



Contemplating the night sky in Maine became a metaphysical experience for physicist Alan Lightman.

PHILOSOPHY OF SCIENCE

A physicist faces the sublime

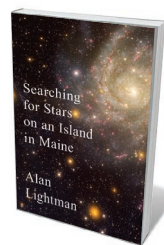
Anil Ananthaswamy on Alan Lightman's journeys in empiricism and experience.

With his debut novel, *Einstein's Dreams* (1992) — the poetic musings of a Swiss patent clerk on the nature of time — theoretical physicist Alan Lightman revealed an enthusiasm for entering the human psyche. His latest book, the collection of essays *Searching for Stars on an Island in Maine*, goes further. Here, Lightman confronts the contradictions that arise from having a rigorous scientific world view, alongside his own mortal desires and fears.

Lightman begins *Searching for Stars* with an account of a mystical experience. He's motoring through the coastal waters off mainland Maine, towards Pole Island, where he has a summer home. It's a moonless night. Before he docks, Lightman turns off the boat's motor and running lights, and lies down in the silence and darkness. "After a few minutes, my world had dissolved into that star-littered sky. The boat disappeared. My body disappeared... I felt connected not only to the stars but to all of nature, and to the entire cosmos." With that, Lightman begins an exploration of the tensions, both

within himself and without, between the materialist reductionism of science, especially physics, and the absolutes of spiritual belief.

As a physicist, he knows there are no absolutes. The idea of a fixed and motionless Earth was disproved in 1851 by the "slow rotation of the plane of a swinging pendulum" — physicist Léon Foucault's experiment — which could be explained only if the planet, not the pendulum, was rotating. Discoveries of the electron and radioactivity showed us that even atoms, once thought indestructible, were anything but. Next, Albert Einstein demolished Newtonian notions of absolute space and time. Then came quantum mechanics, with its claims of uncertainty and indeterminism.



Searching for Stars on an Island in Maine
ALAN LIGHTMAN
Pantheon: 2018

For anyone looking to science for assurance, the bottom falls out. So, Lightman looks past it. "I am a scientist, but I am not a swinging bob on a string," he writes.

He sets the stage for a dialogue, introducing us to the usual suspects in science: Galileo Galilei, J. J. Thomson, Ernest Rutherford and Einstein; and to a handful of spiritual thinkers and religious figures. We meet, for instance, fleetingly, the Indian poet and Nobel laureate in literature Rabindranath Tagore; and, more substantially, Augustine of Hippo, the influential fifth-century Christian theologian.

"Augustine's certainties were absolute," Lightman writes, contrasting these immutable religious ideas — such as the immortal soul — with science's ever-evolving view. Yet, he argues, science, too, longs for an absolute in a final 'theory of everything', and has its article of faith: "that the physical world is a territory of order and logic".

Lightman's scope is sweeping, but he doesn't dig deeply enough. For instance, he expresses disbelief in *bardo* — the Tibetan

CHRISTOPHER GEORGIA/AURORA PHOTOS

Buddhist term signifying the transitory state between death and rebirth. He writes: “I ask for some kind of evidence for all things I believe — even if it is evidence from a personal or transcendent experience. And I insist on evidence for any statements that concern the physical world.” Certainly, there is no ‘evidence’ for *bardo*, independent of the

“As a physicist, Lightman knows there are no absolutes.”

subjective experiences of Tibetan Buddhists. But Lightman stands by his own subjective experience of perceived ‘oneness’

with something larger than ourselves. A rigorous scientific approach would question the veracity of all subjective experiences, not just those that seem unreasonable at first blush.

Therein lies the book’s Achilles heel: it makes little mention of the research on perception that calls into doubt the ‘truth’ of subjective experiences, no matter how real or exalted they feel. Modern neuroscience tells us that what we perceive is not a bottom-up reconstruction by the brain of what’s out there. Rather, it is the brain’s prediction about the probable causes of sensory inputs.

Predictions, and thus perceptions, can be wrong. This is of particular importance when perceptions hint at something spiritual. It’s a subject explored, for example, in the 2015 *Kabbalah: A Neurocognitive Approach to Mystical Experiences* by neurologist Shahar Arzy and scholar of Jewish thought Moshe Idel. Mystical experiences are also eerily similar to those reported by people having ecstatic epileptic seizures, including feelings of time dilation and ‘oneness’, the neural underpinnings of which are under study (M. Gschwind and F. Picard *Front. Behav. Neurosci.* **10**, 21; 2016).

