

# INSIGHTS

BOOKS *et al.*

## AAAS/SUBARU SB&F PRIZES FOR EXCELLENCE IN SCIENCE BOOKS

### New books for young scientists

A charming science-inspired spell book, an overdue ode to overlooked scientists, a vivid exploration of the circle of life, and a dazzling tome packed with images of the cosmos are featured among the finalists for the 2023 AAAS/Subaru SB&F Prize for Excellence in Science Books, a collection of awards sponsored by Subaru of America, Inc., in partnership with the American Association for the Advancement of Science (AAAS, the publisher of *Science*). Read on for reviews of the finalists—which take on topics ranging from the fungal to the forensic—written by *Science* staff with the help of a few friends. —Valerie Thompson

#### CHILDREN'S SCIENCE PICTURE BOOK

### Fox

Reviewed by **Sacha Vignieri**<sup>1</sup>

Understanding death is a challenge for most, but perhaps especially so for young children. Yet sometimes even they must grapple with this phase of the life cycle. In *Fox: A Circle of Life Story*, Isabel Thomas tells a story about the life and death of a mother fox. The book begins by playfully describing the mother fox's life as she hunts and cares for her kits as they grow, play, and learn. Midway through, the fox meets an untimely end when

she is hit by a car after a successful hunt. Her body, readers learn, provides food for scavengers and decomposers, and eventually all that was once the fox is recycled into new life. At the end of the book, Thomas provides a more detailed description of the decomposition and recycling process, describing, in an accessible way, the science behind the book's narrative. The story, warmly illustrated by Daniel Egnéus, not only teaches the biology of death, decomposition, and renewal but may provide solace to children affected by death or dying.

And yet, while the story is sweet and the illustrations adorably depict the fox and her family engaging in typical fox behaviors in the book's first half, the mother's

death feels jarring, especially because much has been made of fox family's bonds before this event. A child might wonder, "What will happen to the fox kits? How will they survive?" The book's illustrations suggest that they do survive, but in nature, they probably would not have made it through the winter alone. For most children, this book's theme might be too upsetting, but for those who have lost someone they love, it may help them to better understand the ways death makes way for new life.

**Fox: A Circle of Life Story.** Isabel Thomas, Illustrated by Daniel Egnéus, Bloomsbury Children's Books, 2021, 48 pp.

### Good Eating

Reviewed by **Jennifer Sills**<sup>2</sup>

In *Good Eating: The Short Life of Krill*, author Matt Lilley challenges readers to look at the world through the eyes of a krill, a tiny crustacean that serves as a food source for many marine animals. "You" (the reader, embodying the krill's experience) sink down into the dark ocean as an egg, hatch, and swim back to the surface, molting repeatedly. Lilley describes each stage of the krill's life cycle in simple language. When the egg first hatches, he explains, "You are a six-armed oval." Later: "You grow more spines." Just





before the krill reaches the surface, he quips, “You grow a face...sort of. About time!”

As the krill matures, the reader discovers its special skills: Your transparent stomach can turn green! You can light up! Now at the water’s surface, you learn that you are not alone: There might be a “million million” creatures just like you—perhaps “a krillion”? (The appendix, which provides background about the Antarctic krill, clarifies that a million million is, in fact, a trillion.)

Dan Tavis illustrates the krill’s journey with clean ink lines and watercolor shading. The krill’s red hues stand out against a backdrop of cool blues and greens. The images reinforce the reader’s role by positioning predators as a krill might see them. The hungry faces of penguins, slightly distorted as if viewed from underwater, peer down from an opening in an ice sheet. The mouth of a blue whale fills a subsequent two-page spread. The book’s main character pops with personality, thanks to its googly eyes and entertaining facial expressions. Although the text plainly describes the krill’s most important role—eating single-celled organisms until becoming food itself—there is no need to worry. The little krill around whom the story revolves escapes its predators and lives to continue its adventure...this time.

**Good Eating: The Short Life of Krill.**  
Matt Lilley, Illustrated by Dan Tavis, Tilbury House Publishers, 2022, 36 pp.

## HeroRat!

Reviewed by Jeffrey Mervis<sup>3</sup>

*HeroRat!* tells the story of Magawa, an African giant pouched rat who has been trained to sniff out buried land mines. The book’s 32 pages are packed with colorful and action-filled drawings.

