BOOKS & ARTS

Surfing the multiverse

The 'many worlds' of quantum mechanics spawned many more of science fiction.

Gary Wolfe

"The futures we fail to encounter, upon the roads we do not take, are just as real as the landmarks upon those roads. We never see them, but we freely admit their existence..."

This passage reads today as a popularization of the many-worlds interpretation of quantum mechanics. In fact, it comes from 'Sidewise in Time', a tale by Murray Leinster published in 1934 in *Astounding Stories*, a leading pulp science-fiction magazine of the early twentieth century. This was more than two decades before the idea of many worlds was introduced into theoretical physics by Hugh Everett. His doctoral thesis proposed to resolve apparent paradoxes in quantum theory by suggesting that each event 'splits' the Universe, resulting in an endless number of separate, mutually exclusive histories or 'worlds' (see pages 15 and 23).

This notion has since become part of the fabric of science fiction and fantasy, ranging from absurdist jokes such as the "infinite improbability drive" in Douglas Adams's *The Hitchhiker's Guide to the Galaxy* to a magical means of travelling between worlds in popular series such as Stephen King's *The Dark Tower* or Philip Pullman's *His Dark Materials*. How did this meme take hold in literature and how has its use in fiction evolved?

Leinster, and Jack Williamson a few years later in his 1938 novel *The Legion of Time*, offered little scientific rationale for what was essentially a hot story-generating idea (although Williamson did presciently mention "an infinite proliferation of possible branches, at the whim of subatomic indeterminism"). But they were among the first to suggest that the idea might be somehow embedded in actual physics, rather than in such earlier occult notions as the 'astral plane'. For them, Everett's hypothesis must have seemed like a kind of validation. This was the tone of one of the first popular accounts of Everett's theory, a 1976 article in *Analog* — the same magazine, retitled, that had published Williamson and Leinster — by science-fiction writers Michael Talbot and Lloyd Biggle.

Writers outside science fiction viewed the possible multiplicity of worlds as more philosophy than physics, and were playing around with the idea well in advance of Everett. The most famous example, published in 1941, is probably Jorge Luis Borges's 'The Garden of Forking

Imagined worlds: which is stranger, science or fiction?

Paths' (in the collection *Labyrinths*), in which a famous maze-maker is described thus: "He believed in an infinite series of times, in a growing, dizzying net of divergent, convergent and parallel times... We do not exist in the majority of these times; in some you exist, and not I; in others I, and not you; in others, both of us."

Borges, like the science-fiction writers before him, was describing multiple timelines as an idea, as a potential condition of the Universe, not merely as a 'what-if' game or a story-making device. This "multiplicity of histories" — the term comes from science-fiction writer Stephen Baxter — is the essential nature of the true parallel-worlds tale.

More widespread are alternative histories. These have been traced back as far as the Roman historian Livy, who imagined what might have happened had Alexander the Great confronted the Roman Empire. Alternative or 'counterfactual' history has grown into such a bustling subgenre that it now has its own annual Sidewise Awards (in honor of Leinster). It virtually supports the careers of novelists such as Harry Turtledove, Eric Flint, Robert Conroy, and even Newt Gingrich and William Forstchen — all of whom have depicted alternative versions of the American Civil War or the Second World War. It also occasionally shows up on the bestseller lists, as with Philip Roth's *The Plot Against America*. This novel seems to be an autobiographical narrative about Roth's

own childhood in New Jersey until we realize that this is a world in which Charles Lindbergh defeated Roosevelt for the US presidency in 1940, and in which anti-Semitism is rapidly becoming state policy. Like other alternative histories, it posits only one divergence point and one alternative.

Possibly more fertile is a virtually infinite series of parallel worlds, occasionally impinging on our own. This has for decades provided the underlying conceit for English writer Michael Moorcock's vast body of work (ranging from the sword and sorcery of his 'Eternal Champion' tales to contemporary England in *The Cornelius Chronicles*). The Eternal Champion is a reluctant hero who finds his prowess tested in a variety of worlds. This is one of the most influential concepts in modern fantastic literature, echoed in such bestsellers as Robert Jordan's *Wheel of Time* series.

Moorcock had been developing his notion since his teenage years and was probably aware of Everett's thesis. "I would have come across a reference to it in *New Scientist* (one of my best friends was then editor) [or] physicist friends would have been talking about it," he has written. In 1962, Moorcock first introduced into science fiction the term 'multiverse', which was later used by physicist David Deutsch (in *The Fabric of Reality*) specifically in relation to Everett's thesis. A nice illustration of the symbiosis of science and science fiction.

P. GOODFELLOW/PENGUIN BOOKS/SPHERE BOOKS/B. HABERFIELD/MAYFLOWER

Parallel worlds and alternative histories

Jack Williamson, *The Legion of Time* (1938). A pulp classic. The hero meets women from two possible futures that he may help determine.

