



The Gates Scholar

University of Cambridge



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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 among the community of scholars, the GSAA 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 500 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!



If, before the coming of the railways, you had been able to look out from the Gates Scholars' Common Room you would have gazed on an industrial and commercial scene. Two great flour mills, powered by the fall of the river, would have dominated the view. There were coal yards and granaries where Darwin College now stands; barges and boats under sail would have been moored at wharves along Silver Street and where Scudamore's punts now gently bob on the water. The Centre of South Asian Studies in Laundress Lane was a warehouse, and not for nothing are

the local pubs called 'The Mill' and 'The Anchor'. For Cambridge was a thriving inland port, a major centre of regional trade, with goods coming up the river from the sea, and grain and other local products being moved from the Cambridgeshire fields to distant markets.

This was not all, from medieval times until the end of the eighteenth-century, Cambridge was the site of a major fair - at Stourbridge down river towards Chesterton, which was truly national and international in scope. Huge wholesale and retail sales in grain, hops, salt, cloth, garments, horses, and all manner of manufactured goods were transacted in the month between the feasts of St Bartholomew (24 August) and St Michael & All Angels (29 September). Merchants and financiers came from all over Britain, and reached across to Europe. Daniel Defoe, in his *Tour through the whole island of Great Britain* (1724-6) reported that the Stourbridge fair was greater than those at Leipzig or Frankfurt.

As we prepare to celebrate the University's 800th anniversary it's worth remembering that the town was here first. When the academics fled from Oxford in the troubled political months of 1209, they sought safety in Reading, Northampton and Stamford. But it was at Cambridge where a new settlement of scholars prospered most. Long-term success came because Cambridge was an attractive and relatively wealthy town, with a cosmopolitan population, known already across northern Europe for its religious houses, schools and hospitals.

Cambridge's distinctive culture, to which the University has since contributed so much, has for centuries been that of a small town widely linked and interacting, economically and culturally, with the world at large.

Now, and most notably with the Gates Scholarship programme, the most attractive characteristics of the city and the University are being re-worked. Cambridge is a beautiful place to study. But for academic enquiry to be meaningful it must address the concerns and issues of our time; and the well educated have responsibilities to use their knowledge wisely and to take on the challenges of leadership in each and every field.

Cambridge is vitally sustained by its openness to ideas and by its international networks. Gates Scholars, through their study here, and through their commitment to work in all sorts of ways for the betterment of society, are thus part of a long Cambridge tradition.

Dr GORDON JOHNSON

Priest of the Gates Cambridge Trust

President of Wolfson College and Deputy Vice-Chancellor of the University of Cambridge

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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.

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Heterogeneous Catalysis

A key technology for the future

You may be surprised to know how many parts of your daily life are touched by catalytic science. Applications for the science of catalysis are far reaching, from the food we eat to the cars we drive. It is a pivotal science which will help us meet the challenges of the future in numerous fields such as green chemistry, renewable energies and agriculture. Catalytic science is, therefore, very important to our economy.

Catalysts are materials which speed up and mediate the chemical reactions without being consumed. Heterogeneous catalysis is where the catalyst is in a different phase from the reactants. This has several advantages over homogenous catalysis, for example, easy separation of the product from the catalyst, recyclability and continuous operation.

The phenomenon of heterogeneous catalysis is governed by surface chemistry principles. Design of catalysts is a major field of research riddled with many complexities. There is a need for deeper understanding of the genesis of catalysis at the atomic level and also of its operational mechanism.

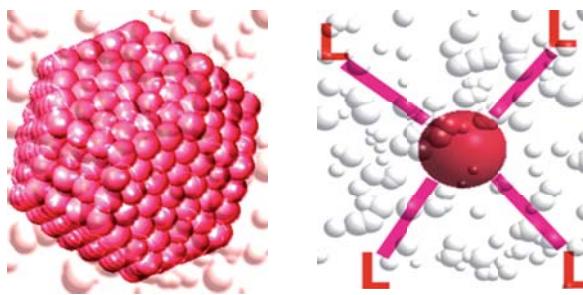
Complexity is a hallmark of the natural world. This complexity often extends to the molecular, atomic and subatomic levels. I have been trying to understand the mechanism of catalysis at subatomic and molecular levels in order to reveal the essential relationship between catalytic performance and catalyst size, structure, geometry and composition. In particular I am pursuing metal surface catalysed Carbon-Carbon and Carbon-Nitrogen bond forming reactions for my doctoral study.

Carbon - Carbon and Carbon-Nitrogen bond forming reactions are an important strategy in synthetic organic chemistry, yet the fundamental mechanism of these reactions remains highly controversial and the mechanism traditionally proposed is ambiguous.

What are the active species?

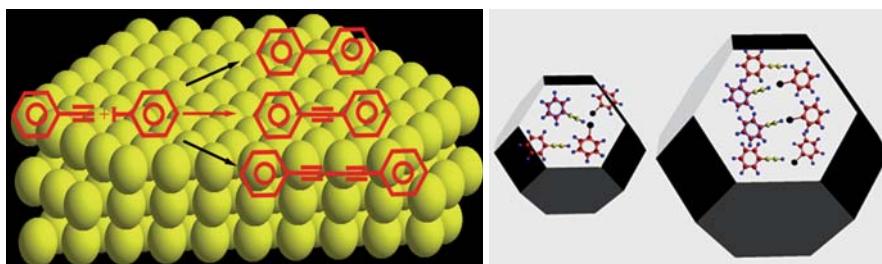
The nature of the problem is whether the catalysis occurs heterogeneously, at the surface of transition metal nanoparticles, or whether it occurs homogeneously, induced by transition metal complexes in solution, derived from the metal nanoparticles.