There is also plenty of content. *HeroRat!* is stuffed with details about Magawa’s training, including the three reasons that pouched rats “make better heroes” than dogs (they cost less to keep and train, they can easily work with different handlers, and they do not weigh enough to trigger mines). The main character has a can-do personality bordering on braggadocio. “I thought it was going to be hard to become a hero, but I’m really good at searching for those awful explosives,” Magawa says about his training by a Tanzanian nonprofit before heading off to Cambodia, which we learn ranks second to Afghanistan as the country with the most land mines. There, he performs so well that he garners a gold medal “for animal gallantry,” billed as the first ever awarded to a rat.

The book’s somber message—that animals can help the planet recover from the ravages of war—is probably too complicated, if not downright scary, for little children. But having Magawa deliver a first-person account of his training renders it a bit too childish for older students. So the book’s target audience is not obvious. Asked what he liked best

about *HeroRat!*, my 9-year-old grandson replied, “You normally think of rats as bad. But this book shows how they can help people.” Adults may want to consider adding this simple but important message as they share Magawa’s story with young listeners.

**HeroRat!: Magawa, a Lifesaving Rodent.**  
Jodie Parachini, Illustrated by Keiron Ward and Jason Dewhirst, Albert Whitman & Company, 2022, 32 pp.

## Tu Youyou’s Discovery

Reviewed by Caroline Ash<sup>4</sup>

In 2015, Tu Youyou became the first Chinese woman to win a Nobel Prize, sharing the Prize in Physiology or Medicine for her role in identifying the ingredient of an herbal remedy that is now the world’s most important antimalarial drug. *Tu Youyou’s Discovery*, by Songju Ma Daemicke, tells the scientist’s inspiring story.

At a time when most girls in China were not formally educated, Youyou’s parents sent her to school, but at 15 years old, she contracted tuberculosis and was bedridden for several months. With the help of antibiotics and her mother’s traditional remedies, Youyou made a full recovery over the next two years. This experience became her inspiration, and she persisted with her education to become a research scientist in 1955, applying modern scientific methods to

test traditional medicines as potential treatments for drug-resistant malaria.

With clear text and vivid illustrations that will appeal to a range of age groups, the book describes how Youyou, whose work overlapped with China's Cultural Revolution, overcame numerous challenges, from limited resources to doubts sewn by her male colleagues. It also reveals how an ancient text inspired the simple method that would ultimately be used to extract artemisinin, or qinghaosu—the compound that would prove effective against malaria—from sweet wormwood. By the time Youyou stood on the podium in Stockholm to receive her prize, artemisinin had saved the lives of 6.8 million children.

The book may be slim, but it does an excellent job of conveying a sense of the time, sacrifice, and the sheer persistence that often underlie revolutionary scientific discoveries. It also succeeds in showing that the scientific method can be applied to folk knowledge to great effect and in celebrating an otherwise unsung life in science.

**Tu Youyou's Discovery: Finding a Cure for Malaria.** Songju Ma Daemnicke, Illustrated by Lin, Albert Whitman & Company, 2021, 32 pp.

## MIDDLE GRADES SCIENCE BOOK

### It Takes Guts

Reviewed by **Marc S. Lavine**<sup>5</sup>

The journey our food takes from the time it enters our bodies to when it exits is long and complicated, and it involves many muscles, tissues, and organs. Capturing the details of each step along the way could be an arduous task, but Jennifer Gardy manages to describe the processes of human digestion in a lively way in *It Takes Guts*.

Each chapter of the book covers a part of the digestive tract, from the mouth to the stomach to the intestines, and describes the different stages of digestion that occur in each one. Readers learn how two sphincters in the esophagus control the passage of food downward while preventing the upward passage of stomach acid, all under the automated control of our enteric nervous system. Sword swallows train themselves to actively control these sphincters to create an almost straight tube from mouth to stomach, a skill exploited by the 19th-century German physician Adolf Kussmaul, who attempted to map out the esophagus of one such individual using a long tube lined with mirrors.

