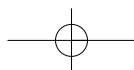


50th London International Youth Science Forum 2008



23 July – 6 August 2008





London International Youth Science Forum 2008

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OM KG KT, 1959-1969

Past Patron

HRH The Duke of Kent
KG, 1983-1988

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BSc PhD CBiol FIBiol FIBioll (*Ireland*)

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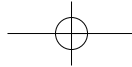
FRSC CChem CBiol MBiol AMIC (*Malaysia*)

Professor Neil Williams, BSc (Hons) PhD

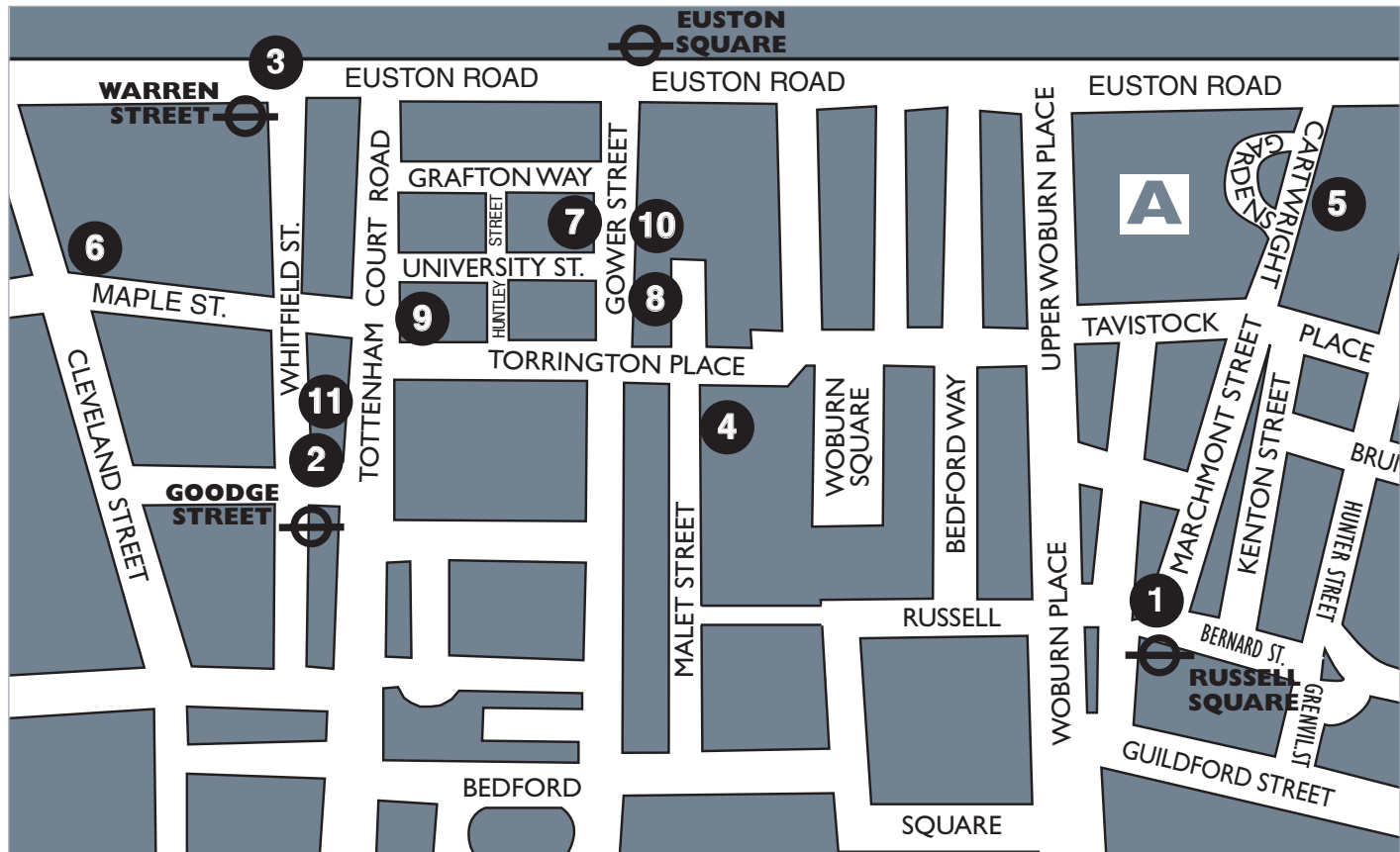
Founded in 1959, the Science Forum aims to give a deeper insight into Science and its applications for the benefit of all mankind; and to develop a greater understanding between young people of all nations.

**LONDON INTERNATIONAL YOUTH SCIENCE FORUM
ROYAL PARADE MEWS, CHISLEHURST, KENT BR7 6TN
UNITED KINGDOM**

Tel: Int + 44 (0)208 295 8395 Fax: Int + 44 (0)208 289 9696
e-mail: enquiries@liysf.org.uk www.liysf.org.uk

