulbright and NIH scholarship programs. The event, titled *Graduate Student Symposium: Standing on the Shoulders of Giants*, built on Cambridge's 800th anniversary celebrations by exploring the role of big questions and interdisciplinary research in academia and beyond.

The day's schedule included three lectures on the future of the energy economy, interdisciplinary research and the nature of philosophy, a series of five-minute long "lightning talks" from scholars to scholars, and—most importantly—some free time to mingle and chat!

Following an afternoon of discussion and debate, the assembled delegates retired to Murray Edwards' ambient Dome Dining Hall for dinner, followed by a meet-up at the Cambridge Union to round out the day's activities.

Despite being only in its second year of running, the Global Scholars' Symposium (GSS) has proven to be a unique and intimate experience: it "was a refreshing breath of informality," wrote 2008 Gates scholar Corina Logan. "Through this medium, scholars discussed their thoughts, shared advice, and gained a higher level of awareness on a range of issues."

For participant Julia Fan Li, the GSS provided an interactive way to work with intellectuals from around the world. She added, "The speakers engaged the audience with a platform

for discussion and I definitely learned as much from the debate as the talks themselves. The exercise for interdisciplinary thinking with Alan Blackwell was great because even though my counter-part for the exercise studied in a different field, we found our research had significant overlap in the social sciences and we're all working together on finding solutions from different angles."

In hopes of providing well-rounded solutions to global challenges, the GSS fostered a space where global scholars could meet and discuss issues together in a productive format. Overall, the event proved to be most beneficial to all who attended.

GREG JORDAN

Class of '07, PhD Candidate in Molecular Biology



True Seeing: A Fragment, A Parable

A Work of Short Fiction

Two rival Renaissance masters catch a glimpse of a world more slippery than commonly seen. And watching them from a distance of five hundred years is a greenhorn art historian given to imagining truths into existence.

To view the newly restored frescoes was to undergo a rite of passage to an older, more disappointing world. In a perverse way it completed the cycle that had begun five years back, when the announcement of the restorations reduced everyone in our little Mediterranean town to children, dangerously eager to learn and to love. The two frescoes, each depicting a battle scene by a renowned Renaissance master, had faced each other like rival reflections for five centuries, during which they had suffered at the hands of clumsy restorers, disciples, anyone willing to participate. Our museum director put forward several reasons for the final restoration, ranging from the pure and simple need for beauty to the loftier quest to recover the past—I still remember how we thrilled to his lyrical evocation of rogue layers of paint being scraped away to allow the originals to rise to view, pristine as suns. But I suspect we ultimately gave in for the same reason people peer into mirrors: the desire to look oneself in the eye. It was an interesting idea, and I would have made something loathsome and academic out of it, had the results of the restoration not jolted us awake. For each original fresco was found to be incomplete—a series of sketches, about half of which had been painted, and the rest left unfinished.

It led to a brief hush, a lull. Then the theories began to appear. Everyone expected me to contribute; I had “the necessary qualifications” (a brand new thesis on art history, followed by a badly paid job on the museum committee). I began by noting that they had been commissioned by a Renaissance ruler to provide our then-powerful city with twin images of its greatness in the form of scenes from victorious wars. He hired the two greatest masters of the day, each championing a style diametrically opposed to that of the other. (Did our duke have another motive—to decide a battle whose fame promised to outlive any of his own?) The older master had been trained in the deepest traditions of classical antiquity, and believed that art—true art, his art—should represent the human form at its purest, most noble and restrained, much like the marble statuary he so loved. To achieve that prized sculptural

effect, he completely subordinated colour to contour, demarcating his figures clearly and filling them with downy areas of paint, uniting marble and flesh in a shared, smooth sensuality. His younger rival, who was already worshipped by the newer breed of artists and posers, had a more painterly style (“painterly” being his own word) where colour ruled in all its extremes, without the apparent limitation of line. His figures were orgiastic whirls of paint that gave the illusion of movement, of aspiring for—what? No one knew for sure, which only added to the thrill. And oh, he openly rejected the time-honoured classicist ideals in favour of a boundless modernity, the promise of a more intensely imagined universe. Everyone knew it could not continue like this; the open quarrels in the streets, the covert sniggers and scoffs, it all had to culminate in something.

I spent the greater part of my days in a dazed, blurred world, trying to picture the moment when each artist realised that his rival had also been signed on for the job. It had never been a question of a dash of paint, the turn of a form; for each a view of the world upon which he had based his life and his reputation was at stake. Of course, that is not how it would have appeared to them. Both masters would have considered it a question of true seeing, in which the one with the possession of the normal and universal truth would ultimately triumph (how could it be otherwise?) over the error of the other. There was no uncertainty, only the resolve to bring about a foregone conclusion.

And besides, I daresay both of them were spoiling for a fight.