In order to investigate this problem we followed a dual approach. First we studied the Sonogashira model reaction by rhodium metal nano clusters as a function of various reaction variables like particle size effects, base, solvent and extent of metal leaching.



Metal nanoparticle & Mononuclear metal complex

Second we studied the Sonogashira reaction on a gold single crystal model catalyst surface under ultra high vacuum conditions, where no possibility of homogenous catalysis exists. This is a clear cut test of whether the reaction is heterogeneous or homogeneous.



Sonogashira reaction on Gold single crystal surface

Bigger particles are better catalysts

Very recently, we achieved two substantial advances. First, using rhodium metal nanoparticles in liquid phase, we showed that the reaction is heterogeneously catalysed by nanoparticle surface, using gold single crystal under Ultra High Vacuum conditions.

Does size matter?

There is a huge interest in examining particle size effects in terms of catalytic efficiency for many chemical reactions. Conventional understanding has been that as the size of the catalyst decreases, catalytic efficiency is

improved. However, we observed that bigger particles (8.0 nm) are better catalysts than smaller particles (2.0 nm) for Sonogashira cross coupling reaction. We postulate that this unusual performance is due to two reasons:

1. Bigger particles more readily accommodate the bulky reactant molecules than smaller particles; and

2. Due to high reactivity, from a high degree of unsaturation, smaller particles decompose the reactants rather than helping the reaction occur.

Second, we observed Sonogashira Carbon-Carbon coupling product on gold single crystal surface under ultra high vacuum conditions. This demonstrates that the reaction is heterogeneous beyond doubt.

For this break-through demonstration, my paper was recognized with a "Young Scientist Award" at the 14th International Congress held by The International Association of Catalysis Societies.

In addition, based on these findings, there is further research to be done. Currently we are designing practical metal nanoparticle catalysts for a variety of Carbon-Carbon and Carbon-Nitrogen reactions which can have immense effect on the industrial applications.

Adventures Down Under

Hunting for ancient molecules in Australia

I'm used to people making big eyes and smiling politely when I say what I do – I'm a Precambrian micropalaeobiologist. I look at some of the early life forms fossilized in very old rocks (1.2 billion years) and try to figure out their biology and why it took another 700 million years for "proper" animals, as we know them, to appear.

My work in Cambridge involves mostly looking down a microscope and analysing the images of my minute life form of choice - acritarchs (in my area of research something reaching the size of 0.5mm is considered "gigantic"). A few months ago my supervisor and I conducted a brain storming session, exchanged a few emails with colleagues and as a result I landed in Canberra on a late September afternoon with horrible jetlag. I was very excited about the research and continent that awaited me. I came here to study molecular fossils.

All of the fossils you see in museums – from dinosaur bones to bivalve shells – are body fossils. Molecular fossils – biomarkers, are membrane lipids, which, under appropriate conditions, can be preserved for billions of years.

And it just so happens that one of the best labs in the world studying them is at the Australian National University in Canberra. Most of the work that has been published to date on Precambrian biomarkers was in fact predominantly analysing contemporary contamination. Jochen Brocks, who heads the lab at the ANU, has developed a novel and very effective way of getting rid of it and controlling for contamination. His technique allows analysing the indigenous ancient biomarkers and not modern ones accidentally associated with ancient rock.

Pipettes, parrots and kangaroos

Earlier this year, when I had already arranged the details of my collaboration with ANU and bought my plane tickets, I had suffered a few panic attacks caused by the realisation that I would be travelling half the world to work on an area of science of which I have only a basic knowledge of and in an environment that will be completely novel (i.e. a real chemical laboratory with lab mates and not a desk with a microscope).

The research group turned out to be an truly international assembly of very friendly and helpful people. I was put to work on day one which left me with no time to fret about my incompetence.

Not only was the laboratory environment completely new to me but also, after leaving work, I was exposed to yet more exciting novelty. Wildly colourful parrots are a very common sight on campus as they fly between eucalyptus trees by day and after dark big, wild possums are seen roaming around the campus.

Learning about the beginning of life will surely help us to understand the current biosphere better.

And yes, there are plenty of kangaroos. I live in a densely populated Canberra suburb where plenty of the bipedal inhabitants hop instead of walking. I regularly see groups of over 30 while walking in the neighbourhood; needless to say my wild excitement gives me away as a tourist immediately.

Results! And now comes the real work...



After experiencing the steepest learning curve of my life and stressing over pipetting the correct amount of precious ancient biological material into the correct vial for hours on end, two weeks into the research we had our first piece of great news. My rock samples were full of ancient lipids!

The analysis will be a long and complicated process but the results can give a completely new and exciting insight into the appearance and functioning of ancient life. Biomarkers, can tell us a lot about the biology and physiology of the organisms that left them behind. This is especially important for characterizing life on Earth in the Precambrian – i.e. earlier than 542 million years ago. Body fossils from this period are scarce and mostly not very informative.

Biomarkers can be specific to organisms, physiology, environment and there is even a biomarker indicating predation (this is obvious enough currently but not so in deep time). This allows more precise characterisation of an ancient ecosystem.

