

BOOKS & ARTS

Life in the universal porridge

What were the chances that the conditions in the Universe would be just right for life?

The Goldilocks Enigma: Why Is the Universe Just Right for Life?

by Paul Davies

Allen Lane: 2006. 360 pp. £22

To be published in the US in April as *Cosmic Jackpot* (Houghton Mifflin).

Jim Al-Khalili

The biggest question of all, according to writer Douglas Adams, is the one about the meaning of Life, the Universe and Everything. Paul Davies, in his book *The Goldilocks Enigma*, phrases it as “How come existence?” but it is the same age-old question, and we humans have taken several routes to try to answer it. The option preferred by most scientists is a cop-out: that we are just a cosmic accident, and that the Universe just happens to be right for life to have evolved in it. They argue that trying to find deeper meaning behind this incredibly unlikely outcome is futile, and hope that some as yet undiscovered laws of physics (such as may one day be provided by string theory or another ‘theory of everything’) will show us that things simply could not have been any different.

There is a second option. A growing band of physicists has argued that our universe is not unique but rather one of many within a larger Multiverse. Given the quite stupendous odds against us being here and the degree of fine-tuning in the laws of nature necessary for life to have evolved, it is not surprising that some have argued for the reality of multiple universes.

Here is a simple example showing how this helps. If millions of people buy lottery tickets, it is not surprising that the winning numbers should come up (maybe more than once). Of course, if your ticket contains those winning numbers, you might consider yourself incredibly lucky. But to anyone who doesn't know you, it is nothing remarkable; after all, someone has to win. Now let us suppose that in the week you bought your lottery ticket, no one else bought one, and yet you have the winning numbers. Is this now more remarkable? For you, there is no real difference, because the odds on you winning are the same whether anyone else buys a ticket or not. But from the point of view of the set of winning numbers, it is truly remarkable that they match the numbers on the only lottery ticket. This is the dilemma we face when we contemplate the incredibly tiny odds on our existence. We are those lottery numbers, and we need a lot of tickets to be bought if we



The Hitchhiker's Guide to the Galaxy asked about Life, the Universe and Everything.

are to stand a reasonable chance of matching anyone's ticket.

For years, the issue had been dismissed anthropically: if the conditions in our world were not ‘just right’, we wouldn't be around to debate the issue. However, it is much more natural and logical to conclude that even though we might be unique, our universe cannot be. If the Multiverse contains an infinite number of universes, some of them must have the right conditions for life. Can it really be that simple?

The first half of *The Goldilocks Enigma* is standard fare, covering all the usual topics, from the Big Bang, inflation and high-energy particle physics to theories of everything and where the laws of physics come from. Davies has a knack of making these subtle and complex concepts seem straightforward. But it is the second half of the book that readers will want to skip to. It is here that he faces head-on the question of why our universe is just right for us, and he covers all the main arguments thoroughly and shows up their shortcomings. Eventually, he chooses a different path that does away with luck as well as the Multiverse. But as Deep Thought, the computer in Douglas Adams' *The Hitchhiker's Guide to the Galaxy*, says, you are not going to like it.

Davies' first suggestion is that the ‘biofriend-

liness’ of the Universe may be due to some as yet undiscovered ‘life principle’, built into the laws of physics from the very beginning, that has steered and constrained the Universe towards producing life. I find this idea hard to swallow and I don't think Davies dwells on it long enough to really make a convincing case.

He then invites us to consider a more interesting — I hesitate to endorse it with the term ‘appealing’ — idea originally expounded by physicist John Wheeler. It takes one of the weirdest features of quantum mechanics and pushes it to its logical conclusion: that conscious observers bring about the universe they find themselves in by the very act of observing it, thereby dragging it out of the quantum superposition of all possible paths it could have followed. Actually, I think this is related to what supporters of the Multiverse version of quantum mechanics would argue — with the difference that, for Davies, our universe is the only one.

The main options, then, are: first, that the Universe is a fluke; second, that it is one of many and happens to be, much like Goldilocks' porridge, just right for us; and third, that conscious observers bring the universe they inhabit into existence simply by observing it, although their teleological actions would have to reach back into the past, forcing the

right conditions to be selected at the Big Bang.

Just when the reader feels that Davies is losing his grip and sliding inexorably towards fantasy, he takes a well-timed reality check, reminding the reader, and himself, that in order to address the question of “How come existence?”, one must either play it safe and back away from the question, or be quite radical. Many physicists will not like this book, but I think it will cause the biggest stir since Roger Penrose wrote *The Emperor's New Mind* (Oxford

University Press, 1989). Most of the ideas are not new, but Davies is courageous, entertaining and persuasive in laying them out clearly. Many scientists might feel that the subject matter, as Davies acknowledges, should be “left to the philosophers and priests”, with scientists tackling only those questions they can hope to answer. But it's still a thoroughly good read. ■
Jim Al-Khalili is professor of theoretical nuclear physics at the University of Surrey, Guildford, Surrey GU2 7XH, UK.