The chronicles are maddeningly silent over what happened next. Most of our city’s literati blamed the passage of time, the unexpected death of the duke, or even a case of nerves that led the masters to abandon their frescoes. Ambiguity suited me fine, because it gave me the opportunity to sift through the different versions of fact, only to find that I preferred fiction after all. I imagined the masters take up their positions before their walls, their backs to each other. But for how long did they maintain that pose? First one, then the other would

slowly turn to look back—and promptly return to his work. But the glances would inevitably grow longer, if not warmer. And perhaps it would strike each painter how appropriate the subject of a battle was to his situation, how disturbingly easy it was to reconcile the brutality of war with the cultured delicacy of art. Or could there be a crucial connection? Savagery acquired a beauty of its own, and art revealed its inherent violence in trying to render living beings as still images, fleeting shadows. The process of depicting violence also sanitized it. Passion could reside in paint, of course (rage could billow in a red cloak, or bitterness swell and ebb in a primeval flood) but that could be viewed with pleasure, always from a distance.

It was at this point that my artists found it impossible to carry on. Each found in the techniques of the other an answer, an echo that he understood too well. The later parts of the two frescoes grew increasingly similar in technique (at least that’s the way it happens in my fantasy). Our classicist admired the new freedom of allowing colours to overrun their bounds and segue into each other with the force of rivers, while the romanticist came to respect the solidity and the glossy strength that made butchery look like something it never is: graceful, dignified and moral. The feeling was a rush, a flame, the discovery of a secret truth, but it needed more time. More time for them to rethink their concepts, allow for a twilight zone in between where the conventional opposites upon which we build our lives—beauty and ugliness, light and dark—are conjoined by the fingertips of mirror images touching in identical, if reversed, astonishment.

And so they stopped. One fine day, I saw them turn from their positions to look each other squarely in the eye, smiling or unsmiling (here I’m not too sure). Placing everything aside, they strode out of the palazzo, startled at discovering similarities in a world that prides itself on difference.

PRITIKA PRADHAN
Class of '09, BAaff candidate in English

TEAM EXTREME

Forty-Seven Minutes as a Cadet

On the Gates Orientation, I hoped to form lasting friendships over a leisurely stroll... My hopes were halfway fulfilled.



Team Extreme crosses the finish line. Pictured (L-R): Lieutenant Stephen Devries, unsuspecting civilian Braxton Boren, Lieutenant Jon Chachula, and Lieutenant Zachary Watson.

On Gates Orientation, I hoped to form lasting friendships over a leisurely stroll. My hopes were halfway fulfilled. Waking up on the first day of Gates Orientation in the Lake District, after having spent long hours on planes, trains, and automobiles (and rather short hours sleeping), I felt that I was justified in hitting the snooze button one more time. Sure, I would have to eat my breakfast quickly, but I had a leisurely three-hour stroll to look forward to that morning. Our first activity was orienteering, and it quite literally sounded like a walk in the park. In fact, I was actually looking forward to the challenge because—despite being a pale, unfit weakling who previously only went outside to get from one library to another—I had a secret weapon in this contest. You see, eight years ago, I had earned the Orienteering Merit Badge at Boy Scout Camp. I wasn’t sure I’d actually completed all the requirements, but I remembered walking around in a field with a compass, so surely that would give me some kind of edge.

When we got off the bus, the instructor met us and told us to divide ourselves into groups of four, and before I knew it I was in a group with three other guys who had been sitting in front of me on the way over. Now I know that Gates Orientation is supposed to be about meeting diverse people from all over the world, but my social skills don’t peak until mid-afternoon. Though I didn’t know my group that well, I had a sneaking suspicion that they weren’t too diverse. When the instructor asked our team name, Second Lieutenant Zachary Watson spoke up without hesitation, “Team Extreme.” It was then I realized that I was the only civilian on a team of military officers.

Very, Very Basic Training

Besides Lieutenant Watson, there was Lieutenant Devries, a Naval Academy graduate and Marine, and Lieutenant Chachula, a West Point graduate fond of triathlons and other similarly sadomasochistic pursuits. Oh, and me. I was a Music major—did I mention

that? Maybe it was because he enjoyed irony, or maybe it was because I was wearing track pants, but Watson (who, it seemed, had taken command of the “mission”) said with a smirk, “Well guys, I guess we’ll just have to run it.” I suddenly sensed that I was in a place where my merit badge could not help me.

We took off down the path, and I resisted the urge to shout out some of the cruder military cadences I had heard, trying instead to remember something about the US military academies’ curricula: physical training and land navigation were their bread-and-butter. They could have won without running, but that wasn’t enough for them; they wanted to decimate the competition. Watson later told me his strategy was simply to “win early, and win big.”

Divide and Conquer

As our path wound through fabulous panoramas of forests, mountains, and lakes, I was



The extreme view in the Lake District (Photo: Ivy Wong).

reminded of the beginning of the film *The Two Towers*. Obviously my companions were the tireless Aragorn and Legolas, deftly running ahead without any thought of rest, while I was Gimli the dwarf, lagging behind and muttering under what little breath I had left. When the path split into two loops, I caught up as our command team conferred on our strategy. It was decided that we could conquer the course faster if we divided into two squadrons: Chachula and Devries would continue on the regular course (hoping that the inevitable Army-Navy feud would not lead to a dissension in the ranks), while Watson and I would double back and take the end of the course backwards.

