The Francis Crick Institute

David Roblin
Chief Operating Officer &
Director of Scientific Translation

Jim Smith
Research Director
What is The Crick?

- Interdisciplinary biomedical research institute in Central London
- Partnership between:
  - Medical Research Council
  - Cancer Research UK
  - Wellcome Trust
  - UCL (University College London)
  - Imperial College London
  - King’s College London
- 1,350 scientists
- Up to 120 research groups
How will we achieve it?

- Initial portfolio brings together:
  - CRUK London Research Institute
  - MRC National Institute for Medical Research
  - UCL, Imperial and King’s scientists
- Strategic partnership with Sanger Institute
- Funding:
  - Intramural from MRC, CRUK, Wellcome Trust
  - Response-mode funding
- Multi- and interdisciplinary working
- Strong clinical and translational links
- Director: Paul Nurse, Nobel Laureate and President of the Royal Society
Strategic priorities

- Discovery Without Boundaries - June 2013:
  1. Pursue discovery without boundaries
  2. Create future science leaders
  3. Collaborate creatively to advance UK science and innovation
  4. Accelerate translation for health and wealth
  5. Engage and inspire the public
Milestones

Cooksey report published

Land purchased

Planning permission received

Imperial and Kings join the partnership

Start of construction

JVA signed

DWB

New building opens


CRUK, MRC, Wellcome Trust and UCL partnership established (UKCMRI)

LRI/NIMR transfer - science commences
Strong foundations

- Cancer Research UK London Research Institute
  - 37 research groups - director Richard Treisman
  - Themes: cell regulatory mechanisms, genomic integrity, tumour biology

- MRC National Institute for Medical Research
  - 52 research groups - director Jim Smith
  - Themes: physiology, development, infection/immunity, structural biology

- Imperial College, King’s College and UCL
  - Collaborations and interactions with strong universities
Our heritage
A history of discoveries

Cancer Research UK London Research Institute

1974  Mel Greaves’ work on the classification of childhood leukaemias becomes the first example of personalised cancer therapy

1975  Renato Dulbecco - Nobel Prize in Physiology or Medicine for work on interactions between tumour viruses and genetic material of the cell

1979  David Lane and Lionel Crawford discover P53, which is mutated in half of all cancers

1983  Mike Waterfield and Julian Downward show that growth factors and receptors can be oncogenes (PDGF and EGF-R respectively)

2001  Tim Hunt, Leland H. Hartwell and Paul Nurse - Nobel Prize in Physiology or Medicine for their discoveries of key regulators of the cell cycle
A history of discoveries

MRC National Institute for Medical Research

1933 Christopher Andrews, Patrick Laidlaw and Wilson Smith discover human influenza virus

1936 Henry Dale, Nobel Prize in Physiology or Medicine for determining the role of acetylcholine as a neurotransmitter

1952 Archer Martin, Nobel Prize in Physiology or Medicine for invention of partition chromatography

1972 Rodney Porter, Nobel Prize in Physiology or Medicine for determining structure of the antibody immunoglobulin

1995 Robin Lovell Badge - Louis-Jeantet Prize for Medicine for discovery of the sex determining gene

1996 Rosa Beddington discovers anterior organising centre
Francis Crick

• Co-discoverer of the structure of DNA
• Nobel Prize for Physiology or Medicine in 1962
• Open to new ideas, collaborative, interdisciplinary, asked the hard questions
The building
Why St Pancras and Somers Town?

- Knowledge Quarter - over 45 academic, cultural, research, scientific and media organisations
- The close proximity of clinical research facilities and faculties of other disciplines including engineering and maths is vital for the stimulation and support of translational research

Department for Business, Innovation and Skills

- Excellent national and international transport links
- Very attractive location for the best researchers
The design

- Four lab floors plus plant above ground
- Three floor basement: animal, containment and imaging facilities
- Space for up to 1,300 researchers plus support staff
- Public access on ground floor - availability for community use
- Lecture theatre, seminar suite, meeting facilities
- Focus on practical sustainability
- High visual permeability
- Observable interior at street level
A sustainable development

- Green principles embedded into the building design and operation:
  - On-site combined heat and power system
  - Solar panels
  - Energy-efficient fittings
  - High-quality landscape areas
  - Extensive cycle storage
- Building materials sourced to minimise environmental impact
- Building Research Establishment Environmental Assessment Methodology Excellent rating
Construction

- 4 year project
- Biggest single building construction project in the UK
- June 2011 – construction of the shell began
- November 2015 – building complete and staff begin to move in
Discovery Without Boundaries
Vision

- To discover the basic biology underlying human health, improving the treatment, diagnosis and prevention of disease and generating economic opportunities for the UK

- We are:

