

## BOOKS &amp; ARTS

## Live long and prosper

Science can boost your chance of reaching a healthy old age — but don't hold your breath for immortality.

**Fantastic Voyage: Live Long Enough to Live Forever**

by Ray Kurzweil & Terry Grossman  
Rodale: 2005. 400 pp. £12.99, \$24.95

**The Life Extension Revolution: The New Science of Growing Older Without Aging**

Philip Lee Miller & The Life Extension Foundation (with Monica Reinagel)  
Bantam: 2005. 416 pp. \$26

**Tom Kirkwood**

In 1939 the British parliament passed a little-known piece of legislation, the Cancer Act, which outlawed the publication of any advertisement containing “an offer to treat any person for cancer, or to prescribe any remedy therefor, or to give any advice in connection with the treatment thereof”. The act was passed to protect the public from potential profiteers at a time when not much was known about the underlying causes of cancer, and when effective treatments, other than radical surgery, were unavailable. The Cancer Act remains in force today, and several successful actions have been brought in recent years.

It is interesting that similar legislation appears never to have been considered necessary to protect the public against claims of treatment that might stave off the ageing process. Such ‘treatments’ have long been sold, with classic cases involving potentially dangerous medical procedures, such as the transplantation into humans of monkey testicles or the injection of fetal cells from sheep or goats. For the would-be confidence trickster, the life-extension scam is one of the oldest games in town. We must assume that no one thought it necessary to legislate against such claims because, despite the evidence to the contrary, it was believed that nobody would take them seriously.

How times have changed. Both *Fantastic Voyage* by Ray Kurzweil and Terry Grossman, and *The Life Extension Revolution* by Philip Lee Miller and the Life Extension Foundation, show that greater scientific understanding of the ageing process has led to a rapid growth in ‘anti-ageing’ medicine. The cosmetics industry and a wide range of other companies now market products, techniques and advice that are advertised as delaying the effects of ageing

and even helping us to live longer. A buzz is in the air that significant life extension is just a few years away. Indeed, the subtitle of *Fantastic Voyage* — “Live Long Enough to Live Forever” — seems designed to make you think that you had better buy it and act upon its advice now. Otherwise you might miss the bus that will carry future generations into the land of the endless tomorrow.

Peel away the gloss, however, and these two books turn out to be rather humdrum contributions to the growing genre of ‘how to’ manuals that aspire to tell us “how to benefit from cutting edge science and add years to your life” and “how to extend the prime of your life and rejuvenate your body, mind and spirit”. Both books do a fair job of summarizing the current state of knowledge about factors that can affect the ageing process and about what can sensibly be done to increase your chances of living into old age in good health.

Each of them also indulges in a bit of fairly pedestrian speculation about what the future might hold in terms of stem-cell therapies, nanobots, cryonics and the like. In many places, the evidence to support the efficacy of the authors’ recommendations is thin, sometimes tenuously so. But on the whole they offer sound advice which, if followed, is likely not only to do you some good physically, but also to make you feel positive about confronting your personal ageing challenges.

The books themselves are basically sensible, so why is there such unnecessary hype on their covers? More generally, why is there a pervasive sense that advocates of life extension must make preposterous claims about imminent longevity gains if they are to gain public notice? In part, the answer lies in the practice of some on the fringes of scientific ageing research who have upped the ante by making wholly unsupported extrapolations from work in cells and in simple animal models such as yeast,

nematode worms and fruitflies. In part, it also lies in the fact that ageing research is still relatively young. There is a media hunger, as yet unchecked by widespread general knowledge of what is or is not scientifically plausible, for fountain-of-youth stories that titillate the public. The BBC, for example, earnestly reported a few months ago the laughable claim that the first human who will live to 1,000 years is 60 already. If even Auntie, as the BBC is affectionately known, can succumb to such arrant nonsense, what hope is there for the more excitable sections of the media?

The saddest thing about the misleading and ultimately unhelpful nonsense uttered by the fantasists in the life-extension lobby is that research advances are genuinely changing the way we regard the ageing process. We have learnt that, far from being genetically determined, ageing is much more malleable than we used to think. This is opening up some exciting approaches to trying to improve health in later life. Much further work needs to be done to transform these beginnings into genuinely effective interventions, but the first steps have been taken. We know, for example, that, in model organisms, boosting some of the mechanisms for cellular maintenance and repair can indeed extend life-span. This does not mean

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**Don't believe the hype: do you look like you were born yesterday?**

The books overlap extensively, which on the whole points to a reassuring consensus. The downside is that there is little in either book that is scientifically exciting or new. Both review briefly what is known about the ageing process before zeroing in on the usual suspects: fats, sugars, obesity, inflammation, exercise, heart health, sex hormones, mental stimulus, food supplements, stress and so on.

that the same techniques will necessarily work in humans, because we know from comparative studies that humans are already endowed, for good evolutionary reasons, with much better maintenance systems than shorter-lived species. By analogy, a design modification that boosts the performance of my own modest car will not necessarily make a Maserati go faster,

as the Maserati is engineered for peak performance already. But we can try.