It turned out to be more difficult to locate the navigation points going backwards, which was a blessing for me since we had to stop to look for them, at least for a moment. After half an hour of running, I confess that I focused less on finding the requisite points and more on not depositing my breakfast on an English National Park. Watson usually found the points before I got

much rest anyway, but he obviously knew how to get the best effort out of his men and was very encouraging as we approached some of the more intimidating hills. After what seemed like a very long time, we reached the rendez-vous point, where our other squadron was waiting with an almost-cinematic, “What took you so long?”

Going the Distance

We ran the final leg together, passing teams that were still starting the course who looked back at us confusedly, as though we’d forgotten something important. The timekeeper was astonished as we crossed the finish line of the 2-1/2 hour course in 47 minutes—before the last group had even begun! The bus driver for the group that had just arrived graciously gave us a ride back to the hostel, which was lucky since the first pick-up bus wasn’t supposed to arrive for another hour and a half. We quickly headed for a pub, reliving our already-immortalized adventure over pints of Guinness at 10:30 in the morning.

I should probably mention that I come from a fairly military family—my father was in Vietnam, both my grandfathers were in World War II, and multiple great-grandfathers were in World War I. My brother is in the Army now, but I could never convince myself to do it, mostly because they do crazy things like make you run through what would otherwise have been a reasonably pleasant nature walk. As I thought back on that morning, I realized that for an instant, I had experienced the military—albeit as the clumsy grunt who slowed down what otherwise would have been a great unit. I hadn’t learned from my teammates’ words, but I had taken part in their world. If that is the type of cultural engagement that Gates Orientation is supposed to provide, then our “mission” was a success. But the next time Team Extreme rolls into action, I’ll be at home, icing my knees.

BRAXTON BOREN
Class of ’09, MPhil candidate in Physics

Gates Fall Ball

Un Ballo in Maschera

On October 25, 2009, new and continuing Gates scholars alike donned their masks for a night of food, fun, and entertainment at the inaugural Gates Fall Ball, "Un Ballo in Maschera." Here are a few photos from the evening!



FALL BALL



Photographs courtesy of Sytske Besemer, Kristin Buterbaugh, Shauna Chai, Usha Chilukuri, Lindsay Chura, Nuria Gonzalez-Rabade, Smruthi Jayasundar, Alexandra Kamins, Kendra Millington, Gina Murphy, Stella Nordhagen, Umang Rawat, and Tara Jane Westover

GlobeMed Imagine 2030

Building a Student Movement for Global Health Equity

From Evanston, Illinois, to a global network, students in GlobeMed are working towards their vision of a healthier and more socially just world.

Imagine the world in 2030. What if the world literally had an army of leaders and advocates for global health equity, working to advance the health of the impoverished through global institutions, businesses, universities, grassroots NGOs, and governments?

What if this new generation of leaders was able to change the face of global health and help deliver on the promise of a more just and equitable world?

That's the world that GlobeMed imagines.

As an undergraduate student at Northwestern, I began to see a burgeoning interest in global health on our campus. But what was a student to do? Few courses in the academic curriculum were rooted in action, and many volunteer experiences, such as medical missions, seemed to lack a responsible or effective design by which students could both learn and make a positive impact.

After traveling to work with NGOs in places such as Guatemala, Ghana, and India, and seeing the energy among many students, a group of peers at Northwestern and I decided that we could create a new way to involve students in global health. In 2007, we organized GlobeMed's first (what has now become annual) Global Health Summit, bringing 45 students to Northwestern University to discuss the formation of a student network with a unified approach. Today, GlobeMed is a growing student network at nineteen universities across the US that partner with grassroots organizations around the world to improve the health of the impoverished.

A Unique Model Rooted in Partnership

Since 2007, GlobeMed's strategy has evolved, but our core approach remains the same. Each GlobeMed chapter forms a partner-

ship with an existing, effective community-based health organization to support specific projects. For example, students at George Washington University have worked to renovate a clinic in Rwanda, and the Northwestern chapter helped to launch a community nutrition program for mothers in rural Ghana. Students from our chapters also work "on-the-ground" alongside their partner NGO

has been a challenging, rewarding, and life-changing endeavor for me. Personally, as the first full-time staff person and Executive Director of GlobeMed's National Office, I learned many hard but valuable lessons about leadership along the way. As a Gates scholar now in Cambridge, I continue to serve GlobeMed, now as a Board member, and I am helping to begin a new phase of expansion for the organization.

I hope that my studies at Cambridge in social theory and global health will strengthen my ability to contribute and serve.



Victor Roy (center) with four students from the National University of Rwanda, near a village where GlobeMed is renovating a health center

during the summer, contributing to a valuable project while also deepening their relationship with the community and partner.