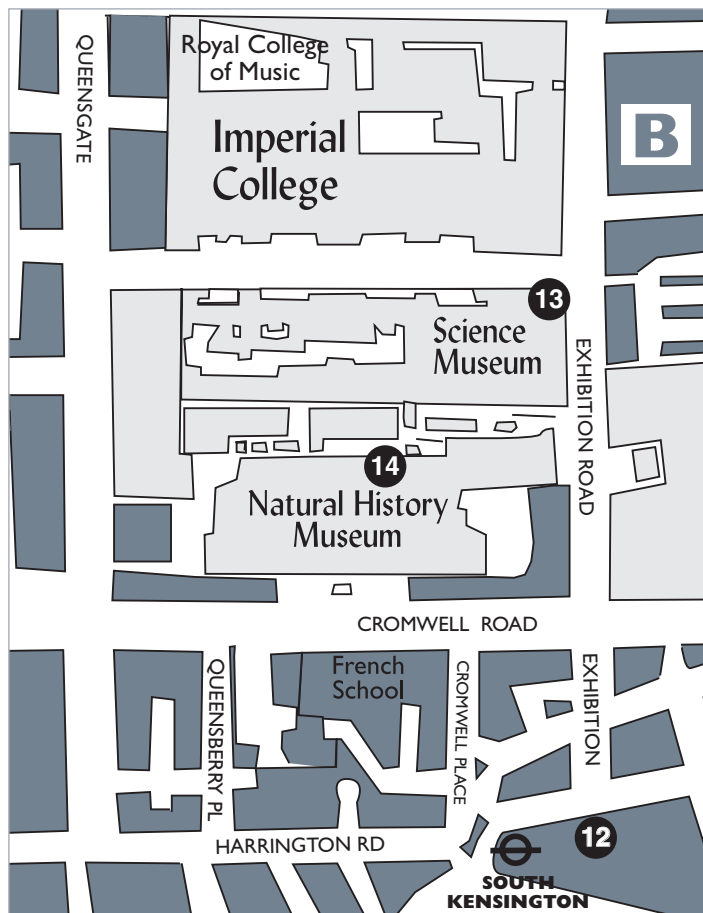


Location of Venues



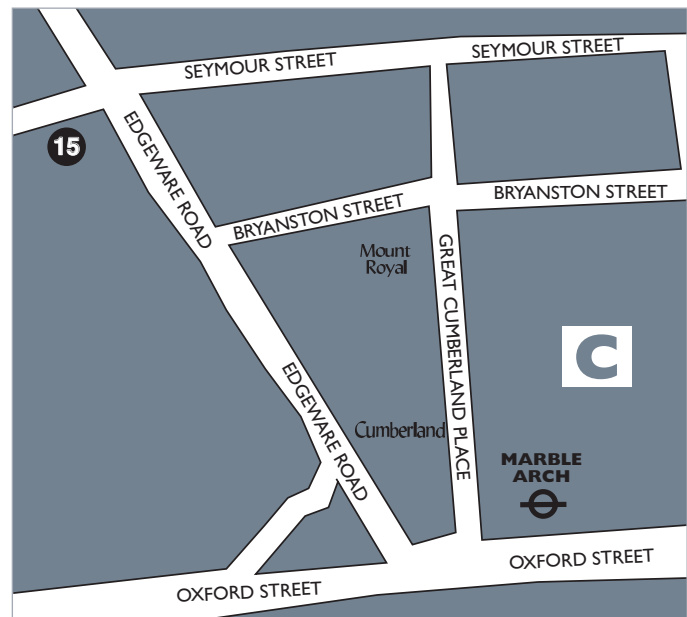
MAP A (University Precinct)

- 1 Russell Square Underground Station (Piccadilly Line)
- 2 Goodge Street Underground Station (Northern Line)
- 3 Warren Street Underground Station (Northern and Victoria Lines)
- 4 University of London Union (coach pick-up point)
- 5 COMMONWEALTH HALL
- 6 RAMSAY HALL
- 7 Cruciform Building
- 8 Darwin Theatre
- 9 188 Tottenham Court Road
- 10 University College London
- 11 American Church Hall



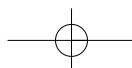
MAP B (South Kensington)

- 12 South Kensington Underground Station (District & Circle, Piccadilly Lines)
- 13 Science Museum
- 14 The Natural History Museum



MAP C

- 15 CARISBROOKE HALL
- Marble Arch Underground Station (Central Line)





**The Prime Minister
2007-present**



10 DOWNING STREET
LONDON SW1A 2AA

I am delighted to welcome you all to the 2008 London International Youth Science Forum. This year, the Forum marks its 50th occasion. It is therefore a suitable occasion to celebrate its success in bringing unique experiences to young people through engagement with scientists, learning about scientific discovery, and gaining an insight into how science and scientists can play a vital role in shaping our future for the better.

Science and technology plays a vital role in all our lives. I am pleased that this year's agenda builds on the momentum of last year's theme on the challenge of climate change. Climate change is the greatest global challenge faced by humankind today and science is critical in helping us to understand the problem, finding innovative ways to reduce energy use for our homes, transport and industry, discovering means of adapting to climatic changes that are unavoidable, and increasing our understanding of the complex natural world around us.

Innovation and engineering lie at the heart of the technological solutions and this year's special theme 'Engineering the Future' will allow you to explore the challenges that science will face over the next 50 years. I hope that you enjoy the events and are inspired to become the scientists of tomorrow, playing a key role in shaping our future for the better.

I hope that you will make the very most of this event, taking the opportunity to enhance your knowledge, meet like-minded young scientists and making many friends. Enjoy the science forum... it may well change your life!

Gordon Brown



London International Youth Science Forum 2008

5

Last year's participants:



The following countries will be represented this year

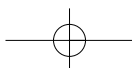
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| Australia | Ireland | Russia |
| Austria | Israel | Scotland |
| Belgium | Italy | Singapore |
| Canada | Jamaica | Slovak Republic |
| China | Japan | South Africa |
| Cyprus | Korea | Spain |
| Czech Republic | Kuwait | Sweden |
| Denmark | Luxembourg | Switzerland |
| Estonia | Malta | Thailand |
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| Greece | New Zealand | United Kingdom |
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| Hungary | Poland | – Scotland |
| Indonesia | Portugal | – Wales |



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Acknowledgements

The Science Forum offers its thanks to all those who so generously assisted in the planning and preparation of the 2008 meeting, and in particular to:

The Lecturers and Speakers whose contribution is invaluable.

AstraZeneca plc; Engineering and Physical Sciences Research Council; Holmes-Hines Memorial Fund; Pfizer Ltd and the Royal Society of Chemistry for their sponsorship of participants from the United Kingdom.

The schools, colleges and local authorities who nominate candidates from Britain to attend the Science Forum and the industrial, commercial, and charitable institutions who sponsor their attendance.

The schools, educational groups, science competitions and foundations worldwide, which select and sponsor overseas participation.

The European Commission which sponsors the attendance of prize winners from the EU Contest for Young Scientists.

The British Council, the principal sponsor of overseas participants, for its generous support, assistance, and unfailing courtesy in so many countries, where participation is made possible through its involvement.

University College London for providing its facilities for plenary and specialist lectures and for seminars.

The Universities, Industries and Research Centres for their generosity in hosting visits to their establishments.

The Wardens, Bursars and Staff of Ramsay Hall and Commonwealth Hall, where participants are accommodated.

The George McGowan Memorial Fund for UK schools sponsorship.

Jess Chaplain for photographic services.

Jim Green for sound systems and programmes for the welcome and farewell parties.

Chef in a Box Ltd, and Frank Phillips for assistance with catering arrangements.

Clarks of London Ltd Coaches for coach transportation.

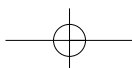
Alito Color Group Ltd for the production and printing of the program booklet.

Courtwood Film Services Ltd for group photograph processing.

Front Cover: 'Newton' by Sir Eduardo Paolozzi.
Jessica Chaplain

The back cover picture features carbon nanotubes.

All those who have assisted, and who are not included in this list, whose support has made the organisation of the Science Forum possible.





