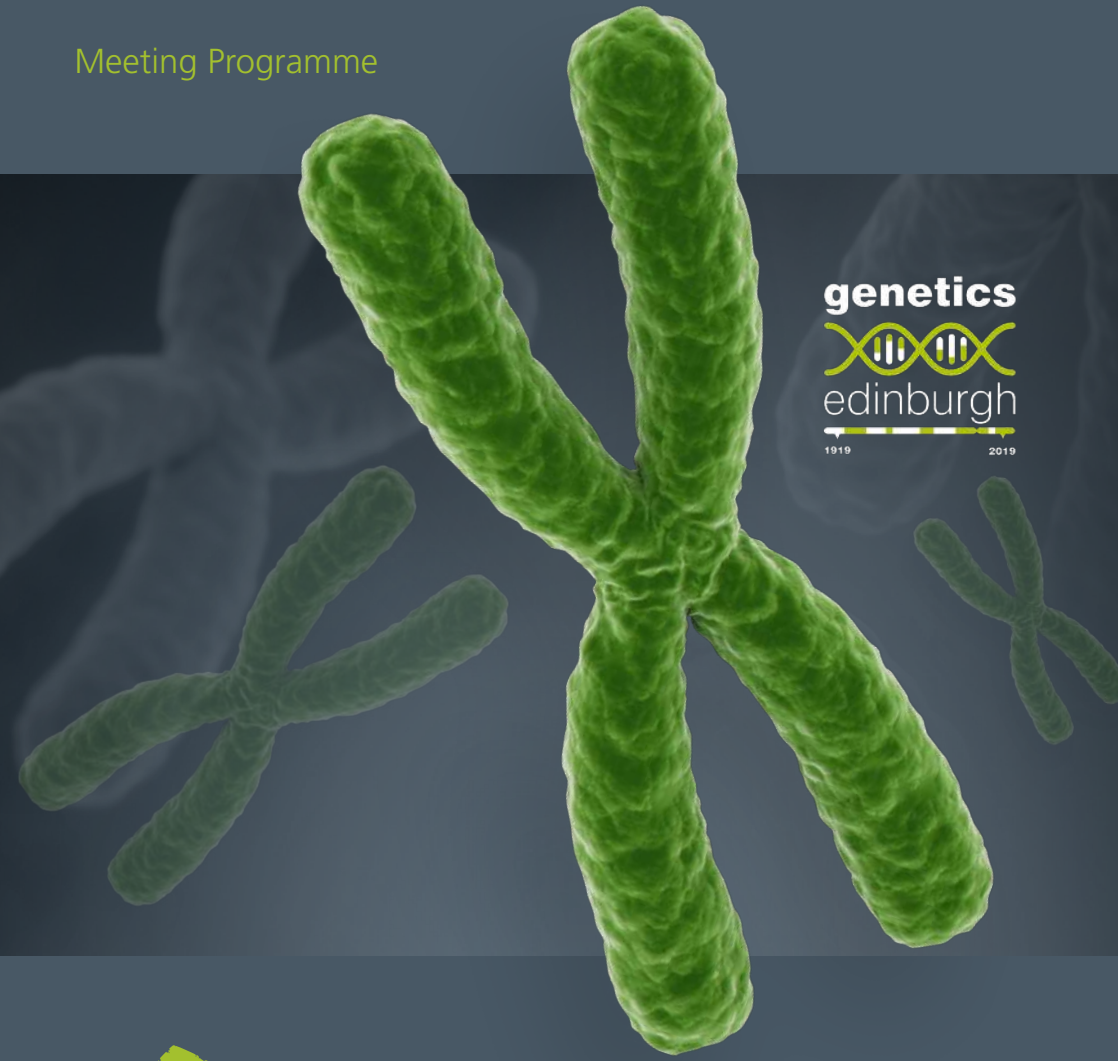
2019 Genetics Society Meeting

A Century of Genetics

13 – 15 November 2019. Royal College of Physicians, Edinburgh

Meeting Programme



100 YEARS
the geneticssociety
1919 - 2019

THE UNIVERSITY of EDINBURGH

WELCOME

Just 10 years after Wilhelm Johannsen coined the term "gene", and 14 years after William Bateson bequeathed us the word "genetics", on 25th June 1919 Bateson and Edith "Becky" Saunders convened a meeting in the rooms of the Linnaean Society to propose the founding of a "Genetical Society". Approved unanimously, the first meeting was held in Cambridge on 12th July that year.

