Nature's Robots: A History of Proteins

Charles Tanford, Jacqueline Reynolds
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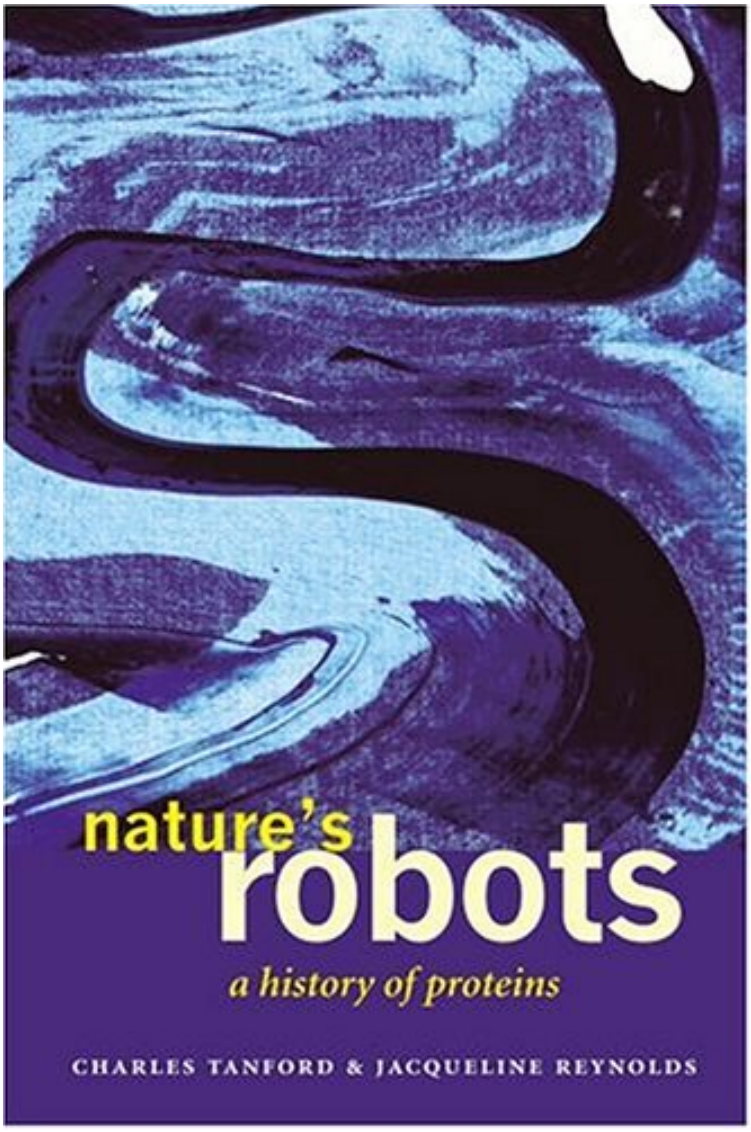

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Charles Tanford, Jacqueline Reynolds : Nature's Robots: A History of Proteins before purchasing it in order to gage whether or not it would be worth my time, and all praised Nature's Robots: A History of Proteins:

0 of 1 people found the following review helpful. Engrossing, entertaining and erudite history of proteinsBy Vivek SharmaNature's Robots by Charles Tanford and Jacqueline Reynolds encompasses history, mythology, mystery, controversies, discoveries, mistakes, excitements, and scientific understanding of proteins. To bring so many different aspects of a subject into one book requires keen insight and clear perspective that only seasoned writers and scientists can possess. Both the authors belong to the select category of scholars of the field who witnessed and participated in