**Professor
Richard O'Kennedy**
PhD, CBiol, FIBiol, FIBiolI
PRESIDENT



June 17th 2008.

Dear Participants,

I am delighted, as President, to welcome you to the London International Youth Science Forum. This is a very special occasion, as it is our fiftieth anniversary, and clearly demonstrates the importance and effectiveness that the Forum has had in catalysing interactions between young people throughout the world with science as a central theme.

Over the last half-century science and technology have played an ever increasing role in the lives of people everywhere. Huge advances have been made in healthcare, communications, genetic engineering, space technology and food production. However, while some countries and communities have benefited greatly others still lack the basic rudiments for life such as food, water, shelter and security. Our planet is threatened by potential and ongoing climate changes and the reduction in energy sources will have huge impacts on our lives and could be a major source of international friction. During the Forum you will have the opportunity to discuss these issues and will learn that such problems cannot be successfully solved without a collaborative approach involving many countries and many different scientific and social inputs. You will find that your ideas will be tested and that you can potentially make a significant contribution to solving these problems.

Take every opportunity to meet as many people as you can and get involved in all aspects of the programme. It is exciting, thought-provoking, demanding and great fun. I guarantee that you will make friends for life and have an experience that may greatly influence your future career. I know this, as I was a past participant who enjoyed and benefited from it immensely. Have a wonderful time and I look forward to meeting you.

Yours sincerely,

Richard O'Kennedy

Richard O'Kennedy Ph.D., C.Biol., F.I.Biol., F.I.Biol.I.,
President, London International Youth Science Forum,
Professor of Biological Sciences,
School of Biotechnology and
Biomedical Diagnostics Institute,
Dublin City University, Ireland.



Halls of Residence



COMMONWEALTH HALL Cartwright Gardens, London WC1H 9EB

Tel: Int +44 (0)20 7685 3500

Fax: Int +44 (0)20 7383 4375

Science Forum Host:
Jake Mann



RAMSAY HALL Maple Street, London W1T 5HB

Tel: Int +44 (0)20 7387 4537

Fax: Int +44 (0)20 7383 0843

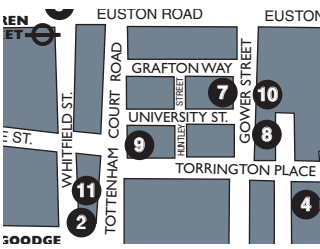
Science Forum Host:
Miriam Toolan



CRUCIFORM BUILDING Gower Street, London WC1



DARWIN THEATRE Gower Street, London WC1



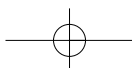
188 TOTTENHAM COURT ROAD (9)



AMERICAN CHURCH HALL (11)



CARISBROOKE HALL Seymour Street, London W2





John Needle
CONFERENCE DIRECTOR



This will be the 50th London International Youth Science Forum.

When the Forum started in 1959, jet passenger travel was a novelty. Computers were huge and electromechanical; radios and television sets operated with valves; the laser had only just been invented, and had no apparent use. Cancers were largely incurable; heart surgery was deeply risky. The first orbiting satellite was a year old, and the space race had yet to begin. Mobile phones existed only as a science-fiction dream and no-one had ever thought of i-Pods.

I was first associated with the Forum in 1964, and it is a slight shock to realise that this will be my 45th Forum; I have lived through all these advances in science and the first participants of the Science Forum are now grandparents...

This will be your first Science Forum and you have grown up familiar with the things that in 1959 would have been considered miraculous. The pace of scientific research accelerates, and it is certain that the next 50 years will produce as many advances as in the last half-century. What will these be? How can you be involved?

This year the Science Forum is turning its focus on the future, and you will have the opportunity to explore how you might contribute to science in your career.

But as always the Forum is a unique event that will introduce you to your fellow students worldwide. We provide the framework of activities, but it is the friendships and contacts you will make over the next two weeks that will bring the Forum to life.

You are in the centre of one of the world's most exciting cities; you are about to meet Science Forum participants who will become lifelong friends and you will be seeing and meeting a range of scientists foremost in their fields. Enjoy!

A handwritten signature in black ink that reads 'John Needle'. The signature is written in a cursive, slightly slanted style.

Programme of Events

Wednesday, 23 July

Arrivals
Welcome & Orientation in Halls of Residence

Thursday, 24 July

10.15 Introductions & Programme Briefing

11.00 **OPENING CEREMONY**

14.30 Lecture/Demonstration: *That's a good question*

20.00 Welcome Party at Carisbrooke Hall

Friday, 25 July

Morning visits to Research and University Departments

14.30 Lecture/Demonstration: *The Magic of Bubbles*

20.00 The Science Forum Bazaar in The Cloisters, UCL

Saturday, 26 July

10.00 Lecture/Demonstration: *Colour is Fun*

Optional Sightseeing Tour of London

Optional Theatre Visits

Sunday, 27 July

09.00 Optional Excursion to Stonehenge and Salisbury

20.00 The Great Crossword Treasure Hunt: *Inter Hall Competition*

Monday, 28 July

10.00 Specialist Lectures

14.30 Lecture/Demonstration: *Engineering the future through Multidisciplinarity*

20.00 Student Topics in Ramsay Hall

Tuesday, 29 July

Day Visits to Research and Industrial Establishments

Wednesday, 30 July

10.00 **Managing the Warming World.** Plenary session. Discussion groups

13.30 Reports. Plenary session. Headline Theme Agreement

20.00 Lecture/Demonstration: *Chemistry and Light*

Thursday, 31 July

08.00 Day Visits to Oxford and Cambridge
Morning: University Department Visits. Afternoon: Free for Private Visits

Friday, 1 August

10.00 Specialist Lectures
 14.15 Visits to Scientific Museums at South Kensington
 20.00 International Cabaret at Carisbrooke Hall

Saturday, 2 August

10.30 Lecture/Demonstration: *Musical Squares*
 14.15 'Science Forum Olympics'
 Optional Theatre Visits

Sunday, 3 August

09.00 Optional Excursion to Hampton Court Palace & Windsor
 20.00 'At Home' in Commonwealth Hall

Monday, 4 August

10.00 **Engineering The Future**
 13.30 Reports. Plenary Session. Headline Theme Agreement
 20.00 'Songs of Home' in Ramsay Hall

Tuesday, 5 August

10.00 Participants' Forum
 14.30 Lecture/Demonstration: *A Vision of the Future: New Technologies in the Science of Sight*
 16.00 CLOSING CEREMONY
 20.00 Farewell Party at Carisbrooke Hall

Wednesday, 6 August

Departures

*All Lecture/Demonstrations; Specialist Lectures and Seminars
 take place at the Cruciform Theatre, or Darwin Theatre;
 Specialist lectures take place at 188 Tottenham Court Road*

Principal Lectures and Demonstrations

These Lectures/Demonstrations take place at the Cruciform Theatre and the Darwin Theatre

Cruciform Theatre
11.00



THURSDAY 24 JULY OPENING CEREMONY

Presiding: **Professor Richard O'Kennedy, BSc PhD CBiol FIBiol FIBiol**
President, London International Youth Science Forum*

Flag Ceremony: **John Needle** Director, London International Youth Science Forum

Principal Address:

'The World in Crisis - calling all Scientists and Engineers' – Sir Colin Terry KBE CB DL FREng

(chairman of Meggitt PLC and former Chairman of The Engineering Council (UK)).