Further along, readers learn about mucus and enzymes, gastrin and ghrelin, and

villi and crypts, all of which play roles in regulating eating and digestion. Less directly involved, but just as important, are other organs that participate in the digestive process. The liver produces bile acids, the pancreas produces insulin and glucagon, and even the appendix plays a part—it is now believed to act as a storage chamber for beneficial bacteria. Speaking of bacteria, many are essential to proper digestion, as some produce enzymes that humans need but cannot synthesize.

Gardy also includes a discussion of normal and not-so-normal things everyone experiences from time to time—such as burping, farting, and more. Being able to distinguish healthy from unhealthy functions is often key to diagnosing ailments and disease, so this material may be particularly valuable to the reader. Overall, *It Takes Guts* is an interesting, entertaining, and informative book to bite into.

**It Takes Guts: How Your Body Turns Food into Fuel (and Poop).** Jennifer Gardy, Illustrated by Belle Wuthrich, Greystone Kids, 2021, 152 pp.



### Snoozefest

Reviewed by **Seth Thomas Scanlon**<sup>6</sup>

Fewer and fewer adolescents are getting enough shut-eye (1, 2). *Snoozefest* is a delightful and informative new book on the science of sleep that may just convince budding young night owls to catch a few more z's every evening.

Author Tanya Lloyd Kyi delves into the history of sleep research with bite-sized but detailed summaries of important experimental milestones, such as the development of electroencephalography (EEG), the characterization of melatonin, and the discovery of circadian rhythms. She also highlights the latest findings on why we sleep and dream, noting, for example, how it helps with consolidation of memories, formation of insights, recovery from trauma, integration of emotions, and

repair of the brain's daily wear and tear.

The book describes how sleep can be beneficial for the proper functioning of the metabolic, cardiovascular, and immune systems, while acknowledging that many major questions remain unanswered. Along the way, Kyi touches on some important public policy issues such as the dangers of sleeping pills, the problems associated with night-shift work, and the need for school systems to better accommodate the "phase-delayed" sleeping patterns of most teens. The author even provides some fascinating examples of how various other species have managed to balance the risks of predation with the need for sleep.

A few tangential topics, such as Freudian dream analysis, are a distraction, and the attention paid to alternative "treatments" for insomnia (e.g., acupuncture) is, in my view, problematic. Instead, the author might have devoted more space to subjects such as how animals dream and sleep. The drawings by Valéry Goulet are fun and inviting but mostly ornamental—the relative dearth of scientifically informative illustrations feels like a missed opportunity.

Still, this book is certainly not the "snoozefest" suggested by the title. Rather, it is a very engaging and informative volume on an enormously important area of research that should rouse even the most bleary-eyed teen from their slumber.

**Snoozefest: The Surprising Science of Sleep.**

Tanya Lloyd Kyi, Illustrated by Valéry Goulet, Kids Can Press, 2021, 80 pp.

#### REFERENCES AND NOTES

1. J. M. Twenge, Z. Krizan, G. Hisler, *Sleep Med.* **39**, 47 (2017).
2. S. Paruthi et al., *J. Clin. Sleep Med.* **12**, 1549 (2016).