Along with raising money for projects and planning summer trips, students in GlobeMed chapters participate in globalhealthU, a curriculum provided by GlobeMed's National Office (the hub that supports the student network) through which chapters organize weekly discussions and public events to encourage a deeper understanding of global health. The unique opportunity to merge critical learning with tangible action in global health has not only drawn many students to GlobeMed, but also transformed their outlook on ways they can be involved in the broader movement for global health equity.

Working to build a non-profit—now with a Board of Directors and three full-time staff—

A Growing Network

It's quite remarkable to see how far GlobeMed has come since 2007: we've grown from seven to nineteen chapters, from 100 to over 400 students, and positively impacted twenty-one communities around the world through health projects. This fall, GlobeMed is launching the "imagine 2030" (www.imagine2030.org) campaign to bring this movement for global health equity to sixty universities over the next two years. Through this campaign, GlobeMed is looking to mobilize hundreds of

new students, community-based partners, and supporters interested in shaping the future of global health. By 2030, these sixty chapters will have produced 30,000 alumni committed to global health equity throughout their lives.

Twenty years from now, we hope we'll look back to this moment as the time when we joined together to begin the hard work required to build the world we imagine.

Check out www.globemed.org and email Victor (victor@globemed.org) for more information.

VICTOR ROY
Class of '09, MPhil candidate in
Modern Societies and Global Transformations

Searching for Sickle Cell

A Rural Ghanaian Research Adventure

Challenges and problems in the battle against sickle cell anemia

My quest to understand the prevalence and manifestations of sickle cell disease in rural Ghana illuminates the many challenges and rewards of pursuing international clinical research. Though it is not always easy to incorporate my diverse interests in global health, epidemiology, human genetics and pediatric hematology/oncology into one cohesive project, my summer work in Ghana proved the perfect challenge. I traveled with Dan Ursu, a fellow MD-PhD student at the University of Michigan, to investigate sickle cell disease in rural Ghanaian communities. We encountered numerous surprises and challenges along the way, but our invaluable experience and our continued efforts will lay the groundwork for future progress in this field.

The Sickle Cell Problem

Sickle cell disease (SCD) is the most common genetic condition of clinical and epidemiological importance in Africa. Over 95% of children born with SCD die before age five. While much is known about SCD, its manifestations and severity among patients vary widely. This suggests that the spectrum of disease severity is in part due to environmental, biochemical, physiological and genetic factors.

Studies investigating the multi-factorial determinants of SCD in Ghana are presently limited to urban populations. However, Dan and I hypothesize that important differences may exist in SCD clinical manifestations, prevalence, and management between rural and urban areas. Exploration of these differences is important for the development of community-specific screening and treatment programs, so we expanded these studies to include some of the most rural and underserved communities in Ghana.

On the Road Again

We worked primarily in small village clinics and health centers, as well as Community Based Health Planning and Services compounds established in the most isolated areas. One of our stops included Ghana's UN Millennium

Village Project, a "proof-of-concept" testing site for the UN Millennium Development Goals. In five weeks, we traveled through 6 districts, visiting dozens of rural clinics and hospitals along the way. Our mode of travel varied daily from overflowing rickety buses and 4x4 UN SUVs to hitchhiking on goat trucks and pickups filled with coffins and coca-cola. Upon arrival, we met with village chiefs and graciously "enjoyed" far too many shots of jungle-juice moonshine and palm wine to appropriately honor local tradition. Similarly, while Dan reveled in dining with the locals and is an enthusiastic eater of delicacies such as sugar cane rat and antelope feces soup, my (vegetarian) diet consisted largely of chocolate soymilk, coke, and pineapple for 6 weeks.

In each rural community, we surveyed SCD patients to understand their medical and family history, disease symptoms and manifestations, treatments, and accessibility and utilization of health care resources. We also interviewed family members, regional health officers, community health nurses and disease prevention officers. We learned that most people know very little about SCD, and that treatments and clinicians available to manage SCD pain crises are few and far between. At the same time, we administered another survey to women of reproductive age to assess their understanding and opinions about prenatal genetic testing for SCD. The information gathered will enable us to explore potential relationships between a woman's knowledge of SCD and her cultural views, health beliefs, and socio-economic status.

Unexpected Challenges

Although English is an official language of Ghana, we relied heavily on the help of health workers as translators in every community. Often the meaning of our questions was lost in translation, or female patients and mothers were uncomfortable discussing family planning matters with a male translator. Medical record keeping is limited outside of urban hospital settings, and most patients could not tell us the details of their diagnosis or their medical histories. For that matter, most patients were

unable to tell us their date of birth or the ages of their children.

Even regional hospital administrators struggled to produce accurate SCD patient lists, and in one instance we were sent out to a village with a list of "patients" who were, in fact, simply all the pregnant women tested for SCD at regular checkups that year. You can imagine their surprise when two American medical students and the district disease prevention officer showed up at their huts, announcing that they have SCD and wanting to know all about it!

