

INNOVATORS & IDEAS: ACADEMIC LEADER

Nancy Jane Rothwell: Brain inflammation and the path to leadership

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Breaking barriers in both the lab and the boardroom, Dame Nancy Rothwell has shaped modern British science in ways few others have. Beginning her research journey at the University of London, she made a pivotal move to the University of Manchester in 1987 – a decision that would forge an extraordinary partnership spanning over three decades. During her early career, she followed her scientific curiosity into the intricate world of fat cells with groundbreaking research that cracked open our understanding of how the body regulates its weight through thermogenesis and brown fat metabolism, providing crucial insights into obesity and cachexia. Then, in a bold pivot that would define the next phase of her career at Manchester, she turned her attention to the brain's inflammatory response in stroke and other neurological conditions, conducting pioneering research that bridged the gap between basic biology and clinical applications. Her scientific brilliance earned her Fellowship in the Royal Society, marking her place among Britain's most elite scientists. Her deep connection with Manchester deepened further when, without planning it, she found herself making history in 2010 as the University's first female President and Vice-Chancellor, steering one of Britain's largest universities through fourteen years of growth and transformation until 2024. Her leadership style, marked by the same curiosity and determination that drove her research, helped position Manchester as a global powerhouse in higher education. Now, as the University's Campaign and External Relations Ambassador, she sits down with Genomic Press to share what she has learned about science, leadership and why sometimes the best discoveries come from taking the road less travelled – offering readers a rare glimpse into the mind of someone who has excelled at both groundbreaking research and institutional leadership while helping build Manchester into a world-leading centre of academic excellence.

Part 1: Nancy Rothwell – Life and Career

Could you give us a glimpse into your personal history, emphasizing the pivotal moments that first kindled your passion for science?

My interest in science was first sparked at the age of about 6 by my father, a biology teacher who kept lots of specimens in jars at our house. When I was 9, I missed about 18 months of school due to illness. Then, I started to read some of his science books and began to draw.

In fact, I dropped biology when I was 14 because I found the plant science part boring (sorry, botanists) and instead took Maths, Physics, Chemistry, and Art for A levels. My first career choice was art, but my kind teacher said I wasn't good enough to make a decent living as an artist. My second choice was Maths, but I decided this could be unsociable (sorry, mathematicians). Ultimately, I studied Physiology at Queen Elizabeth College (now part of Kings), University of London.



Figure 1. Nancy Jane Rothwell, BSc, PhD, DSc, University of Manchester, UK.

I had no career plans at all until I undertook a final-year research project on fat metabolism. I was quickly hooked on research, and I undertook a PhD in thermogenesis and body weight regulation. This was followed by a long career in research in London and, from 1987, in Manchester.

A pivotal moment was securing funding from the Royal Society for a 10-year University Research fellowship, which gave me the freedom to pursue any research, move institutions a few years later to Manchester, and change fields.

We would like to know more about your career trajectory leading up to your most relevant leadership role. What defining moments channelled you toward that leadership responsibility?

I have never had any plans to take on any leadership roles, though along the way of my research, I did happen to take on some roles such as head of the division of Neuroscience in Manchester, then Vice-Dean for Research for the School of Biological Sciences and several external roles on national bodies such as the MRC, Royal Society, Cancer Research UK and for nine years as a non-executive director of AstraZeneca.

All that changed in 2004 when the Victoria University of Manchester and UMIST merged and a new President and Vice-Chancellor, Alan Gilbert, arrived from Melbourne and asked me to be Vice-President for Research for the University. I was reluctant since I then held an MRC Research Chair and had an extensive and thriving research group. I was persuaded and thoroughly enjoyed it. In 2008 I (again reluctantly) became Deputy President and Vice-Chancellor of the University. Over the next two years, Alan's health declined, and I had to step in increasingly. In 2010 I was again





persuaded to apply for the role of President and Vice-Chancellor, which I served as for 14 years until 2024.

Please share with us what initially piqued your interest in your preferred area of research or professional focus.

The first part of my research career was in thermogenesis and metabolism, an interest piqued by a research project as an undergraduate with Professor Mike Stock, who later supervised my career.

A further pivotal moment occurred after I moved to Manchester, where I investigated the impact of infection, injury, and disease on metabolism and body temperature. We used a rodent stroke model to test the hypothesis that the cytokine interleukin-1 (IL-1) caused hypermetabolism and fever, which are common after brain damage. Our hypothesis proved correct, but we had to do one last 'control experiment' to check that the IL-1 antagonist (IL-1Ra) did not affect the extent of damage caused by stroke. To our surprise, the damage was greatly reduced by IL-1Ra. From that moment on, I chose to leave the field of metabolism and research neuroimmunology and brain inflammation.

What were the key impact areas of your research topics?

In the first part of my career, I demonstrated that overfeeding rodents led to an increase in diet-induced thermogenesis and activation of brown fat, which is very similar to the effect of the cold. Hence, some animals remained lean despite an increase in energy intake, while other similar strains became obese.

Later, the main impacts showed that an inflammatory molecule contributed to brain damage, which was not known then. As a result, we understood some of the mechanisms of that damage and its clinical implications.

Could you tell us more about your most relevant focal points within your chosen field of science?

A focal point in understanding energy balance and body weight regulation is the recognition that involuntary energy expenditure and energy intake contribute to overall energy balance.

In neuroimmunology, there was a growing recognition of the importance of the immune system and inflammation in brain diseases.

What habits and values did you develop during your academic studies or subsequent postdoctoral experiences, that you have maintained throughout your life?

