

INSIGHTS

BOOKS *et al.*

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

Books for budding scientists

From audacious space missions and quantum physics to clean cookstoves and coral nurseries, this year's finalists for the AAAS/Subaru SB&F Prizes for Excellence in Science Books dare to go where few children's titles have gone before. Sponsored by Subaru of America and facilitated by the American Association for the Advancement of Science (AAAS, the publisher of *Science*), the competition celebrates high-quality children's science books. Read on for reviews written by the staff of the *Science* family of journals and a few friends. —Valerie Thompson

MIDDLE GRADES SCIENCE BOOK

Champion

Reviewed by **Caroline Ash**¹

The American chestnut once grew straight, tall, and true in the forests of the United States. Then at the start of the 20th century, a fatal fungus blight disease nearly made this prized tree extinct. But thanks to the persistence of American chestnut lovers and scientists in China, Europe, and America, this iconic tree is on the way to restoration. In *Champion*, Sally Walker tells the story of how disaster was averted, revealing the technical details of the three-pronged rescue program.

The first step was to cross-breed American

trees with resistant varieties. The second approach was to inoculate vulnerable trees with weakened blight fungus to stimulate their immunity. Last, genetically modified saplings bearing a gene for an enzyme that reduces levels of toxic oxalic acid produced by the blight were developed.

Descriptions of the technical details entailed at each step are very clearly explained throughout the text, without shying away from complexity. The story of how the research unfolded is told through the voices of the dedicated scientists involved. Clearly, the establishment of the breeding programs were long labors of love, spanning decades; a little more of this passion could have been transmitted in the text. Still, there is a lot of inspiring biology to be learned from this case

study. All in all, this is a great story for more sophisticated junior biologists.

Champion: The Comeback Tale of the American Chestnut Tree, Sally M. Walker, Henry Holt and Co., 2018, 144 pp.

My First Book of Quantum Physics

Reviewed by **Jelena Stajic**²

Quantum physics has an image problem. Spooky, wacky, strange—the adjectives often used to describe its inner workings—paint a picture of an esoteric discipline. Yet, it is the rules of quantum physics that dictate the structure of matter, that help interpret the signals from distant stars, and that make your smartphone run. This message is nicely conveyed in *My First Book of Quantum Physics*, an illustrated guide for children 8 and older (and their parents).

The book follows the development of quantum physics largely chronologically, explaining why classical physics was not sufficient to describe the subatomic world. It then moves on to concepts such as particle-wave duality, the uncertainty principle, and radioactivity. A number of physicists make appearances, from Isaac Newton to Marie Curie,



but it is the familiar cartoon form of Albert Einstein that serves as a guide throughout the book (Einstein's ambivalent attitude toward quantum mechanics notwithstanding). The illustrations are clear, eye-catching, and consistent; the authors occasionally anthropomorphize inanimate objects to make concepts more accessible (for example, an electron "feels comfortable" in its orbit) but largely avoid sounding condescending.

Most commendably, the narrative does not stop in the 1930s. Particle accelerators, the Standard Model of particle physics, and the Higgs boson all get well-deserved mentions, but so do everyday "quantum gadgets," such as laser pointers and light-emitting diode (LED) lights. The book leaves young readers with a sense of quantum physics as a vibrant, active pursuit that has and will continue to influence their lives in very real ways.

My First Book of Quantum Physics, *Kaid-Sala Ferrón Sheddad, Illustrated by Eduard Altarriba, Button Books, 2018, 48 pp.*

Impact!

*Reviewed by Marc S. Lavine*³

Although movies have magnified the potential damage that Earth might suffer from the arrival of an asteroid or comet, there are leg-

itimate reasons to be concerned and there is an ongoing need to track celestial objects that could cause major damage. In starting *Impact!* with the story of a meteor that exploded over the Russian city of Chelyabinsk in 2013, Elizabeth Rusch captures the terror and damage larger space debris can cause. Even though the impact site was more than 80 km outside the city, the shock wave it created shattered glass, rattled buildings, and caused roofs to collapse.

Spotting and tracking asteroids is almost as hard as finding needles in haystacks, while identifying and deciphering previous impacts requires careful detective work. This is especially true when trying to analyze a large impact crater that might be kilometers in diameter, where the impact both compressed the ground and turned the layers of earth and rock upside down. Rusch introduces us to individuals who either track celestial objects or investigate past impacts and to the tools of the trade required to study them. She even reveals how amateur scientists can get involved. And if your interests veer from science to science fiction, she closes with a range of ways one might alter the trajectory of an asteroid, should the need ever arise.