14:15



THURSDAY 24 JULY

'That's a good question'

Professor David Lowe, MD FRCS FRCPath FIBiol
Formerly of the Department of Histopathology, St Bartholomew's Hospital, London

In science, as in life in general, we accept information without questioning it. This is partly a consequence of our education — our teachers don't tell us what they don't know, only what they do, so we are seldom taught the importance of asking the right questions. For example, we accept as an absolute truth that weight is mass times gravity, but what is mass? Or gravity? We tell each other that nothing can travel faster than light but that's wrong, even here on earth today. We will never reach a new answer if we accept only the answers that other people give us. As Chico Marx said, "Who are you going to believe, me or your own eyes?"

A question at the most basic level of human science is, what makes someone a man and someone else a woman? In forensic science this apparently simple problem is one of the most fundamental and sometimes the most difficult. Is there a defining principle? Is it easy to tell? Can a woman have XY chromosomes? Do we judge on the balance of probability or require proof beyond reasonable doubt? In this interactive lecture we will question the ways that sex may be defined and see how definitions have their own difficulties.

Darwin Theatre
14.30



FRIDAY 25 JULY

'The Magic of Soap Bubbles'

Dr Cyril Isenberg, BSc PhD IIP
Department of Physics, University of Kent at Canterbury

Soap bubbles have always fascinated the young. They are attracted by the perfectly formed spherical shells of liquid produced every time one blows a bubble. The unexpected stability of these spheres has led scientists to study the properties of films and bubbles. Much research has been carried out and is presently being undertaken by chemists, physicists, mathematicians and biologists.

Some of these properties can be illustrated by dipping wire frameworks into soap solution. Their surfaces satisfy geometrical constraints that are a consequence of a general minimization principle in thermodynamics. In the simplest example the soap film forms, at equilibrium, a minimum area configuration.

The minimum area property can be applied to the resolution of some mathematical problems of importance in the construction of networks of roads, pipelines and cables.

Recently there has been a resurgence of interest in the properties of soap films by biologists as they are similar in structure to lipid membranes.

Darwin Theatre
10.00



SATURDAY 26 JULY

'Colour is Fun'

**Dr Arthur Tarrant, PhD FInstP FCIBSE CPhys CEng MRI
Visiting Research Fellow, University of Leeds (assisted by Andrew Hanson)**

The precise specification of colour is vital to many branches of industry, and particularly to the consumer industries. We have to be able to specify colours with tolerances, just as we have to specify engineering dimensions with tolerances. But colour is not a simple physical quality like the diameter of a shaft. It is a psycho-physical phenomenon which occurs as our eyes and brain try to make sense of all the physical signals that come to them.

The lecture will describe the processes by which a specification of colour can be achieved and will go on to examine some of the many factors that affect the appearance of colours. It will show how a plain technical problem of commerce can, on analysis, offer an intellectual challenge of the highest kind to scientists. Perhaps it will also convey something of the delight of the scientist who works in this fascinating field.

Darwin Theatre
14.30



MONDAY 28 JULY

'Engineering the future through multidisciplinary'

Dr Daniele Dini, Dott Ing D, Phil CEng MIMechE

The lecture will discuss some of the challenges that engineering is facing in the new millennium and will face in next few decades. The importance of a synergistic approach involving other scientific disciplines (e.g. Physics, Material Science, Biology, Medicine) will be emphasised. Examples will range from aero-engine design to nano-tribological applications.

Darwin Theatre
20.00



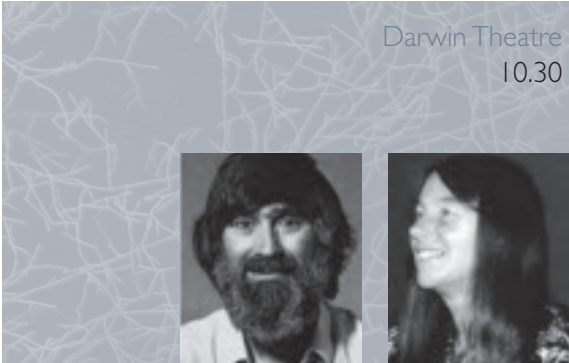
WEDNESDAY 30 JULY

'Chemistry and Light'

**Dr Peter Douglas, BSc PhD CSci CChem MRSC ASIS FRPS
Department of Chemistry, University of Swansea**

The aim of the lecture is to increase the awareness of the audience of the importance of photochemistry in our modern world, beginning with a series of illuminations to show how light may be generated electrically, thermally and chemically. In some cases light can generate light and this is demonstrated by the luminescence of everyday objects such as plastics, powders and drinks. We then look at the uses of chemistry and light and highlight applications in medicine, communications, electronics, photography and plastics through a series of demonstrations. Finally we consider ways in which sunlight, an alternative source to fossil fuels, can be converted into electricity or a chemical fuel with state of the art devices.

Darwin Theatre
10.30



SATURDAY 2 AUGUST

'Musical Squares'

**Dr Mike Gluyas, BSc PhD and Mrs Wendy Gluyas, BA MA
Formerly of the University of Salford**

'Musical Squares' is a scientific 'fun' lecture which is packed with sound and visual illustrations. The lecture explores many exciting aspects of sound and examines the vital role it plays in our everyday lives – from communications and the production and enjoyment of music, to its medical and industrial uses. Covering the whole range from infra-sound to ultra-sound, the physical properties of sound are highlighted to illustrate its importance, both to human beings and in the animal kingdom. The amazing capabilities of the human ear are discussed and demonstrations of ways in which our ears may deceive us are given. The causes and effects of various types of deafness are considered and 'lie detection' tests are presented which will reveal people who are feigning deafness.

