RICKMANSWORTH SCHOOL

Headteacher: S.P. Burton MA PhD

January 2008

Dear Parent / Guardian,

Following the successful trips to The Royal Institution Friday Evening Discourses in the autumn term, The Science Department will be offering students in Years 10 and above the opportunity to attend the spring lectures, as detailed below. The lectures take place at The Royal Institution in London from 8:00-9:00pm on Friday evenings during term time. These lectures offer an excellent opportunity for students with an interest in and passion for the Sciences and a range of other subjects, including Art, Economics and Computing, to explore relevant and cutting edge topics beyond the school curriculum.

Date	Lecture Title	Lecturer	Teachers Attending	Number of places available
Friday 6th February	Aeons before the Big Bang?	Prof Sir Roger Penrose	Mrs Wilshaw Mr Thomson Miss Mir	30
There is much observational evidence to confirm the existence of an enormously hot and dense early stage of the universe-referred to as the Big Bang. A good deal of this evidence comes from a detailed analysis of the cosmic microwave background (CMB), frequently referred to as the flash of the Big Bang. Following the Big Bang the universe was cooled to about 3.7 degrees absolute by its accelerating expansion. But this very detail presents new puzzles of various kinds, one of the most blatant being an apparent paradox in relation to the second law of thermodynamics. The hypothesis of inflationary cosmology has long been argued to explain away some of these puzzles, but it does not resolve some key issues, including that raised by the second law. In this Discourse Prof Penrose will describe a quite different proposal, which posits a succession of universe aeons prior to our own. The expansion of the universe never reverses in this scheme, but the space-time geometry is nevertheless made consistent through a novel geometrical conception. Some very recent analysis of the CMB data, obtained from the WMAP satellite, will be described, this having a profound but tantalizing bearing on these issues.				
Friday 13th February	Darwin's 'Sacred Cause'	Prof James Moore	Mr Gentry Miss Hawkins	20
Why did Charles Darwin, a rich and impeccably upright gentleman, go out of his way to develop privately a subversive image of human evolution in 1837-39? Why did he pursue the subject with tenacity for three decades before publishing *The Descent of Man* in 1871? A radical reassessment of the basis of Darwin's achievement provides the answer. In the standard myth, Darwin was a heroic genius discovering gems of truth beyond the vision of ordinary mortals. He was a great scientist getting on with a scientist's proper job, not a Victorian naturalist with a consuming moral passion. But today we need to examine the circumstances that made it possible for Darwin to craft a theory from available cultural resources. Underpinning his work on human origins was a belief in racial brotherhood rooted in the greatest moral movement of his age, for the abolition of slavery. For abolitionists, the human races were members of one family, with a common ancestry. Darwin extended the 'common descent' image to the rest of life, making not just the races, but *all races* kin. Darwin's science wasn't the dispassionate practice of textbook caricature; it was driven by human needs and foibles. Even our most vaunted theories may be fostered by humanitarian concern.				

Friday 27th February	Robots with biological brains and humans with part machine brains	Prof Kevin Warwick	Miss Gillan Mr Norval	20
In this Discourse, Prof Kevin Warwick will look at the use of implant and electrode technology to create biological brains for robots and to enhance the brains of humans. This technology is already being used with profound effects; in all cases a key element is a clear interface linking the biological brain with computer technology. The Discourse will particularly focus on the use of electrode technology, where a connection is made directly with the cerebral cortex and/or nervous system, with examples from scientific studies. Prof Warwick will consider the future, in which robots have fully or part biological brains and in which humans may link their nervous systems with technology and the internet.				

Friday 6th March	China and climate change: curbing emissions from the factory of the world	Dr Jim Watson	Miss Cameron Miss Bristow Miss Gillan	30
China's economy has grown rapidly over the past two decades, with annual GDP increases of around 10% per year. This economic expansion has been coupled with large increases in energy demand. Coal continues to dominate the Chinese energy system, providing around two thirds of primary energy supply. These trends bring with them several pressing challenges. Securing enough energy to sustain economic growth is an important priority. Alongside this, increasing attention is focused on the environmental side effects of economic development such as desertification, air and water pollution. These side effects also include growing emissions of the greenhouse gases that cause climate change. China is now the world's largest emitter of carbon dioxide and the impacts of climate change within China are expected to be severe. This Friday Evening Discourse will examine the roots of China's economic growth, the impacts on energy demand and the environment, and efforts to mitigate these impacts. It will draw on a decade of research on energy policies in China, often conducted in partnership with Chinese institutions. It will also discuss the importance of environmental protection within China and how this is informing an increasingly active climate change policy. A key question is whether China will be successful in transforming its energy system away from the current carbon intensive path - and under what conditions China might become a leader in global emissions mitigation.				

