

The Nobel Prize web page - Biography:

My parents were born in Norfolk and spent their early years working in the big houses of that rural English county, my mother as a cook and my father as a handyman and chauffeur. After the 1930s recession they moved to Wembley, North-West London, where my father worked as a mechanic in the local H.J. Heinz food processing factory, and my mother brought up their four children and was a part-time cleaner. I was by far the youngest of the family, and at times it was like being an only child. My parents were neither wealthy nor academic, but we lived comfortably and they were always extremely supportive of my academic efforts and aspirations, both at school and university.

My primary school was a considerable distance from where we lived and so I had long walks, often alone, to and from school. This walk took me through a park and some rough land where I could not fail to notice the animals, insects and plants there and how they changed during the seasons. During the winter my attention was attracted to the changes in the stars and planets in the sky. I think it was this curiosity about the natural world which awoke my early interest in science. Two incidents from this time that I remember, were, wondering why leaves were larger on plants growing in the shade compared with the same plants growing in sunlight, and watching Sputnik 2, the second ever artificial satellite and the first with a living cargo (a dog called Laika), as it sped across the skies of London. My life-long interest in astronomy started then and I still regularly use a telescope for astronomical observations, although very much as an amateur.

I enjoyed my time at primary school because my teachers made the world seem such an interesting place and encouraged my innate curiosity. At age 11 in 1960, I moved to an academic state secondary school, Harrow County Grammar School for Boys. This was a mixed experience for me. It was a good, well-resourced school, but was very exam oriented and most of the other boys came from wealthier and more academic families which sometimes made me feel like a fish out of water. I was never very good at exams, having a poor memory and finding the examination process rather artificial, and there never seemed to be enough time to follow up things that really interested me. But there were good things about the school. I had an excellent Biology teacher, Keith Neal, who encouraged his pupils to study natural history and to do real experiments. I had a great time investigating the pigments of different mutant fruit flies by following experimental protocols published in Scientific American, and I also remember making my own beetle collection when it was still acceptable to make such collections. There were also good extra-curricular activities, particularly hill and mountain walking and more surprisingly, learning to fly. I am still a keen mountain walker and an enthusiastic glider pilot. I also made some very good friends who remained important to me into adulthood. It was during my time at secondary school that I abandoned religion. My mother was a Baptist, and as a young teenager I was also a committed believer. But I had real difficulties reconciling a literal belief in Genesis with evolution, and my attempts to accommodate the biblical account of creation by viewing it as a poetic metaphor suitable for an unsophisticated nomadic people was completely rejected by my church. I gradually slipped away from religion over several years and became an atheist or to be more philosophically correct, a sceptical agnostic.

By the end of my time at school I had achieved examination grades which allowed me to go to University, but did not have a basic foreign language qualification which was compulsory for all University entrants. This meant that when I left school I had to work as a technician in a microbiological laboratory associated with the local Guinness brewery. This was a great experience for me because I had a very sympathetic lab head Vic Knivett, who rapidly realised that I could complete the routine requirements of my job in a couple of days each week, and encouraged me to carry out research experiments for the rest of my time. Unfortunately I continued to fail my French Exam and it was only the intervention of Professor Jinks at Birmingham that got me into a University. He had noticed my application for entry and asked me to visit his Genetics Department. After an extensive interview he arranged for my weaknesses in foreign languages to be over-looked and so I started a Biology degree at Birmingham in 1967.

¹ <https://www.nobelprize.org/prizes/medicine/2001/nurse/biographical/>

My time as an undergraduate at Birmingham was extremely stimulating both as a biologist and also for my more general intellectual development. It was the heady times of the sixties when everything could be challenged and everything seemed possible. I met my wife Anne who was a sociology student, and her influence together with activities associated with the student movement of the time opened up my interests amongst other things into the theatre, art, music, politics and philosophy. For the first time I fully recognised the excitement of intellectual endeavour and realised that this was what I wanted to do with my life.