Colour slides, music, sound effects, the sounds of animals – and even the internal sounds of the human body – are used throughout the lecture to highlight the features and uses of sounds and hearing! Several 'on the spot' experiments and demonstrations are performed and some of these involve the participation of (volunteer) members of the audience.

Cruciform Theatre
14.15



TUESDAY 5 AUGUST

'A Vision of the Future: New Technologies in the Science of Sight'

**Dr Keith Martin, MA (Cantab) DM (Oxon) MRCP FRCOphth*
Eye Surgeon, Addenbrooke's Hospital, Cambridge
Research Fellow, Wilmer Eye Institute, Johns Hopkins Hospital, Baltimore, Maryland,
United States of America**

Our understanding of the human eye has increased enormously over the last hundred years, yet numerous disease processes retain the ability to deprive us of our most vital sense. Sadly, many people today remain blind with conditions such as cataracts that are easily, quickly and completely treatable with access to appropriate healthcare. In these cases, the problems are economic, political and logistic. For other conditions, however, we have no effective cure. When the optic nerve is damaged by trauma or severe glaucoma, the vital cells that connect the eye to the brain die. In the past, we have had no way to help people affected by such conditions to see again.

In this lecture, we will look at new technologies being used to restore vision in previously hopeless situations. Recent successes in ocular gene therapy will be discussed, and we will also consider the prospect, no longer science fiction, of rewiring the optic nerve using stem cells, with all the associated ethical and moral issues involved. Finally, we will explore some of the new generation tiny electronic devices that can now be used to replace a failing retina.

So join us to see why the future might just be brighter for those who have lost their sight.

16.15

CLOSING CEREMONY

**Presiding: Jessica Chaplain
Chief of Staff London International Youth Science Forum, 2008**

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Specialist Lectures

15

Monday 28 July at 10.00

These Lectures take place at 188 Tottenham Court Road

Lecture 28/A



'Telecommunications from the past to the future' **Dennis Chen**

Communication is one of the most basic needs in life and perhaps it is only second to the desire to eat and breathe. Communication can take many different forms - from touch and dance patterns used by the honey bee; to a highly intelligent whistles communication by dolphins and whales over vast distances, telecommunication is all around us. Our ancestors used smoke signals or drum noises to convey ideas and messages; but only until the last 100 years has improvement in technology brought upon great advancement in both distance, speed and the reliability of telecommunication. When the first submarine cable went into service, telegraph was slow and expensive. Today, over 3 billion mobile phones are now in use and the number is growing by more than a million units every week.

So what will it be like in the next 50 years? Let's find out together.

Lecture 28/B



'The Physics of Making Money' **Stacy Williams, BSc MPhil (participant in 1991)** **HSBC Investment Bank**

Physics is about understanding complex systems and solving difficult problems. Physicists usually restrict themselves to the physical world of energy and forces, but why stop there? Global financial markets are highly complex systems and making sense of them is as difficult as any problem you would find in a physics lab.

The analytical tools of the physicist are being increasingly applied to the analysis of whole markets and a new field of physics – econophysics, has emerged. The field brings together both physics and economics and has been made possible by the rapid increase in the amount of market data available and the availability of the necessary computing power.

The seminar introduces the field and gives real examples of how work in this area is currently being used by financial institutions to speculate in the markets – and get the money rolling in!

Lecture 28/C



'Dope, Dopamine and Decisions' **Dr Robert Adam, BA MB BS (participant in 1994)** **Ipswich Hospital, Suffolk**

Ever since humans first evolved, they have (unlike most other animals) sought pleasure or escape through the use of psychoactive substances. It seems that the neurotransmitter, dopamine plays a vital role forming a common pathway in the neural circuitry for addiction.

In this seminar we will explore the many varied roles of dopamine so far known in the human brain – much of which we have learned through studying various conditions such as Parkinson's disease and Schizophrenia. Then we will focus particularly on the dopaminergic role in drug addiction. Finally, I will introduce the new field of neuroeconomics where it seems that dopamine may have a pivotal role in how we make decisions. We can begin to speculate as to whether the disruption of dopaminergic systems causes the many drug addicts and patients with diseases, such as those above to result in the poor decisions they often make.

Lecture 28/D



'Animals Don't Read the Textbooks' **Judith O'Toole, BVSc MRCVS HdipEd (participant in 1984)** **Science Teacher, Mount Temple Comprehensive, Dublin, Ireland**

In recent years the veterinary world has provided us with many examples which illustrate how nature and science are constantly changing. The emergence of new diseases in recent years has shown us that we can never afford to become complacent, believing that if we know the facts of a subject today, we will know them tomorrow. Bovine Spongiform Encephalopathy and Feline Immunodeficiency Virus are examples of diseases that are well known to everyone today, yet were unknown twenty years ago. This seminar will take a brief look at the history of veterinary medicine and explain how scientific advances have helped to reveal answers to the mysteries of the past. We will discuss the evolution of new pathogens whilst also considering the understanding of certain diseases as merely a new way of looking at old information.

As scientists we must keep an open mind and be willing to embrace discovery and change as the essence of science itself.



Specialist Lectures

Monday 28 July at 10.00

These Lectures take place at 188 Tottenham Court Road



Lecture 28/E



'The Science of Murder – a Brief Insight into the Science of Forensics'
Joe Derilo

Investigation is a complex business that requires professionals from a wide variety of disciplines working towards the common goal. Science and technology are used to solve criminal acts, identify suspects, and prove or disprove suspicions. This seminar is a brief insight on the different techniques used to achieve that goal.

Darwin Theatre
188 Tottenham Court Road

Wednesday 30 July at 10.00

'Managing the Warming World' Seminars

Plenary sessions will take place at the Darwin Theatre, and Seminars will take place at 188 Tottenham Court Road

Lecture 30/1
'Energy Production and Use'

Lecture 30/2
'Material Recovery, Reuse and Recycling'

Lecture 30/3
'Agriculture and Silviculture'

Lecture 30/4
'Education and Social Change'

Lecture 30/5
'Water Management'

Professor Roland Clift, CBE MA PhD FEng FICHEM FRSA HonFCIWEM



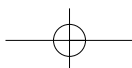
Dr Michael Peters, BSc PhD



Dr Steve Pedley, BSc PhD



Dr Llorenç Milà i Canals, BSc (Hons) MSc PhD



Specialist Lectures

17

Friday 1 August at 10.00

These Lectures take place at 188 Tottenham Court Road

Lecture I/A



'Modern Aircraft Aerodynamics'

Stephen Priebe (participant in 2000)
Studying Aeronautics, Imperial College, London

Today, more than ever, flying is perceived as uneventful routine and many of you would probably consider an airline flight to be hardly more spectacular than a journey with the local bus. It is easy to forget that man only took flight in 1903, little more than 100 years ago. We have come a long way since then – from the wooden and fabric planes of the early days to current aircraft, such as the new super-jumbo *Airbus A380* or the *Joint Strike Fighter*. These modern aircraft are beautifully optimised for a specific purpose, be it civil or military, and make use of some of the most leading-edge technology that you'll find anywhere on the planet.

