

UnEarthed

ISSUE N°6 FALL 2020



secrets

UNIVERSITY OF
PENNSYLVANIA



Letter from the Editors

Dear Readers of UnEarthed,

On behalf of the executive board and our student-led team of writers, editors, and designers, we are incredibly excited to bring you SECRETS, our sixth issue of UnEarthed. While this amazing and passionate organization will surely go on for a long time to come, this is the last issue with some of our original founding members, and so it is filled with extra special energy for a goodbye to our readers. As always, we chose a theme that would have the most engaging and stimulating topics, so we are very excited to present this magazine.

When we think about secrets, we think about all the hidden topics and mysteries that someone might not usually come across. With every issue of UnEarthed, everything is about discovery, and as you look through the articles, we hope you will be taking in new and interesting facts about the world, in a variety of different fields. From the intrigue of Area 51 to creatures of the deep sea to Agatha Christie's mystery novels, these are cool subjects that remain puzzling to real scientists and investigators. As you journey through these articles, perhaps you will find a topic you have a particular interest in and uncover even more secrets!

It was a joy for us to put together this issue of UnEarthed for you. Be on the lookout twice every year to learn more and more about our world with each issue we put out, always with a different theme! And if twice every year sounds like too long of a wait, amazing news: UnEarthed has a digital branch too! Visit www.unearthedpenn.com to explore digital-only articles, fun quizzes, and informative videos—all uniquely made by our amazing Digital team especially for you! Also, all of our print magazines are uploaded to our website, so if you missed previous issues you can read them online.

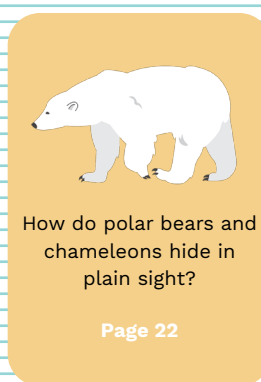
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Ryan Foo
EDITOR IN CHIEF

Chloe Gong
MANAGING EDITOR



The horned lizard can squirt blood out of its eye!
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PORTRAIT MODE



Writing by **EMILY SHENG**
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Have you ever tried taking photos of your friends using Portrait mode? Portrait mode is when the camera focuses on one subject closest to you in the foreground and blurs out the surrounding background into a colorful haze. This is the perfect way to take sharp photos because your friend's face will really pop out! But how does Portrait mode work? What allows the camera to take photos with a blurred background?

iPhones and other smartphones have special software that edits the depth effect using the dual lens camera.¹ In other words, there is a computer code inside the phone that measures the distance of the objects in the photo and blurs the objects far away from the camera.²

In traditional cameras, like the bulky digital single-lens reflex cameras (DSLRs), the portrait mode effect is created by the opening of the lens itself, called aperture, and not a software code. A camera is like a human eye. The aperture of the camera is like the pupil. When the pupil narrows in bright light, less light enters the eye. On the other hand, when the pupil dilates or widens in dark conditions, more light enters the eye. The portrait effect is created by using a wide aperture so more light enters and exposes the camera's sensor.

Aperture is measured in f-stops usually ranging from f/2 to f/22 in the average camera. f/2 is a very large aperture, and f/22 is a very small aperture. Just like with fractions, the larger the denominator, the smaller the actual value.

Using a large aperture creates the portrait mode effect by decreasing the depth of field, the distance between the closest and furthest objects in sharp focus. With a shallow depth of field, the camera only focuses on the subject just in front of the lens! Another name for this artistic, out-of-focus image is bokeh, which comes from the Japanese word for blur, *boke*.³ The bokeh effect is common when taking photos up close of water droplets on flowers or street lights at night.

Now going back to the iPhone, you can also change the aperture on the iPhone in Portrait mode.⁴ If your smartphone does not have a built-in manual mode for taking photos, you can always look in the Google Play Store.⁵ On the iPhone, there is automatically a little italicized f in the upper right corner when in Portrait Mode. This is the same f/stop system for adjusting the aperture in DSLR cameras! You can then choose to use a very small aperture or a very large aperture with the slider bar. The smartphone is able to use software to stimulate opening and closing the aperture exposure.

So the next time you take a photo, remember that you can even adjust the amount of blurriness in Portrait mode by changing the aperture to make your friends and pets really pop!



King Tut's Curse of Death?

Writing by CAROLYN WANG • Editing by EMILY SHENG

You may know King Tut as the ancient Egyptian boy king who was mummified and laid to rest in a gold mask and blue-striped headdress. But is it true that he put a secret curse on everyone who was to disturb his eternal slumber?

Tutankhamen, better known as King Tut, was an Egyptian pharaoh who ruled the 18th Egyptian dynasty from approximately 1332 to 1323 B.C.E. He inherited the throne from his father at the age of nine and ruled for less than a decade before his death at age 19. Shortly after his death, his body was wrapped and preserved in an ornate sarcophagus and later buried with a collection of items that were intended to aid him in the afterlife.

In 1922, more than three millennia later, British archaeologist Howard Carter discovered King Tut's undisturbed tomb in the Valley of the Kings, a burial site for many Egyptian pharaohs and nobles. A year after the initial discovery, Howard and his patron, Lord Carnarvon, along with their team of archeologists, completed a three-month dig to excavate King Tut's sarcophagus and the thousands of artifacts buried along with it. Items ranging from lavish gold shields and animal skins to wine, meat, and vegetables were discovered in the tomb.

After the archaeologists opened King Tut's coffin, strange events began to occur. Many people on or associated with the excavation team reportedly died early deaths by ways of insect bites, heart failure, and even madness.

Newspapers and television popularized this phenomenon as “the curse of the pharaohs.” The media attributed every strange event that befell the archeological team to the bad luck which the ancient Egyptians allegedly wished upon anyone who would unseal King Tut's tomb. Is there truth in this claim? Were the archaeologists cursed?

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Graphics from Vecteezy.com

In actuality, the members of the excavation team died at an average age of 73, which is higher than the average life expectancy of the time period. There were only a select few who died early, unexplainable deaths. Research suggests that a possible explanation is pathogenic bacteria (Staphylococcus and Pseudomonas) and molds, a lot of which were likely brought on by stored food products, that grew in the tomb over thousands of years. These disease-inducing bacteria and molds cause all kinds of reactions in humans, ranging from congestion to bleeding of the lungs. Air samples taken from inside the sarcophagus showed high levels of ammonia gas, formaldehyde, and hydrogen sulphide, which can cause death. Howard Carter and his team of archaeologists were digging inside the tomb for three months, so they were most likely exposed to an unhealthy amount of these bacteria, molds, and toxins. Unfortunately, this exposure could have been a major factor in their untimely deaths.

“The curse of the pharaohs” was once a colossal mystery, but now, not so much.



Design by BRANDON LI

CREEPY CAVE CREATURES

Writing by RICHA PATEL • Editing by LUKE ELEGANT • Design by AMY GUO

Caves are passageways underneath the earth that can be found all over the world: near volcanoes, far beneath the sea, in the mountains, and in many more places. They take almost 100,000 years to form big enough to fit a human! If you were to take a trip through a random above ground cave now, though, chances are it would be thousands of feet long—and you would find hundreds of different types of animals waiting in the shadows.

SALAMANDERS

Salamanders are one of the first animals you will see after stepping into the cave. They live in the first few meters in a dimly lit area that's called the twilight zone. These fiery, orangey-red creatures form one of the few bright spots within a cave. Only search for them during the nighttime, because cave salamanders are nocturnal creatures and will spend the daytime sleeping under rocks and logs.¹

BATS

Look at the cave ceiling during the day, and you will find bats hanging upside-down from the ceiling, fast asleep. Bats are almost blind and surprisingly do not use their eyes to see. Instead, they use a technique called echolocation, where they send out sound waves and listen to their echoes to locate objects.² Come to the cave at sunset, and you will catch a glimpse of the bat colony fluttering around and preparing for their night's hunt.