the remarkable studies and discoveries related to structure and function of proteins. Proteins are biomolecules, and proteins are macromolecules. They consist of hundreds of atoms linked together by covalent bonds, groups of atoms interacting by hydrogen bonds or even hydrophobic associations. The specific atoms are organized into sequences, into amino acids that provide the resulting molecule with specific structure and function. The macroscopic living beings as well as microbes and microscopic constituents of living beings are in effect colonies, cultures, assemblies, collections, societies of proteins. Every proteins is surrounded by ions, ligands, solvents like water, fatty acids and other proteins; and every minute of proteins involves complex and beautiful interplay of physical and chemical interactions and entropy. The complexity and richness of their structure and function is and was the source of perplexity and curiosity of scientists. Questions that seem settled in twenty-first century, for example "Can macromolecules exist?", were once source of acrimony and debate. The book is a source of endless examples of how ideas and concepts emerged, sometimes the originators of ideas got the credit, sometimes original ideas came too early and were discarded by the establishment, only to reappear again, to be embraced reluctantly or enthusiastically.The cult of scientists survives by engaging itself in the pursuit of answers to riddles and curiosities. Proteins enable so many biological functions: their study has led to an understanding of how antibodies function and how we fall sick or recover from a disease, how we perceive things with our eyes or our nose or other senses: that too we see things in color and distinguish rotten apple from a ripe one from just the smell. Proteins are laborers, managers, gatekeepers of biological world; mobility and muscle action can be interpreted in terms of protein physics. The understanding of how proteins are made contains the answer to the questions related to mutations and emergence of diseases, to how traits get passed and even perhaps how evolution occurs. The specific scientific aspects outlined in the history of proteins can be accessed through many textbooks, though the field itself lies at the crossroads between physics, chemistry and biology. The realm of biophysics and biochemical engineering have advanced so much in last fifty years that separate programs, conferences and journals are devoted to them; but there was a time when all the life-processes were incomprehensible, what controlled, actuated, enabled the life processes was mystery to the best minds around. Much has changed since our grandfather's grandfather studied science, (whatever it was that was called science then) and many of the discoveries in protein science are indeed responsible for raising the global health and standard of living. It is quite possible that our by our grandson's grandson's time, we will have mastered the art of making synthetic proteins that will help us solve health, food, energy and recycling problems!The study of the history of proteins introduces (or reintroduces) us to many of the well-known scientists of past two hundred years: Fischer, Svedberg, Staudinger, Ostwald, Sorensen, Kirkwood, Tiselius, Langmuir, Edsall, Sanger, Bernal, Pauling, Watson, Crick, Loeb, etc. The list includes many Noble prize winners. (Many names reappear in history of colloidal science and polymer science). The stories included in the book also give a glimpse of the role of mentors, the lure of erroneous assumptions, the long, laborious journey to perfect experimental system or correctly framed theory. Science proceeds by framing right questions, sometimes also by arriving at the right question only after the wrong question leads you to dead-ends or new unchartered terrains. Many key discoveries in protein science involved answers to questions like: What is the size of a specific protein? How can we separate proteins? How do the large number of atoms organize into biomolecules, how/why do these biomolecules assemble into cells and tissues and so on? What is the structure of proteins and can we crystallize them? How does the presence of proteins in solution affect the viscosity of the mixture or dispersion?Most of the proteins contain only five different atoms - carbon, oxygen, hydrogen , nitrogen and sulfur - and yet their utility for a wide range of functions is mind-boggling. The story of proteins is also inter-related with the story of discoveries and inventions, theories and techniques that emerged in other fields and other contexts: for example, X-ray crystallography, ultracentrifugation, macromolecular hypothesis, colloidal theory, theory of Brownian Motion, statistical thermodynamics all played a role in advancing our understanding and knowledge of protein science. I believe that every serious biochemist and biophysicist, as well as any curious and creative person, must read this book, to appreciate and literally understand how much information and complexity is folded, assembled and sustained by every cell of our body. The best part about reading this book, of course, is that it is great piece of scientific writing and it is also an example of well-written prose (memoir of sorts). You learn key concepts of biophysics/biochemistry and you learn all about the pioneers and pioneering studies in protein science, you learn it all, through quotes, stories, sketches, memoirs... and you find that the authors have managed to transfer their enthusiasm for this field of study to you.7 of 8 people found the following review helpful. History of Science at its bestBy A CustomerPeople who say that History of Science is boring haven't read this excellent book. This book is lively, entertaining and unbiased. While you can find dozens of accounts of the history of chemistry or physics, protein biochemistry has been overlooked for way too long. It was worth the wait though! As the proud owner of some of the material cited in this book (particularly on the history of enzymes), I had a blast reading "Nature's Robots". Read it and then go out and buy "Mendeleyeff's dream", they complement each other beautifully2 of 6 people found the following review helpful. UnreliableBy FibonacciI wish I could give this book a higher rating. It is filled with information, clearly explained. But Chapter 10 includes an unconscionable, ill-informed, gratuitously nasty discussion of the mathematician Dorothy Wrinch (1890-1976) that not only denigrates her work but her character too. Why savage Wrinch, instead of dispassionately criticizing her papers? Since I can't imagine why, I must assume that the portraits of other scientists in this book are

unreliable too.

Proteins are amazing molecules. They spark the chemical reactions that form the basis for life, transmit signals in the body, identify and kill foreign invaders, form the engines that make us move, record visual images. For every task in a living organism, there is a protein designed to carry it out. Nature's Robots is an authoritative history of protein science, from the earliest research in the nineteenth century to the most recent findings today. Tanford and Reynolds, who themselves made major contributions to the golden age of protein science, have written a remarkably vivid account of this history. The authors begin with the research of Berzelius and Mulder into "albumins," the early name for proteins, and the range all the way up to the findings of James Watson and Francis Crick. It is a fascinating story, involving heroes from the past, working mostly alone or in small groups, usually with little support from formal research grants. They capture the growing excitement among scientists as the mysteries of protein structure and function--the core of all the mysteries of life--are revealed little by little. And they include vivid portraits of scientists at work--two researchers, stranded by fog in a Moscow airport, strike up a conversation that leads to a major discovery; a chemist working in a small lab, with little funding, on a problem no one else would tackle, proves that enzymes are proteins--and wins the Nobel Prize. Written in clear and accessible prose, Nature's Robots will appeal to anyone interested in the peaks and valleys of scientific research.

.com Proteins make it possible for us to digest food, to battle disease, to breathe, to move; they underlie life itself. Only in the last 200 years have scientists come to understand how these proteins, or "foremost things," work. How they did so is the subject of this welcome history of protein science. It doesn't diminish our pleasure in such things to know that the aroma coming from a cooked ham is generated by the reaction of maltose and glutamic acid, while the heavenly scent of chocolate comes from the interaction of phenylalaine and sucrose. Tanford and Reynolds aren't exactly given to rhapsodizing, but they write appreciatively nonetheless of advances such as Franz Hofmeister's identification of the "peptide bond" that joins amino acids in proteins, John Kendrew's work in understanding the three-dimensional structure of myoglobin, and the efforts of modern researchers who, joining protein science to cell biology and genetics, are now working to solve the structures of more than 10,000 protein families. General readers and students with an interest in the life sciences will find this well-written history to be of much use--and the best of its kind. --Gregory McNamee `But anyone interested in proteins will find Nature's Robots an absorbing and often exciting story, as well as a major contribution to scholarship.'Nature 17/01/02About the AuthorCharles Tanford and Jacqueline Reynolds are both emeritus professors at Duke University. Tanford is a member of the National Academy of Sciences. They live in Easingwold, UK.