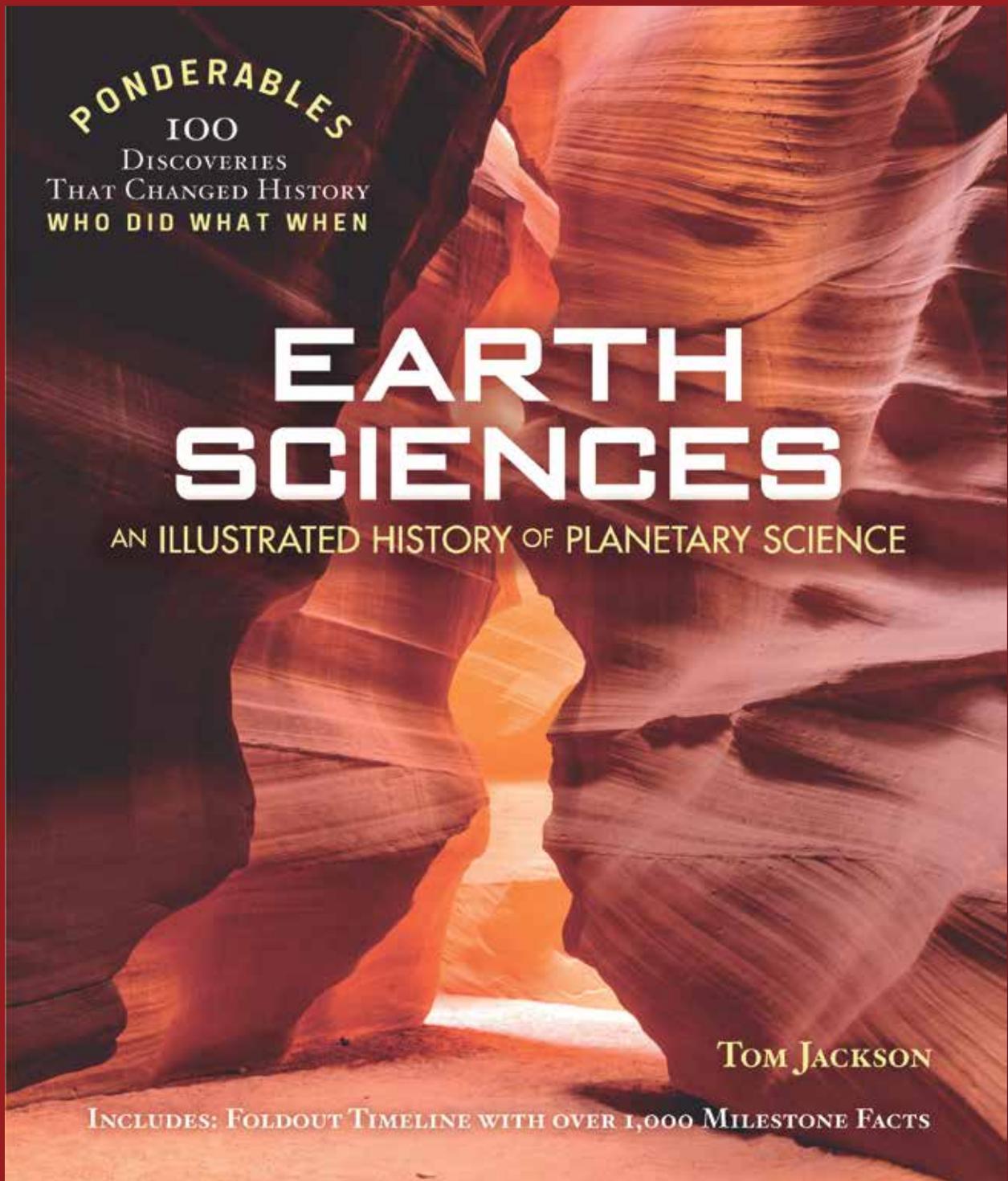


SHELTER HARBOR PRESS

FALL / WINTER 2019



The 10th title in the bestselling Ponderables series



Aurora borealis from Ponderables
Earth Sciences

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Now 10 titles in our acclaimed Ponderables series!

Since 2012, the accessible and visually stunning Ponderables series has more than 500,000 copies in print and has been translated into 22 languages.

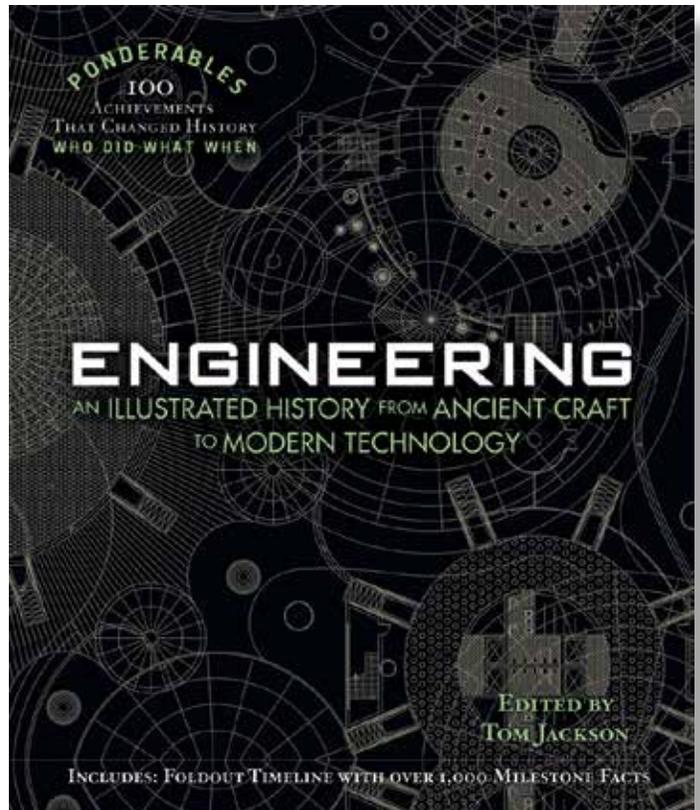
The ten-title series has tackled weighty subjects using a storytelling approach that appeals to both smart kids and curious adults. Each book provides a clear overview that combines compelling historical images and useful illustrations with straightforward explanations of the subject's most important milestones, core concepts, and what's still unknown.

Packaged at the back of each book is a 12-page fold-out timeline that puts each subject in historical context and shows the reader who did what when. The reverse side provides a relevant visual chart that can be put on a wall for easy and quick reference.

Author and Series Editor: **Tom Jackson**, an experienced science writer and editor, specializes in taking complex topics and making them accessible and lively. He lives in the United Kingdom.

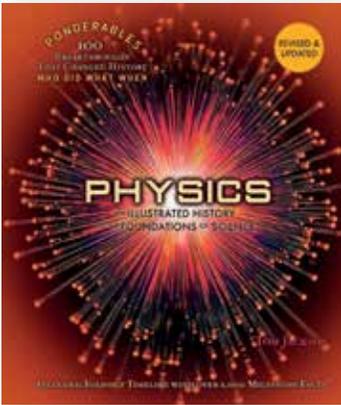
"Whether browsed or read straight through, it will be an enjoyable selection for anyone interested in learning about scientific discoveries that changed the way we understand the world."

Library Journal [starred review]

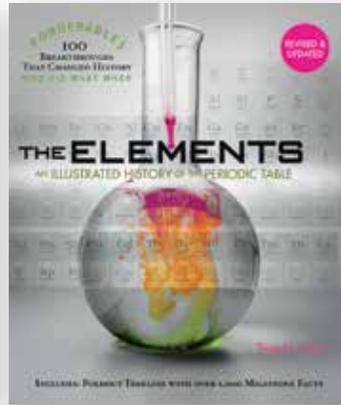


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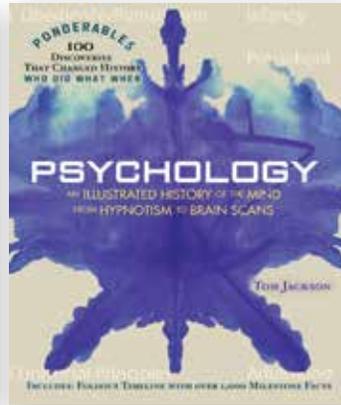




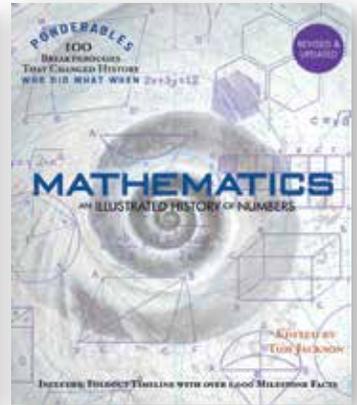
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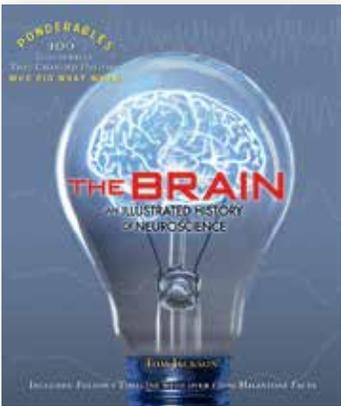
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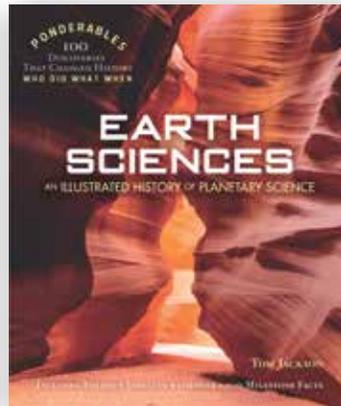
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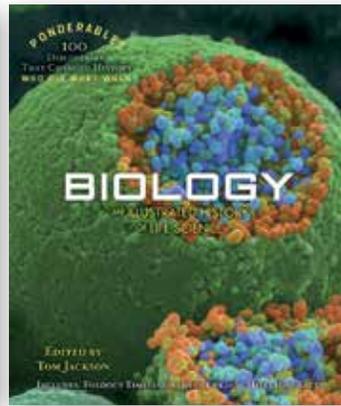
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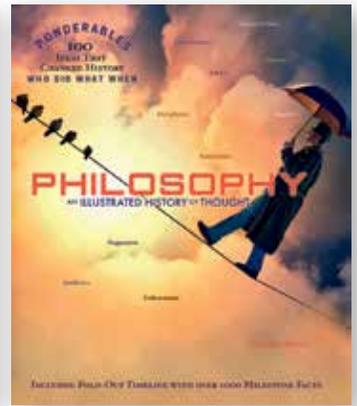
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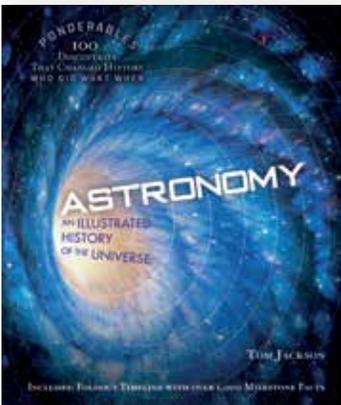
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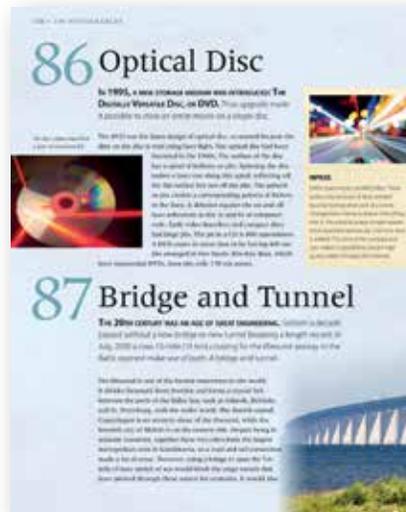
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978-1-62795-136-4



“Aimed at reaching a middle to high school audience and the interested lay person.”

Library Journal

“...graphically stunning, browsable volume features gorgeous layouts and short, intelligent paragraphs.”

