



18TH SOCIETY OF BIOLOGY ANNUAL SCOTTISH TEACHERS' MEETING

# Taking Biology Forward

THURSDAY 6 JUNE 2013, GRAND CENTRAL HOTEL, GLASGOW

To register for the meeting:  
[www.societyofbiology.org/scottishteachers](http://www.societyofbiology.org/scottishteachers)  
For further information:  
Email: [sbs@intel-events.co.uk](mailto:sbs@intel-events.co.uk) Tel: 01786 820 254



## Introduction

The Society of Biology, Scottish Branch is delighted to announce the 18th Society of Biology Annual Scottish Teachers' Meeting.

The Society of Biology is a single unified voice for biology: advising Government and influencing policy; advancing education and professional development; supporting our members, and engaging and encouraging public interest in the life sciences. The Society has been created by the unification of the Biosciences Federation and the Institute of Biology, and is building on the heritage and reputation of these two organisations to champion the study and development of biology, and provide expert guidance and opinion.

The aim of the meeting is to inspire, challenge, and motivate the network of biology teachers, corporate supporters, and community partners in Scotland and to increase the visibility of the Society of Biology and the Scottish Branch.

The Society of Biology celebrates academic achievement and will, with its partner DART publishers, present awards to those who achieved the highest marks in the SQA examinations in biological subjects.

## Programme

0900-0930 REGISTRATION AND EXHIBITION

MORNING SESSION

Chair: Professor Jack Jackson,  
University of Strathclyde

0930-0940 WELCOME

Professor Jack Jackson, University of Strathclyde

0940-1025

**The Genetics Revolution:  
Whole genome sequencing is coming, ready  
or not**

Darren Monckton, Professor of Human Genetics,  
Institute of Molecular Cell and Systems Biology,  
University of Glasgow

1025-1050 COFFEE

1050-1135

**Surgical solutions to biological abnormalities**

Rowan W Parks, Professor of Surgical Science,  
University of Edinburgh

1135-1215

**Plagues, predators and pathogens:  
Infectious diseases in their natural context**

Sarah Cleaveland, Professor of Comparative  
Epidemiology, Institute of Biodiversity,  
College of Medical, Veterinary and Life Sciences,  
University of Glasgow

1215-1225 PRESENTATION OF AWARDS

1225-1235

**Possible support materials for Curriculum for  
Excellence**

Professor Gerry Graham, University of Glasgow

1235-1345 EXHIBITION AND LUNCH

AFTERNOON SESSION

Chair: Nicky Souter, University of Strathclyde

1345-1430

**The Invisible Enemy: Microbes and us**

Dorothy Crawford, Emeritus Professor  
of Medical Microbiology, University of Edinburgh

1430-1515

**Where now for school biology in Scotland?**

Jim Stafford, Consultant in Science Education

# Abstracts

## **The genetics revolution: whole genome sequencing is coming, ready or not**

Darren Monckton, Professor of Human Genetics, Institute of Molecular Cell and Systems Biology, University of Glasgow

### Abstract

It took fifteen years and cost \$3,000,000,000 to generate the first human genome sequence. It now takes less than a day and costs \$4,000. We can now sequence a genome from a single cell and can sequence the genome of a child in utero. We can identify disease causing mutations in a single family and follow tumour progression in a cancer patient. We now have whole genome sequences of several thousand individuals and efforts are underway to sequence 100,000s of individuals to further refine our understanding of the genetic factors underlying the common complex disorders. We are cataloguing the variation in the human microbiome, we can track the spread of pathogens, and monitor pathogen evolution within the course of a single infection. We have genome sequences from a host of agriculturally important species and a growing array of exotic and endangered animals.

Whole genome sequencing is becoming de rigueur in nearly every area of biology and is set to increasingly impact in healthcare. The fabled \$1,000 genome will shortly be a reality and costs will tumble further as new technologies become available. You can already order an analysis of 1,000,000 genetic variants online and affordable whole genome sequencing will not be far behind. It is coming, ready or not.