From the 26 members at the founding meeting, the Genetical Society (now the Genetics Society) has grown over the last century to an all-time high now in excess of 2500 members. Members reflect a broad span of career stages and expertise, covering all major branches of pure and applied genetics. A cursory glance at the past Presidents of the Society reflects both the standing of the Genetics Society over the past century and the breadth and depth of British genetics: from the founders of classical transmission genetics (Saunders, Reginald Punnett), to the developers of the modern evolutionary synthesis (RA Fisher and JBS Haldane), by way of the leading lights in yeast genetics (Paul Nurse), developmental genetics (Conrad Waddington), microbial genetics (David Hopwood, Noreen Murray), plant genetics (Enrico Cohen), ecological genetics (EB Ford), fly genetics (Mike Ashburner), worm genetics (Jonathan Hodgkin), fungal genetics (Guido Pontecorvo, John Fincham), population genetics (Brian Charlesworth), ageing genetics (Linda Partridge), and medical and human genetics (Lionel Penrose, Veronica van Heyningen). In our breadth, we run true to the wishes of the founders who were keen, for example, that both research academics and breeders be involved.

In June we celebrated the unveiling of Blue Plaques for Saunders and Bateson at the John Innes Centre, the focal point of UK plant genetics, founded by Bateson. It is then appropriate that the centenary conference should be convened in Edinburgh, for long a UK centre for animal and molecular genetics. By happy coincidence, 2019 is also the centenary of the origins of genetics research in Edinburgh.

Genetics and Edinburgh

The first lectureship in genetics was instituted at The University of Edinburgh in 1911. The Animal Breeding Research Station of the government's Board of Agriculture and Fisheries was established in Edinburgh in 1919 and evolved over the next 10 years to become The University of Edinburgh's Institute of Animal Genetics. In 1930, the Institute moved into what is now known as the Crew Building at King's Buildings, named after its first director and the Buchanan Professor of Animal Genetics. In 1945, the government established the National Animal Breeding and Genetics Research Organisation as an Agricultural Research Council institute outside the University. Links to the University and the Institute of Animal Genetics were strong from the beginning, and continued throughout numerous organisational changes, coming full circle with the (re) integration of The Roslin Institute (the successor Research Council institute) into

the University in 2008. The internationally renowned quantitative and population geneticists, Douglas Falconer and Alan Robertson, were both associated with the Institute of Animal Genetics.

Meanwhile other strands of genetics research flourished at King's Buildings within what is now the School of Biological Sciences. Many fundamental contributions to genetics were made here, including the discovery of chemical mutagenesis, bacterial conjugation, purification of the first gene (frog rRNA genes), the pioneering work on gene cloning by Noreen and Ken Murray, and the first explorations of animal genomes by DNA hybridisation, by Peter Walker amongst others. This led to the establishment of the Medical Research Council Mammalian Genome Unit. The 'Genome Unit' pioneered genome biology, with its last director developing the fundamental tools of modern molecular genetics – the eponymously named Southern blot – pulsed field gel electrophoresis, microarrays, and sequencing the first piece of mammalian DNA – the guinea pig alpha satellite. The Genome Unit was also the home of CpG island discovery and the identification and cloning of telomeres. The current Institute of Evolutionary Biology at King's Buildings, as one of the successors to the Institute of Animal Genetics, has a strong reputation for its research in evolutionary genetics.

Across the other side of the city, in 1956 the Clinical Effects of Radiation Unit was set up by the MRC to study human chromosome abnormalities. Contemporaneous with the identification of trisomy 21 in Down's syndrome, the unit identified the XXY karyotype in patients with Klinefelter syndrome. This unit then became the MRC Clinical and Population Cytogenetics Unit and pioneered the study of chromosome abnormalities at a population level – particularly on Hebridean islands. In 1988, the Unit changed its name to the MRC Human Genetics Unit (HGU) and has led the understanding of human genome biology, and both Mendelian and complex genetic disease. The HGU became part of The University of Edinburgh and a partner in the Institute of Genetics and Molecular Medicine in 2012.

In short, Edinburgh is at the forefront of population and quantitative genetics, human and animal genomics, and genetic manipulation of farmed animals.