Impact!, Asteroids and the Science of Saving the World, *Elizabeth Rusch, Photography by Karin Anderson, HMH Books for Young Readers, 2017, 80 pp.*

Itch!

*Reviewed by Seth Scanlon*⁴

In this delightful—if slightly disquieting—work, Anita Sanchez artfully describes the ways in which a variety of organisms make us itch. Much attention is directed toward familiar insects and arachnids that cause humans discomfort. In addition, Sanchez elucidates the various ways that fungi (such as those that cause athlete's foot) and plants (such as nettle, poison ivy, cacti, and prickly pears) can induce the urge to scratch.

These pruritogenic pests also allow the author to pivot onto various historical topics in a fun and appealing manner. Lice, for example, serve as a jumping-off point to describe the unhygienic conditions experienced by soldiers during World War I, whereas fleas are introduced in the context of the hugely popular flea circuses of the 19th century.

Along the way, Sanchez offers a whole host of useful tips for preventing or relieving itchiness. After reading this book, you should be able to remove embedded caterpillar bristles, soothe a nettle's sting, avoid mosquito bites, and deodorize a pet that has encountered a skunk. This wealth of information is reinforced with approachable, humorous, and eye-catching illustrations by Gilbert Ford.

The book concludes with a thought-provoking discussion of the neurological and immunological origins of itch. In addition, Sanchez discusses how scratching can (at least temporarily) allay irritation as well as other benefits it can provide. This author/illustrator team is to be commended for conveying a cornucopia of data in an enjoyable and engaging way.

Itch!: Everything You Didn't Want to Know About What Makes You Scratch, Anita Sanchez, Illustrated by Gilbert Ford, HMH Books for Young Readers, 2018, 80 pp.

Trash Revolution

Reviewed by **Hadassah Nusinovich Ucko, Solomon Nusinovich Ucko, and Yevgeniya Nusinovich**⁵

Trash Revolution explains how common materials are produced and recycled and suggests solutions to various real-world problems related to resource consumption, waste management, and climate change. In addition to widely known recommendations such as “reduce, reuse, recycle,” the authors present many solutions made possible by cutting-edge research, such as making biodegradable plastics from stale food and using bacteria to grow compostable fabrics.

The technical information is interspersed with humor and kid-friendly touches—“#gratitude,” for example, is associated with the invention of toilet paper. In addition to general information, the authors provide handy reference charts comparing the benefits and drawbacks of different materials, as well as specific recommendations for handling them. However, some of these suggestions seemed unattainable to us. For example, the authors recommend making your home “a junk-mail-free zone,” but offer no suggestions for how that could be achieved.

We noted a few minor problems, such as a mistaken characterization of deuterium as an extra molecule inside water molecules, a gratuitous negative comment about genetically modified organisms, and a surprisingly positive discussion of waste incinerators that neglected to mention any concerns about their fumes and effects on human health. Overall, however, it is very informative, with thoughtful explanations of what we can all do to make environmentally friendly choices.

Trash Revolution: Breaking the Waste Cycle, Erica Fyvie, Illustrated by Bill Slavin, Kids Can Press, 2018, 64 pp.



Pedestrians walk along the rewilded High Line park in New York City.

Rewilding

Reviewed by **Sacha N. Vignieri**⁶

As the human population grows, we are relentlessly encroaching on the natural habitats that surround us. This book defines and describes the science and process of an increasingly important mechanism for conservation known as “rewilding.”

Rewilders, we learn, want to restore habitats to their prehuman states, creating environments that can support native species and give them room to thrive. The authors first describe the basics of this process, including why it is important, and then discuss several examples of where, why, and how rewilding is happening. These include everything from the Pleistocene rewilding plan, which advocates reintroducing modern stand-ins for megafauna that went extinct at the end of the last ice age, to the rewilding of New York City’s “High Line,” an abandoned, elevated train track where lacewing insects have been released to prevent infestations of harmful bugs.

The book is well targeted toward middle-grade readers because it accurately describes rewilding while remaining accessible and interesting. The authors’ positive tone is both refreshing and important. They present rewilding stories in a way that clearly lays out why the process is ecologically important and why it is important for human society as well.