  BOLD

  IMAGINATIVE

  COLLEGIAL

  DYNAMIC
Strategic priorities

• Pursue discovery without boundaries
• Create future science leaders
• Collaborate creatively to advance UK science and innovation
• Accelerate translation for health and wealth
• Engage and inspire the public
Science questions

“Timidity is ridiculous”
Francis Crick 1992
Outstanding discovery science

- The initial areas of research strength at the Crick will be:
  - Cancer
  - Developmental biology
  - Infection
  - Immunity
  - Molecular biology
  - Neurosciences
  - Stem cell biology and developmental genetics
  - Structural biology
  - Animal house and containment
Discovery Without Boundaries

• Broad scientific remit — little is off-limits
• Great scientists who are free to explore (without boundaries or themes)
• Multi-disciplinarity, no departments or divisions, bottom-up interest groups
• Interact with UCL, Imperial and King’s to introduce physical, computing and clinical sciences
• University attachments (satellites, secondments and sabbaticals)
• Work with AHRCs and BRCs
• State-of-the-art facilities, including animal house and containment
University attachments

- **Secondment**: Relocate a group to the Crick for up to 6 years
- **Satellite**: Small groups (1-3 researchers) embedded in Crick research group for 3 months to 3 years
- **Sabbatical**: Group Leader can spend up to a year in a Crick research group, learning new techniques or hands-on collaboration
- 19 awarded in total - 6 secondments, 10 (6) satellite groups, 3 (1) sabbaticals
- 50% women
Pursue discovery without boundaries
Pursue discovery without boundaries

- Recruit outstanding early career Group Leaders to build an interdisciplinary research portfolio
- Robust review process — benchmark against the highest international standards
- World class research infrastructure and facilities
- Collaborative and effective science IT — sharing scientific data
- Focal point for scientific networking
- High scientific profile amongst scientists and funders
Build multi-disciplinarity

• The Crick will:
  - Create a broad ecosystem of clinicians, engineers, chemists, physicists and mathematicians for example through satellites, secondments and joint appointments.
  - Encourage the involvement of industries in the fields of tools, diagnostics and IT.
Case study: DNA sequencing

- 1953: DNA double helix discovered
- 1962: Watson, Crick and Wilkins awarded Nobel Prize
- 1977: Rapid DNA sequencing method developed
- 1980: Automated DNA sequencing
- 1987: Human genome sequenced
- 2003: Sanger awarded Nobel Prize
- Portable, low cost DNA sequencers including DNA chips
- Personalised healthcare based on individuals' genome sequence

Key advancements:
- X-ray crystallography
- Chain-termination reactions and radioactive labelling
- Fluorescent labelling Capillary electrophoresis
- Advances in informatics to handle large data sets
- Advances in nanomaterials, microfluids and other miniturisation techniques

Disciplines involved:
- Chemistry
- Physics
- Computer Science
- Materials Analytical Science
- Chemistry
Science Technology Platforms

Crick STPs

- Peptide Chemistry
- Mass Spectrometry: Proteomics
- Mass Spectrometry: Metabolomics
- Advanced Sequencing
- Cell Services
- Bioinformatics
- Genomics Equipment Park
- Flow Cytometry
- High Throughput Screening
- Light Microscopy
- Scientific Instrument Prototyping
- Electron Microscopy
- Experimental Histopathology
- Structural Biology Platform
Science Technology Platforms

- Information/understanding of partners’ expertise, equipment and services
- Identify cross-partner opportunities
- Facilitate specialisation across different sites
- For particular specialisms perhaps develop an internal market?
Create future science leaders
Create future science leaders

- Recruit the ‘best scientific athletes’
- Increased number of clinically active scientists
- New career structure
- Flexible and family-friendly
- Multidisciplinary training programme for postdocs and students — internships
- Scientific training of clinicians
- Undergraduate training
Faculty: built-in renewal

- Up to 70% of Group Leaders will be junior appointments: “6 plus 6” year career structure
  - Direct recruitment of outstanding young Group Leaders setting up their programmes
  - Substantial core funding supports strong start and ambition
  - Review at 6 yr, extension for second 6 yr period
  - After 12 years Group Leaders will move to another UK institution
- Secondments from Crick University partners, returning to host after 3-6 years
- ~30% of Group Leaders as senior appointments
  - Senior Crick Group Leaders on rolling contract
  - Regular academic review
  - Strategic senior appointments jointly with university partners
  - Core funding must be supplemented/substituted by response mode
Postdoc Programme

- Postdocs make up largest group within our scientific workforce - up to 600 at steady state operations
- All Crick postdocs offered a four year fellowship with extensions of up to two years for further professional development
- Structured training and career development programme
- Not normally eligible to apply for Group Leader positions at the Crick
- Clinical postdoc programme under development
Women in Science