### Biography

Darren Monckton obtained a BSc in biochemistry from the University of Bath (1989) and a PhD in human genetics from the University of Leicester (1992) under the supervision of Alec Jeffreys. He did postdoctoral research in Baylor College of Medicine with Tom Caskey, and MD Anderson Cancer Center with Michael Siciliano, where he was the Muscular Dystrophy Association Sammy Davies Junior Neuromuscular Disease Research Fellow. In 1996 he was recruited back to the UK by Keith Johnson to take up a lectureship in genetics at the University of Glasgow, where he was also the recipient of a Lister Institute Research Fellowship. He is currently Professor of Human Genetics and Director of the University of Glasgow Welcome Trust four-year PhD programme. He teaches genetics on a range of postgraduate and undergraduate courses, and leads an active research team. His group is investigating the basis of genetic instability in disorders such as myotonic dystrophy and Huntington disease, with the aim of providing improved diagnostics, treatments and cures. He has published numerous scientific papers and book chapters, and has presented his research in many invited seminars and lectures, including the Genetics Society Balfour Lecture, the Tenovus Medal Lecture and many international conferences, and many to patient groups and other lay audiences. He is also a Scientific Advisor to the Myotonic Dystrophy Support Group (UK) and the Myotonic Dystrophy Foundation (USA).

## **Surgical solutions to biological abnormalities**

Rowan W Parks, Professor of Surgical Science, University of Edinburgh

### Abstract

This talk will address what a surgeon can offer for patients presenting with inflammatory or neoplastic conditions. Case studies addressing pathologies, such as appendicitis, cholecystitis and diverticulitis will show how pain is perceived, and how the acute presentation can be managed. Investigation and management of cancer has seen significant advances in recent years and case studies will show the benefits of radiological imaging, surgical resection, and how tissues can regenerate following operative intervention. Under or over-production of insulin can result in specific illnesses or conditions and how this affects patients will be discussed. Medicine continues to be a popular career choice for students and we will look at how school leavers can make themselves competitive for Medical School entry.

### Biography

Professor Rowan Parks was born and educated in Belfast, Northern Ireland. He qualified in Medicine from Queens University Belfast in 1989. He then pursued his surgical training in Northern Ireland, being awarded a Fellowship of the Royal College of Surgeons in Ireland (FRCSI) in 1993. He undertook a period of full time research in the Department of Surgery, Queens University Belfast. This work investigated the effect of obstructive jaundice on gut barrier function and resulted in the award of a Doctor of Medicine (MD) degree in 1997. Following this he completed his higher surgical training on the Northern Ireland higher surgical

training programme and undertook a clinical fellowship in hepatopancreaticobiliary surgery and transplantation at the Royal Infirmary of Edinburgh. He was appointed a Senior Lecturer in Surgery and Honorary Consultant Surgeon in the Royal Infirmary of Edinburgh in 1999, was subsequently promoted to Reader in Surgery in 2006 and was awarded a personal chair as Professor of Surgical Sciences at the University of Edinburgh in 2010.

Professor Parks has a significant interest in undergraduate and postgraduate education. He was previously a Year Director for the medical course at the University of Edinburgh and continues to serve as Chairman of the College of Medicine & Veterinary Medicine Fitness to Practice Committee. His interest in postgraduate training has been as Regional Adviser in General Surgery, Training Programme Director for the South East Scotland General Surgery rotation, Associate Postgraduate Dean (SE Scotland), and Chair of the Scottish Specialty Training Board for Surgical Specialties. Currently, Professor Parks is Deputy Medical Director of NHS Education for Scotland (NES).

## **Plagues, predators and pathogens: infectious diseases in their natural context**

Professor Sarah Cleaveland, Institute of Biodiversity, College of Medical, Veterinary and Life Sciences, University of Glasgow

### Abstract

Pathogens are important components of natural systems, but the transmission of infectious diseases between different populations can have major impacts and implications for the health of humans, their domestic livestock and wildlife, as well as on ecosystem dynamics, wildlife conservation, land-use policy and livestock economies. As human and domestic animal populations continue to expand, with encroachment and fragmentation of wildlife areas, these issues are becoming a growing concern. Understanding the dynamics of these pathogens in complex ecosystems presents a considerable challenge, but is essential for evaluating disease threats and designing effective and appropriate control strategies where necessary.

A growing awareness of the need to develop integrated approaches towards human and animal health has led to the concept of 'One Health' which embraces the study of health in a broad socio-ecological context, recognizing the inter-dependence of different components of ecosystems, as well as the need for inter-disciplinary perspectives in understanding and tackling disease problems.

This presentation will briefly outline the 'One Health' concept and, focusing on research in East Africa, will describe research on specific pathogens to illustrate the impact of selected diseases and how research is helping to inform disease control policies. The presentation will include discussion of diseases such as rinderpest, rabies, canine distemper, and foot-and-mouth disease.