Rewilding: Giving Nature a Second Chance, Jane Drake and Ann Love, Annick Press, 2017, 88 pp.

CHILDREN'S SCIENCE PICTURE BOOK

Living Things and Nonliving Things

Reviewed by **Tage Rai**⁷

If we wanted to define “games,” we might say they involve competing, keeping score, following rules, and having fun. However, in some games, players cooperate and don’t keep score. And while all games have rules, so do many other activities that may or may not be fun. In this book, Kevin Kurtz extends this line of argument to the nature of life.

Are living things the only ones that move, or grow, or reproduce? Kurtz elegantly reveals that some nonliving things can do these things, whereas some living things can’t.

Astute readers may find themselves wishing for a deeper discussion of viruses. Viruses lack cells of their own, but they confiscate their host’s cellular machinery to replicate themselves, thus complicating any cellular definition of life. The conceptual ambiguity of viruses underscores a deeper, albeit understandable, omission from the book: the existential quandary of death.

Ultimately, Kurtz ends with the unsettling realization that there is no categorical distinction between living and nonliving. Instead, he proposes a family resemblance model in which something that has many of the characteristics shared by living things probably belongs to the category.

The book is beautifully illustrated with high-quality photographs of nature, animals,

and inventions. Despite its simple text, *Living Things and Nonliving Things* is deceptively deep and provides a valuable lesson in scientific uncertainty.

Living Things and Nonliving Things: A Compare and Contrast Book, Kevin Kurtz, *Arbordale Publishing*, 2017, 32 pp.

Many

Reviewed by **Jennifer Sills**⁸

In *Many*, a rosy-cheeked, red-haired explorer tries to answer the question so many scientists have pondered: “How many different kinds of living things are there on the planet?” She discovers elephants and oak trees, mushrooms and beetles, and mites and microbes. All of these species, she realizes, are interdependent, forming complex ecosystems.

Here, the story takes a dark turn: Humans have been poisoning and destroying these ecosystems, and many living things have disappeared forever. We have a responsibility, our forlorn narrator warns: We don’t want to reach a point at which we have to “count down instead of up.”

The story’s whimsical tone, which belies its sobering message, will engage readers, but the highlights of the book are the detailed watercolor illustrations that infuse each landscape and statistic with warmth and appeal. Vibrant colors throughout the pages of discovery contrast with the abrupt shift to muted browns on the pages of destruction. The emotional punch the images deliver will be more effective in motivating readers to act than trivia about mushrooms ever could be.

Many: The Diversity of Life on Earth, Nicola Davies, *Illustrated by Emily Sutton*, *Candlewick*, 2017, 40 pp.

What Do They Do with All That Poo?

Reviewed by **Steve Mao**⁹

On any given day, an individual zoo can produce more than 5000 pounds of animal waste. So, “what do they do with all that poo?”

The first part of this book makes it clear that poop comes in different sizes, shapes, and colors and that these properties are related to the distinct diets, anatomies, and physiologies of different animals. How animals use their waste can also affect the characteristics of their poop, as well as how and when they

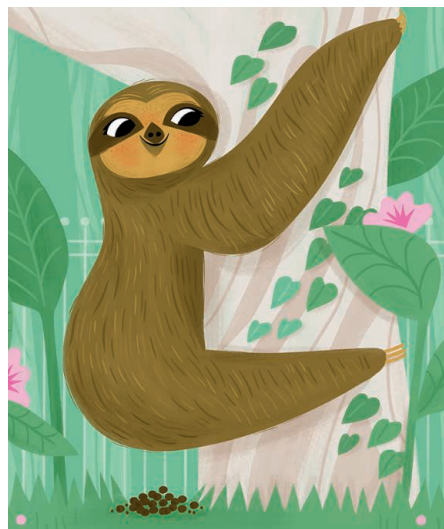
poop. Wombats, for example, excrete upward of 100 cube-shaped droppings every evening to mark their territory, whereas sloths descend from their treetop habitat to poop on the ground just once a week.

How do zoos deal with animal waste? Some is just sent off to landfills, but some is also used to monitor the health of the animals. Some is processed into compost for local gardens, and some is recycled to make useful products such as paper and fuel.