- Women and men equally represented at PhD/Postdoc BUT Group Leader proportion of women drops to ~20%
- Recruiting more women into senior scientific roles is a priority
- Core funding model creates opportunities for greater flexibility:
  - 6+6 Group Leader programme offers stable career structure and funding
  - Option of part-time Group Leader positions or job shares
  - Contract extensions on 6+6 programme for those taking parental leave
  - Mentoring
- Unconscious bias training and best practice recruitment
- Benefits - child, adult and elder care
- Athena SWAN
Collaborate creatively to advance UK science and innovation
Creative collaboration

• Be open to opportunities that allow us to expand or accelerate our science
• Gain access to broader pools of knowledge, expertise, and resources
• Work closely with University partners and the Sanger: satellites, secondments and sabbaticals
• Develop links with clinicians to develop new approaches to human biology
• Disperse outstanding mid-career talent throughout the UK and the world
• Technology innovation
• Focal point for networking
Collaborate with experts

THE FRANCIS CRICK INSTITUTE
MRC Medical Research Council
Imperial College London
UCL
KING'S College London
wellcome trust
CANCER RESEARCH UK
NHS
Other UK Universities
Healthcare industries
GlaxoSmithKline
Collaborate with experts

The image shows a bar chart comparing citation impact across different countries and sectors. The countries included are the United Kingdom, United States, Canada, Finland, Singapore, Germany, and Japan. The chart categorizes the data into Academic, Academic-Industry, and Industry segments.

Source: Thomson Reuters (Scientific) Inc.
Working with others: Precompetitive R&D

Joy’s Law in Discovery

“No matter who you are, most of the smartest people work for someone else”

Bill Joy, Co-founder Sun Microsystems

Source: BCG
Accelerating Translation for Health and Wealth
Translating basic science

- "Positive" trial

- Any trial

Years after Basic Science Publication

Percentage

Accelerate translation

• Develop the translation capability by:
  - Implementing a coordinated Crick translation process - made as easy as possible
  - Providing funding and support for early translation projects
  - Developing a broad portfolio of translatable science
  - Embedding a culture of translation
  - Incentivising engagement in translation activities
  - Cultivating a bi-directional relationship with partner University clinicians
  - Ensuring a bi-directional flow of researchers to industry and back
Close distance translation & Acceleration into capable hands

Multidisciplinary scientists

GROUP LEADER

Hypotheses

Industrial insight

Translatable programme

Acceleration

Close distance translation
Medicalising the Crick

- The Crick will develop a bi-directional relationship with clinicians from our university partners.
- We will explore ways of interacting with their associated AHSCs and BRCs.
- This clinical interaction will:
  - allow clinical information and insights to inform our discovery research
  - improve access to human tissue
  - enable the development of a culture of experimental medicine within the Crick in the pursuit of translatable projects
Translation

Outstanding discovery science

Multi-disciplinarity

Close-distance translation

Collaborate to develop

Generating benefit for human health

Acceleration
Engage and inspire the public
Local community

- A community benefits package worth almost £10 million, including:
  - £3.8 million towards a new district energy centre to provide residents with cheaper heat and power
  - £1.7 million for insulation and other improvements to local homes
  - Apprentices, job opportunities and local business support
  - Improved access and community safety
Education and engagement

- Auditorium and exhibition area
- Teaching laboratory with priority access for local schools
- Ambitious education programme - annual interactions for students at Camden Schools
- Extensive public engagement with science programme
- Support for community initiatives to improve local health and well-being
Living Centre

- Help improve health and wellbeing in the local area
- 450m² space—designed and run in partnership with the community
Summary
What is special about the Crick?

- World class research facilities
- Building designed to encourage researchers to work together
- Long-term support for bold programmes
- Size allows for a critical mass
- Career structure ensures continuous renewal
- Close to academic partners and hospitals
- Permeability between Crick and its partners
- Partner links increase opportunities for multidisciplinary research
- Good connections throughout UK
No traditional boundaries

• Broad scientific remit — little is off-limits
  - Appoint the very best
  - Track and correct imbalances in portfolio

• Multi-disciplinarity
  - No departments or divisions
  - Interest groups for day-to-day scientific discourse
  - Institute-wide activities - seminars, joint lab meetings, retreats

• Small research groups to encourage interaction - average is Group Leader + 9

• Interact with UCL, Imperial and King’s to introduce physical and clinical sciences

• Work with AHRCs and BRCs

• State-of-the-art facilities, including animal house and containment
National benefits

- Better health, improved quality of life and increased prosperity through investment in excellent medical research
- Develop technologies and train scientists and technical staff to the highest standards, for the benefit of the wider UK biomedical science base