Did the 1939 Cancer Act play much part in creating the relatively mature discussion and media reporting of advances in cancer research? Given that it was specific to Britain, I suspect that a deeper common sense prevailed. Let us hope that similar common sense

can be harnessed to take us forward more responsibly than at present into a world in which life-span and health-span are both likely to increase further. ■

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## Anticlimax

### The Case of the Female Orgasm: Bias in the Science of Evolution

by Elisabeth A. Lloyd

Harvard University Press: 2005. 320 pp.  
\$27.95, £18.95

#### Olivia P. Judson

For men, orgasm is an intimate part of reproduction: ejaculation doesn't usually happen without it. Presumably, male orgasms evolved because, in the past, males who experienced sexual pleasure were more likely to have sex, and so were more likely to sire children. But what about orgasm in women? Women can become pregnant without orgasm; indeed, some women bear lots of children without ever experiencing one. So how has the female orgasm evolved?

There are two basic possibilities. The female orgasm may have evolved under natural selection on females, which is to say that females who have the capacity to reach orgasm have historically had more surviving children than females who do not. Alternatively, it may have evolved as a by-product of natural selection on something else. A number of evolutionary biologists have hypothesized about the former, imagining various ways that orgasm might have enhanced female reproductive success. Elisabeth Lloyd, a philosopher of science at Indiana University, prefers the second.

In *The Case of the Female Orgasm*, Lloyd champions the notion — first advanced by Donald Symons in 1979 — that orgasm in women is an accidental consequence of the fact that the clitoris develops from tissue that in a male embryo will become the penis. This would mean that women have orgasms just because men do, not because it enhances their reproductive success. Lloyd also mounts a scathing attack on those who have speculated about how orgasm might have been subject to natural selection on females. She accuses them of failures of logic, shoddy data analysis, and a tendency to ignore data they don't like. She says they commit these sins because they are hostage to a variety of unexamined assumptions, the most egregious being 'adaptationism' — an (in her view) absurd and unjustified commitment to natural selection as an explanatory force in evolution.

Lloyd cites several facts to support her contention that female orgasm is a by-product.

First, there are no data showing that women who reach orgasm during sex have greater reproductive success than women who do not; moreover, orgasm is unnecessary for conception. Second, during the past 50 years, surveys of Western women have found that although a minority always reach orgasm during copulation, some never do, and everyone else does only sometimes. Third, most women find it easier to reach orgasm through manual stimulation than through stimulation from the penis. Finally, some other female primates, such as the stump-tailed macaque, the bonobo and the chimpanzee, can reach orgasm.

But none of these comes close to dealing a hammer blow to natural selection. Consider the fact that the clitoris develops from the same tissue as the penis. This tells us something about the origin of the clitoris, but little about why it is still here. Once something has arisen, it can still be subject to natural selection. It may be that the clitoris has been modified to help women achieve orgasm. Then again, it may not: we don't know.

Or consider the matter of orgasm and reproductive success. There are no data showing that orgasm enhances reproductive success; but nor are there data showing that it doesn't. What conclusion can we draw? None: absence of evidence is not evidence of absence.

Or consider the fact that not all women experience orgasm during sex. Lloyd equates

variation in phenotype with proof that natural selection has not acted. But this need not be so: we all have eyes, yet we cannot all see equally well. No one would argue that eyes have not evolved under natural selection on vision.

The sad fact is that, for now, all statements about the evolution of the female orgasm are conjectures in an empirical vacuum. To advance the debate, we need data.

The most obvious approach would be to ascertain whether there is (or was) a link between orgasm and reproductive success. Measuring the relationship between a given trait and reproductive success is difficult in any organism. It is obviously impossible to know whether orgasmic women have tended to have more children than anorgasmic women. The best we can do is try to infer.

The fact that orgasm is not necessary for conception rules out the obvious way that orgasm could enhance reproductive success — but it could have more subtle effects. For example, could orgasm during sex induce ovulation? In mammals such as ferrets and cats, ovulation is induced by stimulation from the male; might it be facultatively induced in humans? As far as I know, such an effect has not been reported for any primate, but then, as far as I know, no one has looked for it.

We also need to know far more about the nature of orgasm. Orgasm is the result of two phenomena: contractions in the pelvic region,

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