Although there’s no main character, every animal is easily related to. The drawings are vivid and, by and large, accurate. (Wombats, however, do not build a scat-fence, as one illustration seems to suggest.)

Most of the animals highlighted in this book are mammals, but it would have been fun to read about the excretions of other species. Perhaps this will be the topic of a follow-up title (book “number 2,” if you will).

What Do They Do with All That Poo?, Jane Kurtz, *Illustrated by Allison Black*, *Beach Lane Books*, 2018, 40 pp.



A House in the Sky

Reviewed by **Sacha N. Vignieri**⁶

The sight of a common squirrel can inspire squeals of delight from young children. They might ask, “Is it going home?” as the squirrel disappears up a tree. *A House in the Sky*, Steve Jenkins’s lovely story on animal homes, provides answers that will satisfy such questions while providing more detail for a similarly curious adult or older child. “Some houses are made of bubbles,” reads one passage, for example. Below, the author elaborates: “A Siamese fighting fish takes a gulp of air and then blows it back out. It does this over and over again, creat-

ing a floating nest made of bubbles to protect its babies.”

Illustrator Robbin Gourley’s playful yet beautiful renderings reinforce the book’s message. “Look up—a house in the sky!” reads another page. The common swift, rendered in muted browns against a pale blue sky, spends months on the wing, we learn, eating, drinking, and sleeping in the air.

Young children are naturally curious about animals. Jenkins’s sweet exploration of how and where they live provides an opportunity to connect with older readers and to dig a little deeper together.

A House in the Sky: And Other Uncommon Animal Houses, Steve Jenkins, *Illustrated by Robbin Gourley*, *Charlesbridge*, 2018, 32 pp.

The Brilliant Deep

Reviewed by **Julia Fahrenkamp-Uppenbrink**¹⁰

With sparing words and mesmerizing, soft-colored paintings, *The Brilliant Deep* tells the story of Ken Nedimyer, an American fish collector and “live rock farmer” who found a way to restore the world’s coral reefs by growing coral colonies in underwater nurseries and then planting them onto dying reefs.

Nedimyer has long loved the ocean. One of the book’s most memorable images shows him as a boy, looking out over the sea, all its secrets hidden beneath the surface. On the next page, he is snorkeling through an underwater world teeming with life. We follow along as he learns to scuba dive and begins to collect fish to study in aquariums at home.

As an adult, Nedimyer uses his expertise with growing “living rocks”—rocks covered with sponges and other invertebrates that are used in aquariums—to cultivate coral. The book ends on a note of hope as Nedimyer and his organization, the Coral Restoration Foundation, begin to help other countries save their reefs as well.

The simple scientific explanations given throughout the book are easy to understand and are woven into the story in a way that does not distract. However, the main text does not mention climate change or other human threats. A two-page spread at the end merely cites complicated reasons, including changing ocean temperatures and overfishing, for the decline of coral reefs. This is a missed opportunity. Nevertheless, I can only recommend this beautiful and inspiring book, which shows what love for nature combined with human ingenuity can achieve.

The Brilliant Deep: Rebuilding the World’s Coral Reefs, Kate Messner, *Illustrated by Matthew Forsythe*, *Chronicle Books*, 2018, 48 pp.



Awakened by his mother's coughing—the result of cooking indoors over an open flame—Iqbal contemplates how to win his school's sustainability-themed science fair.

Iqbal and His Ingenious Idea

Reviewed by **Jennifer Sills**⁸

Amid monsoons and the daily prayers of Ramadan, Iqbal dreams of winning his school's sustainability-themed science contest. His mother and baby sister Rupa have developed a cough from sitting inside cooking food over an open fire. With the help of his other sister, Sadia, Iqbal finds a way to help them by turning an umbrella into a solar cooker.

Iqbal's story is steeped in the customs and language of Bangladesh while celebrating universal human qualities such as curiosity and ingenuity. Sadia's role is realistic; she joins her brother in school and helps him build his stove, but unlike Iqbal, she is expected to help with childcare and cooking.

Author Elizabeth Suneby seamlessly weaves Bengali words into the text, describing, for example, how Iqbal offers the first serving of "semai"—a dessert made with vermicelli noodles served at "Eid al-Fitr" (the holiday that marks the end of Ramadan)—to Sadia to thank her for her help. Illustrator Rebecca Green's colored pencil illustrations depict Iqbal's family and their village in vivid detail. The book's appendices provide an explanation of the benefits of clean cookstoves and a glossary of Bengali words.

