

FILM

The quest for immortality

The Fountain

directed by Darren Aronofsky
Warner Brothers
US release, 22 November 2006

Emma Marris

The Fountain defies characterization by genre. Aimed at arthouse audiences, it uses one actor — Hugh Jackman — to play the lead in three ambiguously related stories. Is he the same man? We're not sure. The three stories are set hundreds of years apart, but the common theme is the search for immortality, so he could be. The film won the Alfred P. Sloan Foundation's annual prize for a feature film dealing with science and technology at the Hamptons International Film Festival this October. Its director, Darren Aronofsky, has previously directed *Requiem for a Dream* and π , a film with a mathematician as protagonist.

In one of *The Fountain's* three strands, a scientist (Jackman) races to find a drug that will stop the growth of brain tumours before his wife (Rachel Weisz) dies of one. In dramatizing this situation, Aronofsky compresses into about four minutes the whole process of drug discovery, from lead identification right through primate testing. In scenes that intentionally call to mind TV hospital dramas, lab-coated scientists whirl around barking jargon at each other, their eyes wide with earnest concentration.

Here, a researcher in the audience might think, is science finally presented as the dramatic and compelling endeavour it is. The film makes science look sexy, and without wholly departing from actual lab realities. Indeed, the film was co-written by Ari Handel, who has a



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In a biosphere bubble in the future, Hugh Jackman's character in *The Fountain* accepts the idea of death.

PhD in neurology but left the academic track to make films with his college room-mate, Aronofsky. Handel's job was to keep an eye on accuracy. At one point, the hero's boss snaps at him for testing a drug on a monkey on a whim, saying: "The NIH could shut us down." On the other hand, the lab in the film is ridiculously stylish and tidy, but then Hollywood always gives characters apartments they couldn't possibly afford too.

The film is not really about science, but rather attitudes to death. In the first strand, Jackman plays a Spanish conquistador who hopes to use Christianity to cheat death, which is wrong, wrong, wrong, the film says. And it

is the Jackman character in the third segment who, while flying through space in an attractive biosphere bubble and working on his weightless tai chi, figures out that the appropriate response to death is acceptance. For those who are impatient with modern, diffuse spirituality, this comes across as pretty silly stuff.

Back in the central science strand, Jackman's character says: "Death is a disease just like any other, and there is a cure and I will find it." But here we are seeing one of the oldest tropes about scientists played out yet again: the scientist as an allegorical figure of hubris. ■

Emma Marris is a *Nature* reporter based in Washington DC.

Bugs with bugs

Big Fleas Have Little Fleas: How Discoveries of Invertebrate Diseases are Advancing Modern Science

by Elizabeth W. Davidson

University of Arizona Press: 2006. 208 pp.
\$35 (hbk); \$17.95 (pbk)

Mark L. Winston

Insects get sick too, and the curious invertebrate pathologists who have delved into this diseased world have revealed some compelling insights into nature, illness and scientific practice. That is the basic premise of *Big Fleas Have Little Fleas* by Elizabeth Davidson, a book based on tales about the diverse organisms that plague not just insects, but crustaceans and horseshoe crabs too. The author

draws on these pathologies to open the door on biological complexity and the splendour of scientific enquiry.

Davidson takes us through stories of infestations and plagues, uncovering how scientists have methodically unravelled both basic principles and potential control measures by studying parasites and diseases of invertebrates. European investigations into rotting silkworms in the nineteenth century found maladies caused by fungi and protozoans, and inspired Pasteur to establish the field of epidemiology. Elegant research into cholera found the causative bacteria *Vibrio cholerae* hitchhiking globally on copepods, and led US scientist Rita Colwell to suggest filtering drinking water in India through old sari cloth, a simple

control measure that cut infection rates in half. Infestations of gypsy moths today are partly controlled by an arsenal of pathogens whose biology and utility have emerged from more than a hundred years of research.

Much of the work described in the book occurred during the founding era of invertebrate pathology, before the availability of technologies such as gas chromatography, electron microscopy and gene sequencing. Davidson's book reminds us that intuition, rigorous thinking and thorough probing were the most important scientific tools for these early researchers.

Unfortunately, Davidson does not use a similar rigour to probe the relevant policy issues, such as why biological control remains a minuscule sideshow compared with chemical pesticides. Viral, fungal, protozoan, nematode and bacterial agents can provide a solution but

are dwarfed by the almost 2 million tonnes of chemicals used globally each year.

