Prions: The New Biology of Proteins

Claudio Soto

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Prions are believed to be the causative agents of a group of rapidly progressive neurodegenerative diseases called transmissible spongiform encephalopathies, or prion diseases. They are infectious isoforms of a host-encoded cellular protein known as the prion protein. Prion diseases affect humans and animals and are uniformly fatal. The most common prion disease in humans is Creutzfeldt-Jakob disease (CJD), which occurs as a sporadic disease in most patients and as a familial or iatrogenic disease in some patients. Whether prions are infectious proteins that act alone to cause prion diseases remains a matter of scientific debate. However, mounting experimental evidence and lack of a plausible alternative explanation for the occurrence of prion diseases as both infectious and inherited has led to the widespread acceptance of the prion hypothesis.

Interest in prion disease research dramatically increased after the identification in the 1980s of a large international outbreak of bovine spongiform encephalopathy (BSE, also known as mad cow disease) in cattle and after accumulating scientific evidence indicated the zoonotic transmission of BSE to humans causing variant CJD. In recent years, secondary bloodborne transmission of variant CJD has been reported in the United Kingdom.

Prions: The New Biology of Proteins describes the current state of knowledge about the enigmatic world of prion diseases. The book is organized into 12 mostly brief chapters, which nicely summarize the various types of prion diseases and the challenges associated with their diagnosis and treatment. These sections review the biology of prions, the underlying hypotheses for prion replication, and the biochemical basis for strain diversity. Chapters 2 through 5 describe the various characteristic features of prions, including the historical evolution of the prion hypothesis, a detailed description of the possible mechanisms by which the normal prion protein is converted into the pathogenic form, and the cellular biology and putative functions of the normal prion protein. The author's lucid descriptions of the various topics are supported by diagrams and key references. Subsequent chapters describe prion disease laboratory diagnostic tools that are available or under development. Chapter 9 succinctly summarizes the most likely target sites, from the formation of the infectious agent to its effects on neurodegeneration, which can be exploited for likely therapeutic development. The same chapter describes the various antiprion compounds that have been or are being tested as therapeutic interventions for prion diseases.

The book is unusual because its entire content was exclusively authored by 1 person, resulting in a paucity of in-depth information in some areas, which may have been provided by multiple authors. However, all things considered, the book can be a valuable resource for scientists beginning to understand the world of prion diseases, the underlying biochemical mechanism of disease occurrence, and the challenges associated with the diagnosis and treatment of prion diseases.

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Battle of the Genomes: The Struggle for Survival in a Microbial World

H.M. Lachman

Science Publishers, Enfield, New Hampshire, USA, 2006
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Although this book's title promises the excitement of a 21st-century computer game, the cover photograph of Robert Koch in 1883 provides a better clue to the contents. The general plan is a survey of 20th-century genetics, illustrated by insights into human coevolution with microbial pathogens. Early chapters focus on familiar examples, including G6PD deficiency and sickle cell trait as adaptations to malaria, as evidence for pathogen-driven natural selection. Later chapters discuss more recent research findings, varying from female preference for the scent of males with dissimilar human leukocyte antigen types to the role of human CFTR membrane protein in infection with *Salmonella* Typhi. All of these are such good stories that science writer Matt Ridley included briefer versions in Chapter 9 of his popular book Genome: The Autobiography of a Species in 23 Chapters (*1*).

Battle of the Genomes: The Struggle for Survival in a Microbial World discusses in some detail how catastrophic epidemics of cholera, bubonic plague, and smallpox could explain the emergence of certain common human genetic mutations. Some of these mutations are deleterious; for example, CFTR ΔF508, which reduces the risk for typhoid, causes cystic fibrosis in persons who inherit 2 copies. Other mutations are beneficial, such as CCR5 Δ32, which may have protected carriers from smallpox and now reduces the risk for HIV infection. In general, the author's review

of the evidence for and against these hypotheses, which remain speculative, is evenhanded and up-to-date. His accounts of the human and social effects of epidemic diseases and the origins of public health are full of lively anecdotes and colorful detail. Interspersed throughout are personal asides, clinical pearls, and lengthy tutorials on basic science topics, such as DNA replication and gene splicing.

Although this book is far more information dense than are popular books for the lay public, its many shortcomings in terms of organization, depth, and documentation (including surprisingly few references) diminish its value to scholarly readers. More than anything else, it resembles an intellectually inspired but somewhat disorganized professor's medical school lecture, which would probably be more fun to hear in person than to read. Meanwhile, those who are interested in a 21st-century account of the battle of the genomes may want to wait. Rapid advances in genomic science and technology are opening the way to better understanding of biology, evolution, and medicine, but the full integration of these disciplines is still at a relatively early stage. The idea that genes of 1 species can influence whole ecosystems, described by Richard Dawkins in 1982 as the "extended phenotype" (*2*), is only now giving rise to new perspectives on community genetics (*3*).

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Atlas of Human Parasitology, 5th Edition

Lawrence R. Ash and Thomas C. Orihel

American Society for Clinical Pathology Press, Chicago, Illinois, USA, 2007
ISBN: 0891891676
Pages: 525; Price: US $200.00

The 5th edition of Ash and Orihel's Atlas of Human Parasitology is a superb, up-to-date compendium of protozoan and metazoan parasites. It also covers vectors and uncommon parasites found in humans. The authors present the material in a clear and concise manner that encourages one to delve more deeply into the structure and function of these unique and fascinating organisms. It is a must for persons interested in medical zoology and geographic medicine. Laboratory personnel, directors, and teachers who need a refresher course or additional training will find the book very valuable.

The Atlas of Human Parasitology is an essential treatise for helping to protect our citizens at home, deployed military personnel, and global travelers from parasitic infections. The quick keys to the identification of protozoans, helminths, and arthropods are helpful for distinguishing pseudoparasites from harmful ones. The labeling of various stages of the color images with letters, numbers, and arrows is extremely useful.

Attention has been given to opportunistic infections found in patients with AIDS. This book opens new vistas in helping to understand the global impact of AIDS and parasitic infections. The glossary and current references provide a ready resource for those interested in learning more about host–parasite relationships.

As an extra bonus, readers will find this edition a visual feast that integrates science and the arts. This book is highly recommended reading.

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Food Safety: Old Habits, New Perspectives

Phyllis Entis

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Anyone who works in food safety sooner or later discovers that one of the most valuable tools for prevention is simply reading about and understanding how past outbreaks have occurred. Using major and frequently famous or at least newsworthy outbreaks, Phyllis Entis in Food Safety: Old Habits, New Perspectives illustrates how critical factors come together to produce tragic and largely preventable results. This nicely written reference book reads more like an engaging novel in some ways, complete with bad guys (pathogens and sometimes careless corporations) and good guys (intrepid and resourceful outbreak investigators). The author's unique style, usually avoided