The lecturers on my courses were generally enthusiastic about their subjects and encouraged my interest in the biological world. At first my inclinations turned towards the subject of ecology with its then new theoretical models of ecological systems, but a field course collecting marine specimens in freezing cold weather taught me that I was too soft for practical ecology, and I realised that I had a preference for the more controlled and warmer environment of the laboratory. Gradually my interests settled on developmental biology with an emphasis on plants and a molecular approach to the problem. I had an eccentric zoology tutor Jack Cohen who was hugely stimulating and entertaining, and although frequently wrong was always wrong in an interesting way. He taught me the value of the alternative view and also was the first to introduce me to the cell cycle with a project on the respiration rate of dividing fish eggs, a project which ended in complete disaster. This time at Birmingham turned me into a general biologist, and ever since then I have always tried to take a biological approach to any research project that I have undertaken.

A key issue in developmental biology at that time was the problem of how cells underwent differentiation, with most workers concentrating on explanations in terms of changes in enzyme and gene regulation. To me the cell cycle seemed to be a good and simple model for such problems, because the cell underwent molecular changes as it proceeded through its cell cycle. So when my thoughts turned towards a PhD I looked for a laboratory where I could study molecular changes during the cell cycle. Tony Sims at the University of East Anglia (UEA) in Norfolk was just beginning such studies by looking at the enzymes of amino acid metabolism during the cell cycle of the fungus *Candida utilis*. I went to his lab as a graduate student because I was joining a project at its inception and thought that I would be able to make a more important contribution to the work. Tony was a great experimentalist and I rapidly learnt the need for good experiments to make any progress at all in a research project. Like many students, I found the drudgery of real experiments and the slowness of progress a complete shock, and at my low points I contemplated other alternative careers including study of the philosophy or sociology of science. However, the atmosphere at UEA was very supportive and my colleagues made me feel I was making a useful contribution so I survived the difficulties of carrying out real research. In fact I am very much an experimentalist and an empiricist, so it would have been a major mistake for me to have abandoned this type of work. But this experience did teach me the need for sympathetic support of scientific colleagues, because at the forefront of research there are so many difficulties that depression and low motivation are a constant danger.

The next step was what to do as a post-doctoral worker and this question exercised me greatly in my final year as a graduate student. I felt strongly that since the pursuit of good science was so difficult it was essential that the problem being studied was an important one to justify the effort expended. Rather grandly I argued to myself that the process of reproduction was a central property of life, and that this was seen in its simplest form with the reproduction of cells. Therefore, I reasoned that study of the cell cycle responsible for the reproduction of cells was important and might even be illuminating about the nature of life. In particular the control of these processes would be crucial, just like control of flux through a pathway was important for amino acid metabolism. But how could such processes be investigated given so little was known about them? The answer came to me in 1972 when I read two papers from Lee Hartwell who showed how genetics could be used to study the budding yeast cell cycle. I thought this was a beautiful approach to the problem, one I wanted to use as well. The difficulty was that Anne was by now a teacher and neither of us wanted to move to the USA, and so I needed to find a UK laboratory for this work. Murdoch Mitchison in Edinburgh was the UK authority on the cell cycle and worked on fission yeast but he was not a geneticist. I went to Edinburgh on a wonderful blue day with the city under snow to discuss my aspirations, and was immediately attracted both to

Murdoch's laboratory and to this beautiful city. He suggested that I spent a couple of months in Bern Switzerland with Urs Leupold, the father of fission yeast genetics, so that I could gain experience that would allow me to begin a genetic analysis of the fission yeast cell cycle. Urs was a careful but inspirational teacher and within six months I was able to introduce genetics into Murdoch's cell cycle laboratory.