This lecture will introduce you to the basic aerodynamic principles of powered flight. From the fundamental question as to why an aircraft flies (you will be surprised to find that the 'standard' explanation given in most basic physics textbooks and pilot manuals is seriously flawed) to some more advanced topics ranging from high-lift devices for landing to supersonic aircraft design. We will also look at *Computational Fluid Dynamics* (CFD), which allows the flow about a wing or any other aircraft component to be simulated computationally. Apart from providing some really fancy computer simulations, this has actually benefited the aeronautical community enormously – and continues to do so – by offering new insights into complex flows and by 'streamlining' the design process.

If you are fascinated by man's age-old dream to fly, or if you simply want to learn more about one of the most high-tech areas of engineering, you will find this lecture interesting. Next time you board a plane you will look at it with different eyes . . .

Lecture I/B



'You are talking air? The impact of Hydrogen Cell Technology on our future'

Maurice Brown, BBA MBA*
Financial Analyst

The Hydrogen fuel cell has been around since 1839 and its role in the United States space programme has been invaluable. However, it has only been recently that excitement for this technology has caught on. This relatively obscure but highly valued technology has now caught the attention of just about every industry involved in the use or production of fossil fuels to the stock markets. The Hydrogen Industry while still in its infancy holds great promise, as it presents itself as a real alternative to fossil fuel energy. However, the industry will face a tough future ahead of it. Promoters of this energy source must therefore master the learning curve of the energy industry if it is to become a feasible alternative.

Hydrogen fuel cell technology is now coming into its own and it has the potential to radically alter the energy industry and our future. How does this technology work, what are its applications and what problems does it face as an industry? This seminar will examine these questions and why Hydrogen has become such an attractive form of alternative energy.

Lecture I/C



'Astronomy from Space'

Graziella Branduardi-Raymont

Scientists in virtually all branches of astronomy make use of instruments in space to learn more about the Universe. X-rays are absorbed by the Earth's atmosphere, so we have to go into space to learn about X-ray sources in the cosmos. This lecture explains the basics of X-ray astronomy and how X-ray light is focussed to produce X-ray pictures of the sky. Some of the recent results from the European Space Agency's (ESA) XMM-Newton observatory will be presented: this is the largest scientific spacecraft ever built by ESA, and carries the most sensitive X-ray telescope yet.

The detailed spectra of X-ray sources returned by XMM-Newton are highly complementary to the very sharp X-ray images from NASA's Chandra observatory, currently also operating in space: some beautiful examples will be shown, and the discoveries that they have led to will be explained.

Cosmic X-ray sources are some of the most energetic, violent and exotic objects in the Universe: powerful planetary aurorae, generated by highly energetic particles travelling in intense magnetic fields; the densest stars, where energy production is more efficient than in nuclear reactors; the hot debris of the explosive death of stars; the mysterious power houses of supermassive black holes at the centres of active galaxies; the immense energies stored in the hot gases embedding galaxies in clusters; they all provide us with clues about the origin and, ultimately, the fate of our Universe.

* Former participant of the London International Youth Science Forum

Specialist Lectures

Friday 1 August at 10.00

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Lecture I/D



'Congenital Disorders – Dreams and Reality'

Dr Tom Ingram, MB ChB MRCP*

The United Leeds Teaching Hospitals

From just two cells to a system containing billions of interconnecting structures, capable of working constantly together, 24 hours a day, for life – all in nine months!

In this seminar we will explore the process of human development. A process which starts with placement of the fundamental systems necessary for life and ends with arrangements that enable us to perform unexplainably complex processes every day. Within this we will also examine the consequences of what can occur when something goes wrong at a point in this process. We take a look at the variety of clinical conditions through the help of legends, such as that of Count Dracula, and more recently the Thalidomide drug 'epidemic' of the 1960's and the use of chemical warfare in the 1990's. Finally, a review of some of the dreams and realities of how modern medicine is dealing with these problems will be covered. This includes the uses of high frequency sound waves to detect foetal anomalies whilst still within the womb and more controversially, how we can actually treat these problems once they have been discovered.

Lecture I/E



'The Biotechnical Age Society'

Hanan el Khatib (participant in 1996)

Ministry of Foreign Affairs, Malta

Ever since the discovery of DNA in 1953, science has offered infinite potentials and options in medicine and environment fields which have very high social implications. As a consequence biotechnological issues cannot be separated from ethical ones.

In a discussion dealing with science and ethics words like 'control' and 'use' have become very important. Hence, during this seminar we will be looking at legal and political implications that biotechnology has brought about, with potential and existing problems imposing enormous responsibilities upon decision makers and scientists. Is the situation getting out of hand? What are the effects of the scientific competition between the USA, Japan and the EU? Is society at risk? What are the hidden dangers right now? These are all questions that we will cover.

** Former participant of the London International Youth Science Forum*



Specialist Lectures

19

Monday 4 August at 10.00

'Engineering the Future' Seminars

Plenary sessions will take place at the Darwin Theatre, and seminars will take place at 188 Tottenham Court Road

Sir Colin Terry will give an overall introduction for the day with selected specialists leading the following seminars:

Lecture 4/A

Nano technology

Lecture 4/B

Mechanical engineering

Lecture 4/C

Oceanography

Lecture 4/D

Bioscience

Lecture 4/E

Physics

Lecturers/moderators:

Sir Colin Terry KBE CB DL FEng



Dr David Burt, PhD*



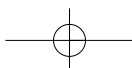
Samantha Healy, BSc, PhD FGS Qinetiq



Dr Cyril Isenburg, BSc IIP, MBE



Maesha Deheragoda
Cancer Research UK Clinical Research Fellow
and Clinical lecturer in pathology at
University College London



Student Topics

FRIDAY 25 JULY

20.00 Science Forum Bazaar at UCL Cloisters

MONDAY 28 JULY

20.00 RAMSAY HALL, Maple Street, London W1T 5HB

Participants who wish to present a paper based on a project or investigation they have personally undertaken will be allocated a period during one of the sessions listed above. Papers will be grouped by category and a schedule with summaries and details of presentation times will be circulated at the beginning of the Science Forum.