### Biography

Professor Sarah Cleaveland works at the University of Glasgow at the Institute for Biodiversity, Animal Health and Comparative Medicine. After training first as a zoologist at Southampton University and then as a vet at Cambridge University, she worked for a year in general practice before embarking on a research career based in East Africa, studying diseases in a range of ecosystems, including the Serengeti National Park. She obtained her Ph.D. in 1996 from the London School of Hygiene and Tropical Medicine, and subsequently worked at the Centre for Tropical Veterinary Medicine, University of Edinburgh before moving on to the University of Glasgow in 2008. Sarah's research addresses many different aspects of disease investigation - identifying causes of wildlife disease outbreaks, understanding how diseases spread among different species, and determining how best to design disease control programmes that will improve the health of humans, wildlife and domestic animals in these complex systems.

In 2008, Prof. Cleaveland was presented with the Trevor Blackburn Award in recognition of her veterinary work overseas by the British Veterinary Association. She is also a founding Director of the Alliance for Rabies Control ([www.rabiescontrol.org](http://www.rabiescontrol.org)), which spearheads the World Rabies Day campaigns ([www.worldrabiesday.org](http://www.worldrabiesday.org)).

## Abstracts continued

### **The Invisible Enemy: Microbes and Us**

Dorothy Crawford, Emeritus Professor of Medical Microbiology,  
University of Edinburgh

#### Abstract

Microbes have inhabited planet Earth for over 4 billion years and during this time they have adapted to occupy every available niche including the most inhospitable hot springs, deep ocean trenches, acid lakes and polar ice caps. In contrast modern man only evolved some 200,000 years ago and we are still learning to live in harmony with microbes; the invisible enemy.

By colonising our bodies microbes have profoundly influenced our evolution and by causing epidemics and pandemics they have helped to shape our history. But despite our detailed knowledge their makeup, and an armament of weapons to fight them, microbes are still responsible for 14 million deaths a year. And presently 'new' microbes are emerging at an increasing rate.

In this talk I will explore the links between the emergence of microbes and the cultural evolution of the human race. I will contrast the infectious diseases suffered by our hunter gatherer, farmer and city-dwelling ancestors as man's lifestyle has changed through the ages, and show how microbes have exploited every opportunity to infect and spread, thereby ensuring their own future. Finally we will take a look at modern times with our present problems, and pose the question: are we better off today than our ancient ancestors were?

#### Biography

Dorothy Crawford is Emeritus Professor of Medical Microbiology at the University of Edinburgh. At the University she led a translational research team working on the Epstein-Barr virus (EBV). This virus is the cause of glandular fever but can also cause tumours in those with immune suppression. She is very active in public engagement and until 2012 was the Assistant Principal at the University for Public Understanding of Medicine. She has written several books on microbes for a general audience and is presently writing a book, Virus Hunt, on the origins and spread of HIV.

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### **Where now for School Biology in Scotland?**

Jim Stafford, Consultant in Science Education

#### Abstract

Now that Curriculum for Excellence has moved into an implementation phase, what messages should be uppermost in the minds of Scotland's biology teachers and what are the influences that will continue to shape school biology in Scotland? This presentation will reflect the impact of the educational philosophy that underpins Curriculum for Excellence, modern thinking on science education, the expectations on science teachers in the 21st century, and changes in the nature of biology courses. All these factors will have an impact on the teaching and learning of biology in Scottish schools.

#### Biography

Jim Stafford is a self-employed educational consultant. He has been a Principal Teacher of Biology, a Local Authority Science Adviser and Quality Improvement Officer. Among others, he has worked recently with SQA in developing the revised qualifications in Higher Biology, Higher Human Biology and Advanced Higher Biology. With SSERC he has recently been involved with leadership training for curriculum leaders in science, health and safety guidance in Biology and in producing The Modern Science Teacher, a guide for new and recently qualified science teachers.

## Awards winners

Biology Higher,  
Graham Bryden, Kelvinside Academy

Biology (Revised) Higher,  
Alexandra Marie Reid, Stirling High School

Biotechnology Higher,  
Zuzanna Kowalczyk-Okodugha, Perth College

Human Biology (Revised) Higher,  
Kirsty Alison Brown, Forth Valley College

Human Biology Higher,  
Emily Jamieson, Grove Academy

Human Biology Higher,  
Nadia Claire Capaldi, St Ninian's High School

Biology Advanced Higher,  
Lindsey J Johnston, George Heriot's School

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