By analysing the biomarkers from the Siberian Lakhanda Formation on which I work (I dare say my samples are some of the most well travelled Precambrian shales – from the Siberian tundra to Australia via the U.K.) I hope to be able to make some exciting progress in the elucidating how our biosphere worked 1.2 billion years ago. Learning about the beginning of life will surely help us understand the current biosphere better.

MARIA PAWLOWSKA
Class of '07, PhD candidate in Earth Sciences

Of Flies and Humans

Finding meaning in basic research

Is biological research at the most basic level as vital or meaningful as treating disease at the bedside?

The problem

Basic researchers must consistently justify how their research can be translated into a variety of practical applications – medicine, the biotechnology industry, and the defense industry, just to name a few. Biomedical scientists in particular cannot be blamed for trying to fit their work into such frameworks – after all, funding for such work is more often than not determined by “clinical relevance”.

But is basic research always as important as the field to which it is ultimately applied? Such was my constant internal dilemma when I transitioned from taking care of patients in the clinic to examining the brains of fruit flies in the lab. However, after months on end at the bench, I have come to see that clinical relevance can take many forms, and that deepening our understanding of the basic mechanisms of how the brain works can be just as important as targeting specific proteins for drug development.

The bench to bedside dilemma

I always had an inkling that whatever I chose to pursue, it would be important for me to be able to see the long-term practical applications of my work. Medicine became increasingly attractive as a way to merge my affinities for biology, problem solving, and communication. Thus, I began to see participation in scientific research as one facet of this overarching career goal.

After studying biology and philosophy at the University of Chicago, I chose to use my Gates year to explore a discipline that had become increasingly interesting to me – neurobiology. My MPhil research at Cambridge focused on a mouse model of Huntington’s disease and was in that way an ideal “bench to bedside” project.

I eventually ended up in the Harvard MD/PhD program with a vision to combine research, clinical and international work.

After sampling all of the basic clinical specialties in medical school and deciding to head towards pediatric neurology or psychiatry, joining a neurodevelopment lab made sense. And that is precisely what I did, only instead of choosing a

the symptoms of certain neurological diseases by manipulating these brains. My research, however, does not involve a particular disease model but instead uses the fly as a genetic tool to try and understand how the brain is wired. But will answering questions about the way the nervous system of a fly develops really help us figure out why certain diseases cause the brain of a child to develop abnormally?



system such as human genetics, which would arguably provide a more direct link between research and clinical medicine, I joined a lab conducting basic research on axon guidance (how nerve cells find each other during development) using *Drosophila Melanogaster*, the faithful fruit fly, as a model.

From the clinic to the microscope

Why, many might ask, would someone interested in research as a means to an end join a fly lab? Indeed, in the beginning I sometimes asked myself the same question. After all, although I was drawn to the captivating field of axon guidance, taking care of patients in the clinic was a meaningful experience for me and it seemed difficult to envision the link between the clinic and the microscope. Yes, fruit flies do have brains, and yes, we can even somewhat recapitulate

How it all fits together

The answer to the preceding question is yes. Allow me to explain. I study the fly version of a protein known as Down Syndrome Cell Adhesion Molecule (Dscam). As the name suggests, Dscam is thought to be related to one of the most common causes of mental retardation. The human version of Dscam is located on chromosome 21, the chromosome which is present in triplicate in Down syndrome, and is thought to be related to mental retardation in patients. What makes the *Drosophila* homologue of Dscam both fascinating as well as a potential window into the organization of the human brain is the fact that the gene can be alternatively spliced into more than 38,000 isoforms, or different versions of the same protein. This confers an unprecedented degree of diversity upon a single protein and may in fact be an underlying mechanism of brain connectivity.

The origins of a myriad of developmental disorders remain a mystery. Understanding the basic principles of how brain cells connect to one another is crucial to understanding how this process may go awry and lead to disease. Insights from even the most basic research, therefore, remain not only significant but indispensable to our understanding of the illnesses from which we suffer.

Postpub.org

Helping scientists reproduce!

Scientific understanding progresses through incremental steps, and experimental results have to be reproduced after first broadcast (particularly in the variable world of the life sciences). The post-publication process currently lacks coherence, resulting in unnecessary duplication of work and frustration for experimentalists. Here is a description of why, and what we think can help.

When a scientific discovery occurs, the first step is to compile a set of experiments that support the idea to write a paper and send it to a journal. At the journal, the process of peer-review is the current gold standard for assessing a manuscript's scientific merit for publication. The published discovery is then read and assimilated into general thinking.

Here's the catch. In the competitive world of 'get your paper out asap', many scientists do not have the luxury of waiting to confirm a discovery from every possible angle. There is always a possibility that the results obtained may not hold true for different as yet untested circumstances. Hence the need for other labs to try and reproduce what has been published; to ascertain if it is a general truth, rather than a specific one. However, independently repeated experiments confirming, colouring, or contradicting published work are often not published, being not sufficiently 'significant' to make a paper in their own right. This is where we sense an opportunity to use the web to help use this untapped resource to advance scientific discussion.

Two years ago, a group of Gates scholars sitting at brunch at The Snug were discussing this issue. A lot of new biology was published every day, and not all of it could be taken at face value because biology was variable and there was no way of knowing if experiments were reproduced elsewhere. This information could be crucial particularly for young scientists deciding on the course of a body of work that depends on existing knowledge.