Readers can also follow instructions to create their own solar cooker. The project will require a pizza box, aluminum foil, plastic wrap, and a lot of patience—the stove will take 30 or 40 minutes to heat up in the sun.

Iqbal and His Ingenious Idea: How a Science Project Helps One Family and the Planet, Elizabeth Suneby, Illustrated by Rebecca Green, Kids Can Press, 2018, 32 pp.

HANDS-ON SCIENCE BOOK

Alexander Graham Bell for Kids

Reviewed by **Marc S. Lavine**³

Alexander Graham Bell is best known for his invention of the telephone, but this wasn't the work that he found most rewarding. Teaching deaf students to finger spell and to speak, using the visible alphabet developed by his father, was his lifelong passion. Bell's grandfather voice trained students with speech problems such as stuttering, and his mother had severe loss of hearing. His interest in speech and sound was critical to many of his future inventions.

In *Alexander Graham Bell for Kids*, Mary Kay Carson weaves together key events and influences that shaped Bell's life, and in turn how he shaped the world around him. Although he was a poor student in school, Bell spent his life learning from the written works of others, from ongoing tinkering and innovation, and from the many colleagues and connections he made throughout his life.

Bell's invention of the telephone has largely overshadowed his many other contributions, such as his work on early versions of the phonograph and metal detectors and his work on airplanes and hydrofoil boats. These inventions often brought him into conflict with other inventors of the day, including Thomas Edison and Elisha Gray.

The book includes many sidebars to explain the scientific principles behind each invention, as well as 21 hands-on activities, that enhance the narrative. But perhaps the true value of the books comes from all the little stories, previously unknown to

me, that show the richness of his life, such as Bell's role in connecting Helen Keller with her teacher, Anne Sullivan, and Bell's role in supporting *Science* magazine during its early years.

Alexander Graham Bell for Kids: His Life & Inventions with 21 Activities, Mary Kay Carson, Chicago Review Press, 2018, 144 pp.

Light Waves

Reviewed by **Marc S. Lavine**³

From the dim flicker of a candle flame to the daily illumination provided by the Sun, visible light enables us to see our world. Despite its presence all around us, the properties of light can be confusing and counterintuitive. Why, for example, does light, which travels in a straight line, appear to bend, when looking at a straw in a glass of water? Or why does our reflection invert when we look at the front of a metal spoon? Using a mix of illustrations and simple experiments aimed at a younger reader, David Adler explains the basic composition, behavior, and properties of light.

Through the casting of shadows by using a flashlight and a tower of wooden blocks, Adler teaches readers about objects that are transparent, translucent, or opaque. We are shown how to divide white light into a spectrum of colors when it passes through a prism, and from this, we are taught why objects have different colors depending on which part of the visible spectrum they reflect rather than absorb.

At times, the writing seems aimed at older readers; however, a glossary at the end helpfully pulls together all the optics terminology.

Light Waves, David A. Adler, Illustrated by Anna Raff, Holiday House, 2018, 32 pp.

Dog Science Unleashed

Reviewed by **Brent Grocholski**¹¹

Dogs make for the perfect assistants for the activities in *Dog Science Unleashed*. This vivid volume lays out two dozen or so exercises that double as experiments, the goal of which is to better understand canine senses and physiology.

The experiments are well described, with step-by-step instructions and photos. Most are easy to set up and only require household items. Exceptional photography accompanies the instructions and helps readers to understand the activities. The wild card, as you might guess, is your pooch's willingness to help unleash the dog science. But that shouldn't be a problem for most dogs; many of the activities involve treats and toys.

In an activity called "A Puzzle for Your Pooch," the authors provide instructions for setting up an experiment to see whether your dog can learn to extract treats from a muffin tin. In another, readers learn how to craft a homemade stethoscope out of a funnel and an empty paper towel tube and to use it to listen to their dog's heartbeat.

Some of the activities are more targeted to helping understand the particular dog you are working with. In "Half Bath," for example, readers are encouraged to determine whether shampoo is right for their pup by washing only one side and monitoring odor, dirt, and oil levels over a month. However, the book sticks to a scientific approach, even for these activities.

