

# Buy now, pay later

Tom Kirkwood

**Human Longevity.** By David W.E. Smith. Oxford University Press: 1993. Pp 175. £27.50. \$35.

"If ye would live long, choose well thy ancestors", advises the Good Book. And it is not a bad idea, apparently, to be female, Japanese, a non-smoker, a light drinker and to enjoy sex, though not all of these options are open to everyone.

The science of human longevity is a game for many players. First, there is the numbers game of demography: how long do we live, and how is this changing? Second, there is the zoo quest of comparative gerontology: how does our longevity compare with that of other species? Next come the doctors and nurses: what do we actually die of? Biochemists and molecular biologists are key players too: what causes the diseases and functional decrements of old age? Sociologists join the team when behavioural and social aspects of longevity are addressed: who lives longest?

David Smith's admirable book tackles each of these issues. For such a large topic, the book is surprising short, just 130 pages of main text. Brevity is both a strength and a weakness. The strength is that the book is easy to read as it skips lightly through a broad array of material. The weakness is that the appetite is whetted, not sated, and inevitably there are gaps.

The demography of lifespan is fascinating. We all know that average lifespan has increased, doubling over the past few hundred years in the developed countries of the world. But we need reminding that most of the change is due to reduction in child mortality. Simple arithmetic shows us that if nearly half of children die before their fifth birthday, and if child mortality is reduced, then the average lifespan jumps dramatically. In seventeenth-century England, for instance, life expectancy at birth was around 35 years. But for a 30-year-old who had survived the dangers of early life, life expectancy was still another 30 years. There is little evidence that maximum lifespan has grown, except in the obvious sense that the longest recorded lifespan can only get longer.

Along with the change in life expectancy in developed countries, there have been large changes in the causes of death. Infectious diseases no longer head the list; cardiovascular disease and cancer have taken their place. A difficult question, touched on but unresolved, is the extent to which old age itself may in the absence of disease or trauma be the cause of death. Death certificates, especially for the very old, are unreliable; many are just plain wrong.

Life insurance costs more for men than women because male mortality is higher at all ages. Females live about 6 years longer than males. There are countries where the difference is small, or even reversed, but these are countries where sex inequality in society is extreme. In Bangladesh, for instance, Smith reports that boys under five are given 16 per cent more food than girls, the difference increasing in times of famine. Bangladesh has short life expectancies at birth both for men (54.9 years) and women (54.7 years), but men live marginally longer. There is an interesting point here. The only known way to extend lifespan greatly in mammals is by severe dietary restriction, which in rodents can increase longevity by 30 per cent or more. Elsewhere, Smith discusses research into the generality of this phenomenon, including trials in primates. The evidence from Bangladesh is not encouraging.

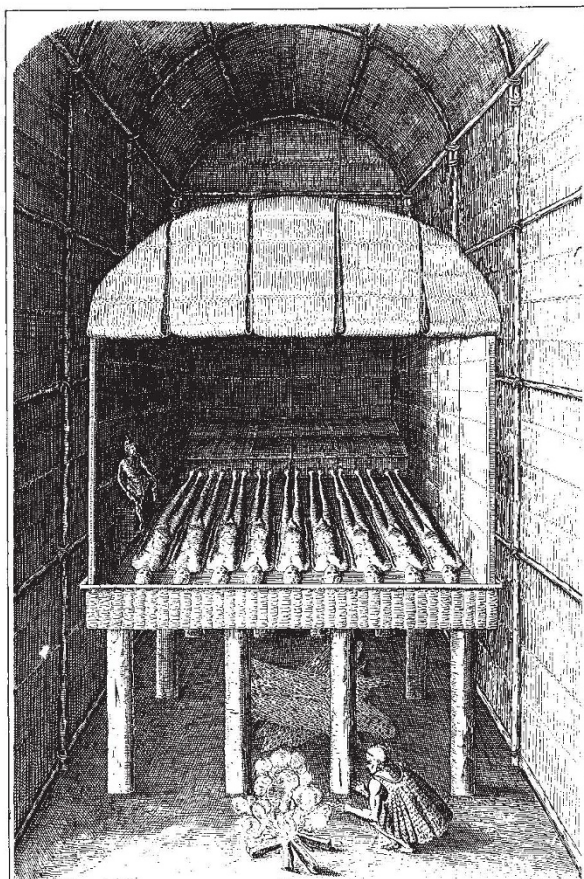
The biological basis of sex differences in longevity is interesting and so far unresolved. Smith discusses in some detail the theory that sex chromosomes have a role to play, but dwells rather less on endocrine factors. Hormones are important modulators of physiology and behaviour and there is evidence, although scant, that castration increases male longevity. Castration does not do a lot for the chromosomes, but it does have a striking effect on hormones. Perhaps unsurprisingly, there are few takers for this route to rejuvenation.

Choosing the right ancestors is a big help. They should be rich because wealth brings health. They should also have the right genes. Genes that have life-shortening effects should be avoided, such as those that predispose to cancer or early-onset Alzheimer's disease. Of deeper interest, however, are genes that modulate the rate of ageing. It is not yet known what these genes are, but strong hints are emerging from

evolutionary theories of ageing and longevity. Some will be genes for maintenance, such as the antioxidant defences of cells. Maintenance is good but may be costly, and a degree of tuning through natural selection is to be expected. Others may be 'buy now, pay later' genes which benefit the young but cripple the old. Smith reviews the main evolutionary theories and asks why humans have evolved a lifespan so much longer than that of other mammals.

The science of human longevity can only grow, as more people turn their attention to this age-old problem. We urgently need to address the fundamental research that some day, it is hoped, will equip us to improve the quality of later life. Smith has done a fine job of introducing the topic to a broad potential readership. □

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ON THE RACK — burial practices among American Indians. Taken from the frontispiece of *Disease and Demography in the Americas* edited by J. W. Verano and D. H. Ubelaker, a collection of 23 regional essays on the biological and cultural impacts of European colonization of the New World. Now published in paperback by Smithsonian University Press, \$29.95.