My 6 years with Murdoch were pivotal for my entire research career. He gave me both complete support and total freedom, spending hours each week talking with me but never instructing me what to do. An astonishingly generous supervisor, he never once was a co-author on any of the papers I produced during my time in Edinburgh. He considered, quite wrongly of course, that he had not made a sufficient contribution to justify inclusion! His laboratory was an exciting environment where I had many interesting colleagues. During my first year, two new recruits came, Peter Fantes as a postdoc and Kim Nasmyth as a graduate student. Peter was of a mathematical and theoretical bent and it was through discussions and joint work with him that the importance of cell mass in regulating progression through the fission yeast cell cycle first became clear to me. Murdoch asked me to look after Kim who was extra-ordinarily bright, and he extended the cell cycle mutant collections during his thesis work. My main efforts focussed on trying to identify the rate controlling steps during the cell cycle. Crucial for this analysis were wee mutants that were advanced prematurely through the cell cycle and so divided at a reduced cell size. I would like to claim that I reasoned abstractly that such mutants would be useful and then tried to find them, but in reality I noticed them only by accident whilst searching for completely different mutants. As is often the case it was nature that provided the best lead to be followed. A third new recruit was a friend of mine from Bern, Pierre Thuriaux who worked with me on showing that *cdc2* was a rate limiting factor controlling the onset of mitosis. A second key advance was showing that *cdc2* was also required for the onset of S-phase. This emerged from work with Yvonne Bissett while we were trying to identify a G1 control start similar to the one defined by Lee Hartwell in budding yeast. As a negative control for this experiment we used *cdc2* mutants which we thought would block cell cycle progression in G2. In fact the results we obtained were ambiguous with the negative controls always giving a small but significant positive response. For some time we thought the experiment flawed and then in desperation hypothesised that *cdc2* was required twice in the cell cycle explaining the mixed results. This turned out to be correct establishing that *cdc2* was a controlling factor for the onset of both S-phase and mitosis.

It was now 1980 and Anne and myself had two little children Sarah and Emily, and we were wondering whether to stay permanently in Edinburgh. This possibility bothered me as I thought it was not advisable to remain in one academic environment, and the long dark winters in Edinburgh could be rather dismal. I also thought that the next stage in cell cycle analysis required molecular genetics, and fission yeast was not developed for these types of experiments, and so I looked for an environment which would make this possible. In the end I decided that the University of Sussex in Brighton was a good place for this work because it had a strong tradition in bacterial molecular genetics and an excellent reputation in biology. It was also almost as far south as it was possible to go in the UK and so had a reasonable chance of having decent summers! I set up my first laboratory there with a technician and myself and began working on fission yeast molecular genetic manipulation. In this project I had great assistance from an excellent post-doc from the next door lab, David Beach, who was already skilled in DNA cloning procedures. There followed a very fruitful collaboration that led to the cloning of the more important cell cycle genes. This allowed me to recruit more workers, in particular my first graduate student Jacky Hayles, who went on to contribute immeasurably to many subsequent projects in my laboratory and still is a stimulating and imaginative colleague with me today. Another very important recruit was Paul Russell who cloned the more important regulators of *cdc2*.

This progress in the molecular analysis of the cell cycle led to more interest being taken in my work and as a consequence to greater competition. My job was not secure in Sussex as I only had a time limited position and the financial support for my lab was limited. I had failed to secure a permanent appointment at Sussex or the major MRC research institutes in Cambridge and London, and was on the verge of moving to the EMBL in Heidelberg where the Director Lennart Philipson had offered me a post. However, we wanted to stay in the UK and just in time Walter Bodmer, Scientific Director of the

Imperial Cancer Research Fund (ICRF) offered me a permanent lab head position at his main laboratories in Lincoln's Inn Fields and I moved there in 1984. For the first time I found myself in a very well funded laboratory and a hot-house scientific environment. There were pros and cons to this; the financial support meant we could do any experiment we wished but there was not the same collegiate support that I was used to in the Universities. Perhaps, not unreasonably, some wondered what a yeast researcher was doing in a cancer research institute. Despite this I was now able to set up an effective laboratory which could take on many of the problems that I could not have addressed before. Lincoln's Inn was a wonderful scientific institute with nearly every molecular biology procedure being carried out by someone within its walls. I quickly built up a laboratory of excellent post-docs who brought in expertise that I did not have, expertise which was essential for a proper molecular analysis of the cell cycle control genes. These included Viesturs Simanis, Sergio Moreno and Kathy Gould, who between them worked out that *cdc2* encoded a protein kinase that was regulated during the cell cycle and was controlled by tyrosine phosphorylation. Another post-doc Melanie Lee cloned the human *CDC2* gene by rescue of a fission yeast *cdc2* mutant, and so established that the cell cycle in humans was likely to be regulated in the same way as yeasts. This was a major step forward, all the more so because she persevered with a project that many argued was highly unlikely to succeed.