We quickly returned to the hospital's lab to investigate. Like many other rural medical centers, the lab lacked the appropriate means to properly test for SCD, but they don't send patient samples out to diagnostic labs for accurate results. We realized that SCD patients and individuals with sickle cell trait (mutation carriers) were literally all around us, but we had no good way of identifying them. More importantly, these individuals were unaware of their own disease status and were thus unable to make informed decisions about their medical care and family planning.

Coming Full Circle

My summer research work in Ghana represents just one way I may continue to build upon my epidemiology training as a Gates scholar, fully utilizing my education as a physician scientist to improve the health and quality of life of people worldwide. The Bill and Melinda Gates Foundation has supported and shaped my education through Mary Gates Research Grants at the University of Washington and the Gates Cambridge scholarship. The Foundation inspires me to be a better student of medicine and to reach beyond the walls of my medical school to discover ways to deliver critical medical care to those most at risk for serious disease. I am grateful and honored to be part of this tremendous humanitarian program.

LESLEY EVERETT
Class of '06, MPhil in Epidemiology

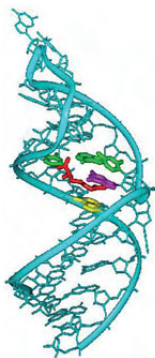
Testing HIV

New Eyes for an African Pandemic

Manufacturing test assays to quantitatively measure viral loads and improve lives in low resource settings

Rapid Tests for Infectious Diseases in Sub-Saharan Africa

Diagnostics for the Real World (DRW) based in Cambridge (UK) is developing rapid diagnostic tests for infectious diseases. The platform technology being built will enable and facilitate the development of tests for diseases such as Chlamydia, Hepatitis, Gonorrhoea and HIV. I undertook this project as part of a team of 5, to prepare a compelling case for securing funding, to build an assay manufacturing unit, with the aim of bridging the gap between technological barriers and earnest market needs.



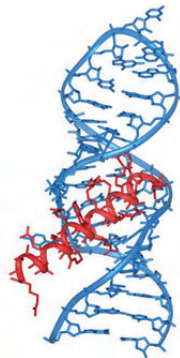
Global Healthcare Climate

Healthcare costs throughout the world continue to outpace the rate of inflation. Recent research shows that apt use of diagnostics can reduce overall healthcare costs through early diagnosis, improved decision-making and better treatment monitoring. This has shifted focus and research efforts driving the growth of the overall in-vitro diagnostics (IVD) market. In the developed world, the aging population, the increased patient demand and the need for decentralization of diagnosis to local health centres or outpatient clinics have driven efforts towards containing and reducing healthcare costs. While in the developing world, plagued with political and economic instability, the lack of health workers and inadequate medical infrastructures have created a great need for easy-to-use diagnostic tests. These requirements create a converging demand for a subset of the IVD market, referred to as the point-of-care (POC) diagnostics. A study was carried out on the HIV diagnostics market and the results revealed a significant need in three specific segments: diagnosis for neonates; HIV treatment monitoring; and individual screening of high risk groups in emergency wards.

Human Immunodeficiency Virus

Today, HIV has become a pandemic, with over 33 million people infected globally. Due to the mutating nature of the infectious agent, HIV patients receiving anti-retroviral treatment should be systematically monitored for drug resistance by measuring the HIV viral load. In the developed world, there is a vital need to expand screening coverage in order to control the spread of HIV. Meanwhile the developing world--home to 66% of those infected with HIV-- contains only 3% of the world's health workers. This deficit of health care workers and mounting number of patients creates an urgent need for rapid, point-of-care, high performance and easy-to-use tests.

An average human immune system takes 3-5 weeks to react to HIV infection. This means that the existing antibody-based tests exhibit a window period during which the infection goes undetected. The nucleic acid amplification based tests, in contrast, detect the HIV virus directly and are therefore the test of choice for early detection. Moreover, as antibodies are transferred from HIV infected mothers to the new-born babies in utero, it is unfeasible to use antibody-based tests for accurate diagnosis for neonates born to infected mothers. Additionally, nucleic-acid tests can quantitatively give a measure of the viral-load and are thus important for monitoring treatment success over time.



The SAMBA—Simple Amplification Based Assay

Existing nucleic-acid tests amplify a segment of the HIV viral genome and have high-performance. However, these tests are expensive, complex and require specialised skills and laboratories. Moreover, they are prone to false positives due to the possibility of contaminations and the inherent amplification nature. The SAMBA HIV test improves the specificity by offering a closed device to reduce the effects of contamination and provides a cost-effective, rapid, simple POC diagnostic test that meets the decentralised needs of the developed world and the ease-of-use needs of the developing world.

To date, the market does not have any rapid POC tests for quantitatively detecting the genome of infectious agents. Besides, such nucleic acid based platforms drastically shorten the time-to-market for revisions of the tests in response to virus mutations and new strains. For example, a test for the swine flu virus spurring current concerns of a global flu epidemic can be quickly crafted and brought to market to detect the viral genome.