Even *Bacillus thuringiensis*, the most widespread biological control agent, is usually used by incorporating its toxins into genetically modified crops, rather than through more ecologically compatible whole-organism field sprays. Rampant antibiotic resistance among human diseases and today's rapidly evolving pandemic agents that afflict or threaten humans, plants and animals are other serious concerns that receive insufficient attention from Davidson.

Big Fleas Have Little Fleas is a book in search of a voice: it is not detailed enough for academic specialists, and not sufficiently well written for a general audience. Chapters start with interesting tidbits, but the writing quality is not sustained. It is a frustrating tease, with occasional elegant moments linked by formulaic descriptions of how this scientist did this, then the next one did that, with each piece of research contributing in a tiny way to larger scientific principles. Yes, science is a slow, methodical and painstaking process, but it's the rare moments of brilliance and the great

investigative stories that thrill readers — elements that are too sparsely described here to make the book a compelling read.

Still, Davidson's book reminds us of one fundamental point: there is still much to learn from contemplating creatures smaller than ourselves, and we have barely begun to unravel the vast biological complexity on which we humans rely. ■

Mark L. Winston is at the Morris J. Wosk Centre for Dialogue, and the Department of Biological Sciences, Simon Fraser University, Vancouver, British Columbia, V6B 5K3, Canada.

The birth of contraception

Contraception and Abortion from the Ancient World to the Renaissance

by John M. Riddle
Harvard University Press: 1992

Michel Raymond

The contraceptive pill — what a wonderful invention! At last, we could have a fulfilling sex life, free from worry about the mischief wreaked by uncontrollable gametes, and could separate the desires for pleasure and reproduction. Let's spare a thought for our poor ancestors, who were faced with the choice of reproducing like rabbits or miserably limiting their sex lives. We've made real progress since then.

Or at least that's what people thought when science delivered modern contraception in the twentieth century. For some reason, this myth — and it is one — still holds, 14 years after the publication of John Riddle's book *Contraception and Abortion from the Ancient World to the Renaissance*.

Birth control, by contraception and abortion, has a long history. In the ancient world there were precise recipes, as we know from books written by the doctors of the time (Soranus, Dioscorides and Hippocrates). These doctors obtained their knowledge from direct contact with ordinary people. One plant in particular was said to be a contraceptive — a giant fennel, *Ferula historica*. It was so sought after and harvested in such quantities that it became extinct.

In the Middle Ages, when universities started teaching medicine, knowledge began to be passed from doctors to their pupils, the next generation of doctors. Contraception was conspicuous by its absence in these courses for men, and such knowledge was lost among doctors. However, it was still transmitted between women — at least while the



Flower power: before the Pill, plants such as the gentian were traditionally used as contraceptives.

traditional way of life continued.

I visited an old alpine village this year that had continued to use traditional agricultural practices until about 20 years ago. An old peasant of 92 told me about a plant with potent contraceptive properties — knowledge she had obtained from her grandmother, who must have learnt about it from her family. The plant concerned was a kind of juniper, the key part being the berries. According to Riddle's book, juniper (which has 23 entries in the index) has been used in contraceptive recipes since ancient times.

The common name of one species of juniper, the savin (*Juniperus sabina*), was derived from its ability to save young women from shame, and modern science has finally confirmed its contraceptive effects. Many of the plants mentioned in old books have had their contraceptive properties confirmed — most of them contain oestrogen.

This traditional knowledge, traces of which remain in the memories of some Europeans, started to disappear with depopulation of the countryside in the nineteenth century: in towns, ancient knowledge ceased to be transmitted. Probably for the first time since the Graeco-Roman era (at least), most Western women no longer had access to an effective means of contraception. The contribution of modern medicine, culminating in the pill, therefore constituted real progress, but it must be seen in the context of history.

Riddle shows us that ancient contraceptive medical practices were safe, effective and commonly used. Sociological studies on their use remain to be carried out. But it is possible that, between the Middle

Ages and the rise of modern contraception, the well-off and city dwellers had little access to effective contraception, thanks to the growth of conventional medicine and the soaring social power of the physician.

This is just one of the many intriguing lines of investigation to arise from this book, which shines a different light on what we are generally taught about the 'progress' of the modern world.

Michel Raymond is at the Institute of Evolutionary Sciences, University of Montpellier II, Montpellier 34095, France.