At the end of the 1980s as a complete surprise my old Edinburgh friend, Ed Southern offered me the Chair of Microbiology at the University of Oxford. It was a difficult decision to move to Oxford as things were going so well at Lincoln's Inn, but when my daughters realised that they would be able to ride ponies almost daily the debate was over and we moved to Oxford in 1988. I had a lot more space and my lab grew in size probably beyond a level that I could properly supervise. Many of my lab colleagues moved with me to Oxford and others including Chris Norbury, Iain Hagan and Tamar Enoch joined me there. During this time the links of *cdc2* with cyclins and maturation promoting factor (MPF) were established, as well as its involvement with checkpoint controls. My administrative work load increased dramatically as the head of a University Department and also as President of the UK Genetical Society. This together with being the supervisor of a large laboratory meant that I failed to take sufficient advantage of the broader academic environment that a University has to offer. I had hoped to recreate my times at Sussex and Edinburgh but this was not to be. However, I did learn how to manage things and how to deal with finances which led to me being approached about returning to London as Scientific Director to ICRF. The temptation of the properly founded laboratory was too great to resist and I returned to Lincoln's Inn Fields in 1993.

This return to ICRF made me a colleague of Tim Hunt with whom I had had close contacts for the previous decade although we had never worked together. He was and is a most delightful companion and our very different backgrounds meant that our conversations, for me at least, were always stimulating and productive. We had the closeness and mutual respect which meant we could utterly disagree without the slightest risk of the other becoming upset. As a biochemist he was more grounded in reality, whilst as a geneticist I was more abstract in my thought. This meant I tended to lose contact with what was really possible within the constraints of the Laws of Thermodynamics as Tim was always ready to point out to me. We were also both natural performers on the lecture stage and not infrequently we entertained as a double act at conferences. There were many other scientists on the world stage that had great influence on the cell cycle field during the crucial times of the 1980s to the early 1990s. Important for me were those working on frog and marine invertebrate egg cell cycles, work started by Yoshio Masui. Marc Kirschner provided immense clarity to this sometimes murky field, whilst Jim Maller successfully achieved the very important task of purifying maturation promoting factor or MPF. My lab collaborated with the French Scientist Marcel Dorée who not only brought well needed biochemistry to my work but great gaiety as well. Closer to my own experimental system were the yeast geneticists, in particular Mitsuhiro Yanagida, a towering powerhouse of rigorous experimental activity, and Andrew Murray, a worker of great imaginative ability. My interactions with these and many others greatly shaped and corrected my thinking about the cell cycle and its control. The 1990s saw my children grow up and in their early 20s they left home. Sarah is an assistant producer for a major TV soccer programme in the UK, whilst Emily has just started a PhD in theoretical particle physics. My heavy responsibilities as Director General of ICRF have taken their toll on my experimental

work. It is a constant worry to me that I have not supervised my graduate students and post-docs properly during this time. It has only been their excellent quality which has kept the work going reasonably well. Their main focus has been elucidating the controls regulating the onset of S-phase and ensuring that there is only one S-phase each cell cycle, a new set of projects dealing with the controls during the meiotic cell cycle, and genomic analysis of fission yeast. These problems all interest me and hopefully in the not too distant future I will be able to devote more of my time to their study. Two other projects are also being pursued. The first is a Science in Society Initiative of the Royal Society which I chair and has as its objective an improvement in dialogue between scientists and the public. Its agenda bears an uncanny similarity to that discussed in the late 1960s during student occupations at the University of Birmingham. The second is the merger of the ICRF with the CRC to generate a single organisation Cancer Research UK, which will form the largest cancer research organisation in the world outside of the USA.

The award of this prize is a water-shed in my life, forcing me to look back over my past and to consider what I should do for the next 15-20 years. I have an idealistic view of science as a liberalising and progressive force for humanity. Better understanding of the natural world not only enhances all of us as human beings, but can also be harnessed for the better good, leading to improved health and quality of life. It is also a truly international activity which breaks down barriers between the peoples of world, an objective that always has been necessary and never more so than now. Scientific understanding is often beautiful, a profoundly aesthetic experience which gives pleasure not unlike the reading of a great poem. It has been a privilege to pursue knowledge for its own sake and to see how it might help mankind in more practical ways. I hope that the future will allow me to continue that pursuit for as long as I am able.