School Library Journal

SPECIFICATIONS FOR PONDERABLE SERIES

Format: Hardcover w/ 24-page, removable fold-out timeline/chart

Extent: 168 pp

Size: 9.25 x 11.2

Illustrations: 300+ color and b/w

Price: \$24.95 US / \$29.95 CAN/ £16.99 UK

Earth Sciences

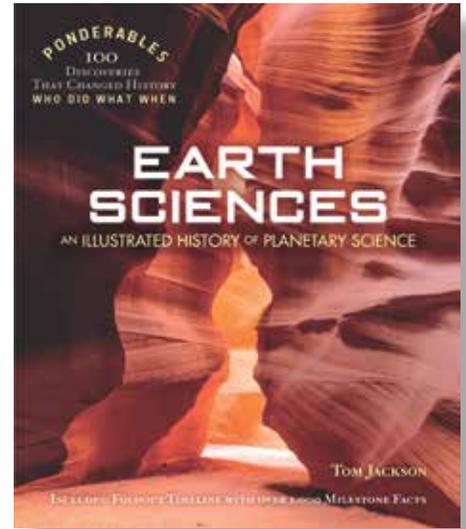
An Illustrated History of Planetary Science

Tom Jackson

An all-new addition to the best-selling Ponderables series, *Earth Sciences* reveals the history and forces that created our planet and are still shaping it today through events such as earthquakes, tsunamis, and volcanic eruptions.

Through 100 pivotal milestones, this gorgeous reference book and timeline shows how our planet has evolved from a disk of dust left behind by a young Sun. The accessible text describes the Earth's ever-changing layers and what researchers have learned about the past through fossils and about the future in the search for habitable exoplanets. At a time when human life is impacting the Earth at a noticeable rate, *Earth Sciences* provides a rich understanding of:

- ▶ 100 milestone facts, labeled "Ponderables," which detail pivotal breakthroughs in geology, meteorology, oceanography, and astronomy
- ▶ Stunning imagery and illustrations to help clarify key concepts
- ▶ An overview of core concepts in Earth Science 101: The Basics and biographies of key scientists
- ▶ A section that explores imponderable topics that researchers still don't fully understand
- ▶ A removable, fold-out 12-page Timeline History of Earth Science that shows every eon, era, period, epoch, and age from the formation of the planet to the present day.



ISBN: 978-1-62795-142-5

Format: Hardcover w/24-page removable foldout timeline/chart

Extent: 168 pp

Size: 9.25 x 11.2

Illustrations: 300+ color and b/w

Subject: Science/Earth Science

Retail price: \$24.95 US \$29.95 CAN £16.99 UK



PROMOTIONAL PLANS

- ▶ Reviews and features in science magazines, websites, and blogs
▶ Book reviews in print and online
▶ Features in holiday round-up gift guides

68 • 100 PONDERABLES

55 Hurricane

WHAT BECAME THE NATIONAL WEATHER SERVICE IN THE UNITED STATES WAS SET UP IN 1870, AND THINGS GOT BUSY STRAIGHTAWAY. IN 1873 THE SERVICE ISSUED THE FIRST HURRICANE WARNING, AND IT HAS BEEN LEADING THE RESEARCH INTO THESE GIANT STORMS EVER SINCE.

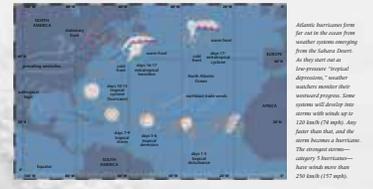
FUJUHARA EFFECT Named after Sakuji Fujuhara, the Japanese meteorologist who described it in 1921, the Fujuhara Effect occurs when two storm systems get close enough that their winds pull them together to the point each other. The storm's charge direction and eventually merge, potentially into a much larger and more dangerous storm. The effect is rare and happens only very few years.

The Weather Bureau of the United States was set up by President Ulysses S. Grant with a mission to "provide for taking meteorological observations at the military stations in the Interior of the continent and at other points in the States and Territories and for giving notice on the northern Lakes and on the seaboard by magnetic telegraph and marine signals, of the approach and force of storms." The new agency was under the auspices of the Secretary of War because it required military discipline to get the right results. (The bureau has been through many changes since then, and is now the National Weather Service, part of NOAA, the National Oceanic and Atmospheric Administration; see more, page 101.)

The chief meteorologist was Cleveland Abbe, who had already started weather forecasting by using weather data sent by Western Union and the Cincinnati Chamber of Commerce. Abbe had consistently lobbied his bosses to provide him with the means to research weather phenomena so he could figure out how to predict them.

Storm season In June 1873, the bureau got wind of a storm moving through the Caribbean. It was nothing too bad, but in August, a major hurricane moved up the East Coast, finally decaying off Newfoundland, and September saw two more hurricanes striking Florida. At the time, the world's leading authority on hurricanes was Benjamin Vides, a Cuban poet, who ran a meteorological observatory in Havana. In 1877 he published a method of using wind and cloud motions to forecast hurricanes. It did little to help.

The average winds of all are in the eye, on an immense circular cloud that surrounds a clear zone with light winds, and a clear circle in the heart of the storm.



What is a hurricane? A better view of the huge storms slowly emerged. Sakuji Fujuhara, a Japanese researcher (see box, left) showed how hurricanes form into the bigger weather picture of the tropical Atlantic. In 1922 Howard Bowie found that hurricanes generally rotate anti-cyclonically, or opposite to the direction of Earth's rotation. In the Northern Hemisphere that would be counterclockwise. However, these details were not helping the warning centers get the message out early enough, and hurricanes hitting the coast would frequently result in hundreds of deaths.

WEATHER SATELLITES It's hard to understand just how large a hurricane is. Trying to capture a picture of one required the development of new technology. The first weather satellite, Vanguard 2, was launched in 1959 to send a general digital camera to take pictures of cloud cover. The results were fuzzy and not very useful. However, US earth scientists discovered with this space system, and since the late 1970s, more sophisticated Generalized Meteorological Satellite have offered a high picture view of the whole of Earth (not just hurricanes).

By the late 1940s, some big pieces of the puzzle were falling into place, thanks mostly to planes flying around hurricanes to plot wind speeds and pressure changes, and map out the mysterious eye, a place of calm at the very center of the storm. In 1948, the Finnish meteorologist Erik Palmén showed that a hurricane requires surface water temperatures of at least 26°C (80°F) in order to form. The water needs to be at least 50 m (160 ft) deep, too. The air above this water layer adds energy to the system, pulling more and more air and water up from the surface. The upward flow of the air creates the beginnings of a central eye, and cooler air from far above falls into it, reducing the air pressure at the heart of the system even further, pulling in more air moisture to create an expanding area. This process will continue until the storm hits land or moves into cooler seas.

In the 1970s, satellite-based sensors were first equipped to withstand hurricane conditions.



66 • 100 PONDERABLES

53 Weather Forecast

TO MANY OF US, BEING ABLE TO PREDICT TOMORROW'S WEATHER helps us know whether to plan a day at the beach or to pack a raincoat. But, in the early days, weather forecasts could be a matter of life or death.

The person who coined the term "forecast" was the British naval captain Robert FitzRoy. FitzRoy had been the protégé of Francis Beaufort, whose Wind Force Scale from the 1800s was a helpful system for judging conditions at sea in the here-and-now, but could not say what would happen next. In 1854, FitzRoy, having retired from command, set up the Meteorological Office as the British government. His job was to gather standardized weather data from British ships with the aim of including climate information on sea charts.

Opportunity arises Later that year, a great storm hit the Black Sea. Supply ships carrying winter provisions for the French and British forces fighting the Russians in the Crimean War were lost. The French astronomer Urbain Le Verrier was able to show that the storm's eastward path across Europe was clear to the weather data collected after the incident. If this data could have been put together into a synoptic map within hours, instead of weeks, the Crimean fleet could have been saved. So the newly invented telegraph network was put to work to carry observation data to new weather observatories. FitzRoy's "Met Office" became the world's first—and longest lasting—weather forecaster. By 1861 it was issuing weather warnings by telegraph, and publishing a daily forecast in The Times of London (as it still does today).

VOICE OF THE BEAGLE Before becoming the pioneer of weather forecasting, Robert FitzRoy had the command of HMS Beagle, a small ship that was used as a naval survey ship. It's second voyage from 1831 to 1836, when FitzRoy discovered the world's first rain forest, New Zealand, and Australia. He took with him a colorful companion, called Charles Darwin, who used the voyage to compare and contrast animals from across the globe, a pursuit that inspired his famous theory of evolution.



A weather map for northern Europe from the 1800s. The lines are weather forecasting patterns with equal air pressure. The map shows how conditions change from one day to the next and can be used to predict what will happen in future.

67 PREHISTORY TO 1500s • 67

54 Exploring Altitude

WEATHER IS AN ATMOSPHERIC PHENOMENON, AND SO TO UNDERSTAND IT, IT MAKES SENSE TO GO UP AND HAVE A CLOSER LOOK AT ALL THAT AIR. TWO EARLY AERIAL EXPLORERS WHO DID SO ONLY JUST MADE IT HOME ALIVE.

FIRST FLIGHT The first balloons capable of carrying passengers were built by the French Montgolfier brothers. The first passenger flew in 1783 aboard their paper and silk craft, but they were not human. Instead the balloon crew was a sheep, a duck, and a rooster, and each was selected for their physical attributes. The duck would be unaffected by altitude, while the rooster was a loud but one that could not fly high. The sheep was the calmest of the three animals.

In 1862, the British Association for the Advancement of Science suggested an expedition be made to explore the "aerial ocean." Charles Coxwell, the country's leading "aeronaut," was appointed to fly an enormous hydrogen balloon (2,600 m³, 91,000 cubic feet) designed to go higher than anyone had yet flown. The other member of the crew was the scientist James Glaisher, who would use a barometer to calculate altitude as indicated by the drop in pressure, and also plot the corresponding fall in temperature. The crew also carried six homing pigeons, and planned to release them one by one as they ascended. The vast balloon rose quickly and the team was above the clouds in just 12 minutes. All was well as they admired the incredible view of the cloud cover below—something familiar to people today who fly by air, but back then something few had seen. At 4,893 km (3 miles) or 15,840 feet up, Glaisher began to release his pigeons. At 4,444 km or 4 miles, the pigeon struggled to fly, and at 4 km (2.5 miles), the birds simply fell from the balloon. At this point, Glaisher reported feeling "balloon sick" and was about to warn Coxwell when he became unconscious. Coxwell, a younger man, was less affected but had lost all feeling in his hands. He managed to open safety valves with his teeth to release hydrogen, and within about 20 minutes, the aircraft was back on the ground, with both the crew revived. Later analysis suggested that the pair had reached an altitude of 11.3 km (37,000 feet), which is near the cruising height of a jet airliner today, and far higher than Mount Everest. The air pressure up there is a fifth of the pressure at sea level, with too little oxygen to sustain the body, and the thin air hits little heat so the temperature is at most -40°C (-40°F).



Coxwell and Glaisher's balloon voyage to the "aerial ocean" came close to ending in disaster as they flew so high that the crew could not support it.

"These are exactly the kind of engaging books I loved to have in my classroom..." Teachersforever.com

69 PREHISTORY TO 1500s • 25

that came in handy when navigating rivers and narrow inlets. Legend has it that the Icelandic Norse used clear crystals as the "Viking compass." This stone, possibly a clear form of calcite, split the light that shone through it, and could be used to locate the Sun even when it was shrouded by clouds—and thus they could always orientate the ship. Off course Despite the ability to make long sea voyages, the Vikings discovered North America by accident. Leif Erikson, a Greenland, was blown off course on a return trip from Norway, and came across a land filled with wild wheat and grapes. Naming it Vinland, meaning "farmland," he soon returned with a better equipped crew of Greenland Vikings to explore the region. They found frozen tundra (probably Baffin Island); dense forests (Labrador); and finally made it back to Vinland, where they established a small settlement. In the 1900s, archeologists found evidence of this first European foothold in America, at L'Anse aux Meadows on the northern tip of Newfoundland. The village, named L'Anse aux Meadows, the Vikings left out with the locals, who the Norse recorded as the skraelings (meaning "the people who wear animal skins").

ENIGMA OF THE RED As his name suggests, Leif Erikson was the son of an Irish—the first—settler in a Viking explorer who is credited with being the first European to visit Greenland. Icelandic sagas record that others had found it before Erik, but he made a success of landing and settling there in 985. He named it Greenland to attract colonists—although climate records show it wasn't quite so cold there as it is now. For 500 years, a community of about 2,500 Norse lived on the southwestern coast, but abandoned their homes when the climate grew colder in the late 1400s.

15 Liquid Rock

THE PERSIAN SCHOLAR AVICENNA IS BEST REMEMBERED AS A PHYSICIAN AND PHILOSOPHER. HOWEVER, HE FOUND ROOM IN HIS BOOK The Book of Healing to discuss the earth sciences, including the source of new rock.