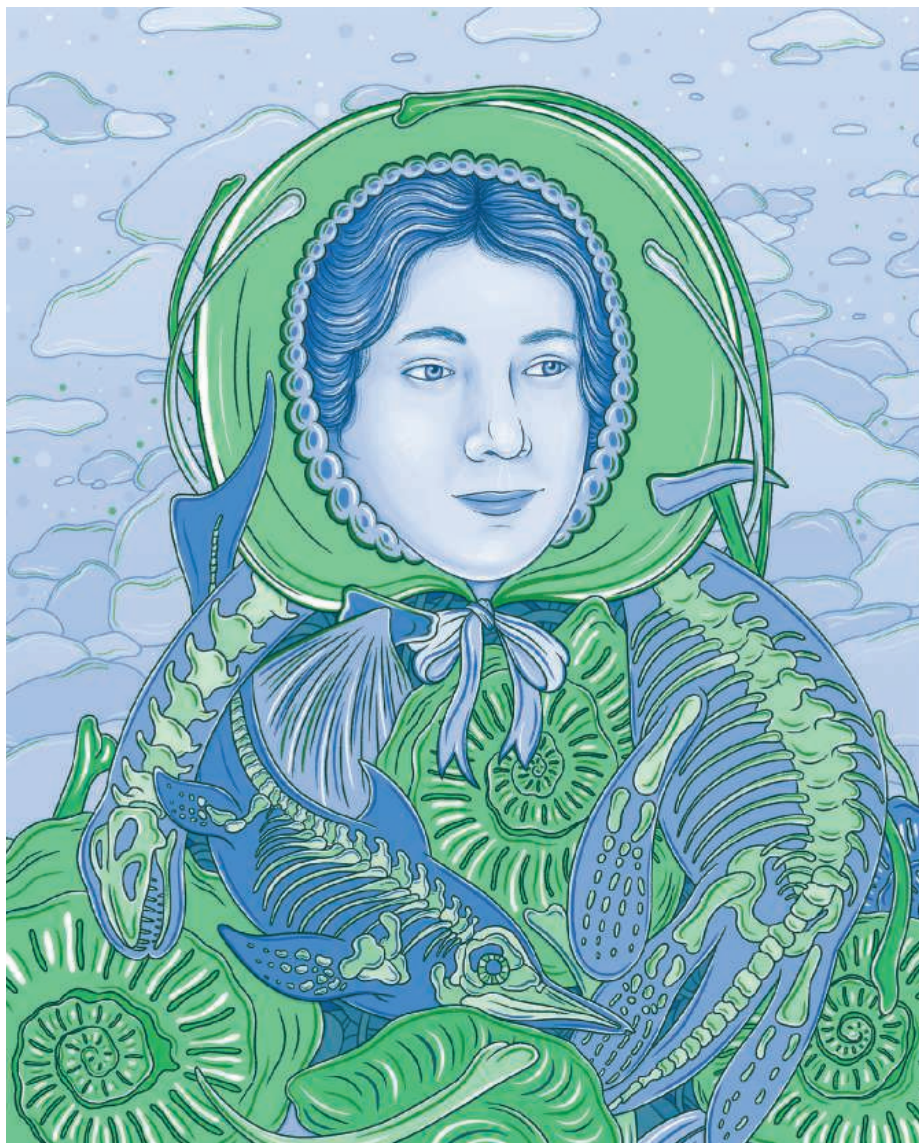
### Stolen Science

Reviewed by **Yevgeniya Nusinovich**<sup>7</sup>

When children learn about science, they are often given the impression that most major discoveries were made by white men. However, *Stolen Science* reveals that there is often more to the stories that perpetuate this idea, and for every Marie Curie who was given credit for her work, there are many women and others throughout history whose scientific contributions went unacknowledged.

In this book, Ella Schwartz presents the stories of 13 scientists and inventors who contributed much to science and in many cases are still forgotten. A pattern emerges across each story: A woman, an enslaved person, or another member of a marginalized group makes a major discovery or invention, but a white man or men get all the credit. In some cases, the men in question intention-





ally undermined the person who made the discovery, as happened to crystallographer Rosalind Franklin, whose crucial work on the structure of DNA was minimized by her competitors. In other cases, the individual's contribution was recognized only after it was later confirmed by someone else, as happened to Carlos Juan Finlay, a Cuban physician who identified how yellow fever is transmitted. The world gave credit to US army physician Walter Reed, even though Reed himself readily acknowledged that Finlay had made the discovery.

Each story in this book is supported by a separate section of text explaining the science behind the work in question using terms that middle-school-aged or even younger children should be able to follow. In addition, each of the featured individuals is beautifully portrayed by illustrator Gaby D'Alessandro, who combines images of the scientists and inventors with symbols of their work.

This is a very important book that not only gives credit where it is long overdue but should also help inspire future scientists from all backgrounds. Readers will be left wondering how much better the world would be if everyone was allowed to develop their talents to the fullest.

**Stolen Science: Thirteen Untold Stories of Scientists and Inventors Almost Written out of History.** Ella Schwartz, Illustrated by Gaby D'Alessandro, Bloomsbury Children's Books, 2021, 128 pp.

## How to Build a Human

Reviewed by **Sacha Vignieri**<sup>1</sup>

We humans attribute our domination of Earth to our big brains, which have allowed us to adapt to, and convert, landscapes all over the planet. However, our

oversized cortex is a relatively recent development. In the introduction of her book *How to Build a Human*, Pamela Turner emphasizes that just 3 million years ago, an extraterrestrial looking for the animal with the largest brain would have selected an ancestor of modern dolphins.