The conference programme celebrates not just the remarkable subject – in all its breadth – that genetics has become, but also highlights the defining role the UK, and in no small part Edinburgh, plays in the subject. For a small nation, the UK hits far above our weight. It should be a source of great pride that over the last century the Genetics Society has been an important part of this success. As a Society we continue to promote genetics and geneticists not least through funding, and enabling attendance at, conferences like this one. We support the promotion of genetics, both via training in science communication and by funding science engagement. Through the provision of training and fieldwork grants, and via the summer studentship scheme, we aim to support the next century's geneticists. May the next 100 years be as productive for British genetics as the first 100.

Laurence D. Hurst, President of the Genetics Society on behalf of the Genetics Society
Eleanor Riley, Director, The Roslin Institute
Wendy Bickmore, Director, MRC Human Genetics Unit
Brian Charlesworth, IEB

PROGRAMME

Wednesday 13 November 2019

09:00 REGISTRATION OPEN

09:30 INTRODUCTION TO THE CONFERENCE
Laurence D. Hurst, Genetics Society
Eleanor Riley, The Roslin Institute

SESSION 1: GENOME STABILITY AND INSTABILITY

Chair: David Finnegan, co-chair Sveta Markovets

09:40 **David Finnegan, The University of Edinburgh**
Introduction to the session

09:45 **Steve Jackson, University of Cambridge**
Harnessing genetic principles

10:15 **Severine Chambeyron, Institute of Human Genetics, Montpelier**
piRNA pathway is a guardian of genome integrity

10:40 REFRESHMENT BREAK AND POSTER VIEWING

11:15 **Kim Nasmyth, University of Oxford**
Title to be confirmed

11:45 **Adele Marston, The University of Edinburgh**
Pericentromere organisation in mitosis

12:10 **Lana Talmane, The University of Edinburgh**
Protein binding as a selective filter for new mutations at regulatory sites in the germline and in cancers

12:25 **Poster pitches x 10 (odd numbers)**

12:55 LUNCH BREAK
POSTER SESSION - ODD NUMBERS

SESSION 2: GENETICS AND SELECTION OF QUANTITATIVE TRAITS

Chair: Josephine Pemberton, co-chair Smaragda Tsairidou
Sponsor: Aviagen

14:00 **Josephine Pemberton, Institute of Evolutionary Biology**
Introduction to the session

14:05 **Greg Kudla, The University of Edinburgh**
A multidimensional genotype-phenotype map of a fluorescent RNA aptamer

14:30 **Peter Keightley, The University of Edinburgh**
Inferring the distribution of fitness effects of mutations

14:45 **Trudy Mackay, Clemson University**
Charting the Genotype-Phenotype Map: Lessons from *Drosophila*

15:15 **Troy Rowan, University of Missouri**
Detecting signatures of ongoing polygenic selection and local adaptation in United States *Bos taurus* beef cattle

15:30 REFRESHMENT BREAK AND POSTER VIEWING

PROGRAMME

Wednesday 13 November 2019

16:00 **Felicity Jones, Max Planck Society, Tübingen**
Gene regulation, epigenomics and recombination in adaptive evolution of natural stickleback populations

16:25 **Balfour Lecture: Susan Johnston, The University of Edinburgh**
Introduced by Laurence D. Hurst
The evolution of individual recombination rates in the wild

16:50 **John Hickey, The Roslin Institute**
Disruptions through Data Driven Breeding and integration will drive step changes in animal and crop performance

17:20 **Ivan Pocrnic, The University of Edinburgh**
Limited dimensionality of genomic information and implications for genomic prediction

17:35 **Patrick Sharman, University of Exeter**
Genetic improvement of racehorse speed

17:50 **Mendel Medal: Professor Bill Hill**
Introduced by Laurence D. Hurst
Appreciation of Bill's work by Trudy Mackay

18:30 DRINKS RECEPTION AND POSTER VIEWING
Sponsor: Genus PLC

19:30 **Public Lecture: Farm, Field and Family – 100 years of genetics in Edinburgh**
Host: **Sarah Chan, Usher Institute**
Speakers:
Josephine Pemberton, Institute of Evolutionary Biology
Bruce Whitelaw, The Roslin Institute
Wendy Bickmore, Institute of Genetics and Molecular Medicine

Thursday 14 November 2019

09:00 REGISTRATION OPEN

SESSION 3: THE GERMLINE, SEX DETERMINATION & SEX CHROMOSOMES
Chair: Brian Charlesworth, co-chair Kay Boulton

09:20 **Brian Charlesworth, The University of Edinburgh**
Introduction to the session