Despite being called the The Book of Healing, readers in 1027 when it was published would find little mention of medical procedures. Avicenna (his real name was Ibn Sina) suggested that rocks were formed by contact with a liquid. That would explain how some fossils form from dead lifeforms. In addition, Avicenna pondered whether mountains are the result of sudden upheavals or slow processes that require a long time scale. Such thoughts would have been heretical in Europe at the time.



Astronomy

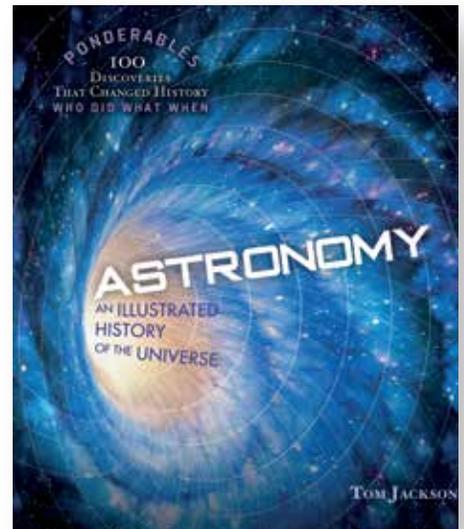
An Illustrated History of the Universe

Tom Jackson

Astronomy is a fact-filled, picture-rich, accessible guide to the science's essential and exciting milestones, including new breakthroughs such as the New Horizons spacecraft's 2015 encounter with Pluto and 2019 rendezvous with a Kuiper belt object.

Originally published as *The Universe*, this revised, updated, and renamed reference book and timeline traces how, over many centuries, great minds have determined our planet's place in the great expanse of the Universe. From megalithic cultures of Stonehenge and Carnac to today's search for alien planets and dark matter, *Astronomy* includes:

- ▶ 100 milestone facts, labeled "Ponderables," which detail pivotal breakthroughs by scientists, ancient and modern, in understanding the Universe, stars, and planets.
- ▶ Stunning astronomical imagery and illustrations to help clarify key concepts
- ▶ An overview of core concepts in Astronomy 101: The Basics and biographies of key scientists
- ▶ A section on imponderable concepts that researchers are still don't fully understand.
- ▶ A removable fold-out 12-page Timeline History of Astronomy and a 12-page Guide to the Night's Sky which shows the constellations visible in the Northern and Southern Hemispheres month by month.



ISBN: 978-1-62795-136-4

Format: Hardcover w/removable foldout timeline

Extent: 168 pp

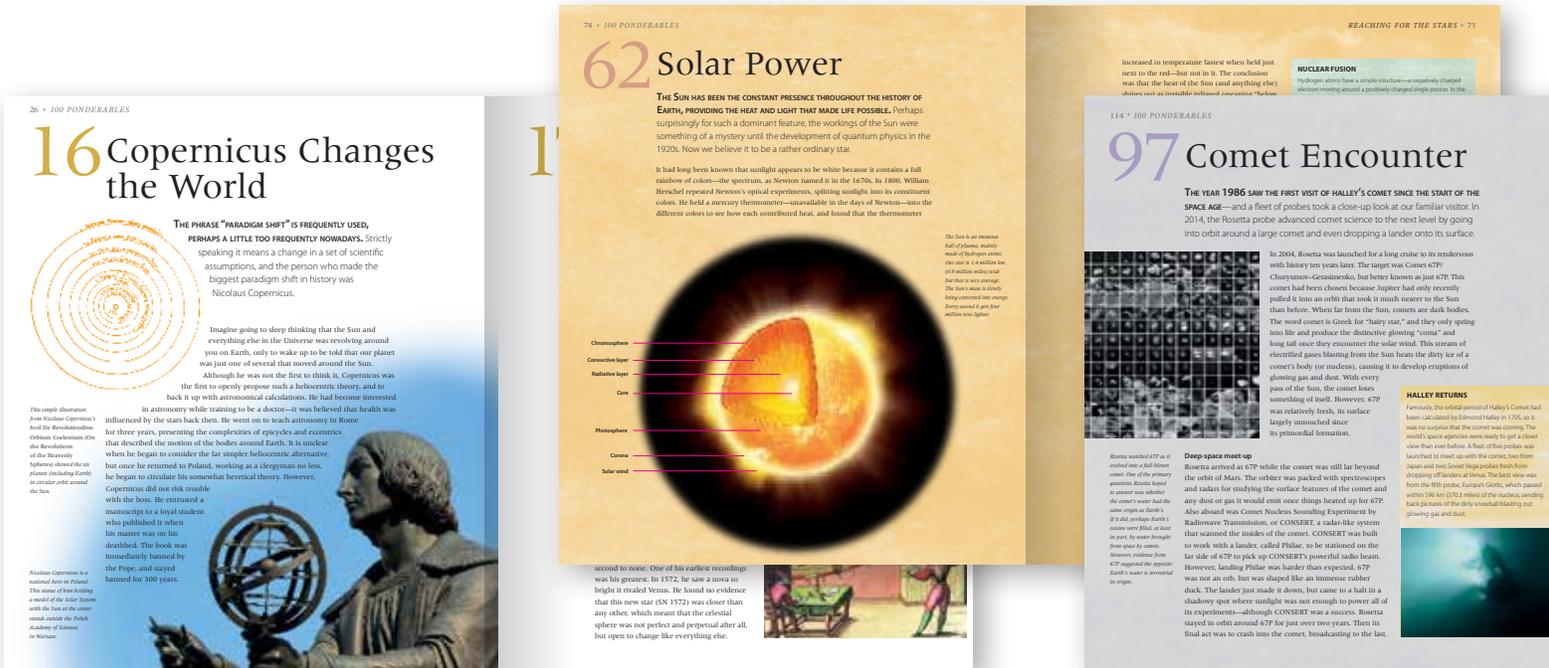
Size: 9.25 x 11.2

Illustrations: 300+ color and b/w

Subject: Science/Astronomy

Retail price: \$24.95 US \$29.95 CAN £16.99 UK

Astronomy's editor, **Tom Jackson**, is a science writer based in the United Kingdom. He specializes in recasting science and technology into lively historical narratives.



THE LONDON STEREOSCOPIC COMPANY

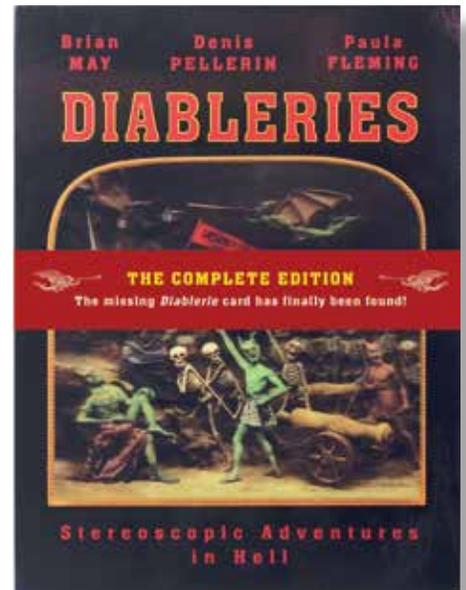
Diableries: The Complete Edition

Stereoscopic Adventures in Hell

Brian May, Denis Pellerin, and Paula Fleming

Finally back in print and revised to include every card in the series, this cult classic provides a rare and satirical look at an 1860s' view of Hell—the French state under the tyrannical rule of Napoleon III.

Thanks to Dr Brian May's imagination and his determination to share the wonders of these strange cards, thousands of readers have escaped the boundary of Earthly tedium! *Diableries* transports them to a nightmarish netherworld inhabited by devils and skeletons—in the nicest possible way, of course! The amazing 3-D cards show scenes of torture, fire, and every variety of licentious behavior, with scantily clad ladies of the demi monde and the devil himself encouraging the participants worst intentions. After five years of searching, Dr. Brian May and his coauthors, were able to find the one card, entitled La Cuve or The Barrel, missing from the initial publication of the book. **This complete edition is truly a collector's item!**



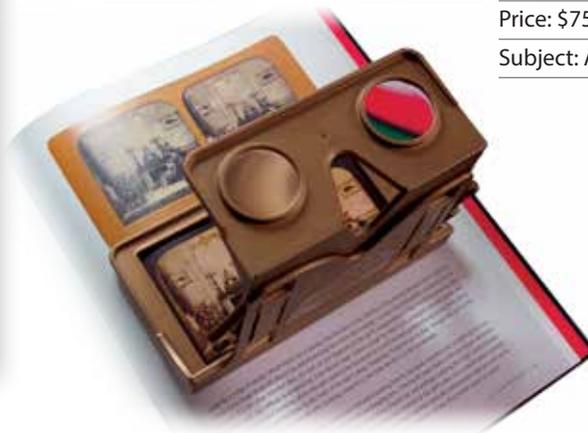
ISBN: 978-1-9996674-3-6

Format: Hardcover, 280 pages, 500 photographs, slipcased with 3-D viewer

Size: 9.25 x 12.80 x 1.5

Price: \$75.00

Subject: Art & Photography

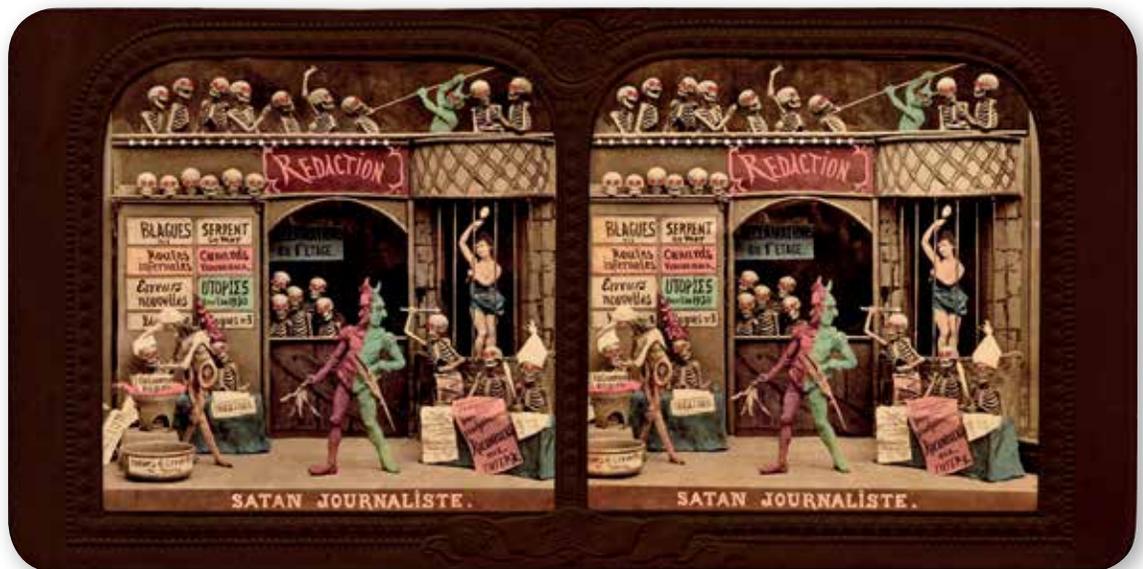


PROMOTIONAL PLANS

- ▶ Radio promotion leading up to Halloween
- ▶ Featured in holiday round-up gift guides

“The images were created by photographing hand-sculpted scenes. They look sepia-toned in daylight and fill with color when backlighted, which is particularly frightening when the eyes of the damned glow red as the green devil parades by.”

Los Angeles Times





These remarkable scenes were initially sculpted in clay, mostly by two leading French sculptors, Pierre Henriet and Louis Habert, who daringly satirized Napoleon and his cohorts at great personal risk. These extremely detailed scenes, that allegorically critiqued daily events in a France where news was censored, were created and then photographed with a stereo camera to be viewed with a stereoscope.



THE LONDON STEREOSCOPIC COMPANY

Queen in 3-D**Updated Edition NOW IN STOCK**

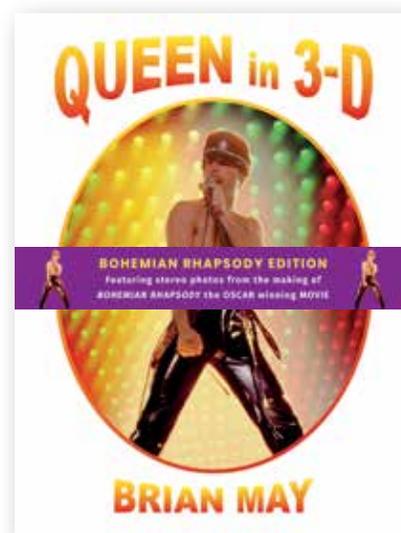
Brian May

Now in stock and updated with 17 stereo images from Bohemian Rhapsody, either edition is a must-have for any Queen fan!