A new manufacturing plant is required to meet the demand for not only HIV products, but for the complete portfolio of existing and future products. We worked on a proposal to obtain funding for the plant from the International Funding Corporation (IFC), a subsidiary of the World Bank. A full financial model was developed to analyse the project's long term sustainability. Overall, project analyses indicate a need for US \$15.5 million from the IFC in exchange of equity. This funding will enable the proven technology to drastically improve lives by permitting quick diagnoses and facilitating effective treatment measures.

JUGGS RAVALLIA
Class of '08, MBA in Management Studies

The Potential of Molecular Farming

HIV-1 Vaccine Candidates Produced and Delivered in Plants

Genetically modified crops that can save our lives

Plants as Production Platforms

There is an increasing world demand for cheap vaccines that can be readily administered to the population, especially in economically less developed regions. A promising concept is the production of vaccines in plants that could be grown locally. Vaccine delivery and storage are also major concerns in all medical initiatives. Using partially processed plant material containing a vaccine subunit could circumvent many of these challenges. There will not be a need for a cold chain or for complex infrastructure and highly specialized personnel. Certain plant tissues are incredibly stable and could function as a means of long-term storage. Large amounts of antigens can be produced at relatively low cost in an agriculturally based system, where the potential for scale-up is most evident. Ideally, the choice of the plant species used to produce the selected antigen should allow for oral delivery in the form of an edible vaccine.

Recombinant protein production systems range from prokaryotic systems such as *Escherichia coli* and *Bacillus*, to eukaryotic systems such as yeast, *Aspergillus*, mammalian and insect cell cultures, transgenic animals, and plants. Of these systems, transgenic plants are potentially one of the most economical systems for large-scale production of recombinant proteins for industrial and pharmaceutical uses. Their advantages include the low cost of growing plants on a mass scale, the ease in scale-up, the availability of natural protein storage organs such as chloroplasts, the established practices for their efficient harvesting, transporting, storing, and processing, the elimination of the purification requirement, and the possibility of compartmentalization in different organelles.

HIV-AIDS

AIDS is one of the most important crises currently facing human development. This disease is caused by infection with HIV, which is presumed to have spread to the human population from non-human African primates during the 20th century. Around 33 million HIV infections were estimated worldwide in

2007, and a large number of these infections are located in developing countries. Sub-Saharan Africa alone accounts for 22 million of these infections.

As a retrovirus, HIV-1 integrates its genes into the target cell DNA, quickly establishing a lifelong infection if not stopped at the time of initial exposure. At first, many patients exhibit mild flu-like symptoms, associated with transient viremia, but then the blood levels of virus drop dramatically and stay latent until the disease phase begins, much later, with up to one third of the cells in the lymph nodes infected. Over time, virus replication leads to a slow and progressive destruction of the immune system, increasing the danger of other opportunistic infections such as tuberculosis and pneumonia.

Prospects for an AIDS Vaccine

The development of an HIV vaccine is crucial. It has proved very difficult and has been delayed partly because of the complex nature of the virus but also because the majority of the research resources have been directed to treatment or basic research. Therefore, a safe and effective vaccine to reduce the transmission of HIV-1 infection or to prevent the disease progression is desperately needed, particularly in developing countries. A successful vaccine would be easily administered and would generate neutralizing antibodies that are sustained, conferring protection against the disease.

If widely implemented, such vaccines may have a significant impact on improving the quality and length of life for HIV-infected individuals, while at the same time reducing the rate at which HIV continues to spread throughout the human population. The combined effect of high rates of virus replication and mutation cause great difficulty in designing experimental vaccines against HIV. Subunit vaccines, however, are both safe and chemically well defined, offering the advantage of targeting specific epitopes that lie within conserved areas of the virus. Two such potential vaccine candidates are the core protein p24 and the regulatory protein Nef, both of which have been expressed in plants.

Plant-Derived HIV Vaccine Candidates

The main objectives of my research are 1) to examine and compare HIV-1 p24 protein accumulation levels in various transplastomic tobacco cultivars, transformed with a variety of vectors, in order to obtain important information concerning choice of cultivar, vector optimization and degradation patterns, 2) to develop and apply plant-processing protocols in order to extract and enhance the formulations of HIV-1 chloroplast-derived HIV-1 antigens prior to immunization studies, and 3) to assess the immunogenicity of purified, partially-purified and unprocessed chloroplast-derived p24 and the fusion protein p24-Nef, produced both in tobacco and tomato, utilizing different routes of administration. A plant-derived adjuvant, Bip, was also assessed as a potential adjuvant for human use.

My results corroborate the immunogenic properties of plant-derived HIV-1 p24 and p24-Nef, showing that they are highly effective in producing immune responses. Plant-derived recombinant antigens are easy to produce, without the need for expensive fermenters, so even with losses during purification or partial processing of the protein, one acre of transgenic plants expressing the antigens at ~40% total soluble protein can produce great amounts of functional HIV-1 vaccine components. These studies, including the oral immunization of partially processed and unprocessed plants, showed effective stimulation of systemic immune responses, as well as the mucosal immune system, thereby offering better protection against pathogens such as HIV, that attack through the mucosa. Plant production of pharmaceuticals, HIV-1 antigens in particular, was shown to hold great potential. Biopharmaceuticals could be produced safely, inexpensively, and in almost unlimited quantities using simple nutrients, water and sunlight.

