

The X and Y of sex

The sex chromosomes, especially the degenerate Y, have a lot to answer for.

The X in Sex: How the Chromosome Controls our Lives

by David Bainbridge

Harvard University Press: 2003. 224 pp. \$22.95, £15.50, E 22.95

Y: The Descent of Men

by Steve Jones

Houghton Mifflin: 2003. 272 pp. \$25
Little, Brown: 2002. 288 pp. £14.99

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Just as the mammalian X and Y chromosomes appeared side-by-side some 200 million years ago, so two popular-science books devoted to the two sex chromosomes have appeared almost simultaneously. They are both informative and great fun to read. They tell overlapping stories of how the genetically immaculate X and the sadly degenerate Y chromosomes evolved from an ordinary autosome pair as the Y chromosome degenerated. It's rather like reading the story of a murder from the viewpoints of different participants, including the victim. Both authors detail the consequences to sex, fertility and disease of the single X chromosome's lonely sojourn in males and of the Y chromosome's tenuous hold on existence. And both go further, to explore the cultural spheres of influence of the sex chromosomes.

Contrary to its clear superiority in size and gene content, the X chromosome is dealt with more lightly in David Bainbridge's *The X in Sex*. After a rather roundabout description of the discovery of the X (which I hope will convince students that the X refers to an 'unknown blob' rather than a particular shape) and an approachable (if rather shaggy-dog-like) explanation of sex determination, Bainbridge gets down to explaining why the possession by males of only one copy of the X makes it so special.

In two major chapters, he describes how genes on the X act differently to genes on other chromosomes in causing disease in males (because there is no other X to mask the dud allele) and in inactivating one or other X chromosome in females (to even up dosage between the sexes).

He also summarizes some of the recent work that shows that the gene content of the X chromosome is atypical, and gives an approachable explanation of why you would expect male-advantage genes to hang out on the X. It's too bad that the book was published before the controversial new hypothesis that the X chromosome is smart as well as sexy, containing far more than its fair share of intelligence genes — I'm sure Bainbridge would have had fun with this idea.

In an interesting final chapter, he argues that sex choice is here to stay, and is not necessarily an evil (well, less evil than killing baby girls) — a point of view that I held, too, until I learned of rampages by gangs of mateless and disaffected young men.

I found this book informative and enjoyable, although rather irritating in its many little inaccuracies and convoluted logic (for example, the role of X inactivation is seen as protecting the female against the toxicity of her two X chromosomes, rather than as a secondary effect of the necessity to boost production in the poor male). I also found the book somewhat galling in its reluctance — sometimes even a complete refusal — to present explanations. For instance, Bainbridge is inclined to throw up his hands, saying "no-one can explain" why *SRY* is in such a precarious position on the human Y chromosome, and "I wish I could tell you why" moles have dispensed with the Y altogether. But why didn't he present the interesting, although speculative, explanations for these and several other fascinating observations?

Steve Jones' *Y* is a much more substantial work — an echo, indeed, of Darwin's *tour de force*, after which it is bravely modelled. His point of departure is, again, the degeneration of the Y chromosome, but his theme soon turns to the damage done by the *SRY* gene it bears, which unleashes testosterone on the body and testosterone-fuelled men on the world. There are brilliantly personalized stories of tracking the Y chromosome in human populations, of fertility and mating practices, paternity testing and a thousand other male-directed topics. Jones' easy command of a panoply of amazing factlets puts the book on a par with the wonderful *Ever Since Adam and Eve* by Malcolm Potts and Roger Short (Cambridge University Press, 1999).

The final chapter of *Y* is a provocative discussion of the accumulating problems of being male, from lower sperm counts to rising feminism. Jones rejects Darwin's eugenicist interpretation that patterns of death and mating show the moral superiority



Y so little? Men already carry the smallest chromosome; now their role in life may be shrinking too.



of males and the inexorable weeding out of the unfit, preferring instead the biological testosterone-driven explanation that it is man's sex that makes him weak. One could argue (although I wouldn't) with his dramatic view of men's heritage of death and destruction, and his dark warning that men are expendable (look at Dolly) and could readily fade from view. But his argument is sustained and backed up with serious science, and is worth taking seriously. It reinforces my despairing view that the world would be better off run by females. Or bonobos.

Jones is a wonderful writer. His language is full of colour and wit, his stories lively and to the point. Yet there is depth and clarity in this racy book, and an appreciation, shared with Darwin, Fisher, Haldane and many eminent geneticists today, that sex and sex chromosomes are special and that understanding them requires special rules.

The X and Y chromosomes both have special pulling power (it's called sex) to kindle interest, and they are the chromosomes that perhaps most influence human lives. In the decade in which the fruits of the Human Genome Project regularly put genetics and genomics on the front pages of newspapers, both of these books reach out to audiences far beyond the genetically, biologically or even scientifically literate. ■

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