cunning way to knit together a molecule. It's enough to spark, but not sate, curiosity.

Delving into the principles behind reactions, Gray follows the Sun's energy from chlorophyll to plant carbohydrates, and onwards to oil, petrol and the chemistry of the internal-combustion engine. This discussion of energy is straightforward ("an itch that the universe needs to scratch"); the coverage of entropy is more difficult to follow. "Feel free to skip this section, by the way: it's really hard," he writes. From a science communicator, that feels like a cop-out.

There are brief mentions of how other factors — concentration, temperature, surface area — affect rates of reactions, but no unifying explanation of chemical kinetics to go with the thermodynamics. Catalysis, surely one of the most important principles of modern chemistry, is notably absent.

Still, it feels churlish to gripe about this love letter. Mann's photography transforms chemical samples into art, and captures the thrill of Gray's demonstrations. Many photos recall the works of eighteenth-century artist Joseph Wright, using chiaroscuro to frame the glow of a reaction with a background of deep shadow. Others are playful: in one, chlorine gas combines with sodium metal to create a billow of sodium chloride, which rises to vaporously salt a net full of popcorn.

The pictorial treats go beyond photography. Molecular structures are bathed in a diffuse violet glow, the shimmer serving as a reminder that their shroud of electrons is a cloud, not a constellation of points. And the most attractive chapter, on the chemistry of light, draws a beautiful analogy between sound waves and musical notes, and electromagnetic wavelengths and colour.

There are gorgeous sequences of stills from high-definition video, such as one showing the hellish cauldron created when aluminium meets bromine. I had an urge to jab the page to make it play. Indeed, Gray's previous works have been ported, extremely successfully, into iPad apps, with multimedia that users can manipulate. I expect that *Reactions* will make the same transition. For now, it feels like an app trapped inside the body of a book. ■

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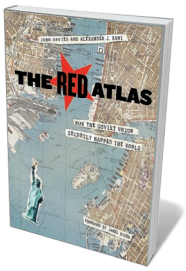
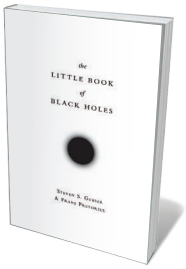
CORRECTION

The Books & Arts article 'Final ascent of physics' (*Nature* **549,** 331–332; 2017) incorrectly stated that *Special Relativity and Classical Field Theory* is the last book in the Theoretical Minimum series, and described it as "historical" instead of "ahistorical". The text and title have been corrected.

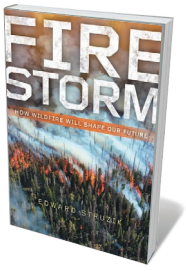
Books in brief



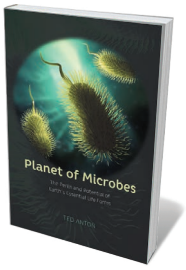
The Red Atlas: How the Soviet Union Secretly Mapped the World
John Davies and Alexander J. Kent UNIVERSITY OF CHICAGO PRESS *(2017)*
It stands as one of the most astounding feats of twentieth-century cartography. From 1950 to 1990, Soviet spies and satellites surveyed most of the planet to create what may be more than one million military maps, so detailed they show the composition of bridges and species of trees. As John Davies and Alexander Kent reveal in this glorious homage embellished with 350 map extracts, the gargantuan project might have been groundwork for a cold-war coup. Ironically, its near-comprehensive coverage has proved a boon for Western surveyors working in otherwise uncharted territory.



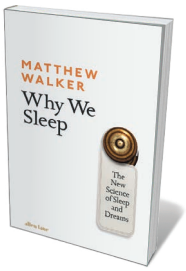
The Little Book of Black Holes
Steven S. Gubser and Frans Pretorius PRINCETON UNIVERSITY PRESS *(2017)*
The first faint chirp recorded by the Laser Interferometer Gravitational-Wave Observatory (LIGO) in September 2015 marked the momentous merger of two black holes. And it's to these astrophysical regions of no return that physicists Steven Gubser and Frans Pretorius devote their slim primer. After extolling black holes as theoretical laboratories, they trek through relativity, Schwarzschild black holes and beyond. The thrills come thick and fast, not least when a hypothetical probe nearing a singularity is "squished and stretched into an infinitesimally thin line".



Firestorm: How Wildfire Will Shape Our Future
Edward Struzik ISLAND *(2017)*
Starting in May 2016, a huge wildfire devastated Fort McMurray, Canada. Dubbed the Beast, it burnt more than 566,000 hectares and displaced 88,000 people. And it is a sign of heated times: a new wildfire paradigm is emerging in North America's boreal forests, already pressured by fracking, logging and insect infestations. Edward Struzik's deft account interweaves reportage, science and policy to show how fires that are normally key to ecological resilience are growing bigger and faster, thawing permafrost, degrading watersheds and disrupting habitats of species from grizzly bears to fungi.



Planet of Microbes
Ted Anton UNIVERSITY OF CHICAGO PRESS *(2017)*
Collectively, Earth's microbial hordes are its dominant life form. A realm that spans the mammalian gut, the ocean floor and the International Space Station is a rich one, and discoveries in it continue to rattle and revivify biology. Ted Anton's captivating narrative follows the field's evolution through key findings in symbiosis, archaea and the microbiome by inspired scientists such as Lynn Margulis, Carl Woese, Margaret McFall-Ngai and Elaine Hsiao. Anton dips, too, into how the findings are influencing diet, agriculture, medicine and environmental sustainability.



Why We Sleep: The New Science of Sleep and Dreams
Matthew Walker ALLEN LANE *(2017)*
If your nightly snooze lasts less than seven hours, you risk weakening your immune system, messing with your metabolism and depriving yourself of a "consoling neurochemical bath". So argues neuroscientist Matthew Walker, who draws on current research to demystify sleep, traverse the wild world of dreams and disentangle sleep disorders. From an infant's polyphasic snippets of slumber to the "hyper-associative problem-solving benefits" of REM dreaming, Walker's investigation is anything but soporific. **Barbara Kiser**

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