YELLOW-RED RAT SNAKES

Another creature in the cave at sunset is the yellow-red rat snake, a reptile slithering out of cracks in the cave walls and snatching bats right out of the air. These snakes officially are said to be 6 feet long—but people have even spotted 8-foot long rat snakes!³

SPIDERS

Glance down at your feet, and you might catch one of the 1000 different species of cave-dwelling spiders. These spiders do not spin webs to catch their prey. Instead, cave-dwelling spiders use their giant legs to chase down their food to hunt it. These legs may measure one foot long! However, these hunts may be hard to see, since cave spiders can go weeks without eating.⁴

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OLM

After traveling through the dark tunnels, if you spot an olm, it is a sign that you have officially entered the deepest part of a cave. The olm is known as a “baby dragon” for its snake-like and translucent body. The olm is the creature that never grows up; it keeps its baby gills for its entire 100-year life. Over millions of years, these creatures evolved to have chemo-, mechano-, and electroreceptors that give them super smell, super hearing, and the ability to sense electric and magnetic fields. It can actually hear sound wave vibrations in the water!⁵

FISH

The further that you weave through the cave's passages, the more water you may notice on the ground. The fish in this water are particularly unique. Not only are they blind, but they are also completely white. But just because they cannot see doesn't mean that they do not eat. These fish eat anything from dead animals to scavenged plants in front of them.⁶ Don't worry: they are only about 3.5 inches long, so their options are limited.

SNAILS

You have made it 3000 feet below the surface of the cave and found a species called Zospeum tholussum: a completely transparent snail. It has an entirely translucent shell and is only about 2mm. These snails only move a couple millimeters or centimeters every week — and that movement is just them going around in circles.⁷

Congratulations! You've made it past all of the creepy and amazing creatures that lie within the cave's depths.

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THEY CAN'T STOP ALL OF US

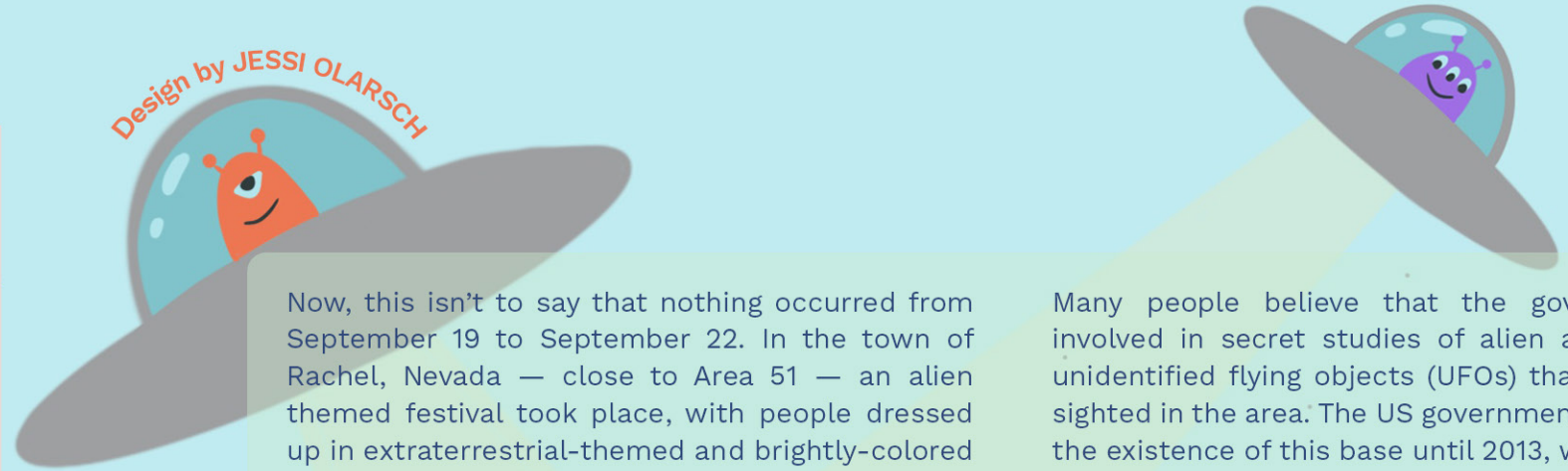
The Secrets of AREA 51 and Alien Life

Writing by DAVID TODARO

Editing by MICHELE MELINE

September 20, 2019. The day people across the nation agreed to raid Area 51 had finally come. Or so we thought... The word about the raid had first spread across social media, beginning on Facebook. The event was created by Matty Roberts on June 27, 2019 and was meant to be taken as a joke. However, it quickly spiraled out of control when millions of people marked themselves as “attending” the Area 51 raid, leading to serious coverage on other social media platforms. The popular slogan of this new Internet trend was “They can’t stop all of us,” and it quickly captured the attention of government officials who feared an uprising. The US government, seeing the amount of responses on Facebook, took special care in protecting the Area 51 base. Roberts was questioned, and he even publicly apologized for what he had meant as a joke, making sure to let all of his followers know that raiding Area 51 could lead to serious consequences. So, most of those who agreed to raid Area 51 remained absent that weekend.

Design by JESSI OLARSCH



Now, this isn't to say that nothing occurred from September 19 to September 22. In the town of Rachel, Nevada — close to Area 51 — an alien themed festival took place, with people dressed up in extraterrestrial-themed and brightly-colored outfits. Residents of Rachel, Nevada were worried that their town was going to be “raided” by alien conspiracists and meme-lovers. However, the turn-out was bearable as the festival never exceeded 3,000 people.² Only 10 arrests were made during the festival, and most of the attendees were families looking to have a good weekend.² The raid did not turn out to be what was expected by the millions of responses on Roberts' Facebook event. Nevertheless, it was a teachable moment, and it showed that some things are meant to be kept hidden from the general public.

Throughout history, Area 51 has been involved in a number of conspiracy theories. A conspiracy theory is a belief not proven to be true, but is spread about a particular organization with the idea that they are behind a specific phenomenon. Conspiracies about the US government have been formed about a number of mysteries beyond Area 51. Was the 1969 moon landing faked to beat Russia in the Space Race? Is there a cure for cancer that the government wants to hide? Conspiracy theories are being formed daily, and many of their followers are very passionate about their beliefs. Now that Area 51 has been identified as a popular conspiracy theory, what is it exactly (or what is it thought to be)?

Area 51 is a site located at Groom Lake, Nevada, and was acquired by the US government back in 1955.¹ There has been much speculation surrounding what exactly happens inside the gated and guarded boundaries of Area 51.

Many people believe that the government is involved in secret studies of alien aircrafts and unidentified flying objects (UFOs) that have been sighted in the area. The US government has denied the existence of this base until 2013, when the CIA finally verified that it was in fact, property of the government.¹

And, it is documented in the Freedom of Information Act that the government used this base to test flight the U-2 spy planes during the middle of the 20th century.¹ These aircrafts were able to reach heights higher than most other planes at the time, which could explain how people could confuse them for possible UFO sightings. So, are the rumors true? Is the US government telling the truth, or did they use these stories to cover something up?

The media has been instrumental in the spread of the conspiracies behind Area 51. Beyond the raid that became a viral meme in 2019, the idea that aliens and alien artifacts are inside Area 51 has gained popularity through other mediums. Television shows such as Ancient Aliens on the History Channel have explored the secrets of Area 51 and human interactions. So, the idea that the government may be hiding something is not a new concept.

