

Professor C. R. Rao

Genome Valley awardee for BioAsia 2010



Professor C. R. Rao, Director of the Center for Multivariate Analysis at Pennsylvania State University.

- Ranks among the world leaders in statistical science over the last six decades.
- Elected Fellow of Royal Society, UK and Member of the National Academy of Sciences, USA
- Awarded Padma Vibhushan in 2001 and Padma Bhushan in 1968.
- Recipient of Shanti Swarup Bhatnagar award of the CSIR in 1963 and Guy medal in silver from Royal Statistical Society in Britain.
- He has many theorems to his credit. He also served as Director of the ISI, Jawaharlal Nehru Professor, and National Professor in India and as Professor at University of Pittsburgh and Eberly Professor of Statistics overseas.....

Biography of Prof. C. R. Rao

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A biography of Prof. C. R. Rao was released in Montreal, Canada, on November 29, 1996 at the conference "Statistics for the 21st Century," organized by the International Indian Statistical Association.

Prof. Rao is a Member of the National Academy of Sciences, USA, a Fellow of the Royal Society, UK, recipient of the civilian award, Padma Bhushan from the Government of India, and recipient of 19 honorary doctorates from universities around the world.

The 178 page book (ISBN 0-9655797-6X) is entitled "Putting Chance to Work.....a life in statistics," and was published by DIALOGUE, State College, PA.

Professor C.R. Rao Received National Medal of Science

Penn State's Callyampudi R. Rao, emeritus holder of the Eberly Family Chair in Statistics and director of the Center for Multivariate Analysis, was one of fourteen scientists and one engineer named today by President Bush to receive the National Medal of Science, the nation's highest award for lifetime achievement in fields of scientific research.



C.R. Rao was honored by the President at the White House with a National Medal of Science on June 12, 2002 with the citation, "for his pioneering contributions to the foundations of statistical theory and multivariate statistical methodology and their applications, enriching the physical, biological, mathematical, economic and engineering sciences."

Rao's theoretical work helped lay the foundation of modern statistics. He has also concentrated his efforts on employing statistical methods to solve practical problems in such diverse fields as economics, anthropology, geology, medical diagnosis and national planning. A book he wrote in 1965, *Linear Statistical Inference and Its Applications*, one of the most-often cited books in science, has greatly influenced research work in theory and application of statistics.

Responding to concerns of industry, Rao developed Orthogonal Arrays, a novel method of experimentation through combinatorial arrangements. This method is commonly used to improve and control the quality of manufactured goods. His evolution of estimation theory in small samples expanded the reach of statistical methods in real-world work.

Rao pioneered differential geometric techniques in exploring statistical inference problems, based on Rao's Distance Function, an accepted field of research.

In addition to Rao, one other mathematician will be honored along with six biologists, two chemists, two physicists, two behavioral and social scientists, and an engineer. Thirteen of these premier researchers received funding support from the National Science Foundation (NSF) over portions of their careers.

"Their contributions to the world around us are enormous. Their ideas have led to major breakthroughs in human health and the tools evolving from their research have put the U.S. in the forefront of many new industries," National Science Foundation director Rita Colwell said. "We are proud of these extraordinary people -- and grateful for their unceasing inquisitiveness, creativity and dedication to obtain new knowledge for the good of all humankind."

The National Science Foundation administers the National Medals of Science for the White House. Congress established the National Medals of Science in 1959. The latest awards bring to 401 the total number of science medals awarded since their inception.

For more information http://en.wikipedia.org/wiki/Calyampudi_Radhakrishna_Rao

Prof. Janet Thornton


Genome Valley awardee for BioAsia 2010

Suggested by Prof. Seyed E. Hasnain:

Prof. Janet Thornton: Director of the EMBL European Bio-Informatics Institute in Cambridge

- Made a series of novel contributions to the area of bio-informatics,
- Director of the EMBL European Bio-Informatics Institute in Cambridge,
- Elected Fellow of the Royal Society
- Elected to the Membership of the prestigious US National Academy of Sciences
- Member of the European Molecular Biology Organization (EMBO)
- Awarded the CBE in Queen's Birthday honors in 2000.