Social Programme

THURSDAY 24 JULY

20.00 WELCOME PARTY at Carisbrooke Hall

SATURDAY 26 JULY

Optional Sightseeing Tours of London
Optional Theatre Visits

SUNDAY 27 JULY

09.00 Optional Excursion to Stonehenge and Salisbury
20.00 THE GREAT CROSSWORD TREASURE HUNT starting from Ramsay Hall

FRIDAY 1 AUGUST

20.00 INTERNATIONAL CABARET at Carisbrooke Hall

SATURDAY 2 AUGUST

14.15 SCIENCE FORUM OLYMPICS in American Church Hall
Optional Theatre Visits

SUNDAY 3 AUGUST

09.00 Optional Excursion to Hampton Court Palace and Windsor
20.00 'AT HOME' in Commonwealth Hall

MONDAY 4 AUGUST

20.00 'SONGS OF HOME' International Folk Song Evening in Ramsay Hall

TUESDAY 5 AUGUST

20.00 FAREWELL PARTY at Carisbrooke Hall

Scientific Visits

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Options for Scientific Visits

There are limited numbers of places for each of these events; we will try to ensure you receive your first choice if possible, but need to know your second and third choices for each day if your first choice has been fully booked.

For each date, please identify your first, second and third choices, and note these **on the Options Form** in this Pack, using the code number for each event.

Scientific Visits

Friday 25 July – Half Day Visits

- | | |
|-------|---|
| 25/1 | <p>Royal College of Surgeons and Hunterian Museum The historical background to surgical medicine.</p> |
| 25/2 | <p>National Physical Laboratory UK's principal facility in measurement and materials science. Visit state of the art facilities ensuring accuracy, consistency and innovation in physical measurement.</p> |
| 25/3 | <p>Imperial College London: Earth Science and Engineering Research and teaching spanning both Earth science and Earth engineering.</p> |
| 25/4 | <p>Zoological Society of London: Veterinary Department Caring for the health of the animals in London Zoo; and research into the welfare and conservation of free living animals.</p> |
| 25/5 | <p>Imperial College London, Dept of Chemical Engineering See the laboratories, pilot plant and computing facilities of one of the UK's largest developments of its kind.</p> |
| 25/6 | <p>University College London: Department of Anatomy & Developmental Biology Research into neuroscience; neurobiology, evolutionary anatomy; cell and development biology.</p> |
| 25/7 | <p>Imperial College London: Dept of Life Sciences Biochemistry The latest developments in Biochemistry.</p> |
| 25/8 | <p>Royal Botanic Gardens at Kew with The Jodrell Laboratory World-famous centre for botanical research and study; includes a visit to Jodrell Laboratory.</p> |
| 25/9 | <p>Imperial College London: Department of Materials Research into biomaterials for tissue engineering and regenerative medicine; and bio-nanotechnology for nanostructures and create nano-biomaterials.</p> |
| 25/10 | <p>London Wetland Centre Over 100 acres of wetland sites, with extensive populations of wild birds, plants and insects. Talk to the experts about biodiversity and conservation.</p> |
| 25/11 | <p>Old Operating Theatre and Herb Garret Original Operating Theatre dating from 1821, with original instruments; find out about surgery before anaesthesia and antiseptics.</p> |

Scientific Visits

Tuesday 29 July – Day Visits

- 
- 29/1 **Airbus UK, Filton**
Aircraft design, assembly and manufacture.
- 29/2 **Rothamsted Research Centre**
Briefing on sustainable agricultural development in developing and emerging countries. Will share research excellence in agricultural and environmental.
- 29/3 **Tilbury Power Station**
The science of electricity generation at a major power plant.
- 29/4 **Royal Marsden Hospital**
World-famous centre for cancer research and treatment.
- 29/5 **University of Warwick: Electrochemistry & Interfaces/ Electron Microscopy Dept**
The application of electrochemistry to the understanding of fundamental and industrially significant interfacial chemical processes at the micro to nanoscale.
- 29/6 **University College London: Mullard Space Science Laboratory**
Exploiting the capabilities of rockets and spacecraft as platforms for scientific instruments, it strives to understand our physical environment and our place in the Universe.
- 29/7 **University of Kent: Electronics Laboratory**
Design and research in electronics and digital multimedia equipment.
- 29/8 **Rutherford Appleton Laboratory**
To explore fundamental questions about the origin of the universe and the structure of matter.

20th EUROPEAN UNION CONTEST FOR YOUNG SCIENTISTS

COPENHAGEN, 2008

**19-26 September,
2008**

Details from

KLINTEVEJ 35

DK-7500 HOLSTEBRO

DENMARK

E-mail: mail@eurocontest.dk



Scientific Visits

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Thursday 31 July – Oxford & Cambridge Visits

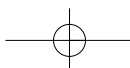
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|--------|---|
| 31/C/1 | <p>Cambridge University Department of Physics: Cavendish Laboratory Prestigious research centre: visit to departments specialising in microelectronics; polymers and colloids; high speed photography; low-temperature physics.</p> |
| 31/C/2 | <p>Cambridge: British Antarctic Survey Responsible for most of the UK's research in Antarctica: the world's greatest natural laboratory.</p> |
| 31/C/3 | <p>Cambridge Earth Sciences Department From geophysics and applied mathematics, geochemistry and sedimentology, petrology and volcanism, palaeontology and evolutionary biology, to the physics and fundamental properties of materials.</p> |
| 31/C/4 | <p>Laboratory of Microbiology for Cambridge Covering a wide range of topics in Molecular and Cellular Microbiology.</p> |
| 31/O/1 | <p>Oxford University: Department of Chemistry A tour of the laboratory and a chance to hear about the research currently being pursued in the Department, which is the largest in the western world.</p> |
| 31/O/3 | <p>Oxford University Botanic Garden This educational and scientific centre is Britain's oldest botanical garden.</p> |



Scientific Visits

Friday 1 August – London Science Museum Visits

- | | |
|-------|---|
| I/NHM | <p>Natural History Museum Exciting interactive exhibitions about the Natural World.</p> |
| I/SM | <p>Science Museum See, touch and experience the major scientific technological and medical advances of the last three hundred years.</p> |