To this day, as far as we know, Area 51 is simply a US air force base where aircrafts of all sorts have been tested and weapons have been stored. But, is the government hiding more from us that they have yet to reveal? Is Area 51 a cover-up for a base that studies alien life? This is a topic that will not die out, especially as conspirists continue to draw conclusions about secrets withheld by the government. While the raid was a failure, people will only continue to predict and speculate until the truth behind Area 51 comes to light.

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Secret to the Sun

Nicolaus Copernicus

Writing by ROBIN HU Editing by SINAIA KEITH LANG

Ask anyone in the 1400s and they would tell you that the Earth was the center of the universe.¹ People truly believed that the Sun, planets, and all other stars were orbiting the Earth. This was called the Geocentric Model of the Universe.¹ However, ask anyone today and they will tell you the opposite, that the Earth is actually orbiting something else: the Sun! So what changed? How did we go from an Earth-centric belief to one completely different? It was actually the work of one key figure who uncovered the secret of the Sun: Nicolaus Copernicus.

Copernicus was a Polish astronomer born in 1473 who originally studied law and medicine in Italy.² After witnessing a lunar eclipse in Rome and drawing inspiration from ancient Greek theories about the movement of Earth, Copernicus decided to move back to Poland to continue his studies and feed his curiosity.³ In Poland, he began his renowned research in astronomy. He had an observatory built where he spent most of his time making observations and complex calculations about astronomical phenomena.² But at this time, the telescope had not been invented (and would not be invented for another 200 years), so Copernicus relied on the naked eye for all his observations.

After years of research, Copernicus eventually developed the Heliocentric Theory, which states that the Earth is not the center of the Universe, but that the center of the Universe is actually the Sun.⁴ He documented his proposal diligently and drafted proof after proof.

However, this line of thinking went against the long-held belief that both biblical scholars and the Catholic Church taught. Copernicus was a devout Catholic himself, so his theory was even more preposterous for someone like him!⁴ It was hard for many to believe that the Earth was moving in an orbit around the Sun, rather than being orbited by the planets and stars. After all, it isn't something that you can easily see. The Catholic Church went so far as to reject Copernicus's theory!⁴ Nevertheless, Copernicus detailed it in a handwritten book that he distributed only to his friends. It wasn't until two months before his death that the book was actually published.⁴ Even after Copernicus' death, his theory still generated lots of controversy. Two renowned scientists, Galileo Galilei and Giordano Bruno, were even punished for supporting Copernicus' theory, decades after Copernicus' death.⁴

Despite the initial disbelief, evidence supporting Copernicus's theory continued to grow. His theory was grounded in foundational physics and astronomy principles — it was hard to deny. After Copernicus's death, technological innovations allowed researchers to not only prove but build upon Copernicus's theory. Johannes Kepler studied planet orbits; Galileo used the newly-invented telescope to study the Sun's motion.⁵ These were all advances brought about as a result of the Copernican Revolution. Slowly but surely, each new discovery continued to prove the validity of Copernicus' theory. Thus, despite the initial controversy and disbelief, by the 1700s, scientists had finally come around and adopted the Heliocentric Theory. At last, the public was convinced: the Earth does in fact rotate around the Sun!

Copernicus forever changed people's view of the universe. He introduced the idea of a Sun-centered solar system, a principle that remains foundational to astronomical research and understanding today. Copernicus' role in challenging the status quo with fact-based scientific observation remains an inspiration to people all around the world for the potential of science in a greater understanding of the universe.

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Ravioli, Ravioli, Give Me the Formuoli

Writing by JULIA HALAS
Editing by ANJANA SRIKUMAR

From the Krabby Patty to Grandma's famous chicken noodle soup, secret recipes are all around us. But what's the point of keeping something that tastes so good such a secret? And what does the popularity of the secret recipe tell us about the act of cooking?

Picture this: Your family has been making and selling the most famous pasta sauce since you can remember. Something "top secret" that you put in the sauce makes it extremely delicious, and your whole town exclusively uses your family's sauce for their pasta dinners. People always ask you what the secret is, but your family keeps it heavily guarded.

Design by BRANDON LI



It's part of your family identity and allows you to have a successful business.

Now picture this: After hours and hours of effort, you have just composed the most beautiful piece of music. The music brings joy to those who listen, and you have become very proud of what you have created. So, when people ask you to divulge the different instruments and notes involved, you hesitate.

Cooking, like composing, is an art form. In making dishes, from new and old recipes, we are creating something where there once was nothing. These two examples explain why secret recipes are so popular: recipes become a source of pride for individuals and groups alike, and artists are eager to protect their art. But, the recipe can easily be shared and replicated. At this point, the artist has a decision to make. They must decide whether to keep those ingredients and cooking methods a secret or whether to share them. We can think of some classic examples surrounding both a decision to hide (think top-secret KFC recipe) or share recipes (tune in to FoodNetwork!).

But which is the "correct" decision? That's for you to decide! Get out the mixing bowl and apron, whip up a dish of your own, and decide how you feel about the secret recipe trend.

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Graphics from Vecteezy.com

The Ugly in the Beauty Industry

1. Animal testing

It is unfortunately common to test human beauty products on animals before they are used. The Humane Society International estimates that 100,000-200,000 animals are harmed or killed for cosmetics every year.¹ Today, cruelty-free makeup companies are becoming more and more popular for animal-loving consumers.

2. Toxins

Have you ever tried to read the ingredients on a bottle of shampoo or lotion? The names of the chemicals used in products like these might seem impossible to pronounce. Since the cosmetics industry in the US is not strictly regulated by the government, harmful chemicals can end up in products that we use. For example, formaldehyde, a probable carcinogen (meaning it can cause cancer), can be found in nail polish.² It's important to know what you are putting on your face, hair, and body!

3. Perception of beauty

Companies want to seem desirable in order to sell their products. Because of this, they may use seemingly perfect models to advertise their products. Advertisers will commonly use technology, such as Photoshop, to make the models in their pictures seem even more "pretty" to society. This digital editing of the human body creates a fake ideal of beauty.

4. Labor

Do you ever wonder what makes eyeshadow shimmer or what makes toothpaste look extra bright? It's a mineral called "mica" that is mined in India. Kids as young as five years old must crawl into small tunnels to collect the material because their families need to make money.³

5. False Advertising

Loopholes in laws will allow companies to market their products as "All Natural," "Additive Free," or even "Organic." However, sometimes this isn't necessarily true. In some cases, businesses have even created fake certificates to appeal to customers who value organic or cruelty free products.⁴