In the pages that follow, Turner takes the reader step by step through human evolution, from an ancient ape ancestor that lived around 20 million years ago to today. Our understanding of this lineage has greatly expanded over the past few decades, and she cleverly describes how humanity's evolutionary tree is full of many branches, each distinctive but in many ways similar. The journey takes place in seven steps, beginning with "We stand up," which describes the evolution of bipedal locomotion, an innovation that likely first emerged in African apes around 7 million years ago. It concludes with "We become storytellers," which summarizes how early *Homo* species developed art, a likely expression of more complex language skills.

Engaging illustrations by John Gurche, a respected paleoartist, accompany Turner's story. His artwork conveys the myriad species of hominoid in ways that clearly display their "humanity," rendering them in ways that allow readers to recognize these species as our relatives. The book is also full of photographs of fossils, art, and tools that further bring human ancestors and relatives to life. Readers will leave this book with an understanding of how we came to be who we are and with an appreciation for the fact that, for much of our history, we lived alongside other species descended from the same ancient ancestor.

**How to Build a Human: In Seven Evolutionary Steps.** Pamela S. Turner, Illustrated by John Gurche, Charlesbridge, 2022, 176 pp.

### HANDS-ON SCIENCE BOOK

## Forensics for Kids

Reviewed by **Michael A. Funk**<sup>8</sup>

As we move through the world, we leave traces of ourselves that can lead back to us. When a violent crime occurs, police can turn to field and laboratory analysis to determine what has happened at the crime scene and whether a suspect was present. In *Forensics for Kids*, Melissa Ross traces how forensic science emerged in Britain and the United States in the 1800s as policing practices mixed with rudimentary medicine and chemistry. This combina-



tion has been refined over the past two centuries, with new sources of evidence, analytical methods, and standards required for achieving a guilty verdict.

*Forensics for Kids* consists of briefly described anecdotes and overviews of specific cases, many of which will be familiar from detective novels and news stories. The scientific explanations of how various forensic techniques are or were applied are short, but the book does include many activities that children can do to simulate the process of collecting and analyzing evidence. For example, readers can try fingerprint matching, identifying a mystery kitchen chemical, or creating a database of shoe prints. Many of these activities can be done in a group and might inspire games or creative adaptations.

Although detective work is important to solving crimes, the book does not examine how systemic biases or unreliable, unscientific forensic methods might distort criminal trials and lead to wrongful convictions. Blood splatter and bite mark analyses, for example, are presented with no mention that the accuracy of these methods has been vigorously questioned by the scientific community.

In one section, the book describes automated DNA testing and aggregated DNA databases as tools to “keep dangerous criminals from being released to the streets,” without discussion of the privacy and due process concerns these methods can pose. Although this context may seem unnecessary, it is critical for readers to understand that such methods have limits and that errors can result in serious consequences for defendants.

**Forensics for Kids: The Science and History of Crime Solving, With 21 Activities**, *Melissa Ross*, Chicago Review Press, 2022, 144 pp.

## Physics for Kids

Reviewed by **Pamela J. Hines**<sup>9</sup>

With *Physics for Kids*, Liz Lee Heinecke adds to her series of books dedicated to hands-on, at-home science experiments. Each chapter of this new installment begins with a full-page color portrait of a scientist whose discoveries underlie the chapter's experiments. The individuals chosen represent the diversity that enriches scientific discovery. A short biography introduces the reader to the featured scientist and describes how a particular discovery they made is applied in the real world. The book then provides instructions for hands-on experiments that explore topics such as relativity, thin films, and sunspots, to name just a few.

Readers learn about Italian physicist



Laura Bassi, born in 1711, who studied atmospheric electricity at her country house when experiments on lightning were banned in the nearby city of Bologna. Heinecke suggests exploring Bassi's fascination with static electricity by watching how an electrically charged balloon can chase soap bubbles on a plate. Another researcher, American engineer Christine Darden, born in 1942, worked at NASA doing calculations for the first space missions and went on to study aircraft wing design. Heinecke encourages readers to follow in Darden's footsteps by folding paper airplanes to see how wing shape affects aerodynamics.