Janet Thornton

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	EBI Director

Professor **Janet Maureen Thornton**, CBE, FRS (b. [May 23, 1949](#)) is Director^[1] of the [European Bioinformatics Institute](#) on the Genome Campus at [Hinxton](#), near [Cambridge](#), UK. She is one of the world's leading researchers in structural bioinformatics, using computational methods to understand protein structure and function.^[2] Her work is highly interdisciplinary, interfacing with structural biology, bioinformatics, biological chemistry and chemoinformatics, amongst others. Together with Prof. Christine Orengo, she introduced the [CATH](#) classification of protein structure.

After graduating in physics from the [University of Nottingham](#), Thornton completed a master's degree in biophysics at [King's College London](#), and a PhD in Biophysics at the [National Institute for Medical Research](#), Mill Hill, London in 1973. She then worked in molecular biophysics with David Phillips at the [University of Oxford](#). In 1978, she returned to the National Institute for Medical Research, and following that took up to a Fellowship at [Birkbeck College](#), part of the [University of London](#). In 1990 she was appointed Professor and Director of the Biomolecular Structure and Modeling Unit in the Department of Biochemistry and Molecular Biology at [University College London](#) and later also was appointed to the Bernal Chair in the Crystallography Department at [Birkbeck College](#). Since 2001 she has been Director of the [European Bioinformatics Institute](#) (EBI), on the Wellcome Trust Genome Campus at [Hinxton](#) near [Cambridge](#). She was an organiser of the [Intelligent Systems for Molecular Biology](#) (ISMB) and European Conference on Computational Biology (ECCB) joint Conference in [Glasgow](#) in 2004.^[3]

Janet Thornton was elected to the prestigious position of [Fellow of the Royal Society](#) in 1999.^[4] She was awarded the [CBE](#) in the Queen's Birthday Honours, 2000. She became a member of the European Molecular Biology Organisation (EMBO) in 2000, and a foreign associate of the US National Academy of Sciences in 2003. Prof. Thornton is a Fellow of [Churchill College, Cambridge](#).^[5]

Professor Janet Thornton FRS - DNA data into biological knowledge

Janet Thornton has made a major contribution to understanding the three-dimensional structure of proteins, their functional mechanisms and the use of computing techniques both in structural analysis and data handling for biology. In particular her perceptive comparative studies have led to the development of computer algorithms that are now in widespread use to analyse and predict aspects of protein structure. These analyses led to an atlas of structures and sequences that is valuable for protein design and used widely in both academia and the pharmaceutical industry. This pioneering role in collating and handling structural information for proteins has contributed to the establishment of the increasingly important science of bioinformatics. Further insights on the structure and function of proteins followed including methods to evaluate the quality of experimentally defined protein structures and a method, known as threading, which can give researchers strong clues about the folding structure of an unknown protein sequence. Since 2001 she has been Director of the European Bioinformatics Institute (EBI) near Cambridge.

Why did the Society award this Fellowship?

Bioinformatics is increasingly important as the means of turning genomic and other biological data into new knowledge about how whole biological organisms work. Janet Thornton has been a leading figure in developing this science as a consequence of her earlier work in structural analysis of proteins. Janet first studied physics before moving into biology via a biophysics MSc and then "being thrown in the deep end" at the National Institute for Medical Research at Mill Hill in north London. "My initial work was on the very careful analysis of the architecture of proteins using crystallography and magnetic resonance techniques," says Janet. "I had always been fascinated by patterns in nature and was able to take on some complex structures and tease out some relatively simple principles." Janet used these principles to classify proteins, later applying this to analysing the results of genomic research and leading her to become one of the founders of the whole field of structural bioinformatics. Janet realised early on in her career that graphical computing could be important in structural biology and the focus of her research gradually changed towards studying protein structures for patterns using computers. "Structural research has now reached the point where we can see evidence of evolution in protein structure - perhaps the ultimate pattern in nature," says Janet. "Proteins which would not have been put together in a classification by their functionality, actually have structures that are so closely related that they probably evolved from each other."