In Brian May's own words and more than 300 previously unseen 3-D photographs, *Queen in 3-D* is an insider's look at life with the rock band Queen, told for the first time. The pictures and self-penned text tell the story of Brian's discovery of the world of stereoscopy as a boy, and chronicles Queen from the early 1970s to the present day.

The images, from Brian's personal archives, were taken using the various stereo cameras which Brian carried throughout his life. Viewed in May's patent OWL viewer (included), they leap into stunning three-dimensional realism, giving uniquely vivid impression of life with Freddie Mercury, Roger Taylor, John Deacon and Brian himself, alongside the people who helped to shape Queen's amazing global adventure.

- ▶ 3-D photos and text exclusively by Brian May
- ▶ Featuring Queen on and off stage from the 1970s to the present day
- ▶ More than 300 previously unseen stereo images
- ▶ Brian May's glimpses of life in the studio and on the road
- ▶ Bonus sections including 21st century-Queen + Adam Lambert
- ▶ Both editions include 3-D viewers designed by Dr May
- ▶ Each volume now has more than 17 stereo images from the movie



ISBN: 978-1-9996674-2-9

Format: Hardcover with 3-D viewer embedded in the cover

Extent: 256 pp

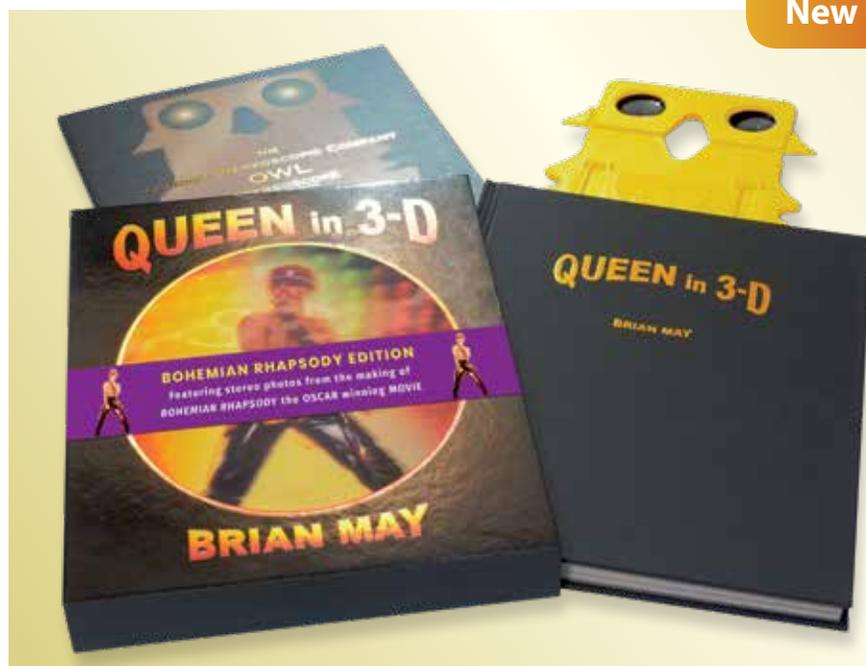
Size: 9.4 x 12.7

Illustrations: over 300 images 4-color and b/w

Subject: Music / Genres & Styles / Rock

Price: \$45.00 US

Imprint: London Stereoscopic Company

New Updated Slipcased Edition**Queen in 3-D Slipcased Edition**

Brian May

The new updated slipcased edition includes a 256-page book and the full size OWL 3-D viewer invented by Brian May.

ISBN: 978-1-9996674-8-1

Format: Boxed set including hardcover book and the iOWL 3-D viewer invented by Brian May

Extent: 256 pp

Size: 9.4 x 12.7

Illustrations: over 300 images 4-color and b/w

Price: \$75.00 US

This book will be promoted on radio stations and in key cities during Queen's 2019 US Rhapsody Tour.

The winner is ... **Bohemian Rhapsody**

ACADEMY AWARDS: BEST ACTOR; BEST SOUND MIXING; BEST FILM EDITING; BEST SOUND EDITING

GOLDEN GLOBE AWARDS: BEST FILM; BEST ACTOR; BEST ACTOR IN A LEADING ROLE; BEST SOUND

SCREEN ACTORS GUILD AWARD OUTSTANDING ROLE BY A MALE ACTOR IN A LEADING ROLE

JAPAN ACADEMY PRIZE OUTSTANDING FOREIGN LANGUAGE FILM

AACTA INTERNATIONAL AWARD BEST ACTOR

SATELLITE AWARD BEST ACTOR



“The closest thing to an autobiography May has written.”

The Bookseller



For one night only the entire cast of WWRY appeared at the Queen's Golden Jubilee concert, and I had a life-changing moment on the roof of Buckingham Palace.

Brian May, founding member, songwriter, and guitarist with the rock band Queen, and co-creator of the internationally successful rock theatrical, *We Will Rock You*, is also a Doctor of Astrophysics, a leading campaigner for animal rights, and a lifelong 3-D photography enthusiast.

Geometry

UNDERSTANDING SHAPES AND SIZES

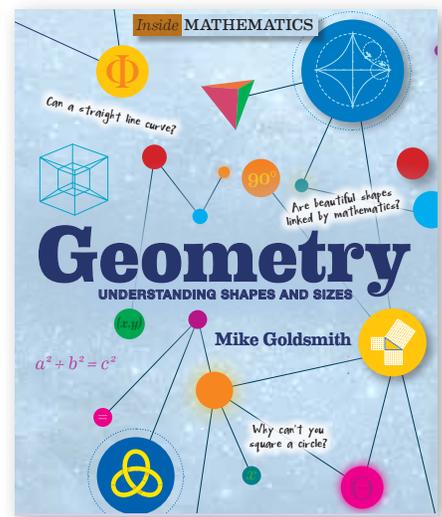
Mike Goldsmith

Series Editor: Tom Jackson

Written to engage and enthuse young minds, the third volume in our series, *Inside Mathematics: Geometry*, introduces readers to the amazing people who figured out how shapes work and how they can be used to build spaces and study places we cannot go, like the beginning of the Universe.

In a classroom, geometry can often bewilder students because its unlike any math they have done before. But *Inside Mathematics: Geometry* helps make sense of all of those lines and angles by showing its fascinating origins and how that knowledge is applied in everyday life. Filled with enlightening illustrations and images, this accessible overview is arranged chronologically, from Euclid's revolution to the Poincaré conjecture, to show how ideas in mathematics evolved.

The word "geometry" means "land measurement." Ancient Egyptians in 3000 BC created the basis of geometry to model the natural world. What began as scratched circles and squares in the dirt has evolved into a branch of mathematics used to create realistic landscapes in video games, build mile-high skyscrapers, and manufacture robots so tiny they can swim in your bloodstream.



ISBN: 978-1-62795-138-8

Format: Paperback with flaps

Extent: 184 pp

Size: 7.5 x 8.8

Illustrations: 200 color and b/w

Subject: Mathematics/ Geometry

Retail price: \$19.95 US / \$24.95 CAN / £ 12.99

Mike Goldsmith has a PhD in astrophysics from Keele University, awarded for his research into variable supergiant stars and cosmic dust formation. His previous books for kids include *How to Be a Math Genius* and *Science Ideas in 30 Seconds*. He lives in London.

Perspective

GEOMETRY OFTEN INVOLVES PARALLEL LINES, BUT THEY HAVE CAUSED PROBLEMS EVER SINCE EUCLID TRIED—AND FAILED—TO PROVE THEY EXIST. But they must do. Think about it, railroads would not work if their tracks were not parallel.

The problem is that railroad lines usually don't look parallel, unless you are hovering over them (or you are very tall indeed). And, since we live in a world of pictures, this raises a question: how is it best to draw these lines? What rules do we apply to make an accurate drawing? And how would we check its accuracy?



The Italian artist Masaccio's Holy Trinity painting from 1427 used a vanishing point to give the scene a true-to-life perspective.



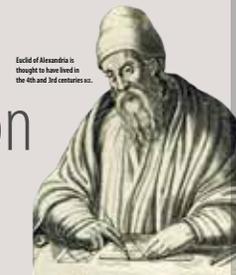
Architectural Veduta and aligned to a vanishing point.

A better! Question artists, c. 15th cen (referred Europe) in the air convinced things lo

Euclid's Revolution

NO ONE IS MORE IMPORTANT TO THE HISTORY OF GEOMETRY THAN EUCLID. The subject is so understood it today might not even exist without him. As with so many ancient Greeks, we know hardly a thing about him, but copies of *Elements*, his greatest work, have survived. For nearly 2,000 years, schoolchildren and scholars alike were taught mathematics using Euclid's *Elements*.

Elements is important for two reasons. Firstly it collected almost all of the geometrical knowledge available in Euclid's time, including 465 theorems and constructions, and it also helped define the way mathematics should be done. Rather than simply stating theorems, Euclid proved them—all of them. By a proof, Euclid meant something that is quite certain. For him, it was not enough simply to measure the angles inside a selection of triangles and conclude that, since they always added up to two right angles, the same must be true of every possible triangle. For one thing, how could anyone know that tomorrow a cunning mathematician would not find a triangle whose angles added up to three right angles?

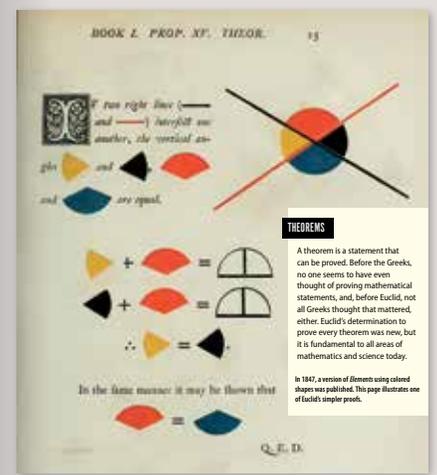


Euclid of Alexandria is thought to have lived in the 4th and 3rd centuries BC.

Something like this actually happened in the 18th century (see more on page 130!)

Mathematical foundations

Secondly, even with modern instruments, no one can draw a perfect triangle. In Euclid's time people usually drew their diagrams on sand, so most triangles were very far from perfect, and angles could not be measured with great accuracy, either. Key to Euclid's genius is the idea of an axiom (which he called a postulate), a fundamental statement on which many theorems depend. Euclid only needed five axioms, and four seem so obvious that they may seem hardly worth stating. They say: 1) Given any two points, you can draw a straight line between them.



A theorem is a statement that can be proved. Before the Greeks, no one seems to have even thought of proving mathematical statements, and before Euclid, not all Greeks thought that mattered, either. Euclid's determination to prove every theorem was new, but it is fundamental to all areas of mathematics and science today.

In 1847, a version of *Elements* using colored shapes was published. This page illustrates one of Euclid's simpler proofs.

PROMOTIONAL PLANS

- ▶ Reviews and features in science magazines, websites, and blogs
- ▶ Book reviews in print and online
- ▶ Features in holiday round-up gift guides

108

An arch redirects the downward force of the masonry so that the stones of the arch only experience a compressional (pushing) force. However, at the base of the arch there is an outward force as well as a downward one, so material must usually be added at either side of the arch to resist this sideways force.

	Force needed to crush (pounds per square inch)	Force needed to pull apart (pounds per square inch)
Limestone	40	8,100
Graite	130	10,850
Concrete	40	5,800
Steel	50	7,250
Oak	45	6,325

means that stone can be used. But what is the ideal shape for an arch, from an engineering point of view? No one seems to have bothered to answer this question for several centuries, during which time many different versions were tried, selected mainly because they looked nice.

that there is a strong crushing force on its top, and a strong tension (pulling) force along its base. Stone is very weak under tension (see table above), and, while wood is much tougher, it is hard to find tree trunks that are long, strong, and straight enough to satisfy architects with grand designs in mind.

Stronger system
The arch overcomes these problems. The shape of the arch deflects the force of the masonry above it sideways, so there is no tensional force at all, which

A dome, such as the Parthenon in Rome, is like a ring of arches, which is why domes push outward, too.

The Geometry of Architecture > 109

A wide selection of arches have been described, and are defined by their shape, not strength.

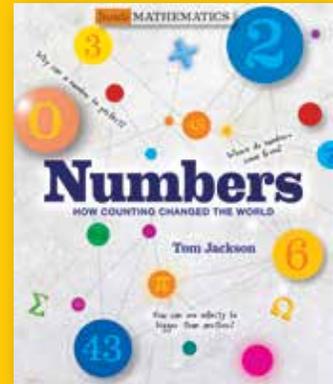
Architects become mathematical
While such factors as strength, wind protection, and fitting in the biggest possible windows have always been important to architects and builders, it was not until the late 17th century that anyone began to look at these issues mathematically. Before then, people just used trial and error for innovative buildings, and sometimes structures collapsed soon after being built.