We decided that it would be good to come up with a repository for repeated data on a published experiment. In a joint effort with colleagues at UCL, Columbia, and Yale, we designed www.PostPub.org, a web 2.0 environment with a companion facebook application that provides identity-verified, results-driven, experimentalist-centric platform focusing on reproducibility and methodology of published

biomedical literature- to facilitate organization of the post-publication process (post-snug didn't really have the same ring to it). This would be different from all 'dumping grounds' for negative data available on the internet, as it would only be for repeated versions of a published experiment (both negative and positive), and completely non-anonymous; thus less ad hominem!

We also hope for this venture to directly involve experimentalists in the post-peer review validation phase of modern science. Currently,



comments and questions on a publication are directed towards the senior 'corresponding author' in a lab, who often does not have the time, patience or indeed direct involvement to answer technical details on methodology of experiments. But as with most complex systems, the devil does reside in the details...

Our solution works as follows: if you've repeated a published experiment and get different results- it could mean either that you've done it wrongly (most likely), or that the original publication is wrong. We provide a place where you can put up your data and methodology (which is pretty 'unpublishable' since it is just a repeat) and a link to the original publication. Others interested in the same topic, perhaps even the experimentalist in the primary publication (notified through the site) can reply to your version, clarifying perhaps

why the difference is seen. Other members of PostPub.org add to this, if they have data that is relevant, and a thread is built that could be as valuable to anyone in the field as the original publication was (admittedly not peer-reviewed, but community reviewed- much like the Wikipedia concept). All someone planning out an experiment that is based on published data need do, is check PostPub.org to see if there is any follow up to it! We see this having an impact on the money currently spent in duplication of data at different sites around the world.

To summarize our progress, we have recruited a board of advisors, won the second prize in the Y50K '07 Yale Business Plan Competition, used the \$4,400 prize to hire developers for the main site's front-end and its Facebook application, and submitted an application to the IRS for 501(c)3 (non-profit) status. The facebook application is a networking tool accompanying the site, and is ready and available. It allows scientists to get to know what their friends' interests and publications are, and links to the main site for more in-depth discussions.

With the assistance of developers in India and the US, we have been battling time zones and busy PhDs/post-docs to work on this, and are now pleased to announce that www.postpub.org will be launched by the end of this year. So if you're a biologist and a laboratory experimentalist with data that's lying around in your desk, here's your space to do something with it. Watch this space and see you soon on PostPub.org!

The post pub team:
James Park ('05), Anand Jeyasekharan ('04), Rajan Kulkarni ('06), Nico Lindeger (Columbia), Stephane Budel (Yale), Juha Lauren (Yale) and Shweta Singhal (UCL)

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Class of '05, MPhil in Biochemistry

Looking to the Future

Laying the foundation for global climate change legislation

The U.S. Congress recently passed another milestone in its efforts to address Climate change but some are still labouring hard to keep the momentum going.

In December 2007, the U.S. Senate Committee on Environment and Public Works amended a bill that would put a cap on U.S. greenhouse gas emissions over the next 40 years. The bill, America's Climate Security Act, aimed to create an economic framework whereby polluting businesses would need permits to emit greenhouse gasses. This "cap and trade" scheme would provide an incentive for businesses to reduce their own emissions so they could avoid the costs of purchasing emissions permits and sell (i.e. "trade") those permits to other businesses. In June of 2008, an amended version of this bill, The Lieberman Warner Climate Security Act, was debated on the floor of the U.S. Senate.

As a new member of U.S. Senator Amy Klobuchar's staff, I was excited to arrive in time for this momentous debate. Unfortunately, the debate in the Senate was occurring as petroleum prices, and in turn political opposition, were peaking across the country. So, although the Lieberman Warner bill received more votes than any previous climate change bill (48 out of 100* Senators voted in favour), the bill did not pass with the 60 votes needed in the Senate.

A foundation for the future

With no hopes of passing a climate bill before the November elections, our office focused instead on passing a bill to create a national greenhouse gas registry. Carefully considering lessons from the European Union's Emission Trading System as well as the Chicago Climate Exchange, we crafted a bill that would create a foundation for a U.S. cap and trade scheme by accounting for and tracking current greenhouse gas emissions in the U.S.

Carefully considering lessons from the European Union's Emission Trading System as well as the Chicago Climate Exchange, we crafted a bill that would create a foundation for a US cap and trade scheme by accounting for and tracking current greenhouse gas emissions in the US.

Our bill, The National Greenhouse Gas Registry Act, would require all businesses to report their emissions if they emit 10,000 metric tons of carbon dioxide - or the equivalent for other greenhouse gases - per year. Additionally, to provide more flexibility for future lawmakers who might consider an "upstream approach" to capping greenhouse gasses, our bill would also cover entities that import or process fossil fuels for consumption.

Essentially, it would cover an upstream approach that caps emissions as they come out of the ground as well as a "downstream approach," which focuses on emissions as they come out of smokestacks and tail pipes.

Although our bill passed the Senate Environment and Public Works Committee in September 2008, at the time of this article's printing, it looks unlikely that it will pass both the House and Senate before the end of the 110th Congress. Nevertheless, our proposed registry will hopefully serve as a starting point for President Obama and the new 111th Congress who are poised to finally take action to address the imminent threats of climate change.

2009 and beyond

Next year will prove to be pivotal in the global effort to deal with climate change. It will mark the 15 year anniversary of the gathering of world leaders in Rio de Janeiro to establish the United Nations Framework Convention

on Climate Change at the 1992 Earth Summit. President Elect Obama has indicated that energy policy will be his top priority when he becomes President of the United States. In December 2009, he and leaders from around the world are expected to meet in Denmark to recommit the world to a united effort to deal with the impending threats of climate change.

