As Graham-Smith discusses, the structure and evolution of galaxies is another hot topic. Almost all galaxies have supermassive black holes spinning at their centres, with masses millions to billions of times that of the Sun. Vast amounts of energy are radiated from near the black hole, or carried off as kinetic energy by collimated (very narrow) jets squeezed out along the poles of rotation and extending, in some cases, for a megaparsec. This process is probably key to the formation of stars and the evolution of galaxies. Energy from the jets and radiation is dumped into the gas between the stars and galaxies, and is believed to significantly influence the rate of star formation and, as a result, galaxy evolution. The heating and stirring of the gas in turn affects the rate of accretion and energy generation around the black hole, in a powerful feedback mechanism.

To refine their picture of this activity, astronomers are marshalling findings from a range of telescopes to map the jets' radio emission and estimate their kinetic and magnetic energy, as well as the energy emitted at optical and ultraviolet wavelengths. They are using X-ray observations to determine how hot the gas is, and infrared observations to gauge how much dust there is in the interstellar medium. They observe spectral lines at millimetre wavelengths to map the outflow of molecular gas. X-rays and γ-rays also tell us about the gas dynamics close to the black hole or in the region where the jets are launched.

Eyes on the Sky does contain a few surprising errors. For example, the Karl G. Jansky Very Large Array radio telescope in New Mexico, for instance, still has 27 dishes after its upgrade, not 36. Nevertheless, Graham-Smith's book is a very interesting explanation of the multitude of telescopes and their history.

Telescope technology continues to develop at breakneck speed. The SKA, for instance, demands new technologies to increase sensitivity, process huge quantities of data very fast and keep costs in check. This and other planned great observatories — the JWST, as well as the γ-ray seeking Cherenkov Telescope Array and the optical/near-infrared European Extremely Large Telescope on the ground — are likely to produce major discoveries in areas such as transient sources of radiation, the understanding of planet formation, the nature of dark matter and the history of the Universe. They will undoubtedly also uncover unknown unknowns, those serendipitous discoveries that are the hallmark of the great telescopes of history. ■

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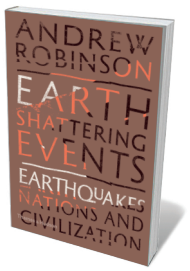
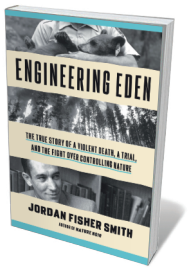
Books in brief

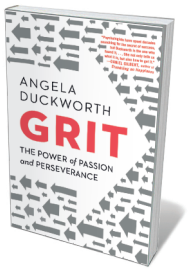


Earth-Shattering Events: Earthquakes, Nations and Civilization
Andrew Robinson THAMES AND HUDSON (2016)
A "fatal attraction": geophysicist James Jackson's description of humanity's penchant for living in earthquake zones is all too apt, notes science writer Andrew Robinson in this compelling history of seismicity and society. Robinson traces more than 2 millennia of cataclysms, vividly evoking events such as the magnitude-8.8 quake-cum-tsunami that largely flattened Lisbon in 1755. Woven through is a history of seismology from its first glimmerings in ancient China, through geologist John Milne's groundbreaking work in the nineteenth century to today's hurdle-ridden drive to predict seismic risk.

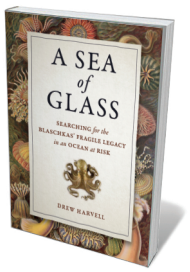


Engineering Eden
Jordan Fisher Smith CROWN (2016)
In 1972, a grizzly bear eviscerated tourist Harry Walker in Yellowstone National Park, Wyoming. His family's lawsuit against the US National Park Service ignited a vastly broader debate about 'managed nature'. In this beautifully synthesized study, writer (and former ranger) Jordan Fisher Smith argues for symbiotic balance in our interaction with the wild, because "the ties that bind, bind in all directions". As he shows, expert witnesses such as zoologist Starker Leopold helped to shift Yellowstone's mismanagement of bears — notably the deliberate feeding that predisposed them to attack.

Blue Skies over Beijing: Economic Growth and the Environment in China
Matthew E. Kahn and Siqi Zheng PRINCETON UNIVERSITY PRESS (2016)
Beijing's atmospheric pollution in 2013 reached 40 times the safe level set by the World Health Organization. To gauge progress on the country's urban sustainability, economists Matthew Kahn and Siqi Zheng apply microeconomics to industry, pollution dynamics, and local and central government efficacy. They see that analysis — along with factors such as growing environmental awareness in China, and evidence of sharply improved air quality in some post-industrial US cities — as potentially heralding a turnaround.



Grit: The Power of Passion and Perseverance
Angela Duckworth SCRIBNER (2016)
When psychologist Angela Duckworth received a MacArthur Fellowship, or 'genius grant', in 2013, the irony was not lost on her; for years, her father had said she was "no genius". But Duckworth saw sheer dogged effort as brilliance of a different sort, and ultimately more important to achievement than talent. She lucidly anatomizes the nature of grit, drawing on her own and others' research (such as psychiatrist George Vaillant's 'treadmill test'), and explicating the passion, purpose, practice and optimism that feed perseverance and resilience. A deft corrective to IQ culture.



A Sea of Glass: Searching for the Blaschkas' Fragile Legacy in an Ocean at Risk
Drew Harvell UNIVERSITY OF CALIFORNIA PRESS (2016)
In nineteenth-century Bohemia (now the Czech Republic), master glassblowers Leopold and Rudolph Blaschka spun supremely lifelike replicas of organisms as teaching tools. Ecologist Drew Harvell, finding more than 500 models of marine invertebrates at Cornell University in Ithaca, New York, set out to restore them. Stunning photos of a number of them contextualize the dramatic taxonomic and ecological shifts in ocean life over the past 150 years. **Barbara Kiser**