Science Forum Staff 2008



Chief of Staff
Jess Chaplain
(UK)
Studying Medicine
University of Edinburgh

Ramsay Hall



Host
Miriam Toolan
(UK)
Studying Natural Sciences



Deputy Host
Lukas Stritesky
(Czech Republic)
Studying Mathematics



Counsellor
Negin Baradari
Studying for Leaving Exams



Programme Assistant
João Barros Vicente
(Portugal)
Studying Environmental Engineering



Counsellor
Chris Kirk
Studying Pharmacy



Senior Counsellor
Samia Elkommos
(Egypt)
Studying for Leaving Exams



Dwayne Patterson
Studying for Leaving Exams



Organising Assistant
Erik Szabo
(Slovak Republic)
Studying Chemistry

Commonwealth Hall



Host
Jake Mann
(Guernsey)
Studying Medicine



Deputy Host
Guncha Welsapar
(Sweden)
Studying Medicine



Counsellor
Ibrahim Patel
(Egypt)
Studying Electrical and
Electronic Engineering with
Computer Science



Programme Assistant
Ojali Negedu
(UK)
Studying for Leaving
Exams



Counsellor
Nandini Sarma
Studying International
Baccalaureate Program



Senior Counsellor
Sam Taylor
(UK)
Studying for Leaving
Exams



Counsellor
Edith Knox
Studying for Leaving Exams



The BA runs a whole series of activities and events designed to engage young people with science



For 14 - 19 year olds these include:

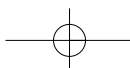
- The annual Festival of Science; a programme of discussion events running alongside the main festival of events, specifically chosen for students in this age bracket.
- The BA CREST Science Fair, offering students the chance to showcase their science projects and win cash prizes or represent the UK at international contests.
- Science Communicators awards, designed to get young people thinking about how to articulate science through a variety of media.
- BA CREST Awards bring real science projects to the classroom.

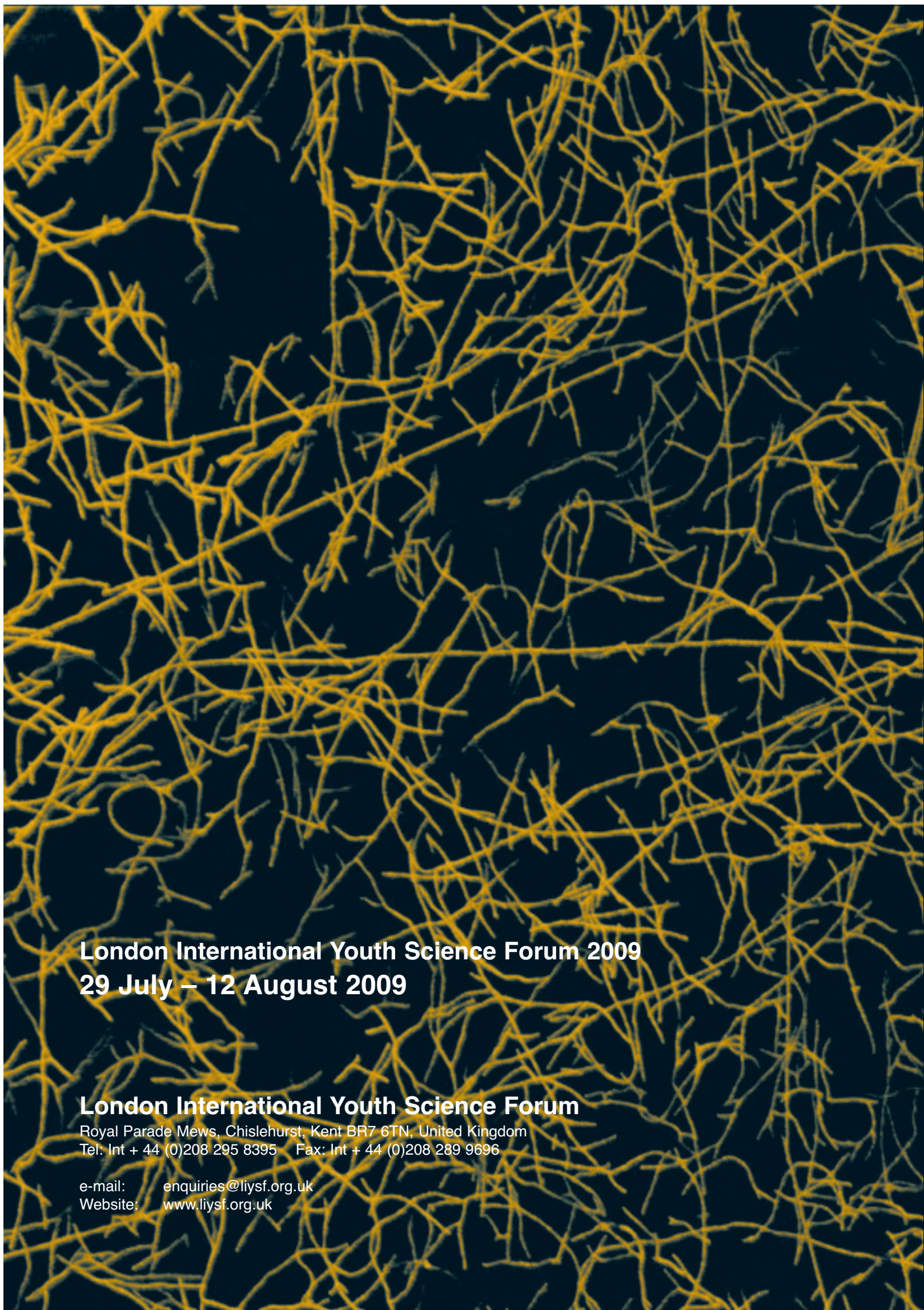
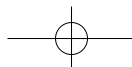
The BA provides a student bursary package, which includes accommodation, registration, food and some travel expenses.

To find out more, visit hyperlink
<http://www.the-ba.net>
or email:
supporters@the-ba.net.

If you would like any further information about what the BA can offer you, please contact:

**Adrian Fenton,
The BA,
Wellcome Wolfson Building,
165 Queen's Gate, London
SW7 5HD
email: adrian.fenton@the-ba.net**





London International Youth Science Forum 2009
29 July – 12 August 2009

London International Youth Science Forum

Royal Parade Mews, Chislehurst, Kent BR7 6TN, United Kingdom
Tel: Int + 44 (0)208 295 8395 Fax: Int + 44 (0)208 289 9696

e-mail: enquiries@liysf.org.uk
Website: www.liysf.org.uk