Honesty, integrity and openness. Just occasionally being open means that you will be 'cooped,' but on many more occasions, it will help in valuable steps forward, insights, and new collaborators and friends.

At Genomic Press, we prioritize fostering research endeavours based solely on their inherent merit, uninfluenced by geography or the researchers' personal or demographic traits. Are there particular cultural facets within the scientific community that warrant transformative scrutiny, or is there a cause within science that deeply stirs your passions?

The scientific community still lacks diversity. Gender balance has improved since I was training, at least in biology, but the diversity of ethnicity, background, and geography is still poor.

What have you most enjoyed in your capacity as academic or research leader?

Undoubtedly, training young scientists and clinician scientists. I have supervised over 50 PhD students, several of whom are now research leaders and professors. Every few years, we meet up for a fantastic reunion.

Outside professional confines, how do you prefer to allocate your leisure moments, or conversely, in what manner would you envision spending these moments given a choice?

Spending time at our house in Sweden surrounded by forests and lakes. I have also developed a passion for gardening in the last few years.



Figure 2. A striking new landmark on Manchester's campus, the Nancy Rothwell Building cuts an imposing figure against the city's skyline. What began as an ambitious engineering hub has become a fitting tribute to one of the University's most influential leaders. Named in 2024 to honor Dame Nancy's remarkable 14-year tenure as Vice-Chancellor, this seven-story powerhouse is now home to thousands of budding engineers and scientists. The building's sleek black exterior, captured in the top image, contrasts with the intimate glimpse below of its dedication plaque and time capsule – a thoughtful touch that links the building's cutting-edge facilities with the rich history of innovation at Manchester.

Part 2: Nancy Rothwell – Selected questions from the Proust Questionnaire¹

What is your idea of perfect happiness?

Being with friends and family and having a rewarding job where you feel you can make a difference.

¹In the late nineteenth century, various questionnaires were a popular diversion designed to discover new things about old friends. What is now known as the 35-question Proust Questionnaire became famous after Marcel Proust's answers to these questions were found and published posthumously. Proust answered the questions twice, at ages 14 and 20. In 2003 Proust's handwritten answers were auctioned off for \$130,000. Multiple other historical and contemporary figures have answered the Proust Questionnaire, including among others Karl Marx, Oscar Wilde, Arthur Conan Doyle, Fernando Pessoa, Stéphane Mallarmé, Paul Cézanne, Vladimir Nabokov, Kazuo Ishiguro, Catherine Deneuve, Sophia Loren, Gina Lollobrigida, Gloria Steinem, Pelé, Valentino, Yoko Ono, Elton John, Martin Scorsese, Pedro Almodóvar, Richard Branson, Jimmy Carter, David Chang, Spike Lee, Hugh Jackman, and Zendaya. The Proust Questionnaire is often used to interview celebrities: the idea is that by answering these questions, an individual will reveal his or her true nature. We have condensed the Proust Questionnaire by reducing the number of questions and slightly rewording some. These curated questions provide insights into the individual's inner world, ranging from notions of happiness and fear to aspirations and inspirations.



What is your greatest fear?

I do not really have a greatest fear, but perhaps having a highly debilitating disease such as the great scientist Professor Sir Colin Blakemore suffered.

Which living person do you most admire?

Sir David Attenborough was an amazing science communicator but also a lovely and humble person. He came to visit me during rehearsals for the Royal Institution lectures that I delivered for the BBC. He brought me his book and confided that the RI lectures were the hardest thing he had ever done.

What is your greatest extravagance?

Fast cars.

What are you most proud of?

Training so many great scientists.

What is your greatest regret?

Being too risk averse during the earlier part of my career. As my colleague Professor Sir Andre Geim (Nobel laureate in Physics 2010) said 'If you follow the trodden path, you may find that all the grass has been eaten'.

What is the quality you most admire in people?

Honesty and kindness.

What is the trait you most dislike in people?

Dishonesty and meanness.

What do you consider the most overrated virtue?

Intellect. Too little scientific emphasis is placed on insight, imagination, and intuitive leaps.

What is your favourite occupation (or activity)?

Discovering new knowledge.

Where would you most like to live?

Where I live now-UK and Sweden, split between city and countryside.

What is your most treasured possession?

I struggled with this one, but maybe it was my mother's wedding ring, which has been passed down through generations.

When and where were you happiest? And why were so happy then?

When I was in a lab coat early in my career because I was discovering things for myself rather than just supervising them, and when I was on a boat in a lake in Sweden because it was so quiet and peaceful.

What is your current state of mind?

Calm but usually busy.

What is your most marked characteristic?

My mother said being organized, but my partner (of over 50 years) would say optimism.

Among your talents, which one(s) give(s) you a competitive edge?

Perseverance and optimism.

What do you consider your greatest achievement?

Being elected a Fellow of the Royal Society.

If you could change one thing about yourself, what would it be?

Be more focused, but I like variety.

What do you most value in your friends?

Loyalty.

Who are your favourite writers?

Sir Peter Medawar, Arthur Conan Doyle, and, a long time ago, Enid Blyton.

Who are your heroes of fiction?

I could not answer this one because it changes depending on what I read.

Who are your heroes in real life?

Sir David Attenborough, Dame Bridget Ogilvie, Sir Peter Medawar.

What aphorism or motto best encapsulates your life philosophy?

Do as you would be done by.

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Nancy Rothwell¹

¹University of Manchester, Oxford Road, Manchester, M13 9PL, UK

✉ e-mail: Nancy.rothwell@manchester.ac.uk

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