Given the scope of the problem, which transcends the fields of politics, physical sciences, economics, national security, global poverty, human health, I expect some of you Scholars who are reading this article are already, or soon will be, a part of a global collaboration to address this great challenge. As our chief benefactor has said of us, "*We need highly educated leaders, skilled in research and analysis, who will undertake a creative approach to defining and solving problems ... On graduation from Cambridge, Gates Scholars are in an ideal position to bring new vision and apply their learning to the benefit of society at large.*" Like so many of the great challenges we face, Mr. Gates is precisely correct in his assessment of what is needed to tackle such an all-encompassing challenge.

So, in my unofficial capacity as an actor in the U.S. Government, I hope and trust that with our creativity, expertise, analysis, and common interests we can all work together to achieve a collective triumph over one of the greatest and most complex threats that our species has ever faced.

*Six Senators who were not present for the vote also indicated they would have voted in favour of the bill

Leadership in Action

Pan-scholarship Symposium on Leadership for Positive Change



The first ever pan-scholarship Symposium, organised by the Gates Scholars on 23rd June of this year, was such a success that it is set to become an annual fixture. The event, entitled 'Leadership for Positive Change', brought together 60 students from Fulbright, Rhodes, Marshall, NIH and Gates scholarship programmes. Participants engaged in presentations and discussions about leadership, and covered issues such as the power of social entrepreneurship, the role of the media, science policy and democracy among others.

Among the keynote speakers, Lord May (former Chief Scientific Adviser to the UK Government, and former President of the Royal Society), spoke on science and leadership, Adele Blakebrough MBE, one of the UK's leading social entrepreneurs, talked about leadership via social entrepreneurship and Mary Hockaday, Deputy Head of BBC Radio News, spoke on leadership and the changing face of international news media. All three keynote speeches were followed by panel discussions

led by groups of students from different scholarship programmes and varying subjects. This brought further life to each topic ranging from work with AIDS charities to recent experiences in Zimbabwe.

Hamish Forsyth, Convener of the Symposium and External Officer of the Gates Scholars' Council, said "*The objective was to bring together people who share a common desire and capacity to be agents for positive change in their fields.*" Dr Gordon Johnson, Deputy Vice-Chancellor of the University of Cambridge and Provost of the Gates Cambridge Trust, commended the symposium and expressed his hope that participants would leave with "*new energy, new ideas, new collaborators, and a shared sense of belonging to a broader community of scholars committed to leading for positive change.*"

KATE BRANDT
Class of '07, MPhil in International Relations



Special Times

Building a community of Gates Scholars

Coming to a new place can be daunting, especially a foreign country with new customs and traditions. The Gates retreat in the Lake District helped me forge connections with fellow scholars who create a vibrant and diverse community in Cambridge.

Throughout the bus ride north and while enjoying activities such as kayaking and hill walking I talked with fellow scholars about topics ranging from cosmology to French literature and enjoyed conversations on religion and mathematics. Despite our varied academic interests, I found that we all share a passion to use our talents to achieve our best and contribute to the world through the goals we pursue. It was refreshing to see that, despite the numerous achievements of my colleagues, they were not complacent, but hungry to learn more and strove to find out about me and my interests. I have found the Gates Scholars to be open, humble, and caring. It is a prestigious society but not a pretentious one.

Returning to Cambridge after four lively days, I had a good community base in Cambridge. I realized the advantages of having acquaintances in many colleges studying in numerous departments. Through my colleagues, I have met fascinating people studying various subjects whether it is at a formal hall, punting, or at a lecture. It is rare now that I walk down King's Parade without running into somebody that I know.

At the end of my time in Cambridge, I know that the friendships forged will last throughout my lifetime. We will draw upon our experiences and each other and use what we have to contribute to the world in whatever ways we can.

MICHAEL DUYZEND

Class of '08, MPhil candidate in Computational Biology





Photographs courtesy of Emily Alden, Jochen Brandt, Muhammad Irfan, and Jaya Savige.

Public Health

A tripartite nature

While it seems beneficial to view public health as providing basic medical services to the world community, it is important to remember that healthcare is deeply enmeshed in governmental and educational issues. Strategies to sustainably address these issues can function in both developing and developed nations.

Public health is often viewed with an “us helping them” mentality. A company might fund a hospital in Africa and flaunt how this helps the developing world. While important, projects like these assist only a small population and fail to address the larger issue of providing basic access to education and healthcare to all individuals.

Assisting in development is challenging since healthcare is so intertwined with governmental and educational issues. For example, children need schools to study but children cannot study if they are sick or malnourished. Vaccination campaigns can run through schools but students need schools to know

the benefit a vaccination can bring. Given the interrelationship of these topics, how can we allocate available resources in the most sustainable and fruitful ways?

I promote working from the ground-up, emphasizing youth education, and using technology. Organizations must work with local leaders to focus social mentality on development. Endowing responsibility in local leaders allows the community to invest in their own development without feeling belittled by foreign services. This approach also provides a network of socially conscious and trusted individuals able to oversee development projects in regions of interest.

Youth education ensures socially conscious future leaders to sustain current development projects and develop new ones. Technology, such as advertisements featuring local people benefitting from development projects, promotes others to follow suit. A detailed log of projects also provides a way to measure the success of development work.

In the developed world, this approach is also valuable. We are citizens of the world and, as such, must strive to bring our nations into the consciousness of our global family.