From [Les Prix Nobel](#). *The Nobel Prizes 2001*, Editor Tore Frängsmyr, [Nobel Foundation], Stockholm, 2002

This autobiography/biography was written at the time of the award and later published in the book series [Les Prix Nobel/ Nobel Lectures/The Nobel Prizes](#). The information is sometimes updated with an addendum submitted by the Laureate.

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Addendum, February 2008

It was six years after these words were written when I was 57 years of age, that I discovered my parents were not my parents. This revelation came about because of the US Department of Homeland Security rejecting my Green Card application on the grounds that the details given on my birth certificate were insufficient. In the UK there is both a short and a long birth certificate, and the former which I had did not record the names of parents. I applied to the UK Registry Office for a long certificate and went on holiday. On my return, I was greeted by my PA asking if "I had made a mistake with the name of my mother." She handed me the new long birth certificate and the next few seconds of my life were both unexpected and transforming. The name of my mother given on the certificate was the name of the person I thought was my sister and the space for my father's name was blank. I had been brought up by my grandparents thinking that they were my parents.

Both my mother and grandparents died some years ago so I could not confirm with them what had happened. A more distant relative had been 12 years of age and lived in the house where I was born, and had been sworn to secrecy about my birth. She was able to tell me that my mother became pregnant at 18 years and was sent away to her aunt's for the last months of pregnancy and my birth. My grandmother then came and pretended that she was the mother and returned to the family home with her "new son." My grandparents then brought me up to protect their daughter. My mother got married when I was nearly three and there is a poignant photograph of the wedding with her holding her new husband with one hand and me with her other hand. Everyone kept the secret so even my two brothers (now my uncles) did not know the truth of my origins. And of course I still do not know who my father is beyond a rumour that he may have been a serviceman, perhaps even an American serviceman which would presumably please the US Department of Homeland Security.

Does any of this change anything? Not really, I was brought up by loving grandparents and had a happy childhood. All my relations have changed of course, with parents becoming grandparents, brothers

becoming uncles, nephews and nieces becoming half brothers and sisters. In fact, it was quite nice to acquire new half siblings at a late stage in life. Both my grandparents were also illegitimate so I inherited the name 'Nurse' twice through the maternal line in three generations: so apart from being somewhat unsettled, which I suppose is understandable, nothing really has changed, although I continue to wonder who my father is. Of course I regret not having had time with my real mother or the opportunity to discuss my origins with her later in life, and then there is the final irony that even though I am a geneticist my family managed to keep my genetic origins secret from me for over half a century.

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The Royal Society web page – Sir Paul Nurse FMedSci FRS²

- Fellow, elected 1989
- Professional positions: Director, The Francis Crick Institute
- Interest and expertise: Subject groups: Biochemistry and molecular cell biology
- **Awards:**
 - **Copley Medal** (for his contributions to cell biology in general and to the elucidation of the control of cell division)
 - **Florey Lecture** (on “How is the cell cycle regulated?”)
 - **Louis-Jeantet Prize for Medicine** (no citation available for this award)
 - **Nobel Prize in Physiology or Medicine** (jointly with Leland H. Hartwell and Tim Hunt for their discoveries of key regulators of the cell cycle)
 - **Royal Medals** (in recognition of his work on the control of the cell cycle in eukaryotic cells by his discovery of the identity and function of genes that regulate the key control points in the process of cell proliferation)
 - **Royal Society GlasoSmithKline Prize and Lecture** (in recognition of his seminal contributions to the understanding of the molecular basis of regulation of the eukaryotic cycle)
 - **Rutherford Memorial Lecture** (given in New Zealand).

Paul Nurse is a **geneticist and cell biologist** whose discoveries have helped to explain how the cell controls its cycle of growth and division. Working in fission yeast, he showed that the *cdc2* gene encodes a protein kinase, which ensures the cell is ready to copy its DNA and divide. Paul's findings have broader significance since errors in cell growth and division may lead to cancer and other serious diseases.