How will this work help society?

"The structure and function of proteins, in particular how they fold, is of vital importance to our understanding of how nature actually works," says Janet. "The amount of information that is generated on protein structure, DNA sequences and more recently whole genome maps is enormous and requires specialized databases and handling techniques." Turning that mass of data into useful knowledge that can be used is where bioinformatics comes in looking for comparisons

in known structures that can give clues to function in an unknown structure. This work will be key to unlocking the potential applications of the human genome research. "Using the knowledge derived from the human genome and other high-throughput biological data will have a major impact on almost every part of life, especially medicine and agriculture," says Janet. "New diagnostic tools will lead the way to better treatments designed for individual patient and using improved drugs." Janet believes that bioinformatics is going to be at the centre of biology over the next twenty years and that similar techniques - chemoinformatics - could make an impact in the science of smaller molecules.

What are the current areas of research being investigated?

"When I moved to the EBI I was fortunate that most of my research team from London was able to move with me," says Janet. "And I am able to spend around 50% of my time on research." Keeping involved with laboratory research is important to Janet. "The area is so dynamic: new information, new findings are being published all the time and to keep up to date with developments you need to be involved," explains Janet. "It also means that I have a good understanding of what developments in bioinformatics would be useful and desirable from a practical point of view." Janet's group is currently investigating enzyme active sites to classify functional activity with protein structure, analyzing and compiling databases of interactions of proteins with other proteins, large molecules called ligands and DNA, as well as structural and modeling studies.

How useful is European funding in this area?

The EBI is part of the European Molecular Biology Laboratory (EMBL) an international network of research institutes funded by EU countries, Switzerland and Israel. The EMBL established the world's first nucleotide database in 1980 and EBI has built on this work. "The European Commission has recently awarded us ~12 million under the Framework 6 programme to form the BioSapiens Network of Excellence in Bioinformatics," says Janet. "This network will bring together 24 bioinformatics groups in 14 countries to form a pan-European virtual institute for research on genome annotation, the process in which information from **gene** and protein databases is extracted, analysed, and interpreted. It will also train researchers in bioinformatics techniques." The network will allow the best and most appropriate methods to be applied to specific proteins and will integrate information from existing separate bioinformatics databases into a single resource which will be open to researchers globally. However, Janet thinks that some aspects of European Commission research funding need to change. "The BioSapiens network is a tremendous project that should bring together European laboratories in a network that will endure, however there is a desperate need for rolling and increased funding for the core databases," explains Janet. "These databases are part of the fabric of the European science infrastructure and as the data flows continue to increase will require scaling up. Europe needs to find a better way of funding them. Whilst the EC provides excellent schemes to fund research, mobility and scientific networks, it does not provide rolling grants to maintain these critical data resources. This is a strategic area of knowledge - with great wealth creation potential - where European money could create real added value for researchers across the continent."

Fellowship

Professor Thornton was elected to the fellowship in 1999.

Professor Janet Thornton

Structural biologist Professor Janet Thornton has had a distinguished career in academia and, since 2001, she has been the Director of the European Bioinformatics Institute in Cambridge. Throughout her professional life Professor Thornton has used computers to study protein sequences and structures; she was one of the first people to classify these structures and describe them in terms of their component parts. She was admitted to the Royal Society in 1999 and holds professorial appointments both at Birkbeck and University College London.

Professor Thornton joined Birkbeck in 1980. 'I was part-time initially: a wonderful opportunity to spend time with my two children while continuing with my research. Later I understood how lucky I had been and appreciated how much support I'd received at Birkbeck.'

It is not just her immediate family to whom Professor Thornton is committed; she has also become part of a large scientific family. 'The people I have met through my work have been one of the great delights of my career. I have always worked with PhD students and it is wonderful to watch them participating in this research field.'

On being made a Fellow, Professor Thornton said: 'I admire Birkbeck immensely, both for its work in giving people the opportunity to study, but also for its world-class research; the words Birkbeck and crystallography are synonymous.'