

More Research Less Cancer

December 2024

An update prepared for
The Lord Leonard and
Lady Estelle Wolfson Foundation

Thank you for your support

We're delighted to present you with an update from the Francis Crick Institute. Our dedicated researchers continue to push the frontiers of knowledge, helping to shape our fundamental understanding of human health and disease.

Earlier this year Professor Charles Swanton's world-class contribution to cancer research was recognised with the Jeantet-Collen prize for Translational Medicine. The annual Louis-Jeantet awards are prestigious recognitions of excellence in European biomedical research, highlighting outstanding scientists who have made significant contributions to their field. Charlie joins eight other senior faculty who have received one of these prizes in previous years, which reflects the calibre of our scientists and signifies the Crick's culture of excellence and innovation.

We continue to build a research environment where translation is part of the fabric of scientific life. Crick researchers are encouraged to think creatively about where their ideas

could lead and are supported to get there with the right partners. As part of this, we recently secured just over £11m in funding for a joint project with Imperial College London and AstraZeneca to develop molecular glues to tackle previously 'undruggable' disease targets. And earlier this year we welcomed MSD scientists as the first occupants of Skylab, a new commercial laboratory space on the roof of the Crick.

On behalf of all of us at Cancer Research UK and the Francis Crick Institute, we'd like to thank you for your support over the years. We are pleased to provide you with highlights of advances across the Crick and update you on the progress of Sir Paul Nurse and his PhD students in the Cell Cycle Laboratory.



A year of discoveries

Sep
2023

Working with a team of London hospitals, scientists in Professor Adrian Hayday's lab uncover new information about a specialised type of immune cell. This cell is key to protecting and repairing cells in the healthy gut. People with inflammatory bowel disease have fewer of these protective cells, which leaves them vulnerable to disease progression and severe complications. This discovery could lead to better management and treatment options for these people.

Oct
2023

Dr Jonny Kohl's lab shows that pregnancy hormones 'rewire' the brain to prepare mice for motherhood. Their studies reveal that two hormones, oestrogen and progesterone, act on a small number of brain cells to 'switch on' parental behaviour in the mother, before giving birth. Some of these changes seem to be permanent, suggesting that pregnancy could lead to lasting differences. The team believes the brain may also be affected in a similar way during pregnancy in humans, which could influence parental behaviour alongside environmental and social cues.

Dec
2023

Developmental and epileptic encephalopathies are rare types of genetic epilepsy that start in early childhood. There are currently no specific drugs to treat one of the most common types of genetic epilepsy, called CDKL5 deficiency disorder (CDD), but researchers in Dr Sila Ultanir's lab identify a new therapeutic target for this disorder. This provides hope to the families affected by these conditions and it's a significant contribution to the rare epilepsy field.

Mar
2023

Dr David Bauer and Dr Emma Wall highlight the importance of monitoring emerging SARS-CoV-2 variants and vaccine performance as the virus continues to change. This joint project with the National Institute for Health and Care Research's Biomedical Research Centre at UCLH involves participants in the Legacy study, which is an investigation into immune responses to COVID-19. This discovery will help scientists to better understand the evolution of this virus.



Apr
2024

In partnership with Bristol-Myers Squibb, Professor Charles Swanton and his team show that examining the immune cells in the environment around a lung tumour could help predict how a person's cancer might progress and respond to treatment. This discovery, which stems from the TRACERx study, could lead to significant changes to how lung cancer is treated.

Jun
2024

Dr James Lee and his team discover a major cause of inflammatory bowel disease (IBD) and related conditions. Their research also identifies a potential therapeutic option that could transform the way we treat IBD and autoimmune conditions.

Jul
2024

Dr Greg Findlay and his lab map the effects of all the possible changes to a gene called VHL. Variations in this gene can increase the likelihood of developing kidney cancer, but the cancer risk of each of the changes had not been fully understood. This work could help to decide what sort of therapy or pre-emptive care a person needs, based on the differences in their genes.