Paul's contributions to cell biology and cancer research were recognised with a knighthood in 1999. In addition, Paul's endeavours relating to the discovery of cell cycle regulatory molecules saw him jointly awarded the Nobel Prize for Physiology or Medicine in 2001.

Over the last thirty years, Paul has held many senior research leadership roles. In 2010, he was elected as President of the Royal Society for a five-year term. Since 2011, he has been the Director and Chief Executive of the Francis Crick Institute, a London-based biomedical research institute due to open in 2015.

² <https://royalsociety.org/people/paul-nurse-12012/>

The Francis Crick Institute web page³

Paul Nurse – Cell Cycle Laboratory

Our laboratory works to understand how cells grow and divide. The cell cycle is a complex process involving cell growth, DNA synthesis and mitosis that leads to the division of a single cell into two daughters, a process that is fundamental to all living organisms.

Using fission yeast, a single-celled eukaryote, our lab investigates the regulatory networks that control the orderly progression of events through the cell cycle that ultimately lead to a timely mitosis and division. Cell cycle transitions are coordinated with cell growth and we are working to uncover the mechanisms by which cells monitor their own size and control progression through the cell cycle.

We expect our studies in fission yeast will lead to an improved understanding of human cellular controls. This is important as uncontrolled cell growth and proliferation can lead to diseases such as cancer.

Biography

Paul Nurse was born in Norfolk and raised in London, where he attended Harrow County Grammar School. In 1970 he received a degree in biology at the University of Birmingham and a PhD in 1973 from the University of East Anglia for research on amino acid pools in *Candida utilis*.

After spending several months in Urs Leupold's laboratory in Bern, Switzerland, where he learned classical genetics of fission yeast, he went to the laboratory of Murdoch Mitchison at the University of Edinburgh for postdoctoral studies on the cell cycle. Here, between 1973-1979, he used a classical genetic approach to study the cell cycle by identifying and studying a set of cell cycle defective mutants that have formed the basis of much of his future work.

From this work Paul identified the *cdc2* gene in the yeast *Schizosaccharomyces pombe* and showed that it controlled the progression of the cell cycle from G1 phase to S phase and the transition from G2 phase to mitosis.

In 1979 he set up his own laboratory at the University of Sussex. Here he developed techniques that allowed him to clone the *cdc2* gene from fission yeast and to show that it encoded a protein kinase.

In 1984, Paul joined the Imperial Cancer Research Fund (ICRF, which became Cancer Research UK in 2002) and in 1987 he identified the human *cdc2* homologous gene which codes for the cyclin dependent kinase CDK1. He left ICRF in 1988 to chair the Department of Microbiology at the University of Oxford. Here he continued his work on the cell cycle and also initiated new research areas to study cell form and genomics. He returned to the ICRF as Director of Research in 1993, and in 1996 became Director General of the ICRF and in 2002 the Chief Executive of Cancer Research UK.

In 2003, Paul became President of Rockefeller University in New York City where he continued to work on the cell cycle, cell form and genomics of fission yeast.

In 2010, he became the first Director and Chief Executive of the Francis Crick Institute in London and in addition for 5 years was President of the Royal Society.

Awards and recognition

Paul was awarded the 2001 Nobel Prize in Physiology or Medicine along with Leland Hartwell and Tim Hunt for their discoveries of protein molecules that control the division (duplication) of cells in the cell cycle.

In 1989 he was elected a Fellow of the Royal Society (FRS) and in 1995 he received the Royal Society Royal Medal and became a foreign associate of the US National Academy of Sciences. He received the Albert Lasker Award for Basic Medical Research in 1998 and was knighted in 1999. He was awarded the French Legion d'Honneur in 2002, the Royal Society Copley Medal in 2005, and the Japanese Order of the Rising Sun in 2018.