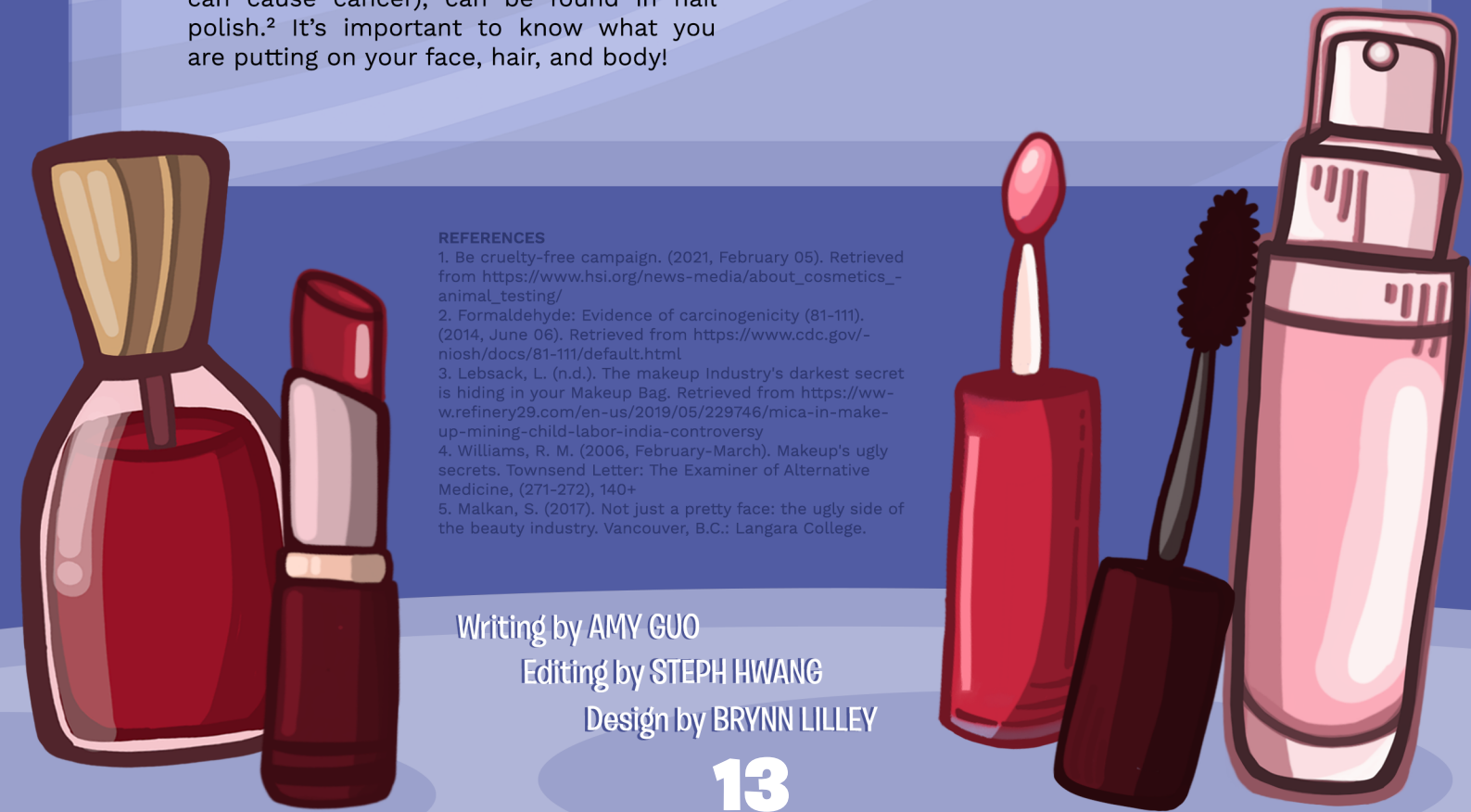
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Writing by AMY GUO

Editing by STEPH HWANG

Design by BRYNN LILLEY



HORNED LIZARDS' SPECIAL ATTACK

Writing by MOHAMAD HAZIM

Editing by PAIGE ORNER



When we think about special attacks, we usually think of Pokemon or the Power Rangers. But did you know that some real-life animals have special attacks too? Prey animals, which are species that are hunted by other, usually bigger, animals, have adapted some clever attacks to give them time to escape death. Perhaps the coolest of these special attacks belongs to the horned lizard. When all other defenses fail, the horned lizard can shoot blood out of its eyes to distract its predators!



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The horned lizard is a reptile that can be found in dry places across North America, including California, Texas, Southern Guatemala, and even Canada! These lizards are small, and most species are only around 5 inches long.¹ Their small size makes them an easy target for many of the other animals that live in the same habitats. In fact, the horned lizard is targeted by coyotes, wolves, hawks, and mice!¹

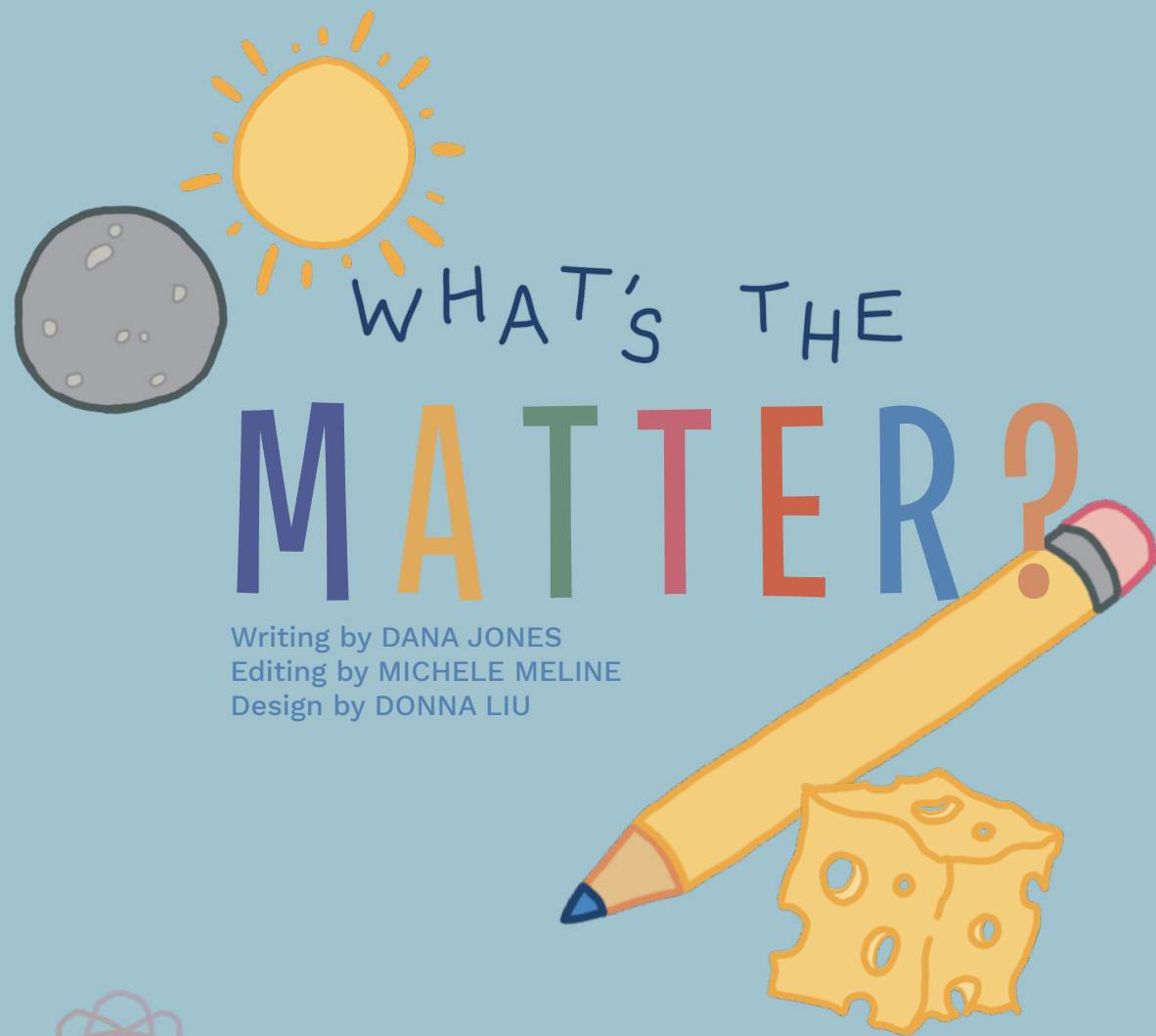


Luckily, the horned lizard has a few helpful tricks to deal with these predators. Shooting blood out of its eyes is usually a last resort. Instead, one of the horned lizard's main strategies is camouflage. Camouflage is a tactic that helps animals blend into their surroundings. The horned lizard's patterning and earthy color helps it blend into the rocks and dirt of its environment, camouflaging it from other animals.¹ The lizard is also good at standing still so that its predators do not notice sudden movements. Certain types of horned lizards also roll onto their backs when they are being targeted.¹ Some scientists believe this is the lizard playing dead, while others think there are yet unknown reasons for this strategy.¹

When these defense methods fail and the horned lizard is on the edge of death, it uses its most famous attack strategy. As the lizard is facing its predator, a small pocket under the lizard's eye fills with blood.¹ When it identifies the right moment, the lizard shoots the blood out of its eye toward the predator and retreats. This blood can reach as far as six feet away!¹ Interestingly, the horned lizard only uses this strategy when it is being targeted by big cats, wolves, and coyotes.¹ These animals find the lizard's blood to be bitter and are so disgusted that they might avoid pursuing the lizard altogether. This quick distraction is all the horned lizard needs to run away and live to see another day!