The experiments in this book are well chosen to suit students in the upper grades of elementary school or in middle school, and the supplies needed are simple and readily available. Safety tips are established early on, keeping the focus on carefully exploring the natural world. For each set of experiments, which are illustrated by photographs alongside the how-to protocol, a short paragraph explains the physics that drives the phenome-

non under consideration. For those who want to dig deeper, the author suggests potential modifications. This would be a handy book to have around for any youngster interested in the physics of the natural world.

**Physics for Kids: Science Experiments and Activities Inspired by Awesome Physicists, Past and Present**, *Liz Lee Heinecke*, Illustrated by *Kelly Anne Dalton*, Quarry Books, 2022, 128 pp.

## The Science Spell Book

Reviewed by **Valerie Thompson**<sup>10</sup>

As alchemists and astrologers were supplanted by chemists and astronomers, many mysterious elements of the natural world yielded to scientific explanations. But this does not mean that there is no longer a place for magic in science. “Creativity and awe are integral traits of any success-

ful scientist, and they are rooted in the imaginative exercises of childhood,” notes Cara Florance in *The Science Spell Book*, a compendium of mystical experiments for the science-minded spell-caster.

The collection’s 25 activities are divided into five categories: “infusions,” exploring plants as pigments and indicators; “illumination,” probing the nature of light; “sorcery,” interrogating electromagnetism and other fundamental forces; “alchemy,” describing physical and chemical changes; and “mimicry,” looking to plants and animals for engineering inspiration. Moody photos featuring minerals, dried herbs, and candles illustrate the activity’s end products—a violet solution that changes color when breathed upon; earthy pigments derived from coffee, flower petals, and clay; insect wings and acorns coated in borax crystals.

Fanciful titles and charming incantations infuse each activity with magical touches, but science lurks just below the surface. “Current flows through the coiled course. Domains align to exert their force,” reads the opening of “Magnetic Manifestation,” for example, which guides readers through the steps required to create an electromagnet. A short summary of the principle at play comes next, followed by a list of supplies, steps, and a short section that elaborates on the science underlying the activity. Readers are likely to have some of the required items on hand—rubbing alcohol, cream of tartar, and turmeric, for example. Others are more unusual—think butterfly pea flower tea, hobby motors, LEDs—and might need to be purchased in advance.

“Learning the scientific reasoning behind a mysterious event does not take away from the magic but instead exposes more exciting mysteries and questions to be answered,” observes Florance. Readers need look no further than this delightful book for proof that this is so.

**The Science Spell Book: Magical Experiments for Kids**, Cara Florance, Sourcebooks eXplore, 2022, 224 pp.

## Funky Fungi

Reviewed by **Michael A. Funk**<sup>8</sup>

Whether a strange color sticking out of dull brown leaves, a drooping mane of tendrils attached to a tree, or maybe just an odd funk in the air after a rainy day, fungi are amazing and diverse and a bit strange. In *Funky Fungi*, Alisha Gabriel and Sue Heavenrich convey an infectious love for finding fungi in the wild and explain how these mysterious organisms fit into our ecosystems and lives.

The book is packed with interesting and up-to-date facts about this often-misunderstood kingdom of life. Mushrooms—both those that are edible and those that should not be eaten—are well represented but are just a small sliver of the diversity discussed. Yeasts, molds, insect-zombifying *Cordyceps*, and even a honey mushroom that may be the largest organism on Earth are all on the figurative menu. Speaking of eating, don’t expect tips for distinguishing poisonous mushrooms from safe—this book is not a foraging guide and doesn’t try to be. Although there is a section on fungi as food, Gabriel and Heavenrich stick to what readers can find in a supermarket. Other ways to appreciate fungi include growing a mold garden, dyeing a piece of fabric with pigments extracted from mushrooms, and starting a compost heap.

In addition to fungus facts, the book includes profiles of mycologists, beautiful high-resolution photos, and lots of activities, both indoor and outdoor. Although some of the terminology and concepts in the text might challenge younger readers, the denser sections are also packed with engaging examples and will hopefully inspire more reading and adventuring. There are a few online resources mentioned near the end and suggestions for field guides if readers want to take their forays to the next level.

**Funky Fungi: 30 Activities for Exploring Molds, Mushrooms, Lichens, and More**, Alisha Gabriel and Sue Heavenrich, Chicago Review Press, 2022, 128 pp.