Philip K. Dick, *The Man in the High Castle* (1962). Among the best and most influential alternative-world scenarios, in which the Allies lost the Second World War.

Michael Moorcock, *The Eternal Champion* (series, 1962–present). Several series of interconnected novels set in a multiverse of alternative realities.

Gregory Benford, *Timescape* (1981). One of science fiction's most compelling accounts of working scientists, dealing with cross-time communication to alter the past and thus create a variant future.

Stephen Baxter, *The Time Ships* (1995). This ambitious sequel to H. G. Wells's *The Time Machine* updates the classic tale with its notion of multiplicity of histories, and at one point directly alludes to Everett.

Among 'hard science-fiction' writers, quantum theory has become enormously influential. It provides something of a rationale for novels and stories that seek to question the fundamental nature of reality. Some of these writers go so far as to provide calculations and bibliographies to justify their fiction; others let their imaginations roam independently, more interested in metaphor than in theory.

For example, Frederik Pohl's *The Coming of the Quantum Cats* makes specific reference to quantum theory in a complex satirical tale. The main character encounters versions of himself from different time-streams — in one, Nancy Reagan is the US president, in another, Arabs rule the country. Meanwhile, the philosophical implications of quantum theory fascinate writers as much as physicists. Greg Egan's *Quarantine* begins as a detective thriller about a mental patient who can apparently walk through walls; it ends up as a challenging speculation on the role of the observer in the collapse of the wave function and how this might affect the many-worlds thesis. Towards the end of *Brasyl*, Ian McDonald suggests the mind itself may be a function of a kind of quantum computer entan-

gled in a vast web of parallel universes — having introduced us to three disparate periods in Brazilian history, McDonald only gradually reveals the strange connections between them.

Such authors strive to incorporate actual developments in scientific theory into their fiction. They "play with the net up" in the words of science-fiction writer and physicist Gregory Benford. Among these authors, the many-worlds hypothesis has joined the vast arsenal of shaky but convenient speculations — along with time travel, faster-than-light propulsion, uploadable minds, quantum computing and alien contact. These speculations, not yet fully testable in reality, provide continuing fodder for the ongoing dialogue between scientifically literate fiction writers and practising theorists. Tracing the actual parameters of this dialogue over the past century of physics and fiction would be a daunting task, but it might well reveal, as Moorcock himself once put it, "the romantic imagination working ... perfectly efficiently in both the arts and the sciences." ■

Gary Wolfe is professor of humanities and English at Roosevelt University, Chicago, Illinois 60605, USA.

EXHIBITION

Art shadowing science

Systema metropolis

by Mark Dion

Natural History Museum, London, UK
(15 June–2 September)

Colin Martin

American artist Mark Dion recently spent 18 months collaborating with scientists at London's Natural History Museum, collecting and identifying samples from four 'hidden' environments across the metropolis — cemeteries, a main road, a park and along the River Thames, including a power-station outlet.

"I'm not doing science," he says. "I shadow aspects of the process to get to an essence of the desire to do those things." The outcome of this investigation into the cross-fertilization between nature and urbanization in London is unveiled in an exhibition installed in five temporary pavilions in the museum's Jerwood Gallery. The scene is set with Dion's homage to Carl Linnaeus, whose binomial classification system democratized botany and zoology, enabling amateurs and professionals alike to collect and classify specimens. It includes a bust of the Swede and other historical material from the museum's own collection.

Photographs of the small invertebrates found at three cemeteries — including East Finchley where evolutionist T. H. Huxley is buried — are displayed in a simulated scientist's workplace (see picture). Another pavilion displays two square-metre samples of soil excavated from the 2012 Olympic Park. Fauna and flora colonizing

the soil will be kept alive throughout the exhibition, housed in a contemporary herbarium.

Insects were collected by a device mounted on a car while driving along one of London's busiest roads on 23 May, Linnaeus's birthday. The species of the squashed specimens were determined by DNA analysis and photographs of intact specimens of the species displayed.

Dion appropriates the methods, tactics and traits of science, to explore serious questions in a playful and subjective manner that scientists cannot adopt. In his own words, he is able to act as a "lightning rod" for ideas about science.

"I'm not conducting an experiment in strict scientific terms, but for some people it's enough to look the part," he comments in an interview published in the catalogue to a concurrent, touring exhibition, *The Natural History of the Museum*. This Dion retrospective charts his development as an artist, and is showing at the Dunkers Kulturhus in Helsingborg, Sweden, until 26 August (www.dunkerskulturhus.se) and at Seedamm Kulturzentrum in Pfäffikon, Switzerland, from 15 September to 11 November (www.seedamm-kultur.ch). ■

Colin Martin is a London-based writer.

M. DION/NATURAL HISTORY MUSEUM