Design by ANGELA SONG



Writing by DANA JONES
Editing by MICHELE MELINE
Design by DONNA LIU

Your pencil eraser. Your fingers and toes. The cheese pizza you had for lunch. The sun and the moon, and all the stars. The air you breathe. Everything around you is comprised of matter, of protons and neutrons and electrons all bundled up into tiny atoms. You can't see them, but you know they're there. Scientists have proven it. Now, if everything around you is made up of matter, you might be inclined to think that everything in the universe is also made up of matter.

That's entirely untrue! In fact, normal matter, everything you can see and smell and touch and taste, actually makes up less than 5% of the entire universe.¹ How is that possible, you may ask? That is perhaps the universe's greatest secret, and one we have yet to figure out. Fortunately, we have quite a few interesting theories as to what exactly makes up the other 95%.

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DARK MATTER

The first of these theories is about dark matter, a strange and invisible substance that makes up 27% of the universe.¹ But if it's invisible, how do we know it's there? For one thing, scientists have observed that the stars and planets at the edges of rotating galaxies are orbiting about the center faster than they should be. Also, when scientists look deep into outer space, they often see strange optical illusions—rings or arcs of light with no clear source. Both of these phenomena can be explained by huge clouds of invisible matter known as “dark matter halos.”²

Although it has the word “matter” in its name, dark matter is nothing like normal matter. Not only is it invisible, but it does not interact with visible light or any other forms of radiation, meaning that it is impossible to measure with any of our current instruments. It also can't be antimatter—particles that have the opposite effects as normal matter—because physics predicts that when an antimatter particle comes into contact with a matter particle, the two will annihilate each other, leaving behind a signature that we have not yet observed. One possibility is that dark matter is actually a bunch of gigan-

tic galaxy-sized black holes. You can imagine a black hole like a whirlpool that sucks in anything that passes too close by. Its gravitational pull is so strong that nothing can escape once it has fallen in, not even light! Black holes do contain a lot of mass, and they would certainly be invisible given that light cannot escape. However, we can still observe them indirectly because of how they bend light around them, and, as of yet, we haven't observed any black holes that are close to the size of a galaxy.¹ So dark matter must be something else entirely.

The two most popular dark matter candidates today are MACHOs (Massive Compact Halo Objects) and WIMPs (Weakly-Interacting Massive Particles). MACHOs are small, dense balls made up of heavy elements that are hard to detect because of their size and because they don't emit light. WIMPs, meanwhile, represent a much stranger theory: they are exotic particles that don't interact with normal matter or light but still exert a gravitational pull.¹ However, neither candidate has been observed, so dark matter remains, for now, a mystery.

DARK ENERGY

The other 68% of the universe is made up of something even weirder: dark energy, a bizarre force that appears to repel gravity. Dark energy has an interesting origin story. For decades, scientists believed that the universe exploded into existence out of nothing and, although it has been expanding ever since, this expansion is slowing down such that eventually the universe will stop expanding entirely and then start to collapse inward, crushing everything that has existed or ever will exist into a single point in spacetime. Scary, right?

Fortunately for mankind, this theory isn't quite accurate. When scientists tried to measure the rate at which the universe's expansion was slowing down, they discovered that, in fact, the universe's expansion is speeding up. They were certainly puzzled, because the force of gravity is supposed to pull things together, not push them apart. The only way to explain this accelerating expansion would be to propose some kind of force that not only repels gravity, keeping the universe from collapsing in on itself, but that also grows stronger as time passes.²

This mysterious force has come to be known as dark energy. Unfortunately, we have no clue what it is. One theory suggests that dark energy is a property of empty space. Empty space is not actually “nothing,” and perhaps it possesses its own form of energy that grows stronger as more empty space is created. Another possibility is that dark energy is a fundamental force that fills all of space like a fluid and whose properties are the opposite of gravity's. A third possibility is that empty space is actually full of temporary “virtual” particles that blink in and out of existence. Yet another theory is that Albert Einstein's theory of gravity is not entirely correct, and that we need a modified theory to describe what is happening to our universe.¹ But just as with dark matter, nobody has discovered the truth yet.

Scientists will almost certainly discover the true nature of dark matter and dark energy someday. However, this day may not be for many, many years. The universe, it seems, does not want to reveal her darkest secrets just yet.

Secret Societies of the Ivy League

Writing by SARAH ROOT • Editing by PAIGE ORNER • Design by AMY GUO

Dark robes, candlelit rooms, ominous (scary) chanting—this is what you might imagine when you hear the words “secret society.” Secret societies are fascinating, often having long histories full of mysterious traditions and rituals. Some of the most notable secret societies come from the Ivy League, a group of eight universities made up of Harvard University, Princeton University, Yale University, Brown University, Dartmouth College, Columbia University, Cornell University, and the University of Pennsylvania. While little is known about the elusive organizations that dwell within these college walls, over the years, some of their secrets have been revealed to the public. Now, we’ll share those secrets with you!

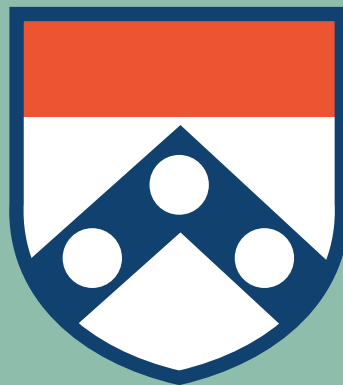
Yale University: The Skull and Bones Order

From the name, the Skull and Bones Order seems sinister, reminiscent of pirates with their skull and crossbones flags. However, in reality the organization is not scary at all! The Skull and Bones is one of the oldest secret societies in the nation, founded in 1832 by William H. Russell.¹ The society is both social and academic; members meet to discuss world affairs and to make new friends. In order to become a member, you have to be “tapped,” or chosen, by former members. Many of the rituals of the organization are secretive, as the Skull and Bones Order owns a windowless building known as the “Tomb” in which only members are allowed.² Alumni of the organization have gone on to be some of the most powerful people in the world, including President of the United States!¹



University of Pennsylvania: The Sphinx

The Sphinx Society is the largest secret senior society at the University of Pennsylvania. Named for the beautiful stone sphinx statue that guards exhibits in the Penn Museum, the Sphinx Society was founded in 1900.³ For a long time, the organization advised the University administration and promoted the image of the University both on campus and to the public.³ They were committed to engaging the campus in healthy competition, as well as bettering the community through service.³ While not much is known about their induction rituals or practices, they are more open about their membership and goals than some of the other secret societies.



