JCI The Journal of Clinical Investigation

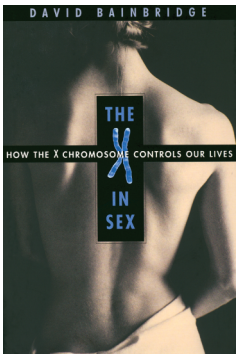
The X in sex: how the X chromosome controls our lives

Brooke Urquhart Grindlinger

J Clin Invest. 2003;112(11):1602-1602. https://doi.org/10.1172/JCI20433.

Book Review

by David Bainbridge Harvard University Press. Cambridge, Massachusetts, USA; London, United Kingdom. 2003. 224 pp. $22.95. ISBN: 0-674-01028-0. In his follow-up to Making Babies: The Science of Pregnancy, British biologist David Bainbridge explains the science of sexuality and how the X chromosome not only controls sex determination but also has a hand in the genetic lottery of sex-linked diseases and everyday life. Bainbridge begins with the philosophical musings of Aristotle and other ancient Greek philosophers who questioned how sex was determined at a time when the dissemination of features from parents to child was considered a theological affair and a woman was oft thought of as a “ribby offcut” of man. Centuries later, Charles Darwin described the phenomenon whereby animals bequeath characteristics to their offspring — yet no one could explain how this occurred. Bainbridge then introduces us to Hermann Henking, who in 1891 observed an antisocial accessory chromosome that stood aside during the cellular dance of division that we call mitosis and only ended up in half of the duplicated cells. Furious argument over the assertion of a physical, chromosomal inheritance of sex continued until 1905, when Nettie Stevens discovered X’s elusive partner, Y. Bainbridge assembles an invincible case for the Y chromosome and its control over our lives, describing its critical role in triggering male development and how […]



The X in sex: how the X chromosome controls our lives

by David Bainbridge

Harvard University Press. Cambridge, Massachusetts, USA; London, United Kingdom. 2003. 224 pp. $22.95.
ISBN: 0-674-01028-0.

Reviewed by Brooke Urquhart Grindlinger

E-mail: science_editor@the-jci.org

In his follow-up to *Making Babies: The Science of Pregnancy,* British biologist David Bainbridge explains the science of sexuality and how the X chromosome not only controls sex determination but also has a hand in the genetic lottery of sex-linked diseases and everyday life.

Bainbridge begins with the philosophical musings of Aristotle and other ancient Greek philosophers who questioned how sex was determined at a time when the dissemination of features from parents to child was considered a theological affair and a woman was oft thought of as a "ribby offcut" of man. Centuries later, Charles Darwin described the phenomenon whereby animals bequeath characteristics to their offspring — yet no one could explain how this occurred.

Bainbridge then introduces us to Hermann Henking, who in 1891 observed an antisocial accessory chromosome that stood aside during the cellular dance of division that we call mitosis and only ended up in half of the duplicated cells. Furious argument over the assertion of a physical, chromosomal inheritance of sex continued until 1905, when Nettie Stevens discovered X's elusive partner, Y. Bainbridge assembles an invincible case for the Y chromosome and its control over our lives, describing its critical role in triggering male development and how the absence of Y eventuates, by default, in female development. The role of the X chromosome seems almost inconsequential in this process, and the reader begins to wonder whether the author has forgotten that, as suggested by his title, X marks the spot. Of course, this is his intent. Bainbridge champions the dominance of Y only to reveal that the X chromosome is a mysterious and powerful entity, controlling much more than just our sex. In a witty and lighthearted style, the author leads us along the evolutionary path of the science of sexuality, stopping along the way to divulge key discoveries in our understanding of why boys are boys and girls are girls.

This is popular science in fine form — both entertaining and informative. The comprehensive approach to X-linked diseases such as Duschenne muscular dystrophy and color blindness, as well as the consequences of anomalous X and Y pairing — for example, women born with only one X or males born XXY — would benefit families facing such complex genetic diagnoses. A fascinating look at twinning explains why female twins are less alike and less rare than male twins. Bainbridge also investigates a possible role for the X chromosome that may help explain why women are more likely than men to suffer from autoimmune diseases such as lupus and rheumatoid arthritis

Beyond providing the traditional fare of transcription and translation, Bainbridge morphs with ease from biologist to historian, drawing on a wealth of material to highlight major genetic discoveries, while painting a rich philosophical and historical picture that brings into consideration not only the biological but the religious, cultural, and ethical implications of each advance. Most engaging is the chapter colorfully titled "The Duke of Kent's Testicles," which follows the progression of the X-linked "disease of kings" — hemophilia — throughout the royal houses of Europe. At that time in history, no one could have predicted that the union of national powers via intermarriages within the European monarchy would result in the deaths and illnesses of kings and heirs and even play a part in the Russian Revolution. Never losing sight of the gravity of his subject, Bainbridge touches lightly on the futuristic concept of "designer babies" and the implications of allowing couples to genetically engineer their own children.

This is not to say that the Y chromosome is the less compelling of the pair. Within three months of this volume's release, David Page and colleagues published the complete genome sequence of the Y chromosome (1), reinforcing the notion that even the most impenetrable stretches of the human genome hold valuable secrets and that the Y chromosome has its own story to tell.

Bainbridge provides a prime example of science made amusing and accessible — a rare combination. His dry and lively wit suggests that some anecdotes and turns of phrase were written with a wink and a smile, and this slim volume should appeal to scientists and nonscientists alike. However, some well-intentioned analogies may at times seem frivolous or simplistic and stretch the boundaries of accuracy in the minds of more academic readers. The merging of related citations into a chapter entitled "Further Reading" hinders their easy identification for readers interested in learning more and is as such a minor flaw. Overall, *The X in Sex* represents a jargon-free journey for the layperson interested in (some of) the reasons why men and women are so different.

1. Skaletsky, H., et al. 2003. The male-specific region of the human Y chromosome is a mosaic of discrete sequence classes. *Nature.* **423**:825–837.