Forth Abbey, an immense house in southern England, was an enormous construction project. It took 17 years to build and then fell down 11 years later in 1825 because its tower was too tall.

Numbers

HOW COUNTING CHANGED THE WORLD

Tom Jackson



ISBN: 978-1-62795-074-9

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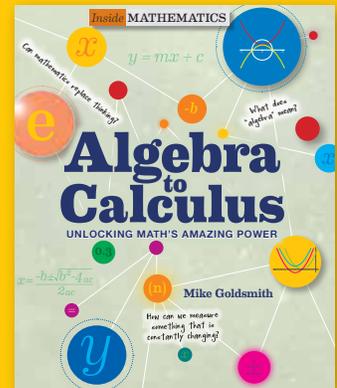
Subject: Mathematics

Price: \$19.95 US / \$24.95 CAN

Algebra to Calculus

UNLOCKING MATH'S AMAZING POWER

Mike Goldsmith



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140

An unknot can be twisted into a knot, but it is still an unknot.

Kenneth Perko showed that there are two knots which are actually just one. They are now called the Perko pair.

were all the knots with up to 10 crossings. There were 166 of them. Nearly a century later, in 1974, Kenneth Perko, an amateur mathematician who spent most of his time being a New York lawyer, realized that two of Little's

knots were actually the same. Even though they were right next to each other in Little's table, no one had spotted this before. Actually, Perko didn't spot them either: eyes are little use in analyzing knots, and one of the most brilliant

Knots > 140

knot mathematicians, Louis Antoine, was blind. Antoine developed a kind of infinite knot now called Antoine's necklace (see below and the box on page 130). Perko only came across the double-counted knot when he was checking whether Little's method of knot analysis worked. The fact that the method classified the same knot as two different ones showed that it didn't!

The search for invariants
What Charles Little had tried and failed to do was to find an invariant. A knot invariant is a number, equation, or measurement which can be applied to any image of any knot. No matter how twisted a knot is, its invariant must remain

An early stage in the construction of Antoine's necklace, which is based on wild knotting. At each stage, new loops are drawn around each existing loop, and the process goes on forever.

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LOW SPEED RELATIVITY

The speed of light is 670,616,629 miles per hour (299,792,458 meters per second), and it is this high speed, together with the squared terms in the formulas, that explain why we don't usually notice the effects of relativity. The fastest human beings were the crew of the Apollo 10 spacecraft, who traveled at 24,791 miles per hour (1,083 meters per second) in 1969. This is less than 0.004 percent of the speed of light, which means that they and their capsule shortened by about 0.0000007 percent, and their watches and hearts and thoughts slowed down by about this same tiny amount.

The world's fastest men, Eugene Cernan, John Young, and Thomas Stafford. Behind them is the Saturn V rocket carrying the Apollo 10 capsule.

spacecraft had its own beacon, people on Earth would also see it flashing slower but you would not notice any change.

Geometry of spacetime
Three years later Hermann Minkowski, a German mathematician, found a new way to look at these changes, saying that, thanks to Einstein: "Henceforth space by itself, and time by itself, are doomed to fade away into mere shadows, and only a kind of union of the two will preserve an independent reality." In Minkowski's new geometry of space and time, the space-distances and times we measure really are shadow-like projections of a kind of union of space and time called spacetime. This does make sense of the way we actually experience objects. A soap

Hermann Minkowski devised the geometry of space and time.

The Geometry of Space and Time > 183

bubble is a good illustration. Just as we can say that it is an inch (or a centimeter) long, we can say that its existence is 10 seconds long as well. A person might occupy 3 cubic feet in space, and 90 years in time. On the other hand, it's not really possible to have an object that does not last for any time. So, the length of time for which an object lasts is as much a part of it as its length, width, or height.

Minkowski's geometry is based on the Pythagorean theorem, seen here in two and three dimensions.

Lengths and angles
If you look at a yard-long ruler, you rarely see it as one yard long; the length depends on the angle you view it at. The rules of projective geometry (see more, page 70) explain how these changes work. Could it be, Minkowski wondered, that there is an explanation here for why objects shrink according to the speed of the observer?

And as an angle opens to differ in length depending on the position of the people who look at it, if the end matter through a small angle, it will appear to lengthen according to some people (like A), and shorten according to others (like B).

Chakra Crystals

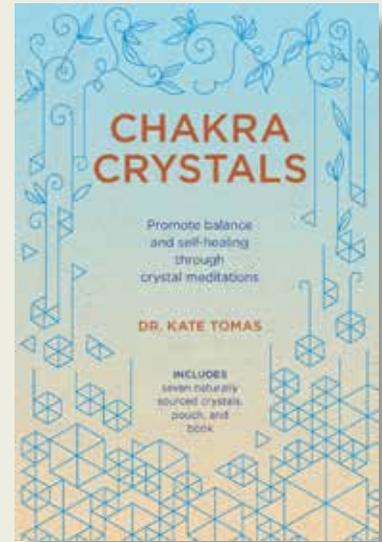
Heal Your Soul – Transform Your Life

Dr. Kate Tomas

Discover the ancient knowledge of chakra healing and restore balance to your mind, body, and spirit with this unique book and crystal set. Dr. Kate Tomas, a trained psychic and master magickal energy strategist, shows you how to have a more fulfilling life through the power of meditation-based crystal healing.

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Size: Box w/ drawer 5.25 x 7.75 Book: 5 x 7.25

Illustrations: 40 b/w

Subject: Mind, Body, & Spirit/Crystals

Retail price: \$24.95 US



THE LOCATION OF THE CHAKRAS

Crown chakra

Brow chakra

Throat chakra

Heart chakra

Solar plexus chakra

Sacral chakra

Base chakra

Sodalite
Brow chakra



Green Quartz
Heart chakra



Carnelian
Sacral chakra



Clear Quartz
Crown chakra



Blue Quartz
Throat chakra



Yellow Jasper
Solar Plexus chakra



Black Obsidian
Base chakra



Dr Kate Tomas is a high-profile crystal therapist and professional intuitive who works with corporate and private clients both in the UK and the US. Kate holds an MA in Cosmology and Divination, and her work has been featured in a number of UK publications including *Vogue*, *The Daily Mail* and *Prediction* magazine. Visit her website at: katetomas.com

Harness the transforming power of crystals

• HOW CRYSTALS WORK •

It is important to understand a little about each of the seven major chakras. In the text that follows you will find details of each chakra, the energy they govern, and their corresponding physical influences.

The base chakra

EARTH • PHYSICAL IDENTITY • SURVIVAL • BASIC INSTINCTS

Located at the base of the spine, this chakra is our energetic foundation. It is here that we can connect to the earth and feel grounded and safe. Through working with the base chakra, we can stabilize our energy and enjoy a good healthy relationship with our physical body.

The base chakra is associated with all things physical and practical. This energy center needs to be working well and in balance for us to have great physical health, financial prosperity, and security. People who are considered to be down-to-earth have strong, balanced base chakras. The color associated with the base chakra is red, a vibrant, strong color. Red has the longest wavelength and the slowest vibration of all colors in the visible spectrum.

It is very important to have a balanced and open base chakra, especially when working with the energy of crystals and meditating, because our link to the earth through this chakra provides a strong foundation for our spiritual growth. It may be useful to imagine human energy as the branches and roots of a tree. A tree can grow only as tall as its roots can grow down. A tree's roots usually extend as far underground as the branches spread in the crown. If we were able to see a full-grown tree with its roots exposed, we would perceive that what we see above ground is reflected almost exactly below.

Like the roots of a tree, the base chakra anchors us in the physical world, making us feel grounded. By being fully connected to the real

• THE BASE CHAKRA •

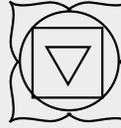
world and the earth, our energetic roots absorb energy. If our base chakra is not fully clear, balanced, and clean, then we will be restricted in how much we can develop our other chakras. For this reason, it is important to recognize the base chakra as the gateway to unlocking the energy and potential of all the other chakras. Each chakra is associated with different parts of the physical body, and the base chakra is connected with the parts that support ourselves—our legs, bones, and



28

29

The Base Chakra



• Crystal •
BLACK OBSIDIAN

Set aside a particular time to practice this meditation when you know you will not be disturbed. Get comfortable and make sure that the room in which you are going to be meditating is warm enough. Prop yourself up on cushions, if necessary, or sit in a chair that supports your body. Select the crystal you are going to be meditating with, in this case black obsidian, and hold it gently in whichever hand feels most comfortable. You are now ready to begin.



66

The Sacral Chakra



• Crystal •
CARNELIAN

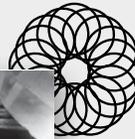
Set aside a particular time to practice this meditation when you know you will not be disturbed. Get comfortable and make sure that the room in which you are going to be meditating is warm enough. Prop yourself up on cushions, if necessary, or sit in a chair that supports your body. Select the crystal you are going to be meditating with, in this case carnelian, and hold it gently in whichever hand feels most comfortable. You are now ready to begin.

74



A great introduction to the seven chakra crystals. Easy to understand and follow!

The Crown Chakra



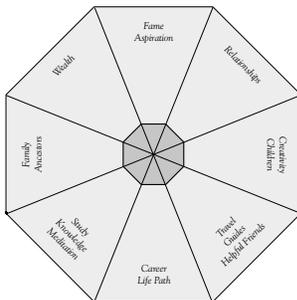
• Crystal •
CLEAR QUARTZ

Set aside a particular time to practice this meditation when you know you will not be disturbed. Get comfortable and make sure that the room in which you are going to be meditating is warm enough. Prop yourself up on cushions, if necessary, or sit in a chair that supports your body. Select the crystal you are going to be meditating with, in this case clear quartz, and hold it gently in whichever hand feels most comfortable. You are now ready to begin.

114

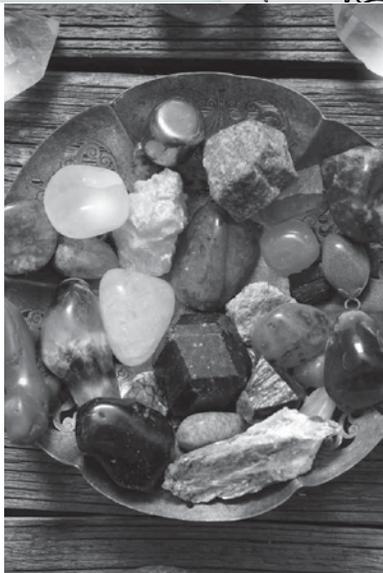


• GOING FARTHER •



You can identify which crystal is the best one to place in each area from what we have learned about their healing properties. For example, rose quartz is a good crystal to place in your relationships corner, because it is the crystal of love. Likewise, clear quartz is an amplifier of energy as well as a crystal that encourages and supports spiritual growth, so it could be placed as an amplifying grid in the wealth area, or as a single crystal in the spiritual growth area.

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The Cup of Destiny

A traditional fortune-teller's cup and saucer plus illustrated book of interpretations

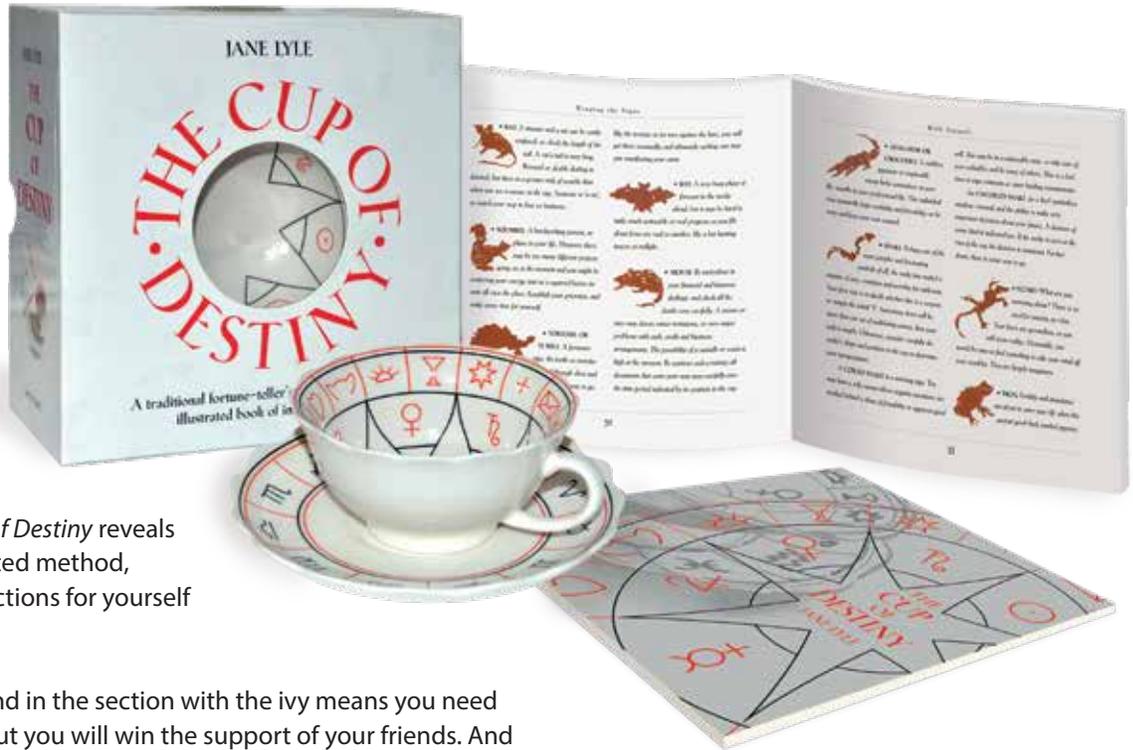
Jane Lyle

With this bestselling kit, which has more than 200,000 copies in print, learn to read the future using an Edwardian-style cup and saucer.