³ <https://www.crick.ac.uk/research/labs/paul-nurse>

He was a member of the Council for Science and Technology advising Prime Ministers from 2000 to 2015. In 2013 he became the winner of the Albert Einstein World Award of Science conferred by the World Cultural Council, and since 2017 has been a Chief Scientific Advisor of the European Commission. His nomination for the Royal Society reads: "Distinguished for his studies of genes, which regulate the cell cycle in fission yeast and higher organisms. He developed techniques for transformation, gene replacement and expression vectors in the fission yeast *S. pombe*. He identified two major controls in the cell cycle and he cloned and characterised genes involved in commitment to DNA synthesis or mitosis notably the 'start' gene *cdc 2*. He showed that *cdc 2* encodes a protein kinase which is potentially regulated by phosphorylation. He identified, cloned and sequenced the human equivalent of *cdc 2* and showed that its sequence is extensively conserved from yeasts to man. Together with Maller and Lohka, he has now shown that purified preparations of the vertebrate cell-cycle regulator 'maturation promoting factor' contain the product encoded by the *cdc 2* homologue."

Paul has received over 70 honorary degrees and fellowships including those from universities where he was trained - Birmingham, East Anglia, Edinburgh and Sussex - as well as Oxford and Cambridge. He is also a fellow of the Academy of Medical Sciences and is an Honorary Fellow of the Royal Academy of Engineering, and of the British Academy.

Qualifications and history

- 1973 PhD, University of East Anglia, UK
- 1974 Research Fellow University of Edinburgh
- 1980 Research Fellow University of Sussex
- 1984 Imperial Cancer Research Fund (ICRF) Group leader at Lincoln's Inn Fields (ICRF became Cancer Research UK in 2002)
- 1989 Professor of Microbiology at University of Oxford, UK
- 1996 Director General of ICRF
- 2002 Chief Executive Cancer Research UK
- 2003 President of the Rockefeller University, USA
- 2010 President of the Royal Society and Director of the Francis Crick Institute
- 2015 Director of the Francis Crick Institute

The Rockefeller University web page⁴

Education

- B.Sc. in biological sciences, 1970
University of Birmingham
- Ph.D. in cell biology and biochemistry, 1973
University of East Anglia

Postdoc

- University of Bern, 1973
- University of Edinburgh, 1974–1980
- University of Sussex, 1980–1984

Positions

- Head of Laboratory, 1984–1987
Imperial Cancer Research Fund
- Professor, 1987–1993
University of Oxford

⁴ <https://www.rockefeller.edu/our-scientists/heads-of-laboratories/953-paul-nurse/>

- Director of Research, 1993–1996
Director-General, 1996–2002
Imperial Cancer Research Fund
- Director-General, 2002
Chief Executive, 2002–2003
Cancer Research UK
- Professor, 2003–
President, 2003–2011
President Emeritus, 2011–
The Rockefeller University
- President, 2010–2015
The Royal Society
- CEO and Director, 2010–
Francis Crick Institute

Awards

- Canada Gairdner International Award, 1992
- Lewis S. Rosenstiel Award, 1992
- Louis Jeantet Prize, 1992
- Royal Medal, The Royal Society, 1995
- Alfred P. Sloan Jr. Prize, 1997
- Albert Lasker Basic Medical Research Award, 1998
- Knighthood, Great Britain, 1999
- Nobel Prize in Physiology or Medicine, 2001
- Legion d'Honneur, 2002
- Copley Medal, The Royal Society, 2005
- Albert Einstein World Award of Science, 2013
- Henry G. Friesen International Prize, 2015

Honorary Societies

- Foreign Associate, National Academy of Sciences
American Academy of Arts and Sciences
Member, European Molecular Biology Organization
The Royal Society
The Chinese Academy of Sciences

Selected Publications

- Kawashima S.A. et al. Potent, reversible, and specific chemical inhibitors of eukaryotic ribosome biogenesis. *Cell* 167, 512–524 (2016).
- Swaffer M.P. et al. CDK substrate phosphorylation and ordering the cell cycle. *Cell* 167, 1750–1761 (2016).
- Takemoto A. et al. Nuclear envelope expansion is crucial for proper chromosomal segregation during a closed mitosis. *J. Cell. Sci.* 129, 1250–1259 (2016).
- Kawashima, S.A. et al. A chemical biology strategy to analyze rheostat-like protein kinase-dependent regulation. *Chem. Biol.* 20, 262–271 (2013).
- Coudreuse, D. and Nurse, P. Driving the cell cycle with a minimal CDK control network. *Nature* 468, 1074–1079 (2010).