### YOUNG ADULT SCIENCE BOOK

## The Complete Guide to Absolutely Everything (Abridged)

Reviewed by **Megan Engel**<sup>11</sup>

With wry, irreverent British humor, Adam Rutherford and Hannah Fry tackle a host of big, albeit seemingly random, questions, devoting a chapter of *The Complete Guide to Absolutely Everything (Abridged)* to each. These range from the age-old and deep (Do we have free will? What would aliens look like?) to the droll (Does my dog love me? Are we all suckers?). Most are not definitively answered, but the quest for solutions is engaging and enjoyable, peppered with pop culture, literary, and classical references and easy-to-digest analogies.

Rutherford and Fry focus less on objective scientific truths and more on us. For example, readers journey through human

timekeeping, from sundials to “leap seconds,” and learn how the modern financial system hinges precariously on subterranean fiber-optic cables that deliver atomic time to banks.

Instead of Einstein’s time dilation, expect to learn about time dilation inside the human body (time seems to slow when we are in peril or cut off from sunlight). And Darwin’s theory of evolution takes a backseat to his debunked theories of human emotion.

Despite mostly glossing over technical details, *The Complete Guide* does highlight some fascinating recent scientific findings—the fact that rats appear to feel regret, for example, and a case in which a woman appeared to be able to smell Parkinson’s disease on a patient’s clothing months before they began exhibiting symptoms—as well as a number of state-of-the-art experiments.

Rutherford and Fry also shine a light on important issues that plague modern science, such as the “File Drawer Problem,” wherein “shiny novelties” are prioritized for publication over essential but less flashy experiments that verify existing results, and the related “replication crisis.”

Readers are likely to finish *The Complete Guide* with a pocketful of intriguing anecdotes with which to entertain at cocktail parties and a feeling of endearment toward humankind, who dare to ask questions they are “singularly ill-equipped to answer.”

For a full-length review of *The Complete Guide to Absolutely Everything (Abridged)*, see “Confronting age-old questions, big and small,” *Science* **375**, 35 (2022).

**The Complete Guide to Absolutely Everything (Abridged): Adventures in Math and Science**, Adam Rutherford and Hannah Fry, W. W. Norton, 2022, 304 pp.

## Sticky

Reviewed by **Marc S. Lavine**<sup>5</sup>

In *Sticky*, Laurie Winkless takes readers on a tour of what makes some things stick together and others slide past one other, describing how a range of factors can change these interactions. The book includes an exploration of materials such as paints, permanent and temporary adhesives, nonstick coatings, tires, gecko feet, and shark skin. For each, the factors that make them sticky or slippery involve chemical and physical attractions or repulsions. In fact, as Winkless notes, neither “sticky” nor “slippery” are technical terms, and there is no simple numerical scale to delineate between the two states that we often think of as opposites.

Winkless takes a very broad view of surfaces and interfaces, such that the book includes detours to related topics that are often needed to understand the science under



consideration. For example, to understand how air currents interact with the surface of golf balls and airplane wings, the reader requires a crash course in aerodynamics. Likewise, Winkless's discussion of the factors that affect the speed of high-performance race cars goes well beyond the engineering of the car's tires or brakes, describing how specific track and race day conditions affect the chemistry and design of many of the car's components.

We do not often think of slipperiness in the context of earthquakes, observes Winkless, however, it is the stick-slip motion of tectonic plates that leads to cracks in the earth and the movement of faults. Meanwhile, in discussing the surface properties of ice, we learn about a raging scientific debate in the otherwise sedate sport of curling, with two competing theories of the underlying factors that determine the curl of a stone.

Through a wide range of topics, including some that are likely to be less well known, *Sticky* offers readers an insider's guide to the secret science of surfaces.

**Sticky: The Secret Science of Surfaces.**

Laurie Winkless, Bloomsbury Sigma, 2022, 336 pp.