MICHAEL DUYZEND

Class of '08, MPhil candidate in Computational Biology

Tailor-Made Treatments

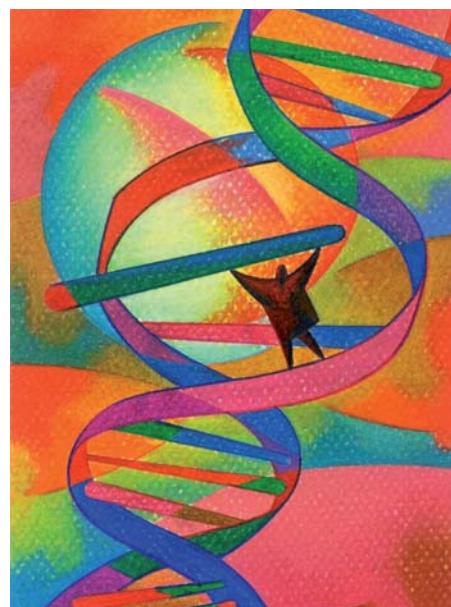
The promise of personalized medicine

My first encounter with personalized medicine was as part of Secretary Leavitt's task force at the US Department of Health and Human Services. I remember finding the challenging nature of the work daunting, but its potential very exciting.

Personalized medicine involves tailoring medical care based on the individual patient's genes. For instance, genetic factors could be used to identify predispositions to specific diseases, select among therapeutic options, and design tailored prescriptions which afford a lower incidence of unwanted side effects. While using a genotype-centered approach is not yet widespread, many advocates in biotech, the civil-sector, and government, expect that it will be the next revolution in healthcare.

Many barriers, however, still stand in the way of realizing the promise of personalized medicine. Federal regulation of genetic testing is varied and genetic privacy has not been fully addressed by current legislation. Perhaps most critically, the science behind many gene-trait

associations is still relatively uncertain – in fact, some experts believe that only 50 of the 1,400+ gene-trait associations available are reliable.



Since Cambridge, part of my work in government and the private sector has focused on helping this field mature. In addition to clinical use, I'm particularly interested in the impact of genetic testing on global health and the blockbuster drug model.

One significant benefit of employing genetic testing during treatment and clinical drug trials is that pharmaceutical companies can materially lower the cost of bringing a drug to market. This “minibuster” model creates the possibility of profitably developing treatments of neglected diseases, hopefully advancing public health in developing countries worldwide.

ANDREW ROBERTSON
Class of '01, PhD in Genetics

Toiling for Toilets

Working towards sustainable sanitation

There is much to be done if we are to achieve the United Nations' goal of providing improved sanitation to an additional 1.5 billion people in developing countries by 2015. And even more if we are to do this in a sustainable way.

Most people would not consider the topic of toilets to be appropriate for serious conversation, and yet they are part of one of the most important health crises of our time. As of 2004, 2.6 billion people - 40% of the world's population - either defecated in the open or in unsanitary facilities (WHO and UNICEF, 2006). Developing countries are most affected, where 50% of the population do not have access to improved sanitation.

The World Health Organization (WHO) estimates that poor sanitary conditions and practices cause 85-90% of diarrhoeal diseases in developing countries (Prüss-Üstün et al., 2004), contributing to the deaths of 1.6 million children under the age of five each year (WHO and UNICEF, 2006). Additionally, one billion people suffer from worm infections associated with the unsanitary disposal of faeces (WHO, 2004). These examples highlight the huge impact of poor sanitation, coupled with lack of access to clean water, on public health in developing countries.



Clearly, an affordable approach to sanitation that simultaneously protects public health and the environment is needed. To address this need in a sustainable manner, a holistic consideration beyond the technical is necessary. In my research, I aim to contribute to the increased sustainability of sanitation systems by developing and applying an evaluation methodology using environmental, economic, and socio-cultural/institutional indicators.

For example, in the eThekwin Municipality in South Africa, I am evaluating and comparing the sustainability of a conventional and an alternative approach to sanitation for 6300 indigent households in a peri-urban area. My research indicates that, contrary to traditional engineering approaches, developing a sustainable sanitation system goes way beyond technology and economics: other serious considerations include environmental impact, cultural norms, personal habits and perceptions, local government structure, and skills of the local workforce. This means that engineers like me have to become more than just engineers to reach across disciplinary boundaries. So, Gates Scholars - engineers and non-engineers alike - please talk to me about toilets, perhaps even over dinner!

AMPARO FLORES
Class of '06, PhD candidate in
Engineering for Sustainable Development

Testing Trials

Genetic information and young women

Learning that you carry a genetic mutation that increases your risk of developing breast cancer can be hard to handle for any woman, but it is especially difficult for young women, who face unique body image, fertility and partnership concerns. For the research component of my Cambridge MPhil, I examined how women between the ages of 25 and 35 respond to news that their lifetime risk of breast cancer may be as high as 80 percent due to their DNA.

In qualitative interviews, many women told me they felt exhausted by the prospect of having

to make sense of risk and decide on a course of action. More and more, women who test positive for BRCA, the breast cancer mutation, choose to remove their breasts and ovaries to reduce their risk of developing breast cancer to two percent. Women who wanted children described to me their worry over passing the mutation on, yet they also felt rushed to conceive so that they could remove their ovaries. Where some women found their partners to be supportive, I heard about how others struggled to maintain their relationships and how single women fretted over finding partners who would be willing to see them through their plight.