The ancient art of reading tea leaves or coffee grounds is made easy with this book and beautifully designed cup and saucer, based on an original Edwardian design. *The Cup of Destiny* reveals the secrets of this time-trusted method, allowing you to make predictions for yourself and your friends.

For example, tea leaves found in the section with the ivy means you need endurance and faith now, but you will win the support of your friends. And leaves found in the heart near the rim of the cup means that love is not far away.

Why not turn the kettle on now and start your first reading?



ISBN: 978-1-62795-001-5

Format: Paperback + facsimile Edwardian cup and saucer + positioning cloth with handy tip sheet of the most important symbols and meanings

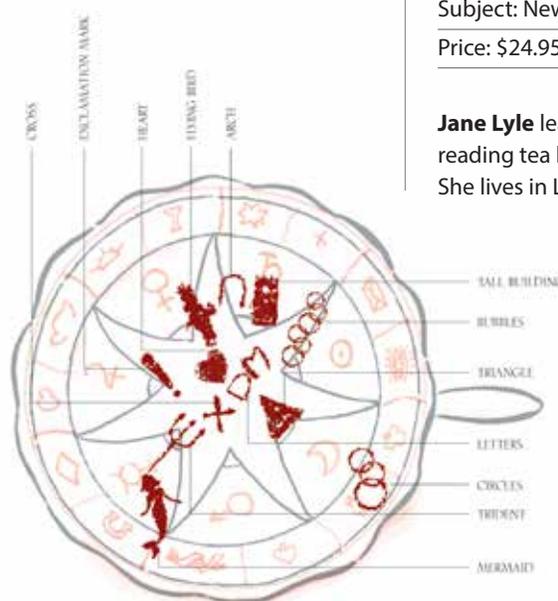
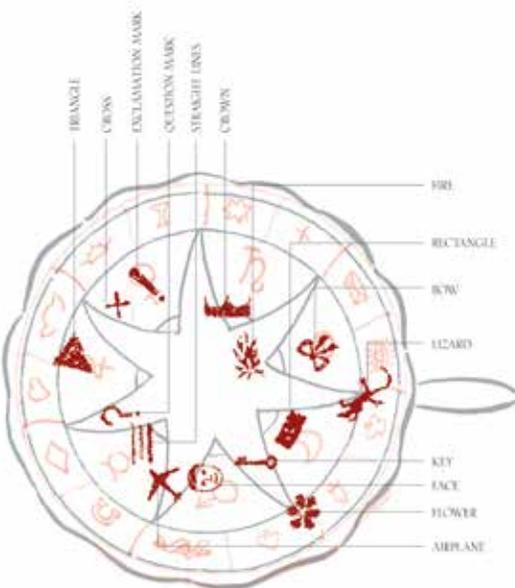
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Subject: New Age

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Jane Lyle learned the traditional art of reading tea leaves from her grandmother. She lives in London.

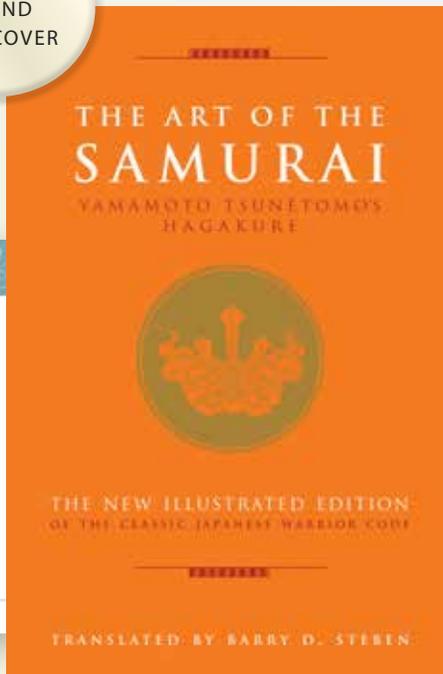


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Yamamoto Tsunetomo's
Hagakure

Translated by Barry D. Steben

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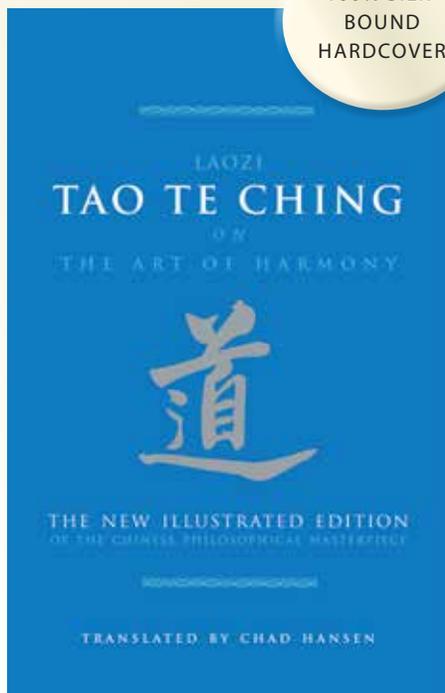
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Yamamoto Tsunetomo (June 11, 1659 – November 30, 1719), spent 30 years as a samurai serving the lord Nabeshima Mitsushige in the Saga Domain, Hizen Province, Japan.

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The New Illustrated Edition
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Laozi / Translated by Chad Hansen

In 81 verses written in 6th century BC, the Chinese sage Laozi teaches readers how to live a life with integrity and balance. A contemporary of Confucius and the founder of Taoism, Laozi's writings are strikingly relevant today. Among his lessons in self-awareness are that flexibility and suppleness are superior to rigidity and strength; and that self-absorption and self-importance are vain and self-destructive. This beautiful edition of one of the world's greatest works is an ideal guide to a more mindful life.

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Chad Hansen, a specialist in ancient Chinese thought, is Professor in Chinese Philosophy at the Centre of Asian Studies at the University of Hong Kong.



What Makes You Happy?

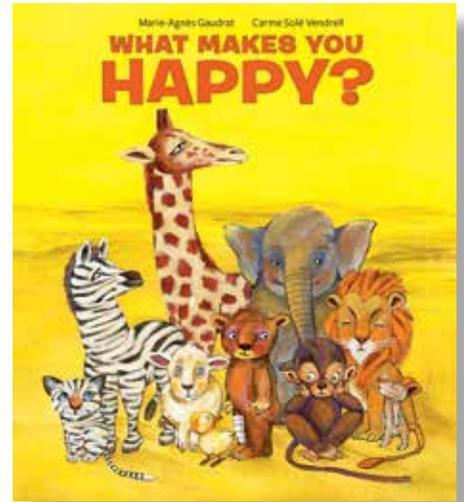
Marie-Agnès Gaudrat and Carme Solé Vendrell

“What Makes You Happy? is one of my favorite books of 2018. Thank you for publishing it!”

—Colleen Kammer, Bookseller, Book Beat Oak Park, Michigan

A bestseller at a new low price, *What Makes You Happy?* is both a joyous and significant invitation for adults and children to explore together what is truly important in life.

Thirteen brilliantly painted scenarios and clever gatefolds enable a parent or adult to enter into a conversation with a child about what is important in a little one’s life. Each scene provides plenty of conversational opportunities to discuss how empathy, truthfulness, honesty and community can contribute to personal happiness. *What Makes You Happy?* works both on a one-to-one and in a classroom setting.



ISBN: 978-1-62795-121-0

Format: Hardcover w/ 13 gatefolded stories to share, ponder, and discuss

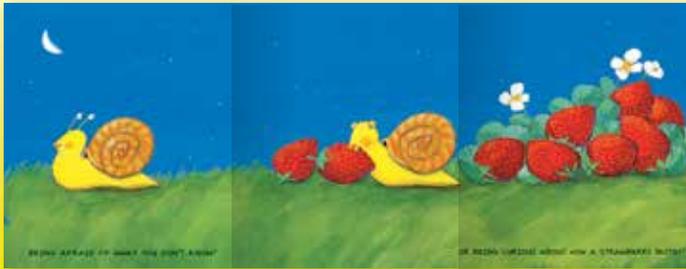
Extent: 60 pp

Size: 10 x 11

Illustrations: color throughout

Subject: Juvenile Fiction / Philosophy

Price: \$16.95 US New lower price!



OH OH
WHAT DID THE SNAIL SEE?
HE LOOKS WORKEED!



IT AS FOR ME,
I DON'T LIKE BEING PERCHED UP THERE AT ALL!



WELL FROM THAT WOULD BE TO BE FOR YOU

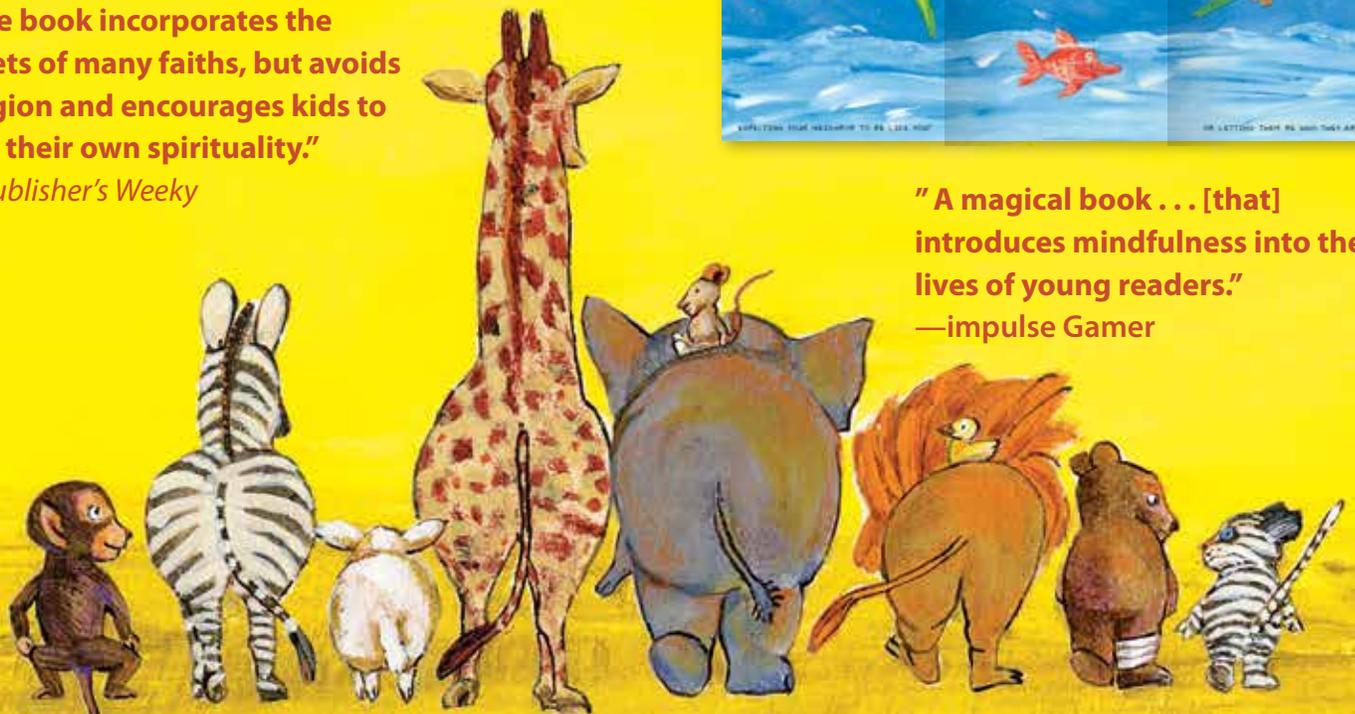
OR LETTING THEM BE WITH THEM ARE!