## Astroquizzical

Reviewed by **Adrian Cho**<sup>12</sup>

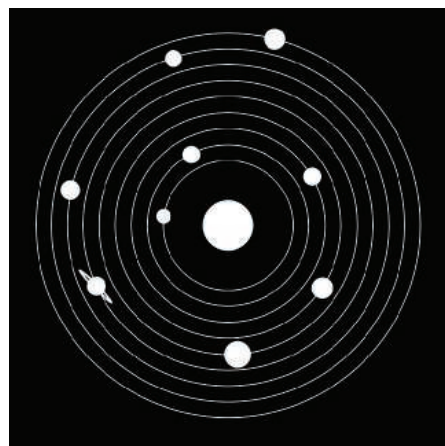
Ever wonder why stars twinkle, what will happen to Earth when the Sun dies, or how we know that the Universe is expanding? This lavishly illustrated, fact-packed book answers these questions and more in a way that is both accessible and conceptually meaty. The reader comes away with a solid introduction to astronomy, planetary science, stellar and galactic astrophysics, and cosmology.

The reader takes a tour of the cosmos guided by Jillian Scudder, an astrophysicist at Oberlin College and Conservatory, who since 2013 has fielded questions on her blog of the same title. Moving ever outward, she opens with the night sky, takes a close look at the Moon, and swings through the planets in our solar system. She examines the Sun and other stars, zooms out to the galaxies, and finally contemplates the Universe as a whole.

Among the questions, Scudder sprinkles 10 thought experiments, musings on some hypothetical scenario, such as, "What

would happen if we split the Sun in half?" Some of these digressions are pretty quirky. Scudder asks, for example, what would happen if you could open a door on Earth's surface and step out on the Moon? The answer: nothing good, thanks to the 1480 kilometer per hour wind that would spit you through the door.

The real stars of the show are the cosmos's own treasures. The book features dozens of jaw-dropping photos of marvels such as Olympus Mons, the 24-kilometer-tall volcano on Mars, and the fiery face of the Sun speckled with coronal mass ejections. The famous photo of countless galaxies taken by



the Hubble Space Telescope may well bring the viewer to an awestruck stop. Thanks to Scudder's accessible prose and the luscious illustrations, readers will come away with many answers, but likely even more questions to fuel their curiosity.

**Astroquizzical: Solving the Cosmic Puzzles of our Planets, Stars, and Galaxies (The Illustrated Edition).** Jillian Scudder, Icon Books, 2021, 224 pp.

## The Last Days of the Dinosaurs

Reviewed by **Victoria Arbour**<sup>13</sup>

Sixty-six million years ago, the beginning of the end of the age of dinosaurs came crashing down in the form of an asteroid that struck what is now the Yucatán Peninsula in Mexico. The details of this cataclysmic event, and what happened afterward, have

rarely received the feature-length treatment that Riley Black presents in *The Last Days of the Dinosaurs*.

In just over 300 pages, Black pulls together decades of scientific research on the demise of the nonavian dinosaurs into a deeply compelling narrative of both luck and misfortune in the face of almost unimaginable calamity. Starting just a few days before the asteroid impact, Black centers the story on the animals present in the Hell Creek Formation of the western United States, a geological unit that has been studied for more than 100 years and that provides the best window we have into the time before and after the mass extinction. Through the eyes of the inhabitants of Hell Creek, readers pass through the moment of impact and then the first hour, day, month, and year of the Cenozoic era.

The story continues with chapters set one hundred, one thousand, one hundred thousand, and one million years after the asteroid impact, charting the reshaping of the world. Each chapter ends with a detour to somewhere else on the planet—Antarctica, India, and the Atlantic Ocean, for example—providing a global balance to this otherwise tightly focused narrative.

Unlike the other mass extinctions recorded in the fossil record, extinction for most species at the end of the Cretaceous probably happened within a few hours or days after the asteroid impact. Black's writing captures the horror of the impact event without lingering on doom and gloom, instead keeping a steady momentum focusing on survival and change.

Black recounts stories of lucky survivors whose descendants will be familiar to many readers—frogs, snakes, turtles, and crocodiles—and organisms that rarely get a mention in dinosaur stories, such as the planktonic coccoliths and coil-shelled ammonites. And of course, as the nonavian dinosaurs pass into history, we see the changes that happen to the ancestors of today's mammals, who evolved into new forms in the asteroid's aftermath. ■

For a full-length review of *The Last Days of the Dinosaurs*, see "Inside the dinosaurs' demise," *Science* **376**, 360 (2022).

**The Last Days of the Dinosaurs: An Asteroid, Extinction, and the Beginning of Our World.** Riley Black, St. Martin's Press, 2022, 304 pp.

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