Brown University: Societas Domi Pacificae

Brown University’s Societas Domi Pacificae, founded in 1824, is the oldest known secret society in the country.⁴ For a while, the society was thought to have been dissolved in 1834, however, evidence suggests that the society has continued to operate; it was just hidden from the prying eyes of curious people. It is believed that 15 seniors are selected each year to join.⁵ All members follow their motto, which translates to “see, and consequently, you will conduct yourself properly and irreproachably into the benefits of God, the Republic, and the University.”⁶ Of the three secret societies noted here, the least is known about this one. Their practices are truly hidden secrets.



SECRETS NO MORE:

Writing by JEREMY WYMAN • Editing by SINAIA KEITH LANG
Design by ELYSSA CHOU



An important part of the government’s role in a democracy is to be reasonably transparent with its citizens. Thanks to the Freedom of Information Act, American citizens are able to keep an eye on the federal government as well as get a glimpse into the things that have been done in the past. Here are some cool facts about these released documents:

- 1 The Central Intelligence Agency (CIA) tried using a number of different animals for spying during the Cold War. In Operation Oxygas, dolphins were used in covert operations and to search for underwater mines. In Operations Tacana and Axiolite, they explored using pigeons and ravens with cameras around their necks to take photos of sites within the Soviet Union. Lastly, in Operation Kechel, the CIA explored using dogs and cats as mobile recording devices.
- 2 The Office of Strategic Services (OSS), the precursor to the CIA, was known for its zany plots such as reportedly drugging Hitler’s vegetables with female hormones. A 2008 information dump revealed that popular home chef, Julia Child, worked for the OSS during WWII. She helped develop a shark repellent that kept sharks from accidentally exploding underwater bombs.
- 3 In the 1950s the United States government began exploring the possibility of Extra Sensory Perception (ESP). ESP is about psychic abilities, such as knowing what will happen before it happens, or learning information without ever hearing or seeing it. This project was met with both scepticism and excitement. In the 1990s, there was a secret U.S. army unit, codenamed “The Stargate Project,” that continued to investigate the usefulness of “remote sensing through mental means.” Today, research into the extrasensory is often seen as largely unscientific and useless.
- 4 In 1972, the CIA sent their most advanced submarines to collect photos from a spy satellite that were dropped from space into the ocean. This was a mission that required a lot of precision and technical ability beyond what was thought possible at the time. The CIA was able to pinpoint the location of the small object and then retrieve it from 16,000 feet (a little over 53 football fields) under the sea.

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Schrödinger's Cat

Writing By CIANAN CS

Editing By NANCY ZHU

SCHRÖDINGER'S CAT

In day-to-day life, things tend to be one way or the other. Either you brushed your teeth or you didn't, either you love brussel sprouts or you hate them. But one day a scientist by the name of Schrödinger wondered if something could be two things at once, a question that forever changed the way modern physicists think about the world.¹ Here's what he thought:

Say I put a cat and a special robot full of sleeping powder into a sealed box. Every minute, the robot flips a coin. If the robot gets three heads in a row, then it releases the powder and the cat falls asleep. Schrödinger's question is this: When does the cat fall asleep?

At any moment, the robot could get three heads in a row and the box would fill with sleeping powder, making the cat fall asleep. But since the coin toss relies on probability, no one can say for certain when exactly this happens. With the cat and the robot both hidden in the box, no one can see from the outside either. Schrödinger then concluded that the cat is simultaneously awake and asleep.

MAKING WAVES

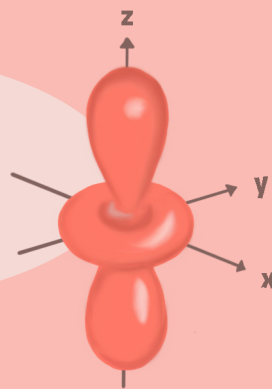
If this question was posed before the 1900s, no one would have taken Schrödinger seriously.

How could something be two things at the same time? From the perspective of classical physics, where everything could be determined using math and observation, this conclusion seemed absolutely ridiculous. But then scientists learned about matter waves.

Matter is anything you can interact with: You're made of matter, cats are made of matter, even the Sun is made of matter. We tend to think of matter as being one solid thing. But in 1924, physicist de Broglie realized that all matter could also be thought of as being a wave.²

Whenever you drop a rock into a lake, a bunch of ripples form that quickly move outward in all directions. These ripples are made of matter, the water in the lake, but they also have the characteristics of a wave. And when de Broglie looked at the movement of electrons, the smallest piece of matter, he found they also had these same wave characteristics. From there it was simple to prove that everything, even you, have wave properties! Unfortunately the waves are so small, they're basically impossible to see. But in subatomic particles, particles smaller than an atom, these waves can have a big impact.

This is an image of the 3 dz² electron orbital. The wave of electron means it tends to live in certain region of the atom



Design By JOANNE CHU



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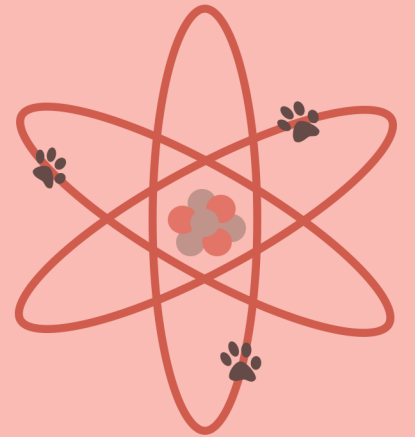
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LET'S GET WEIRD WITH QUANTUM MECHANICS

These two facts revolutionized science, and even created a whole new branch of physics called Quantum Mechanics. Mechanics explores the way things work, and quantum describes the behaviour of really tiny objects with tiny amounts of energy. Although scientists need to learn a great deal of complex math and physics in order to understand the cause and effect of various quantum mechanical systems, here are some fun results that everyone can learn about:

NOW YOU SEE ME, NOW YOU DON'T:

One of the weirdest consequences of quantum mechanics is electron tunneling. An electron is a tiny particle that makes up electricity and because it's so small, scientists can't see it directly with microscopes. Therefore it's hidden and similar to Schrödinger's cat, it can be in multiple states at the same time. Its size means its waves are very big in comparison to itself. Both of these facts together allow the electron to do something very special. In everyday physics, a ball thrown at a wall can't go through the wall because it hits the wall and bounces off. But with quantum physics, an electron can actually go through things. Imagine if a ball passed through the wall! This is called tunneling, as if the electron were tunneling through barriers. However, it's really because when an excited particle is so tiny, we can't really be sure where it is.⁴ And this means, sometimes it can be where we least expect it.



TRUE RANDOM:

Albert Einstein is famously quoted for saying "God does not play dice with the universe."⁶ He said this because he never believed in one of the most powerful truths of quantum mechanics, that some events are truly random. What does random mean? When someone flips a coin, we often say it's random because it has a 50% probability of landing on heads, and a 50% probability of landing on tails. However from Einstein's perspective, the coin flip wasn't truly random. If you knew the strength of your thumb and the wind currents in the air and the forces on the coin, you could always calculate the answer. Einstein believed that there were no secrets behind how the universe worked, and that with enough math and physics, anything could be discovered. However, it has since been proven that despite what Einstein thought, small particles like electrons can have unknowable secrets, proving that the universe truly can be random. It just goes to show that even geniuses like Einstein can make mistakes too!

SECRET INFORMATION:

Normally when people hear the word entanglement, they think about things wrapped together. In a sense, this is what happens to particles when they're entangled in the quantum sense. The difference, however, is that once particles are entangled, they're entangled no matter how far away you take one of them, even to a whole other galaxy!⁵ Therefore if you could use entangled particles to send messages, you might be able to send messages faster than the speed of light, something impossible in ordinary physics.