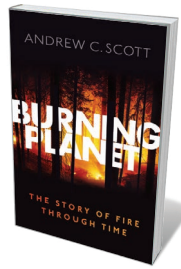
The book’s narrative structure — set up as the articulate reveries of a physicist, who is alternately naturalist, stargazer and philosopher, wandering around his island, constantly thinking grand thoughts on mossy slopes — risks becoming self-parody. Lightman saves the day somewhat by acknowledging the indulgence.

However, as a broad take on intellectual thought at the intersection of science and spirituality, *Searching for Stars* is stimulating. Lightman is to be admired for his willingness to take off his scientist’s hat and plunge into preoccupations most of his peers would strenuously avoid, some for fear of ridicule. Once again, this deft wordsmith has effortlessly straddled the divide between the hardest of the hard sciences and the nebulous world of existential doubts and longings. ■

Anil Ananthaswamy is a journalist and author of *The Man Who Wasn’t There*, an exploration of the neuroscience of the sense of self.

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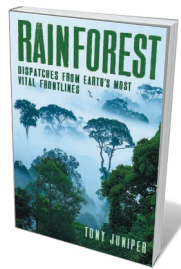
Books in brief



Burning Planet

Andrew C. Scott OXFORD UNIVERSITY PRESS (2018)

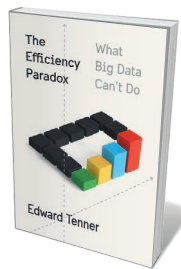
Megafires regularly crackle through the headlines, yet wildfire management remains largely misguided. Geologist Andrew Scott redresses the balance in this scholarly yet accessible study, drawing on ground and satellite observation as well as his original research into the 400-million-year history of fire on Earth. Through technologies such as scanning electron microscopy, Scott’s study of fossil charcoal has unearthed an astounding deep-past record of botanical riches and shifts in climate and oxygen levels. A timely book in an era of heightened fire risk and threats to water supply.



Rainforest: Dispatches from Earth’s Most Vital Frontlines

Tony Juniper PROFILE (2018)

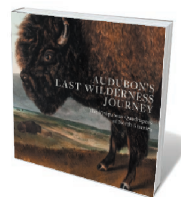
The “green oceans” that are tropical rainforests help to regulate Earth’s water, climate and carbon cycles; support 50% of terrestrial flora and fauna; and offer a lifeline to 1.6 billion people. Yet half have been cleared, in large part by consumer-led interests, from cattle ranching to palm-oil production. Environmentalist Tony Juniper surveys the terrain through myriad lenses: the bitter history of exploitation and its impact on indigenous peoples; the stupendous biological riches; and the conservation science and community involvement that, given political and industrial will, could halt the felling.



The Efficiency Paradox: What Big Data Can’t Do

Edward Tenner KNOPF (2018)

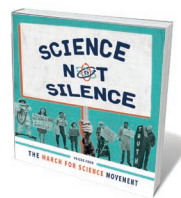
We pursue efficiency through engulfment in the digital. Yet, argues historian of technology Edward Tenner in this perceptive study, the promise of big data and algorithms for information, education, medicine and beyond is dissipating. The Silicon Valley dream of a frictionless existence is failing because ethical, political and social elements were factored in poorly, spawning issues such as flawed algorithms. Sympathetically critiquing the work of others in this arena, including Nicholas Carr and Cathy O’Neill, Tenner calls for a strategy that blends intuition and experience with high technology.



Audubon’s Last Wilderness Journey

Marilyn Laufer et al. GILES (2018)

Forget birds: otters, bison, armadillos, black bears, elk, beavers and other New World mammals starred in ornithologist John James Audubon’s last great work of natural-history illustration. Published in three volumes between 1845 and 1848, and inspired by Audubon’s 1843 journey up the Missouri River, the original featured 150 hand-coloured illustrations. Curators at the Jule Collins Smith Museum of Fine Art at Alabama’s Auburn University have now made them available to all. Accompanying the striking reproductions are fresh essays on hunting, conservation, wilderness, mammalogy and more.



Science Not Silence

Edited by Stephanie Fine Sasse and Lucky Tran MIT PRESS (2018)

More than one million researchers, postdocs and science aficionados took to the streets across some 600 cities on 22 April 2017. The March for Science was a riposte to the US administration’s ennuï around research; it aimed to reify the fundamental, multidimensional importance of science in tackling global challenges and advancing knowledge. This vibrant photo-essay compilation, edited by science communicators Stephanie Fine Sasse and Lucky Tran, pays homage to the international community and its resilience, creativity and ongoing commitment to speaking truth to power. [Barbara Kiser](#)