The X files

The X in Sex: How the X Chromosome Controls Our Lives

by David Bainbridge

Harvard University Press, 2003
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Reviewed by Florence Haseltine

One of the very first biological questions a child asks is why there are boys and girls—or some variation thereof. I suspect that the way a parent handles this question has a profound effect on a child's future scientific curiosity. Certainly it is one that I pestered my father with until he said, "When you grow up, you figure it out."

David Bainbridge is also clearly interested in this fundamental question, and he tries to focus on it by glamorizing the X chromosome. Putting her on a pedestal, as this writer does, allows her to be examined and investigated in humorous and insightful ways. One can only wonder what Bainbridge's parents did to put him on the right track.

Science is an adventure, and adventure stories need to be told, retold and expanded. This book's examination of many current scientific findings makes it useful and very enjoyable for an individual with a basic biological education and a sense of humor. The author has had the benefit of a broad education in philosophy. He uses his knowledge of ancient texts to illustrate, highlight and make fun of ideas surrounding sex differentiation, and to see how these ideas have proved to be correct or incorrect. He focuses on the historical discoveries and medical diseases that have made the genes encoded on the X chromosome extremely important to scientists' understanding of gene regulation.

Bainbridge limits his discussion to an odd range of animals. Somewhat to my surprise, although he is a veterinarian working at the University of Manchester, he does not include farm animals. Civilization has been greatly dependent on and affected by animal husbandry, so many of the most prestigious laboratories that study reproductive processes and sex differentiation have been in the animal husbandry sections of veterinary schools.

Bainbridge's views on the animal kingdom add to his musings, however. His story of one species of worm, which decide their sexual differentiation on the basis of whether there are other worms around or not, allows him to philosophize on the reasons for this varied pattern of sex differentiation. He could have extended his discussion to the question of dominance of XX vs. XY cells in embryonic development of cattle

when there are twins of opposite genetic sex, giving rise to the freemartin—a female calf that is masculinized, often contains male cells and is often sterile—from the predominantly XX calf.

One of the great joys of reading a book like this, when you have been in the same scientific field as the author, is comparing your knowledge with his or hers. I questioned some of Bainbridge's assertions and facts but, to my chagrin, I found after checking the literature that he was correct.

Bainbridge did, however, bring up the noted discrepancies of immunologic disorders in human females and males. Understanding why, in certain diseases, there are major differences in rates of incidence between the sexes will be one of our biggest scientific challenges. Many autoimmune diseases, such as autoimmune thyroiditis and rheumatoid arthritis, occur with a higher frequency in females. Bainbridge hypothesizes that the number of X chromosomes correlates with increased autoimmunity by pointing out that XXY individuals have a higher rate of autoimmunity than XY individuals.

It should be noted that people with Turner syndrome—with an XO karyotype—have a much higher incidence of autoimmune thyroiditis and develop it at a younger age. This story is not straightforward, and Turner syndrome patients can have a wide range of karyotypes, but this observation should still force us to look at the role of X chromosome dosage in autoimmunity.

Bainbridge's humorous approach and beautiful expression of the facts has encouraged me to go to my favorite Internet site and order his other books.

Also of interest

The Boy Who Loved Windows: Healing the Heart and Mind of a Child Threatened by Autism

by Patricia Stacey

DaCapo Press, 2003

A memoir of the author's battle—ultimately successful—to keep her son from becoming autistic, this book is a compelling read for anyone with an interest in autism.

Responsible Research: A Systems Approach to Protecting Research Participants

by Daniel D. Federman (Editor), Kathi E. Hanna (Editor), Laura Lyman Rodriguez (Editor), Kathe Lyman Wunnenberg

National Academy Press, 2003

An important look at informed consent, conflict of interest, federal oversight, ethics and other issues in the use of human subjects as research participants.

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