Quantum Mechanics is such a new and exciting field, and every day scientists and engineers are making new discoveries that could revolutionize technology forever.⁷ If you study hard in school, maybe one day you'll be the expert that changes the world!



Now You See Me, Now You Don't

Writing by SHIVANI PATEL · Editing by GRACE QIAN

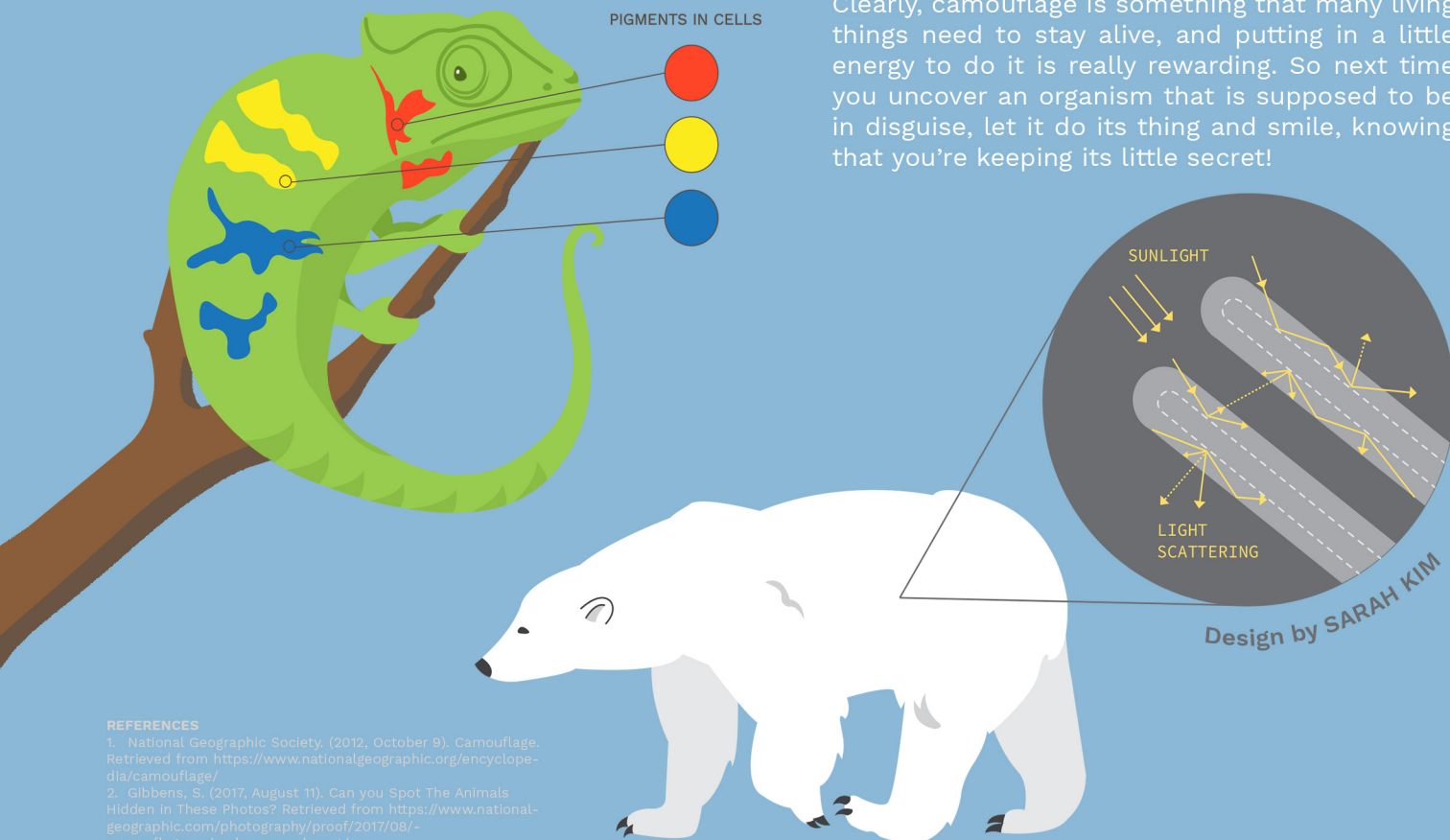
Have you ever passed something that was hiding in plain sight? Many living things do this using camouflage. Organisms camouflage themselves from their surroundings as a way of defending themselves.¹ There are many examples of animals who use this tactic, including stick insects, octopi, chameleons, and even zebras! A stick insect looks like a twig or branch, while an octopus matches its skin to its background.²

Organisms need either pigments or prisms for camouflage.¹ Pigments are chemicals in their cells which absorb light. This energy allows organisms to change their colors, which can occur over seconds, days, or even months! Another way organisms camouflage is through physical structures in their bodies that act as prisms, which reflect and scatter light into many different colors! As these prisms move, light can travel through them differently depending on the color, changing the appearance of the organism. For example, polar bears actually have black skin, but their fur reflects sunlight, making them look white.

Camouflage through pigments and prisms is used in cool ways. Two examples are background matching and disruptive coloration, both of which are types of mimicry.³ Mimicry is when an organism looks or acts like something else. This could be its environment, or even another organism! Background matching allows living things to closely resemble their environment or surroundings. The stick bug does this, mimicking the plant it lives on. Disruptive coloration, on the other hand, involves a pattern of colors.¹ This tricks predators, and prey at times, into thinking an organism is something other than what it actually is. The spots on butterflies often mislead predators by mimicking the eyes of larger animals.

Camouflage seems like it takes a lot of energy and work, so why do organisms have it? It gives them a chance to survive with predators all around.¹ An octopus camouflages itself in response to a threat so it can be hidden. Chameleons change their colors to communicate, warning others that danger is close.²

Clearly, camouflage is something that many living things need to stay alive, and putting in a little energy to do it is really rewarding. So next time you uncover an organism that is supposed to be in disguise, let it do its thing and smile, knowing that you're keeping its little secret!



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I Spy ... Everything



Writing by MORGAN GILFOND · Editing by CHLOE GONG · Design by MINJU KIM

Have you ever seen advertisements popping up on your computer or smartphone for goods you were just talking about? Do you get the feeling that your devices are spying on you? Well... in many ways, they are. Your online purchases, web searches, and even locations are tracked by your devices and stored for later use. This may seem scary at first, but there are some advantages to letting other people track your data.

“Cookies” (not the delicious food) are small files that collect your data and use it to improve your web browsing experience based on your preferences. For example, if you are looking at furniture websites to replace an old couch, these websites may ask to store your information so you can receive targeted advertisements later on. You might be scrolling through Instagram later that day when couch images start crowding your feed. Cookies make this possible. Instead of looking at random, irrelevant advertisements all day, cookies make sure you see products that align with your interests. Pretty cool, right?

However, as more and more websites have begun collecting consumer data, concerns over privacy issues have surfaced. It can be very frightening to think about how our personal data can be exchanged between companies without our knowledge.



Personal data that you enter on the web is not private, but usually companies are simply trying to help connect you with the products that you are already looking for. This means that we should not be afraid of using technology, but it does highlight how the market for information is secretly operating in the dark.

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Our personal information has become extremely valuable, and the buying and selling of data is a shadowy business. In our increasingly digital world, the scariest part of data collection is how secretive it is. The way we measure data itself is through “bytes,” which indicate the size of information stored on electronic devices. The market for data is worth billions of dollars, and some 2.5 quintillion bytes of data are created each and every day! If you laid 2.5 quintillion pennies flat, they would cover the Earth... five times over! You do not know which apps are tracking your every move, or which are profiting off your user profile. Therefore, even if you do not want your data to be widely distributed, it is challenging to maintain your privacy. The lack of privacy and control is frightening, and has become increasingly problematic as the market for data continues to grow. Even though most of us feel like we are in control of our devices, maybe we should start thinking more about how our personal information is controlled by others.