What the book does not provide are broad insights into dog behavior or socialization. But focusing on more universal and less variable traits is probably for the best in a home experiment-driven book.

Dog Science Unleashed: Fun Activities to Do with Your Canine Companion, Jodi Wheeler-Toppen, Photography by Matthew Rakola, *National Geographic Kids*, 2018, 80 pp.

Dig In!

Reviewed by **Michael Funk**¹²

Modern agriculture has given us seedless watermelons, tomatoes in February, and apple varieties with trademarked names and intensive marketing. However, there remains something magical about planting a seed, watching it sprout, and after a long season, tasting the fruit (or vegetables) of one's work and dedication. *Dig In!* encourages kids to get in the kitchen and rescue neglected stems and seeds for experimentation in the garden.

The book features 12 simple projects, some of which may be better controlled versions of events already happening in your crisper drawer. In particular, growing lettuce, onions, and potatoes from sprouts is nearly foolproof. Others, such as garlic and ginger, might require some preparation. Growing plants from seeds requires the most patience, but the wonder of seeing sprouts emerge from soil is sure to delight kids of all ages.

The projects in *Dig In!* are simple and can be started in an old cup or newspaper pots.

Alongside the garden projects are recipes that can be the source of the seeds or sprouting material. The pairing might encourage picky eaters to give celery or herbs a chance, although I would not expect to harvest much from your sprouts and seedlings unless you have a working garden already.

Nevertheless, intrepid young gardeners should find these projects inspiring and will hopefully want to learn more about how their food is grown as a result.

Dig In!: 12 Easy Gardening Projects Using Kitchen Scraps, Kari Cornell, Photography by Jennifer S. Larson, *Millbrook Press*, 2018, 64 pp.

Bug Lab for Kids

Reviewed by **Lauren Kmec**¹³

How do you measure a beetle's strength or the speed of a centipede? *Bug Lab for Kids*, by entomologist John Guyton, reveals the answers to these questions, among others.

The book is divided into nine well-organized units, each containing several lab exercises. An introductory section provides helpful advice regarding appropriate attire for fieldwork, first aid treatment for bites and stings, and the importance of keeping a field notebook. Another unit offers a straightforward primer on the scientific method.

Would-be entomologists start by learning how to make and use a collection net, as well as how to care for live critters. More sophisticated collection techniques, such as the use of an aspirator to capture very tiny insects, are also covered. Readers can then embark on a variety of activities to observe insects in their natural habitat.

Other labs include a spiderweb search, a papier-mâché wasp's nest construction project, a multiweek butterfly-rearing operation, and a taste test of edible insect "treats" (not for the faint of heart!). Although special equipment such as a blacklight is required for some experiments, many of the necessary tools can be constructed from household materials or purchased inexpensively.

Interspersed throughout the book are fun and surprising snippets of bug trivia: Moths navigate by the moon, bees "dance" to communicate with other bees, and horned dung beetles can pull 1000 times their own weight. These tidbits bolster Guyton's message that although bugs may not be cute or cuddly, they are indeed fascinating.

Bug Lab for Kids: Family-Friendly Activities for Exploring the Amazing World of Beetles, Butterflies, Spiders, and Other Arthropods, John W. Guyton, *Quarry Books*, 2018, 144 pp.



A human-pooch foot race teaches young readers how to create a repeatable experiment.

YOUNG ADULT SCIENCE BOOK

Rocket Men

Reviewed by **Laura M. Zahn**¹⁴

The year was 1968. Protests against the Vietnam war filled the streets of America, and the United States and the Soviet Union were racing to the moon. In 1969, men would walk on its surface. However, before we could accomplish this feat, we needed to be sure that they could get there and return safely.

Focusing on the Apollo 8 mission—the first manned mission to orbit the moon—in *Rocket Men*, Robert Kurson vividly transports the reader into the minds of the people involved, especially the astronauts and their wives, as they prepared for and underwent this perilous mission. The possibility of death is a recurring theme. Kurson repeatedly reminds the reader of the fatal fire that claimed the lives of the Apollo 1 astronauts and the experimental nature of space travel. Yet, fear was not at the forefront for Frank Borman, Bill Anders, and Jim Lovell. Instead, the book emphasizes how these brave men were willing to sacrifice everything for their country.