More scientific and sociological research is needed so that we can offer women who test positive for BRCA better treatment options and understand their concerns. For instance, wouldn't it be nice if the best way to reduce risk of developing breast cancer no longer required removing body parts? Then the young women I talked with would not have to grow up so suddenly.

ARIANA GREEN
Class of '07, MPhil in Modern Society & Global Transformations

Ambassadors Around the World

Gates alumni start outreach efforts

The Gates Scholars' Alumni Association recently started an exciting new outreach program, promoting the Gates Cambridge Scholarships and graduate study at Cambridge to potential applicants around the world. This idea was borne out of the desire to increase the level of awareness about this incredible opportunity that is available to bright, passionate, and ambitious students.

We think it is important to continue to attract an accomplished and diverse applicant pool for the Trust, and there are two aspects to this program. The first is organizing events in geographic centers around the world to publicize the Scholarship to all interested applicants. The second is building up a set of "Gates Ambassadors" to act as liaisons to individual colleges and universities throughout the year.

Cambridge in New York City

We held an event in April 2008 in New York City at the Graduate Center- City University of New York. We invited more than fifty representatives from area schools to attend the "information session" to learn more about graduate study at Cambridge. Fellowship advisors, students, and some of their parents were in attendance to hear Dr Gordon Johnson speak about the benefits of a graduate education at Cambridge and the history of the Gates Cambridge Trust. Also present was the President of the Graduate Center, who graciously hosted us, William Kelly (himself a Cambridge graduate, St. John's, 1975, and father of a Gates alum Ann Kelly, 2002).

The audience of about seventy listened to Gates Ambassador Hilary Levey speak about the application process before hearing a lively panel of Gates, Marshall, and Rotary alums discuss graduate life at Cambridge. After the formal part of the evening, applicants and advisors mingled with other Gates alums and recent award recipients over tea and dessert.

The event laid the foundations for several

speaking events for Gates Ambassadors, including sessions at West Point and Columbia. Additionally, students from Rutgers, The King's College and several other schools who attended the session, provided feedback that they now planned on applying for the Gates; one student wrote, "*learning more about this exciting opportunity increased my enthusiasm about the possibility of graduate school abroad.*"

This event will be held again in Spring 2009 and a similar session is planned for San Francisco in the spring as well.

Ambassadors in action

Following this successful event, the Ambassadors program really took off. We solicited applications from alumni around the world to serve as Ambassadors and received an enthusiastic response. Peter Brereton (2001), in explaining his decision to become a Gates Ambassador, summed up the thoughts of his fellow Ambassadors well: *"I am convinced that the scholarship needs a concerted effort by alumni to inform university administrators, faculty and students of the incredible opportunities available to them via a Gates Cambridge Scholarship. We must, as alumni, seek recognition throughout the academic world that our scholars are as intellectually competitive as any of the other major fellowships (in ALL fields) and that we are universally committed to improving the lives of citizens throughout the world, and working to overcome social and economic injustice."*

We currently have seventeen Ambassadors, like Peter, reaching out to students around the world. This fall we have been building a

database of university contacts and sending them letters about the scholarship. Many advisors have requested meetings, connected us with students one-on-one, or asked us to visit their campus to give a formal presentation about the Gates. We've done so in California, New Jersey, New York, and in countries like Spain, India, and Zambia.

Gates Ambassador Ming Lim (2004) explains why this is an important effort in Asia: *"In many countries, particularly in the Asian region, the Gates Scholarship is not widely known due to the lack of publicity. Previous Gates Scholars from the Asian region were mostly undergraduates already studying overseas where there is more publicity about the various scholarships available. My experience in promoting the scholarship locally has been largely informal - such as through contacts with friends back in Malaysia. However, I am aware that there is a large pool of highly-suitable applicants that we could tap into, if only they were informed of the opportunities available."* For a full list of current Ambassadors, go to <http://gatesscholar.org/about/how-to-apply.asp>.

We need you!

As we continue to grow our outreach efforts we would love to have you join us, wherever you are in the world! In the spring we will send out information on becoming a Gates Ambassador and we hope you will consider helping the Gates community in this way.

HILARY LEVEY
Class of '02, MPhil in Modern Society & Global Transformations

Brief write-up of US new scholar-alumni meetings

This year we had another successful round of alumni-new scholar meetings in the US! Forty-four meetings were arranged between alums and new scholars from Albany all the way to Seattle, and everywhere in between - the meetings also went international this year, with one meeting in Scotland. Those who couldn't connect in person spoke by phone. Feedback from some of these coffee dates and brunches was so positive that in areas with a larger concentration of new scholars and alums, a dinner was organized. This year in Princeton, New Jersey seven new scholars and three alums, along with their partners, enjoyed a lively Italian meal together, enabling some of the 2008 scholars to develop connections with one another early on, and to see the wonderful alumni community that they will join within a few years. If you are interested in hosting one of these dinners next year, please email Hilary Levey (levey@post.harvard.edu)!

Socializing in the Bay area

The Gates alums in the Bay area have been very active this year! On top of the fabulous dinner in September, we have also had more informal get-togethers. In May a group of ten alumni and their partners got together for a fabulous Thai dinner along the Embarcadero in San Francisco. We've also been socializing during non-Gates sponsored events. San Francisco and its environs attract many Gates alums both for higher educational and work opportunities—and the weather isn't bad either! We look forward to welcoming new alums to the area as well, so be sure to email Nathan George (nathan.george@gmail.com), the RC for the area if you aren't already on his list.