Aug
2024

In collaboration with research teams in Cambridge and Paris, Professor Marika Charalambous and her team have uncovered a previously unknown way that certain fatty acids, such as omega-3s, are passed from mother to baby during pregnancy. Such fatty acids are essential for healthy development and their lack can lead to growth problems. The discovery, which uses advanced computational techniques, could help to identify ways to tackle this deficiency in unborn babies.

The Cell Cycle Laboratory

The cell cycle lies at the core of life itself, enabling the growth, repair and reproduction of organisms from microscopic yeast to complex creatures like humans. The cell cycle and its control is central to understanding cancer, and a number of drugs that target molecules identified by the Laboratory are used in current cancer therapies or are in cancer clinical trials. The Cell Cycle Laboratory, led by Sir Paul Nurse, delves into the intricate and essential processes that take place in a cell as it prepares to divide.

The Crick was honoured to host His Majesty the Emperor of Japan in June this year, accompanied by representatives of the Imperial Household, the UK Royal Household and the UK Government. Emperor Naruhito was greeted by Paul, Crick Chair Lord Browne, former Deputy CEO Dr Sam Barrell and Emeritus Scientist and Nobel Laureate Sir Tim Hunt.

Emperor Naruhito heard from UK and Japanese scientists based at the Crick about research areas of interest to both countries, highlighting how international collaboration is at the heart of the global research endeavour. His Majesty visited the Cell Cycle Laboratory and heard about how the scientists use fission yeast to build a more detailed picture of how cells prepare to divide. Emperor Naruhito and Paul spent some time discussing the team's research and how understanding fundamental processes such as the cell cycle can help to progress our understanding of ageing and disease.

Earlier this year Paul announced that he would be stepping down as Director of the Crick and passing the baton to Professor Edith Heard. As a director who has always stayed close to the research, he is looking forward to dedicating more time to mentoring the PhD students and early career researchers in his lab.

"Leading this institute has been an extraordinary privilege. The success of the Crick is grounded in our shared mission of advancing science for the benefit of humanity, and I am confident that this mission will endure, strengthened by the innovation and curiosity of the many wonderful scientists here. After years of overseeing our strategic direction, I am looking forward to refocusing on the science that continues to intrigue and excite me."

Sir Paul Nurse

A chance to bond at the laboratory retreat

We caught up with PhD students Hannah Kynman, Hale Phillips and Lizzie Ryder who spoke about their recent trip with members of the Cell Cycle Laboratory. The laboratory retreat offered the scientists some time away from the bench to discuss their projects, exchange ideas and even the opportunity for a dip in the sea! All lab members are grateful for the support they receive from The Lord Leonard and Lady Estelle Wolfson Foundation.

Hannah:

For our lab retreat, we went to Weymouth in Dorset and every day we had scientific discussions. It was interesting and a really enjoyable way of going into the fine detail of each person's research.

Hale:

We each gave a talk about our individual projects and where we'd got to so far, and there were also a couple of general discussion sessions where we covered broader topics around the cell cycle. I led one of the general discussion sessions – I'd never done anything like that before, but it was a really valuable experience.

Lizzie:

It was a great opportunity to bring up any stumbling blocks that we'd hit or problems that we'd encountered and really talk it through. We were able to benefit from everyone's experience and, because we're still at the early stages of our projects, it was incredibly useful to get their input. I was given some useful advice about an issue I'd been having with my cells – and now I've implemented that in the lab, my cells are behaving themselves!

Hannah:

I thoroughly enjoyed the chance to go into the fine details of my research and have discussions with people who know so much about the work. Each presentation took one to two hours and

we were encouraged to ask any questions we wanted. It was very open and supportive.

Hale:

The idea of it was a little daunting at first, but once the discussions got underway it felt really good to be able to contribute. And aside from the science, the retreat itself was great fun. We all visited the beach together and even went for a run.

Hannah:

One evening the lab went out for dinner and entered a pub quiz. It was very funny but we were awful! I think we finished second to last – we did our best, but we just didn't know enough about TV shows in the 80s!

Lizzie:

Paul would have been really helpful for that, but there were so many of us that we had to split the lab into two teams and he said he couldn't possibly pick a team to side with!

Hale:

We all enjoyed the week so much. I think it brought us closer together socially and scientifically.