NURIA GONZALEZ-RABADE
Class of '06, PhD candidate in Plant Sciences

The Missing Link

Bilateral Donors as Determinants of Aid Effectiveness

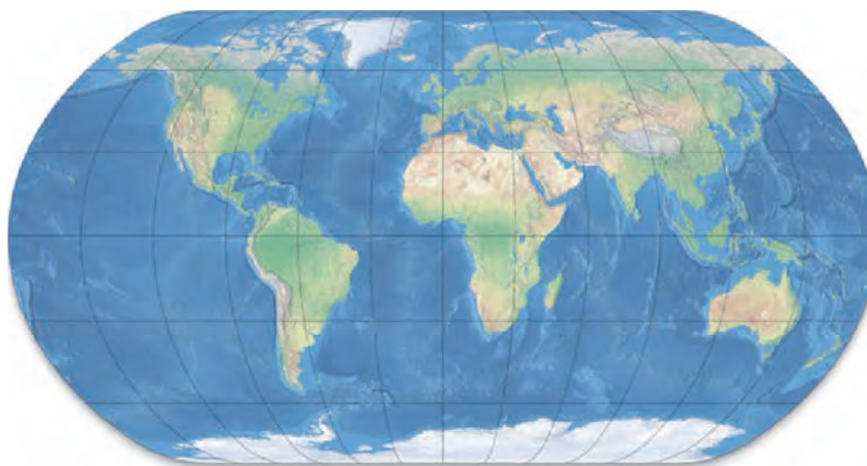
What determines the performance of foreign aid?

What is distinctive about foreign aid that it warrants continuous public investment? Why don't we replace all government-to-government foreign assistance with philanthropy by organizations like the Bill and Melinda Gates Foundation or social enterprise ventures? If we do believe a publicly funded foreign aid system has an important and complementary contribution to make, how do we ensure its effective usage to solve the world's promise? In short, what determines the performance of foreign aid?

My current research at the London School of Economics, where I am currently an Assistant Professor in the Development Studies Institute (DESTIN) and the Department of Government, grapples with some of these difficult questions. In an era of budget retrenchment when vocal critics call for the end of state-run foreign aid programs due to their ineffectiveness, trying to figure out what determines when aid is more or less effective is more than simply a methodological question. It is ultimately a question germane to the future of public financing for international development.

My own take on this question is that a key determinant on the performance of foreign aid is the aid agency itself. While most scholars focus on the governance and political will of developing countries as key factors to consider, the management and organization of the aid agency is an important, if under-studied, independent variable. Over 75% of Official Development Assistance is supplied directly by bilateral foreign aid agencies; the number is even higher if you consider that rich world government

contributions are an important source of funding for multilateral and non-governmental organizations. Yet we know very little about



how bilateral agencies operate, and what we do know is almost exclusively the product of official public relations documentation rather than scholarly research.



Donor Accountability and Performance

A commonly held assumption pervasive to official documentation is that aid effectiveness is directly proportional to the accountability of the bilateral aid agency. My current research attempts to explore this relationship by uncov-

ering what constitutes accountable donor practices and considering to whom such responsibilities are owed and why. It then asks whether the linkage between accountability practices and better performance is more tenuous than is usually assumed. For example, does more documentary reporting hold staff more accountable or simply detract from work that ensures results are actually achieved? Do performance targets generate incentives to disburse monies faster for poorly conceived projects? Examining whether an accountability-performance trade-off exists in bilateral aid agencies can provide some much-needed data on the organizational dynamics in aid agencies and their effects on aid performance.

Anyone who believes there is value in publicly investing in international development should be concerned with the achievements of taxpayer funds in achieving greater social good. A closer cross-national understanding of the bilateral aid agency as a determinant of aid effectiveness will inform our understanding of the organizational determinants of aid effectiveness. This can help us make sense of policy options for reforming foreign aid in order to achieve lasting improvements to planned development interventions that stand to remedy global injustice and inequality. Aid is not dead, nor is it ever likely to be. Making its organization more effective must therefore assume the highest priority.

NALIMA GULRAJANI
Class of '01, PhD in Management Studies



Pictured at a joint Gates-Marshall event in Washington, DC (L-R): Nick Hartman (Marshall), Justin Bangs (Gates), Tristan Brown (Gates), Anke Weber (Gates), Peter Orszag (Marshall), Chloe Schama (Gates), Cyndee DeKlotz (Gates), Rob Rivers (Gates), Lauren Zeitels (Gates)

Class Notes

If you would like to contribute an update to Class Notes for the next issue of The Gates Scholar, please email magazine@gatesscholar.org with your full name, the year you entered as a Gates Scholar and your update.