A giant leap?

Dark Side of the Moon: The Magnificent Madness of the American Lunar Quest by Gerard J. DeGroot

New York University Press: 2006. 352 pp. \$29.95

James R. Hansen

Dark Side of the Moon stands, and falls, on its cunning soundbites. With a cheeky rhetorical flourish, Gerard DeGroot, a history professor at the University of St Andrews, UK, attacks the integrity of the American Moon-landing programme of the 1960s. Thankfully, he does not go so far as to suggest that the landings never really occurred, being merely part of a US government conspiracy to fool the Soviet Union about the United States' strategic capability in the Cold War, but the book's presentation is almost as fanciful.

Serious research into the embedded agendas of the US space programme is well worth undertaking, and many of the questions raised by this book are worthwhile. To what extent did myths constructed by the administrations of John F. Kennedy and Lyndon B. Johnson, and sustained by NASA, manipulate the US drive to the Moon? What do the Apollo missions tell us about the growth of the technocratic mentality? How did nostalgia for Apollo corrupt America's subsequent space efforts? Several books have profitably explored such matters, notably Walter A. McDougall's *The Heavens and the Earth* (Basic Books, 1985). Certainly there is more to learn. DeGroot could have added fresh insight if only he had conducted substantive research instead of filling his book with baseless assertion and arm-waving polemic.

The most grievous defect lies not in what DeGroot does not understand about the US lunar programme, but rather what he could have easily ascertained, but did not, about the history of the Soviet programme. His indictment of Apollo

hinges on the implicit notion that the Americans were the only ones racing to the Moon. But as Asif A. Siddiqi's groundbreaking *Challenge to Apollo* (NASA, 2000) explained, the Soviets made a concerted effort to beat the United States to the Moon. Siddiqi's monumental 1,000-page book is one of the most important space-history books ever published. DeGroot fails to cite it and seems to be unaware of its existence.

The author is more adept at turning a phrase than erecting a solid edifice based on original source materials and exhaustive research. He states oh-so-matter-of-factly that the words uttered by Neil Armstrong when stepping off the Eagle were “canned” — a “freeze-dried slogan”, a “meaningless” statement, “prepared earlier and then taken into space along with

the Tang and the tubes of hamburgers”. With just a little research the cynical author could have discovered that Armstrong's “one small step” was not in the least bit canned; inside the Lunar Excursion Module, the commander of Apollo 11 formulated it in the hours between landing and stepping down off the ladder. Nor did Apollo 11, incidentally, carry Tang or tubes of hamburgers.

For DeGroot, the Moon landing marked a “high point” in “America's love affair with science and technology”, but also a decline in so much else about US society. Savouring the irony, he juxtaposes the capacity of Americans to build the sophisticated machinery needed to take them to the Moon with their inability any longer to build a decent car. While Ford Pintos exploded and AMC Gremlins fell apart, he says, Americans “arrived at parties to celebrate the lunar landing in Toyotas, Datsuns, Volkswagens, and Renaults” — another great soundbite, but one lacking fuel because, in 1969, imports made up a small fraction of the US car population, with Renault barely a blip on the screen.

In his preface, DeGroot relates that the Americans who walked on the Moon were his childhood heroes but, unlike the rocket scientists and spaceflight enthusiasts, he grew out of it, never succumbing to the sexual appeal of the rocket ship: “The tall, slender phallic tube sits on its pad while men who yearn for youth trade in techno-babble. The adventure appeals to most boys, some men, very few girls, and almost no women. Freud probably had a lot

to say about this sort of thing.” DeGroot is not the first to make the phallus comparison; others have argued that the language of engineering and rockets has been particularly sexist. But he does not reference any of those analyses, either. Nor did he look for data that could have shown that his categorical statement about women and spaceflight is shaky.

Having previously published what he describes as a depressing book on the history of the atomic bomb, DeGroot claims he hoped for spiritual uplift by turning his attention to a history of the Moon landings. But forlorn was he to find, in place of his childhood heroes, “a gang of cynics, manipulators, demagogues, tyrants, and even a few criminals”. Apollo was not a high-water mark for our species, he says, but “a brilliant deception, a glorious swindle”.

“Hubris took America to the Moon” is DeGroot's thesis, but all he really proves is that hubris sometimes writes a book. ■

James R. Hansen is professor of history, Auburn University, Auburn, Alabama 36849, USA.



Apollo 11 launched a nation's hopes as the United States raced to the Moon.

NASA