“The book incorporates the tenets of many faiths, but avoids religion and encourages kids to find their own spirituality.”

—*Publisher’s Weekly*

“A magical book . . . [that] introduces mindfulness into the lives of young readers.”

—*impulse Gamer*



The Secret Language of Trees

Fifty of the Most Important Tree Species Revealed

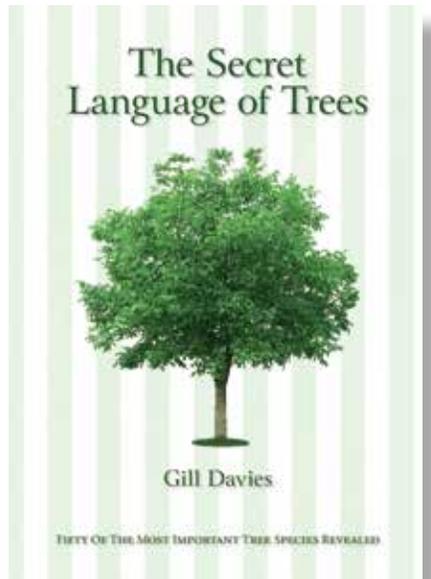
Gill Davies

While trees are all around us, they affect human lives in surprising ways.

Trees are essential to human life in more ways than commonly assumed. Beyond providing wood and charcoal for homes, latex and dyes for our clothes, fruits and nuts for our food, or simply providing a shady place to rest, trees also provide the world our most essential vital resource: oxygen. In this revealing book, you'll learn how trees provide refuge for many animal species; and their bark, roots, leaves, flowers, fruits or seeds offer many remedies to human ailments.

This guide to fifty of the most important tree species details their history and their practical and medicinal uses, was well as their symbols and the legends associated with them.

- ▶ **Habitat**
- ▶ **History**
- ▶ **Meanings**
- ▶ **Secrets and special associations**
- ▶ **Intriguing information**



ISBN: 978-1-62795-134-0

Format: Hardcover

Extent: 152 pp

Size: 5.78 x 8

Subject: Gardening

Price: \$14.95 US / CAN

Maple

MOST MAPLES trees grow to about 10–45 meters (33–148 feet). Many deciduous trees, they blossom with green, yellow, orange or red flowers in late winter or early spring – around the time the leaves appear – and several species make a great floralized with nectar and pollen much appreciated by bees. With a range of colorful leaves, in general all maples are renowned for their glorious autumn show. Norway maple, silver maple, Japanese maple and red maple are especially popular.

LATIN NAME: Acer

HABITAT: Most of all 120 species are native to Asia, with a few in Europe, northern Africa, and North America. This tree has been introduced to the Southern Hemisphere.

MEANINGS: Maple was first collected and used by indigenous North Americans and then adopted by European settlers who regarded it as a natural production.

INTRIGUING INFORMATION: The original form of maple syrup was made by boiling down the sap of the tree. During World War II the US Army developed a synthetic maple based on the maple tree.

SECRETS AND SPECIAL ASSOCIATIONS: It is the national tree of Canada and the United States of America. It is also the national tree of the Czech Republic and the United States of America. It is also the national tree of the Czech Republic and the United States of America.

Order of Libanus

THIS MAJESTIC, evergreen conifer can stretch upward to 40 meters (130 feet). It has blackish-brown, cracked bark with near ridges and slightly hairy twigs. The young cones is conical, becoming broader as the year pass by. Needles have spiral arrangement along the stem and clusters. The tree produces cones after some forty years but growth becomes extremely slow after twenty. It flowers in autumn; male cones appear in early September and their female counterparts by the end of that month. Cedar was used for the ships and temples of the ancient Egyptians while its resin served in mummification. There are several other cedars including *C. atlantica* which is sacred to Hindus.

LATIN NAME: Cedrus libani

HABITAT: Native to eastern Mediterranean Libanus (Lebanon) and Asia Minor. It has been widely introduced to other parts of the world, especially in the tropics and subtropics.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

INTRIGUING INFORMATION: The tree has been used for centuries as a source of wood for building and as a source of resin for medicine and incense.

Small Trees and Shrubs

Bambusa nana is one of the largest members of the grass family. All such trees, shrubs, and temperate climates, especially in the Asia-Pacific region. They include the world's fastest growing plants that can stretch up 90 centimeters (30 inches) within a day. Its compressive and tensile strengths are greater than concrete and steel. Bamboo shoots are enjoyed in Asian dishes. Other creatures that eat bamboo include rats, chipmunks, elephants, gorillas, golden bamboo leopards and giant pandas.

LATIN NAME: Bambusa nana

HABITAT: Native to southern Europe and Western Asia, India, Pakistan and the USA – above the equator.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

INTRIGUING INFORMATION: The tree has been used for centuries as a source of wood for building and as a source of resin for medicine and incense.

Jacaranda

THIS FAST-GROWING, elegant tree has soft, green foliage and large racemes of lavender, funnel- or bell-shaped flowers that completely and gloriously cover its canopy in a show that may last for some two months. This explosion of color is followed by the ground turning blue as the flowers drift down. Soon thick, curved seed pods develop that contain flat, winged seeds – all these glories followed by golden leaves in winter. It enjoys grasslands, wooded areas and riverbanks, but, if introduced to an area, it does, overgrowing crops may spread over other native plants. It is also known as green sheep tree, black goat, Brazilian rosewood, blue trumpet tree or fern tree.

LATIN NAME: Jacaranda mimosifolia

HABITAT: Native to South America, especially in the tropical and subtropical regions of Brazil, Colombia, Venezuela, Ecuador, Peru, Bolivia, Paraguay, Uruguay, Chile, Argentina, and Uruguay.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

INTRIGUING INFORMATION: The tree has been used for centuries as a source of wood for building and as a source of resin for medicine and incense.

Corvis zilligianus Judas tree

of Judah (cherry) trees in Kyoto's imperial court. Poets honored the delicate flowers, which were seen as a metaphor for ephemeral life, luminous and inspiring yet over all so quickly. Today in Japan there are still picnic and feasts, sake drinking and night festivals by the colorful paper lanterns to celebrate the vibrant season.

LATIN NAME: Corvis zilligianus

HABITAT: Native to southern Europe and Western Asia, India, Pakistan and the USA – above the equator.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

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Autumn (Fall)

As children collect the last of the blackberries, huckleberries and chestnuts, creatures such as squirrels, wood mice and jays also gather their winter stores and add to their nests for autumn. The days grow colder and shorter, while leaves create less chlorophyll and so take on their glorious autumnal glows and many birds before migrating from the trees. Suddenly there is a quiet over for animals as birds from predators. Autumn trees, colorful and hospitable continue to bloom in the forest while, try, which flowers in the rain, provide a valuable source of nectar for some insects from their blossoms. Birds collect their seeds, many are to migrate. Deer sign and buds develop and the first rain falls. Meanwhile, although ferns grow all year round, generally autumn is the best time to discover an impressive array of mushrooms and woodlands in the forest. Cobwebs glisten with raindrops or dew as mist settles over the woodlands, the low angle of the sun streaming through its shafts – followed by spectacular sunsets, large moons and night stars that seem extra bright above the trees.

Winter

Hibernation food through the tree cells to prevent winter dehydration as they are also infused with compounds that help prevent their freezing. Frost highlights the intricate patterns of bare branches or swallows of evergreen needles. Night owls continue to swoop on canopy prey but more busy creatures – hedgehogs, dormice, bats and bees – are hibernating. Foraging voles, shrews, mice, mice, mice, hedgehogs and deer however, still leave their tracks on fresh snow. This is the perfect

Maple

MOST MAPLES trees grow to about 10–45 meters (33–148 feet). Many deciduous trees, they blossom with green, yellow, orange or red flowers in late winter or early spring – around the time the leaves appear – and several species make a great floralized with nectar and pollen much appreciated by bees. With a range of colorful leaves, in general all maples are renowned for their glorious autumn show. Norway maple, silver maple, Japanese maple and red maple are especially popular.

LATIN NAME: Acer

HABITAT: Most of all 120 species are native to Asia, with a few in Europe, northern Africa, and North America. This tree has been introduced to the Southern Hemisphere.

MEANINGS: Maple was first collected and used by indigenous North Americans and then adopted by European settlers who regarded it as a natural production.

INTRIGUING INFORMATION: The original form of maple syrup was made by boiling down the sap of the tree. During World War II the US Army developed a synthetic maple based on the maple tree.

SECRETS AND SPECIAL ASSOCIATIONS: It is the national tree of Canada and the United States of America. It is also the national tree of the Czech Republic and the United States of America.

Order of Libanus

THIS MAJESTIC, evergreen conifer can stretch upward to 40 meters (130 feet). It has blackish-brown, cracked bark with near ridges and slightly hairy twigs. The young cones is conical, becoming broader as the year pass by. Needles have spiral arrangement along the stem and clusters. The tree produces cones after some forty years but growth becomes extremely slow after twenty. It flowers in autumn; male cones appear in early September and their female counterparts by the end of that month. Cedar was used for the ships and temples of the ancient Egyptians while its resin served in mummification. There are several other cedars including *C. atlantica* which is sacred to Hindus.

LATIN NAME: Cedrus libani

HABITAT: Native to eastern Mediterranean Libanus (Lebanon) and Asia Minor. It has been widely introduced to other parts of the world, especially in the tropics and subtropics.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

INTRIGUING INFORMATION: The tree has been used for centuries as a source of wood for building and as a source of resin for medicine and incense.

Small Trees and Shrubs

Bambusa nana is one of the largest members of the grass family. All such trees, shrubs, and temperate climates, especially in the Asia-Pacific region. They include the world's fastest growing plants that can stretch up 90 centimeters (30 inches) within a day. Its compressive and tensile strengths are greater than concrete and steel. Bamboo shoots are enjoyed in Asian dishes. Other creatures that eat bamboo include rats, chipmunks, elephants, gorillas, golden bamboo leopards and giant pandas.

LATIN NAME: Bambusa nana

HABITAT: Native to southern Europe and Western Asia, India, Pakistan and the USA – above the equator.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

INTRIGUING INFORMATION: The tree has been used for centuries as a source of wood for building and as a source of resin for medicine and incense.

Jacaranda

THIS FAST-GROWING, elegant tree has soft, green foliage and large racemes of lavender, funnel- or bell-shaped flowers that completely and gloriously cover its canopy in a show that may last for some two months. This explosion of color is followed by the ground turning blue as the flowers drift down. Soon thick, curved seed pods develop that contain flat, winged seeds – all these glories followed by golden leaves in winter. It enjoys grasslands, wooded areas and riverbanks, but, if introduced to an area, it does, overgrowing crops may spread over other native plants. It is also known as green sheep tree, black goat, Brazilian rosewood, blue trumpet tree or fern tree.

LATIN NAME: Jacaranda mimosifolia

HABITAT: Native to South America, especially in the tropical and subtropical regions of Brazil, Colombia, Venezuela, Ecuador, Peru, Bolivia, Paraguay, Uruguay, Chile, Argentina, and Uruguay.

MEANINGS: It is a symbol of strength and endurance. It is also a symbol of peace and harmony.

INTRIGUING INFORMATION: The tree has been used for centuries as a source of wood for building and as a source of resin for medicine and incense.