CLASS NOTES

2001

Geraldine Parsons - I moved to Scotland in September 2008, to take up a lectureship in the Department of Celtic, University of Glasgow. I hope to get back to Cambridge in the near future to enjoy a little more of my truncated research fellowship, I am also relishing the change of scenery!

2002

Alessio Ciulli - I have been awarded a Human Frontier Science Program Fellowship at Yale University, starting in February 2009. I look forward to my experience at Yale, and hope I will be able to meet with Gates alumni who are still based on the East Coast. Be in touch!

2003

Shiladitya Paul - I finished my PhD last year, but I am still around working for an R&D organisation in Cambridge. Further, I am keeping close links with the Gordon Laboratory, Department of Materials.

2004

Chiraag Bains - I graduated from Harvard Law School this past spring and married classmate Tara Ramchandani this summer. We have moved to Boston, where I am working as a law clerk at the federal district court.

Douglas Guilfoyle - I received my PhD in international law from Cambridge in November 2007. In June 2007 I married Zoe Rose in All Saints Church, Canberra. I was offered a lectureship in Law at University College London starting October 2007 and am presently teaching public international law, international criminal law, and international law of the sea to a diverse and highly internationalized student body. A book based on my PhD research, *Shipping interdiction and the law of the sea*, will be published with CUP in 2009. I have also had the chance to assist in preparing legal advice for some less-developed countries regarding their off-shore resources.

2005

Lina Sestokas - I was married to Steven Scroggins in Cambridge, MA on Sep 6, 2008. We met in Emmanuel College, when I was a Gates Scholar and Steve was a Herchel-Smith Scholar from Williams. We now live in the San Francisco Bay Area, where I work for Google and Steve is a graduate student in chemistry at the UC Berkeley.

2006

Tristan Brown - After graduating from Cambridge last summer, I returned to the United States and worked for [then Senator] Barack Obama's presidential campaign. I am currently working in Washington, DC as an aide to a U.S. Senator.

Mohammed Elshafie - After finishing my PhD in the Engineering Department, I was awarded the Philip Turner Prize for the best research involving the use of the centrifuge for the simulation of construction processes. My work involved simulating deep excavations and predicting the potential damage to adjacent buildings from the excavation-induced displacements. I have been offered a job as a post-doc in the Engineering Department and a 5-year Engineering Fellowship at Robinson College Cambridge.

Alejandro J. Ganimian - The non-governmental organization that I founded in Buenos Aires, Argentina, is now about to complete its first year of operations. "Educar, Integrar & Crecer" (Educate, Integrate & Grow-EIC) works with young people to improve the quality of education of the poorest children in Argentina. In its first year, EIC has created a Student Learning Center, where approximately 100 children go every week after school for personalized classes on language and math. EIC has also opened a Community Computer Lab, where more than 100 children go to reinforce the learning they do at school using open-source software. Both programs take place in the Province of Buenos Aires and serve the children of La Cárcova shantytown—one of the largest and most dangerous in the province. EIC currently has more than 20 volunteers, a staff of 7 people, and a permanent board of directors, and it promises to become the fastest-growing youth-led NGO in the country.

Sally Louise Gras - I am now a lecturer in Chemical and Biomolecular Engineering at The University of Melbourne in Australia where I teach Metabolic Engineering. I am also a group leader at the Bio21 Molecular Science and Biotechnology Institute where my group researches basic and applied bioengineering problems from amyloid fibrils, materials research and tissue engineering to functional foods and projects on cheese microstructure. I have been awarded funding by the Australian Research Council Linkage and Discovery Schemes and received an Indo-Australia biotechnology grant. For further information see: <http://www.chemeng.unimelb.edu.au/people/staff/gras.html>. I am also helping Australian students apply for places at Cambridge University as part of my role on the Cambridge Australia Trust Victorian Committee.

Up and Coming

Mark your calendar

Cambridge events

Open Mic

Date: Monday Dec 1, 8pm
Venue: Gates Room

Email Amber North (an328@cam.ac.uk) if you would like to play a tune, read some poetry, or share some other talents.

Holiday Party

Date: Sunday Dec 7, 7pm
Venue: Clare College MCR

Come by for some mulled wine, mince pies, corny holiday tunes, and a gift exchange with your fellow scholars before break.

10th Anniversary weekend

Date: July 3rd-4th, 2010
Venue: Cambridge

To celebrate ten years of the Gates-Cambridge Scholarships, the Gates Scholars Alumni Association, along with the Trust and the Council, are organizing a multi-day event at Cambridge in July 2010. The days will be full of panels and lectures on the state of the Gates and important issues in major fields like the Humanities, Development, and the Sciences; the evenings will be full of reminiscing with old friends at Cambridge dinners, and making new connections amongst the Gates community. Please keep your eyes open for more information in the coming months, but if you have any questions or suggestions please email Hilary Levey (levey@post.harvard.edu) or Jennifer Gibson (gibson@cantab.net).

Worldwide Events

Alumni in different regions of the world regularly get together to socialize over dinner, drinks and sometimes a night out to the theater or other cultural event. Please check in with your regional coordinator for any upcoming events this winter and spring.



Front cover: Shefali Mehta-a Gates alumna-waiting in a Lion Research vehicle to fly out of the Seronera airstrip in Serengeti National Park in Tanzania

Photograph by Megan Strauss. The photo is provided courtesy of Shefali Mehta '01.