2001

Meredith Price Provost - It's been a busy year. I got married in January to Adam Provost, then graduated from medical school outside of Toronto in May, and moved out to Phoenix to start residency training in obstetrics and gynecology in June! If anyone is in the Phoenix area, please look us up!

2002

Alexander Domin - After my Cambridge PhD I made the tough choice of leaving my start-up company Enval and joining BCG in Germany. After three years I had learned a lot and had worked way too much. Then this summer it all happened at once: I left consulting to join a venture capital fund specialized on commercializing clean technologies, I got married to my best friend during the best party of my life (with many Cantabrigians in attendance), and we got to spend 6 weeks backpacking around Vietnam and Indonesia! Starting next year I will be based in Munich, so if you're ever in the area, do stop by for a proper beer!

Kate Franko - I currently work as a research fellow at the University of Auckland studying bioeconomics and health policy. I enjoyed catching up with fellow alumni back in the UK this summer and look forward to seeing more of you at the ten year reunion next year. Feel free to be in touch if you're in the Antipodes!

Hilary Levey - I recently completed my PhD in Sociology at Princeton and am now a post-doctoral fellow at Harvard, working for the next two years as a Robert Wood Johnson Foundation Scholar in Health Policy.

2005

Ingrid Nelson - I miss Cambridge and the Gates community very much. I've just finished my third year of my PhD in Geography at the University of Oregon and am heading to Mozambique in September on a US Student Fulbright Fellowship, where I am researching new family legislation and its impact on gendered natural resource use and land rights.

2006

Joan Ko - Since leaving Cambridge, I have been working as a Sustainability Consultant with Arup in London, helping to plan and design new settlements and improve existing cities. Currently, I am looking at the social impacts of highways, assessing the effect of climate change on tourism and heritage, and helping to masterplan a low carbon precinct in Finland. In October, I was awarded the James Watt Medal of the Institute for Civil Engineers for the best journal paper written on 'energy' in 2008.

Alumni Calendar

September 2009

Gates alumni have recently rekindled their relationship with the British Council at a series of events in Washington, DC. As part of an orientation weekend for the newly selected Marshall scholars, the Director of the British Council, Ms. Sharon Memis, invited Marshall scholars and Gates alumni to an informal supper at her home on September 12, 2009. The event turned out to be a lovely evening filled with delightful and inspiring conversations among Gates alumni, Marshall scholars, and members of the British Council. Many thanks to Andy Robertson (2001) and Cyndee Carver DeKlotz (2002) for organizing.

On September 14, 2009, British Ambassador Sir Nigel Sheinwald and the Association of Marshall Scholars hosted a reception for the 2009 class of Marshall Scholars. Both Gates and Marshall alumni were in attendance and recognized during the reception. Dr. Peter Orszag, a Marshall alum and currently the 37th Director of the Office of Management and Budget under President Barack Obama, was the guest speaker at the event. Dr. Orszag stated, "Winning a Marshall or Gates Scholarship is a significant accomplishment. It will open doors for you—both in your mind and your career." These remarks and others by Dr. Orszag and Sir Nigel captured the spirit of the evening and filled our minds with memorable Cambridge experiences and great hope for the future. For the Gates alumni in attendance, the evening sparked friendships and strengthened bonds between both Gates and Marshall Scholars. It is our hope that this and future events will continue to foster collegiate and professional ties amongst Gates and Marshall Scholars.

Upcoming Events

Mark your calendar

Cambridge events

Distinguished Lecture Series

Date: 1 December 2009, 6:30 pm
Venue: Queen's Building Auditorium, Emmanuel College

Dr. Mark Brenner presents on the "Cyberknife," the world's most accurate radiosurgery instrument.

Global Scholars Symposium

Date: June 2010
Venue: Cambridge

Worldwide events

10th Anniversary Weekend

Date: 2-4 July 2010
Venue: Cambridge

In 2010, the Gates Cambridge Scholarship celebrates an important milestone – its 10th Anniversary! Since its inception, the scholarship has developed into a full fledged community of scholars, comprised of experts (or soon to be experts!) in a diverse array of fields and all committed to giving back to their communities.

To mark the occasion, the Gates Cambridge Trust and the Gates Scholars Alumni Association (GSAA) invite you to join us from 2-4 July 2010 for a weekend of reconnecting with old friends and meeting new, while discussing some of the challenges facing our communities. The weekend will consist of panel discussions led by experts from all over the world, keynote speaker dinners and, of course, the odd pub outing or two!

Further details, including how to register, can be found at www.gatesscholar.org. The Trust has generously offered to cover the costs for the weekend, including accommodation and food. Participants will be responsible for their own transportation to/from Cambridge. There are a limited number of discretionary subsidies available for those who feel the cost of a flight will prohibit them from coming.

A draft programme for the event can also be found on the website and a list of speakers, panels and venues will be announced in Winter 2009. If you have suggestions for speakers (Gates Alumni/Alumnae or international experts) or ideas for the programme, we would love to hear from you. Please email 10thanniversary@gatesscholar.org.

We hope to see everyone there!

Front cover: Lesley Everett, Ghana