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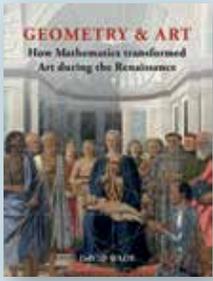
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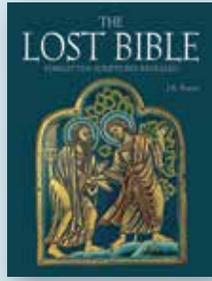
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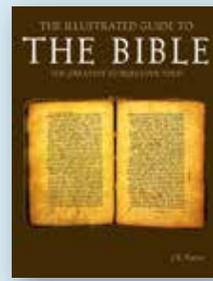
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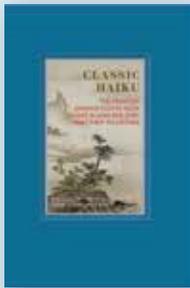
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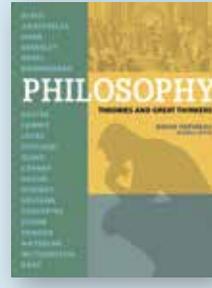
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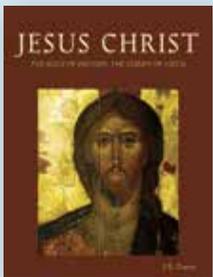
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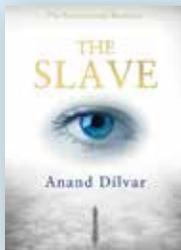
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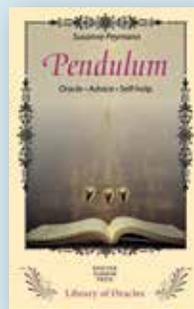
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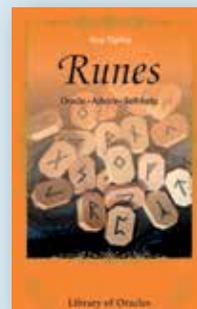
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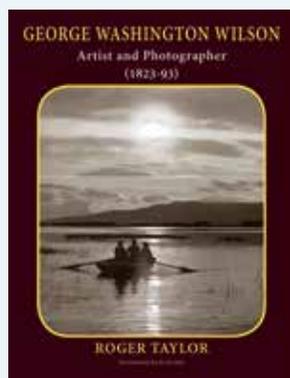


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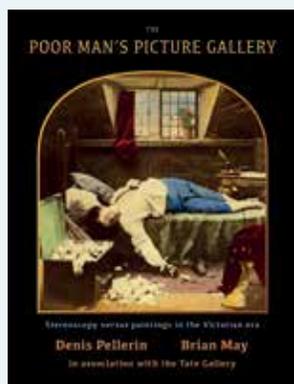


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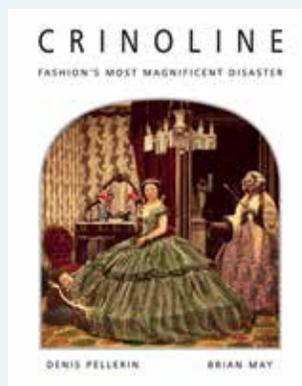
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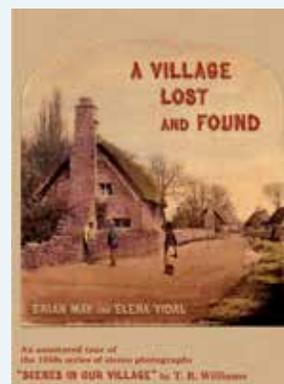
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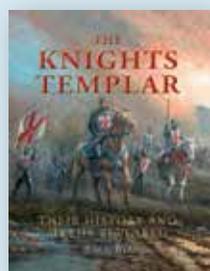
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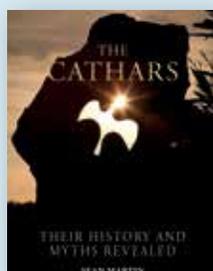
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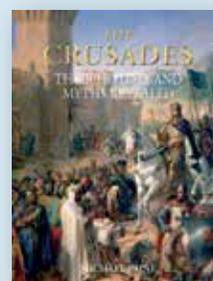
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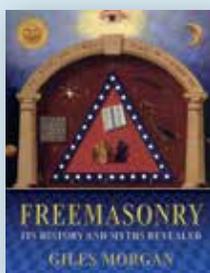
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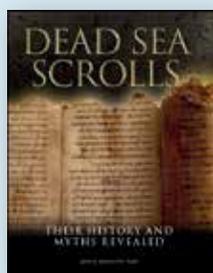
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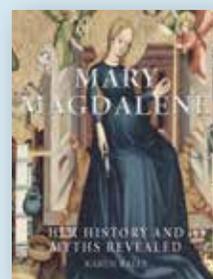
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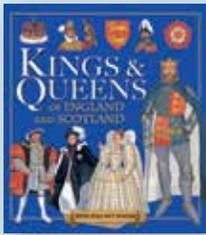


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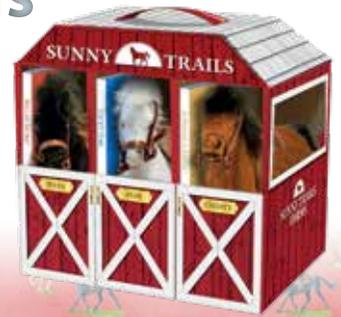


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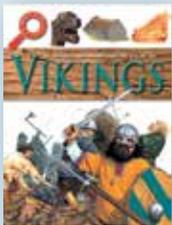
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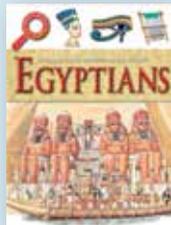
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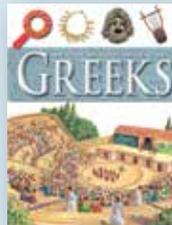
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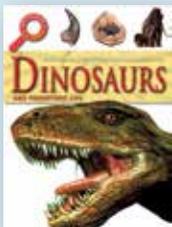
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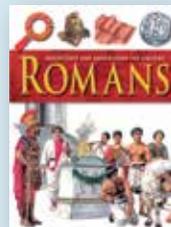
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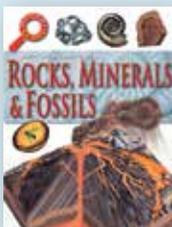
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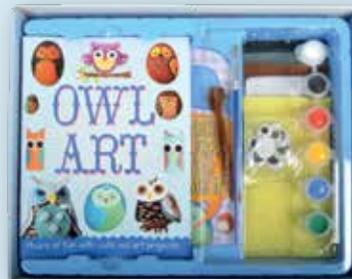


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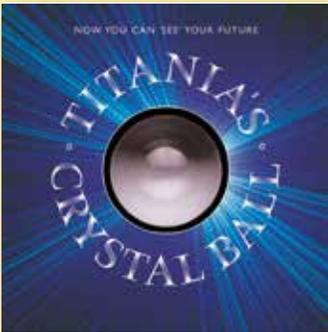
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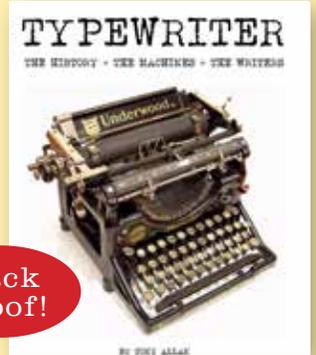


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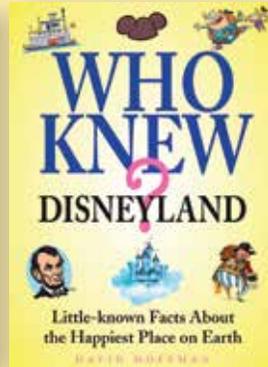
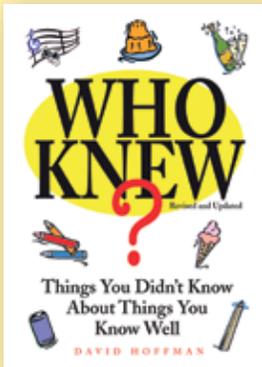


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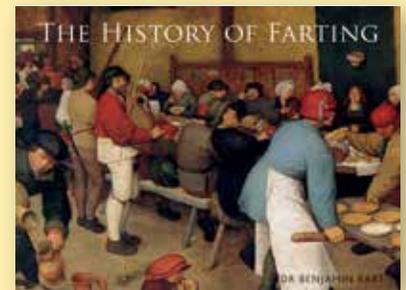
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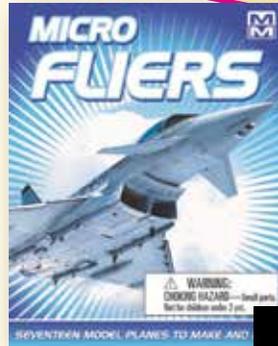


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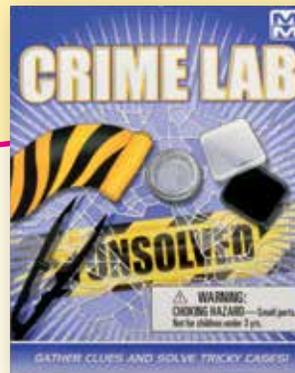
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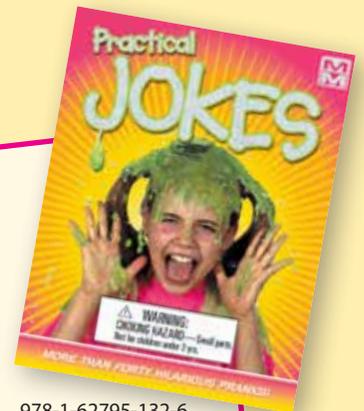
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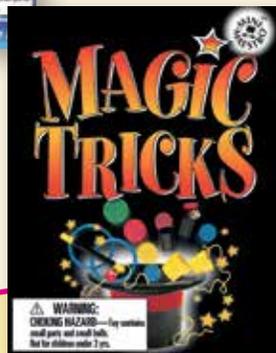
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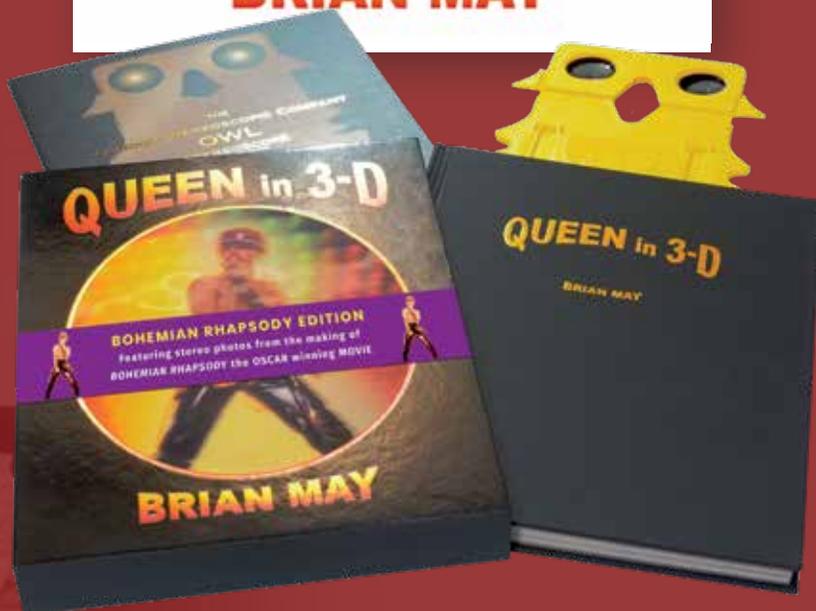
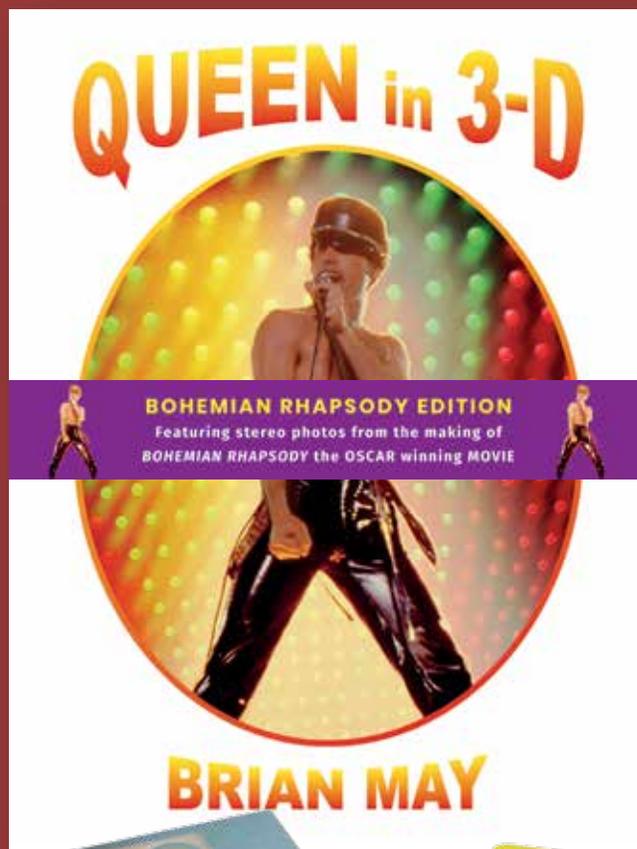
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