An update on PhD student Billy Whyte

Now in the final year of his PhD, student Billy Whyte is focusing on answering the major questions his research has opened up over the past few years.

His project explores the genetic controls that govern when a cell is the right size to divide into two. Using a type of single-celled yeast, Billy is investigating how they keep their size in check. He explains, "I'm using a combination of genetics and cell biology to look at how one gene might determine the cell size at the point of division. Understanding how cells manage their size could tell us much more about diseases where cell growth goes wrong, like cancer."

He's recently discovered that one molecule appears to be a major factor in how a cell checks its size when it's ready to split in two. "This is quite exciting," he says, "I identified a molecule that can compensate for others when they're absent, which is something that wasn't previously considered."

Recognising the support he received from the Crick's science technology platforms (STPs), Billy says, "The whole team in the Flow Cytometry STP have been incredible, especially when training me up and troubleshooting experiments. I've also had immense help from Dr Tania Auchynnika in the Proteomics STP – she's guided me through all the steps of preparing, testing and analysing my samples."

"I've really enjoyed being in Paul's lab. We're given licence to pursue our intellectual curiosities in a way that really helps to develop us as scientists," he continues.

"There are so many opportunities at the Crick. Not just the valuable mentoring, but also the variety of lectures and seminars that we can attend here. I've learnt so much about other research areas, which has impacted the way I think about my own project."

Billy also played a role in the Crick's summer public engagement event, Discovery Day. He guided young children on an 'adventure through the cell cycle' that lab members designed, allowing them to convey complex biological concepts in a fun and accessible way. He says, "It was an incredibly fun and rewarding experience!"

Dr Clovis Basier: After the Crick

“ Spending the last six years at the Crick has been an extraordinary experience, full of discovery, friendship and learning - I've grown as a scientist and as a person.

I had the privilege to work alongside brilliant minds and dive deep into the very fundamentals of biology. One of the biggest highlights for me was working closely with Paul, whose guidance has been invaluable. His mentorship has not only shaped my scientific thinking but also taught me how to navigate the complex world of research.

During my PhD, I published two scientific papers that focused on understanding cellular growth. In my first study, I explored how cells regulate their growth, particularly how their size and stage in the cell cycle influence the production of material inside the cell. The answers have provided new insights into how cells control their internal processes, which could have implications for understanding diseases where growth regulation goes awry.

The second paper came from a surprising observation during my first study. I found that even in stable conditions, certain cell processes are programmed to be chaotic. Cells seem either designed to be very stable, but not able to change direction quickly – like passenger jets, or to be unstable but highly manoeuvrable – like fighter jets. In the aspect of growth that I studied, cells are more like fighter jets than passenger jets! It's still a mystery why cells choose to operate this way so there's more work to be done to fully understand this phenomenon. Although it's not yet clear what practical applications might come from my findings, that's often how science works. Discoveries can take years or even decades to reveal their full impact.

I've now taken up a position with Boston Consulting Group. My role will involve helping businesses make strategic decisions, a shift from the lab bench to the boardroom. I'm excited to apply the problem-solving skills, analytical thinking and storytelling abilities I've developed to this new role. Science teaches you to tackle complex problems, break them down and communicate them effectively – skills that I'm sure will serve me well in consulting.

Reflecting on my time at the Crick, I am deeply grateful to the Lord Leonard and Lady Estelle Wolfson Foundation for funding my PhD and supporting so many other students in the lab. Paul's philosophy of filling the lab with creative young scientists, guided by a few experienced mentors, has been instrumental in my growth. It's an approach that fosters independence, creativity, and collaboration – a combination that has prepared me well for whatever comes next.”

Thank you

The core mission of the Crick is to harness the power of discovery research without boundaries to address the biggest global health challenges of our time.

I hope you've enjoyed the updates from Paul's lab and about how Crick scientists are driving forward research that could benefit society for generations to come.

Thanks to your commitment and belief in our vision, we're making progress in understanding the fundamentals of life and how they underpin health and disease. We truly value our longstanding partnership with you as we strive to make discoveries that will transform many lives. Thank you again for your generosity over the years.

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