This story, about a little-recalled but major move forward into space, will captivate readers of all ages, but as a full-length chapter book with few illustrations or pictures, older readers will have an easier time with this book. Kurson's evocative writing places the Apollo 8 mission into historical perspective and allows us to vicariously experience the launch of the Saturn V rocket and the awe felt by the first men to leave low Earth orbit.

Rocket Men: The Daring Odyssey of Apollo 8 and the Astronauts Who Made Man's First Journey to the Moon, Robert Kurson, Random House, 2018, 384 pp.

Chasing New Horizons

Reviewed by **Keith T. Smith**¹⁵

On 14 July 2015, the New Horizons spacecraft flew past Pluto, capturing headlines around the world. *Chasing New Horizons* tells the story of that mission: how it was designed, funded, built, launched, and operated. The narrative is as recalled by Alan Stern, the mission's principal investigator, written up by the astrobiologist and science communicator

David Grinspoon. This provides great insider access, although it's clearly a subjective view.

A brief introduction explains how Pluto was discovered in 1930 and why, in the 1980s, planetary scientists began to lobby for a mission to visit it. Teenagers may struggle with the subsequent chapters, however, which describe how the mission was designed and funded. These sections are a labyrinth of NASA committees, working groups, design proposals, and advisory reports. The second half of the book is far more engaging, covering the spacecraft's launch in 2006, its flyby of Jupiter in 2007, and the Pluto encounter itself. Those chapters come alive with the authors' passion for exploration and the excitement of finally reaching the destination.

Throughout *Chasing New Horizons*, there is a strong sense of the team's drive to make the most of the brief Pluto flyby and the meticulous planning that required. The authors emphasize the important roles played by engineers, project managers, and mission controllers, reminding readers that it takes more than a good idea and talented scientists to fly a successful mission.

Chasing New Horizons: Inside the Epic First Mission to Pluto, Alan Stern and David Grinspoon, Picador, 2018, 320 pp.

Built

Reviewed by **Donna Riley**¹⁶

Roma Agrawal's *Built* is a full-throated celebration of structural engineering. The book nicely balances innovative new builds such as The Shard in London with tried-and-true designs such as the Middle Eastern water transport system known as the *qanat*. Classic narratives of the Brooklyn Bridge and the Hancock Tower are interspersed with more obscure examples, including a lovely description of spider silk as bridge material.

Agrawal makes passing reference to workplace gender discrimination. Stark in their normalcy and minimized as anomalies, her vignettes nonetheless may elicit a #metoo from many readers as they serve to remind us how far we have yet to go in building inclusive work environments in engineering.

Agrawal, like many engineers, is almost absolute in her optimism: "The possibilities are limited only by our imaginations—for whatever we can dream up, engineers can make

real." But whiz-bang technical feats alone cannot solve problems such as our water crises, for example. This points to perhaps the biggest shortcoming of the book: a missing discussion of how public policy interfaces with large engineering projects and the processes by which such projects are planned, funded, administered, and maintained.

In all, *Built* is a welcome addition to the library of accessible reads on engineering.

Editor's Note: For a full-length review of Built, see "Behind the scenes of the built environment," Science 359, 1108 (2018).

Built: The Hidden Stories Behind Our Structures, Roma Agrawal, Bloomsbury USA, 2018, 320 pp.

Spying on Whales

Reviewed by **Sacha N. Vignieri**⁶

Whales are massive, their habitat is enormous, their life spans can be much longer than our own, and their intellect is both compelling and mysterious. We are captivated by whales, yet they remain difficult to know.

Nick Pyenson enters into this long affair from a paleontological perspective, being most interested in how these remarkable creatures evolved from four-legged terrestrial ancestors to marine leviathans and in the many forms they took in between. As he describes his pursuit of this knowledge, we see how challenging it really is to study these animals, both those that existed in the past and those with whom we share the world now.

Throughout the book, Pyenson brings his readers where he goes, whether it be on an adventure in the Atacama desert to solve a mystery involving dozens of intact fossil whale skeletons, or to an internal destination—his heart—as he contemplates the fact that in a single right whale's lifetime, the world has gone from being rich with whales to being nearly without them. In the end, the reader takes away an improved knowledge of whales, especially their history, but perhaps even more importantly, a deeper understanding of the intertwining of our fates.

Spying on Whales: The Past, Present, and Future of Earth's Most Awesome Creatures, Nick Pyenson, Viking, 2018, 336 pp.

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