Friday 13th March	Unlocking the mystery behind the flooding of New Orleans	Dr Scott Steedman	Miss Gillan Mr Thomson Mrs Wilshaw Miss Mir	30
When the coastal defences protecting New Orleans were breached by rising waters following hurricane Katrina in 2005, one of the world's most powerful centrifuges was quickly deployed, even before the waters had reached their crest. Why was a centrifuge relevant and what did it reveal? Dr Scott Steedman was one of the task leaders for the Federal investigation into the hurricane Katrina disaster, having steered the transfer of centrifuge technology from the UK to the US Army Corps of Engineers during the 1990s. In this discourse, Dr Steedman will explain what happened in New Orleans and how and why this useful mechanical invention was so vital in identifying a critical weakness in the city's defences.				

Friday 20th March	Ocean acidification: the other CO_2 problem	Dr Carol Turley	Mr Thomson Miss Fields	20
Over approximately the last 200 years, since the start of the industrial revolution, human dependence on fossil fuel energy has increased atmospheric CO_2 concentrations from about 280 parts per million to 38 5ppm. If we do not mitigate global CO_2 emissions it now seems almost certain that the greenhouse effect of CO_2 will result in serious global warming. The oceans have taken up half the fossil fuel CO_2 produced over this period and whilst this has buffered climate change to some extent, it is increasing the acidity of the world's oceans. Further rapid increases in ocean acidity will happen this century at the same time as the seas are warming, creating multiple threats to the marine environment. This will have a profound impact on ocean chemistry and could have an equally profound impact on marine organisms, food webs, ecosystems and the services they provide. This Discourse aims to demonstrate that ocean acidification is a strong additional argument to that of climate change for urgent and substantial reduction of CO_2 emissions.				

Friday 27th March	The moral imperative to enhance human beings	Prof Julian Savulescu	Miss Hawkins Miss Gillan Miss Honarkhah	20
Should we use science and medical technology not just to prevent or treat disease, but to intervene at the most basic biological levels to improve biology and enhance people's lives? There are various ways in which people can be enhanced but in this Discourse Prof Savulescu will focus on biological enhancement, especially genetic enhancement, and will consider the current possibilities for the biological improvement of human beings. Far from being merely permissible, Prof Julian Savulescu will argue that we have a moral obligation or moral reason to enhance ourselves and our children. Indeed, we have the same kind of obligation as we have to treat and prevent disease. Not only *can* we enhance, we *should* enhance. Prof Savulescu will begin by considering the current interests in and possibilities of enhancement and will then go on to offer three arguments that we have very strong personal reasons to seek to enhance. He will deal with a range of objections and argue that there are good social and public interest arguments in favour of obligatory population level enhancements based on social and economic arguments and the necessity to preserve humanity.				

For each lecture, we meet at Croxley Green station at 6:15pm and travel together to and from the Royal Institution. Students will be responsible for paying for their own ticket, which costs £1.50 for under 18s and £5.30 for adults on a group ticket. We will return to Croxley Green station at approximately 10:30pm, from where students should make their own way home. If you would like your son / daughter to take a different route home, for example leaving the train at Moor Park, please indicate this on the reply slip. **Please note that smart dress is required at the lectures; no jeans, trainers or sportswear are permitted.**

If your son/daughter is no longer able to attend a lecture, he/she should inform the teachers accompanying the group by Wednesday of the week in which the lecture takes place so that his/her place may be offered to another student.

If you would like your son/ daughter to attend any of the above listed lectures, please complete, detach and return the slip below to Mrs C Wilshaw by Friday 30th January 2009. Places will be allocated on a first come, first served basis. Please note that attendance at lectures requires a minimum of 10 students; if this number is not reached for a particular lecture, will inform students that this particular lecture trip will not occur.

Yours sincerely,

Mrs C Wilshaw,
Head of Physics & Assistant Head of Science,
Rickmansworth School.

Royal Institution Science Lectures – Spring 2009

I give permission for my son / daughter: Name of student: _____ in form: _____ to attend the Royal Institution Friday lectures listed below and to travel home from Croxley Green station unaccompanied on his/her return.

Date	Lecture	Tick if your son/daughter would like a place to attend this lecture
Friday 6th February	Aeons before the Big Bang?	
Friday 13th February	Darwin's 'Sacred Cause'	
Friday 27th February	Robots with biological brains and humans with part machine brains	
Friday 6th March	China and climate change: curbing emissions from the factory of the world	
Friday 13th March	Unlocking the mystery behind the flooding of New Orleans	
Friday 20th March	Ocean acidification: the other CO_2 problem	
Friday 27th March	The moral imperative to enhance human beings	

If your son / daughter will not be returning to Croxley station with the rest of the group, please give details of this below (e.g. leaving the train at Moor Park):

_____

_____

Please provide your son / daughter's e-mail address for reminders closer to the time of the lectures and mobile phone number in case he / she needs to be contacted on the day of a lecture.

Student's e-mail address: _____

Student's mobile phone number: _____

Signature of parent: _____ Date: _____

Please return to Mrs C Wilshaw by Friday 30th January 2008