09:25 **Genetics Society Medal: Deborah Charlesworth, The University of Edinburgh**
Introduced by Laurence D. Hurst
The diversity of sex chromosomes and the importance of genetics in understanding them

PROGRAMME

10:00	**Doris Bachtrog, University of California, Berkeley** Massive gene amplification on a recently formed *Drosophila* Y chromosome
10:25	**Laura Ross, The University of Edinburgh** Genomic exclusion: males that lose their fathers genes
10:50	REFRESHMENT BREAK AND POSTER VIEWING
11:30	**Stephen Wright, University of Toronto** Y degenerate? Evolutionary genomics of Y chromosome degeneration in plants
12:00	**Peter Ellis, University of Kent** Differential sperm motility mediates the sex ratio drive shaping mouse sex chromosome evolution
12:15	**Poster pitches x 10 (even numbers)**
12:45	LUNCH BREAK POSTERS SESSION - EVEN NUMBERS

SESSION 4: HUMAN GENETIC VARIATION: FROM MOLECULES TO POPULATIONS

Chair: Wendy Bickmore, co-chair Peter Joshi

Sponsor: Edinburgh Genomics

14:00	**Wendy Bickmore, The University of Edinburgh** Introduction to the session
14:05	**Gil McVean, University of Oxford** The ancestry of everyone
14:35	**Peter Visscher, University of Queensland** Estimation of additive genetic variance from whole genome sequence data
15:05	**Evropi Theodoratou, The University of Edinburgh** Phenome wide Mendelian randomisation study of genetically determined biomarkers using large scale data
15:30	REFRESHMENT BREAK AND POSTER VIEWING
16:00	**Anna Gloyn, University of Oxford** Unravelling causal mechanisms for diabetes
16:40	**Joe Marsh, MRC Human Genetics Unit, The University of Edinburgh** The role of protein complex assembly in dominant Mendelian genetics disorders
17:15	**Alasdair MacKenzie, University of Aberdeen** CRISPR and UK Biobank analysis of an enhancer that modulates fat and alcohol intake and mood suggests a role in male alcohol abuse and anxiety
17:30	**Patricia Heyn, The University of Edinburgh** Gain-of-function DNMT3A mutations cause microcephalic dwarfism and hypermethylation of Polycomb-regulated regions
17:45	**M. Madan Babu, University of Cambridge** Understanding variation in GPCR drug targets
18:15	**Genetics Society AGM**
19:30	**Conference Dinner and Ceilidh,** **InterContinental Edinburgh the George (formerly Principal Hotel)** **19-21 George Street, Edinburgh** **Sponsor: Cobb Vantress**

PROGRAMME

Friday 15 November 2019

09:00 REGISTRATION OPEN

SESSION 5: EPIGENETICS AND NON-CODING RNA
Chair: Robin Allshire, co-chair Liz Bayne
Sponsor: Diagenode

diagenode
Innovating Epigenetics Solutions

09:30	**Robin Allshire, The University of Edinburgh** Introduction to the session
09:35	**Kat Arney, Genetics Unzipped**
09:50	**Adrian Bird, The University of Edinburgh** DNA base composition controls cell fate via SALL4
10:15	**Sito Torres-Garcia, The University of Edinburgh** Stochastic epigenetic silencing by heterochromatin primes fungal resistance
10:30	**David Baulcombe, University of Cambridge** The tomato epigenome
11:00	REFRESHMENT BREAK
11:30	**Beth Sullivan, Duke University** Alpha satellite variation, transcription, and centromere assembly: finding function in the recesses of the human genome
12:00	**Anna Thamm, University of Oxford** MpFRH1 miRNA Controls the Patterning of Epidermal Structures in the Liverwort *Marchantia Polymorpha*
12:15	**Rosalind John, Cardiff University** Genomic Imprinting: linking early life adversity to maternal behaviour and lifelong health
12:30	**Anne Ferguson-Smith, University of Cambridge** Epigenetic modulation of repeat elements – implications for non-genetic inheritance
13:15	POSTER PRIZE AWARDS
13:30	**Final Comments** **Eleanor Riley, The Roslin Institute** **Laurence D. Hurst, Genetics Society**

POSTER PRIZE SPONSORS:

Session 1:
PLOS BIOLOGY

Session 4:
PLOS GENETICS

Session 2:
Heredity

Session 5:
Biology Open

Session 3:
frontiers in Genetics

SILVER SPONSOR:

LOHMANN TIERZUCHT

www.genetics.org.uk