SECRET WOMEN & THEIR NOT-SO-SECRET SUCCESSES

Writing by ANIA ALBERSKI

Editing by STEPH HWANG

Design by DONNA LIU

Who developed the theory of relativity ($E=mc^2$)?

Albert Einstein.

Who discovered the laws of motion?

Isaac Newton.

Who invented the telephone?

Alexander Graham Bell.



Scientific discoveries and inventions make our world stronger and smarter! Not all of them have become world-famous, however. If you've taken a science class, you've probably heard about at least one of the names listed above. But... what about Rosalind Franklin, Katherine Johnson, or Grace Hopper? These women made incredible advances in the world of science and technology, and yet, they have received little credit for their work. It's time to uncover their successes and make their names a little less secret.

Let's start with Rosalind Franklin. She was born in London, England in 1920. Franklin studied chemistry at the University of Cambridge where she also got involved with research. After studying the properties of coal and other organic materials, Franklin moved to Paris to work at a laboratory where she learned how to use X-rays to create images of solids with complex structures. In 1951, while working at a lab in London, Rosalind Franklin used her X-ray techniques to take photos of DNA.

X-Ray: These pictures show us the inside of something, but they're not taken with a camera or phone. They're taken with rays of radiation!



Rosalind Franklin decided to call the image of the DNA "Photo 51." This photo was not released to the public when it was first discovered. However, someone who worked with Franklin decided to share the image with two scientists at Cambridge, James Watson and Francis Crick. In 1953, Watson and Crick published their model of DNA which was completely based off of the image taken by Franklin. They stole her work! In 1962, they were awarded the Nobel Prize for that model, and Rosalind Franklin's name was forgotten.

Unfortunately, Rosalind Franklin was not the first woman to be ripped off for her work. Katherine Johnson knows a similar story...

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Johnson was born in West Virginia in 1918. After graduating Virginia State College with highest honors, Johnson began teaching at a public school. In 1939, she was among three individuals chosen to be the first Black students at West Virginia University. A few years later, Johnson learned about the opportunity to work at the all-Black West Area computing section at NACA (National Advisory Committee for Aeronautics). As a human computer, Katherine Johnson spent her time analyzing data and making calculations to better understand flight tests and crashes. In 1957, the Soviet Union launched the Sputnik satellite, changing the course of Johnson's life.



Human Computer: Before the world gained easy access to personal computers, the term "computer" usually referred to a person who made calculations by hand. Women typically occupied these positions and were responsible for a lot of the math that enabled incredible scientific achievements.

After the launch of Sputnik, Johnson compiled notes which would lead to the creation of the Space Task Group. This also marked the transition from NACA to NASA (National Aeronautics and Space Administration). Johnson did calculations for the first human space flight and co-authored a research paper about satellite positions. In 1962, NASA prepared for Astronaut John Glenn's mission to circle the Earth from space. Glenn said he would only step into the space capsule if Katherine Johnson would run the numbers and confirm them for him by hand. She did and the mission was successful; he circled the Earth three times. Katherine Johnson died earlier this year, but her legacy has been documented in the film, *Hidden Figures*.

Lastly, we turn to Grace Hopper, a woman who paved the world of technology in a way that we now take for granted. Hopper was born in New York in 1906, and she attended Vassar College and Yale University to study toward her Bachelor's and Master's degrees. After she graduated, she returned to Vassar to teach mathematics. After a few years, she joined the Navy and became a lieutenant. She was placed at Harvard University's Bureau of Ordinance's Computation Project. While working for the project, Hopper had the opportunity to work on Mark I (the first large-scale automatic calculator).

Fun fact about Mark I: When Hopper was working on the computer, she noticed a moth had gotten stuck in the machine. She coined the term 'bug' that we use today to talk about computer failures.



In 1949, Grace Hopper began working on the Universal Automatic Computer I (UNIVAC I) computer. Her team compiled computer languages for the system to be able to run. The computer was able to successfully compute a large array of input, thanks to Hopper's significant work.

All of these women contributed significant discoveries and inventions to the world of science and technology. What will YOU contribute?



DEEP SEA-CRETS

Writing by SHUNMEL SYAU

Editing by ALLAN ZHANG

Design by JOANNE CHU

Where in the world is there terrain as varied as land, yet is less explored than outer space? The sea! The ocean's habitats (yes, the ocean has habitats too!) include plains, canyons, volcanoes, the longest mountain chain on the planet, and the Mariana Trench, which runs 11,000 meters deep.^{1,2}

The deep sea starts 200 meters below the ocean surface. The stretch of water from the start of the deep sea to 1000 meters deep is otherwise known as the twilight zone.¹ Although sunlight filters feebly through to the twilight zone, there is not enough light for photosynthesis—the chemical reaction plants do to turn light into energy. Past the twilight zone, no sunlight can pass at all.²

Try to imagine this: you are experiencing depths of immense pressure and frigid temperatures, similar to outer space. Around 1000 meters deep, bioluminescence, which is the creation of light without heat by an organism, illuminates the environment around you in place of sunlight.² While creatures may employ bioluminescence for different purposes, it is a sign of them adapting to their extreme environment. This explains why some look quite like aliens!

There's a diverse cast among the ocean depths. Creatures with translucent bodies, creatures with gaping, fanged maws, and creatures with eyes mounted on long stalks.³ Some of these animals sound like they are from fantasy stories. The oarfish looks like an eel — if eels were 25 feet long, silver, and had red spikes running down their length. Meanwhile the giant squid has no business being fifty feet long. It's no wonder these animals gave rise to myths. Once upon a time, fossils of shark teeth were thought to be the tongues of sea serpents.⁴ As it stands, there is still much mystery and intrigue associated with the sea.

Studies suggest that more than 80% of the ocean is uncharted territory and almost 99% of the seafloor is unknown to us.^{1,5} Yet, the ocean constitutes over 70% of Earth's surface.⁵ The ocean is such a crucial part of our planet, but we know so little about it. It's fascinating to think about what we can unearth if we continue to explore the deep sea—maybe one day, you'll be the one to explore the depths and discover the secrets it holds!

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SAFETY IN NUMBERS

Writing by FERNANDO V. NEGRETE • Editing by NANCY ZHU • Design by VANESSA LIEW

Stop for a moment, and think about a number besides one. I guarantee that the number you thought of is the result of the multiplication of prime numbers! First, let's recall that a prime number is defined as a number that can only be divided by itself and by one. For example, 2, 3, and 5 are the first three prime numbers. The fact that you can write any number as a multiplication of primes sounds very uninteresting, but the impressive thing is that this multiplication is unique, meaning it can only be done in one way. For example, the number 345 can be written as the product of the prime numbers $5 \times 3 \times 23$, and there are no other primes that can give the same result!

This “unfolding” of numbers into a product of primes is called prime factorization. Why is this important? Prime numbers have fascinated mathematicians for centuries. For example, the Greek mathematician, Euclid, showed almost 2000 years ago that there are infinitely many primes. However, only recently have mathematicians found a method to use prime factorization to hide messages and keep very important information or secrets safe. The method has similar characteristics to bank account numbers and passwords. It is particularly useful when two parties, who know nothing about each other, want to communicate securely, kind of like a private chat.

The trick utilizes the property of prime factorization of numbers, by multiplying two very large prime numbers, call them a and b , and then obtaining an extremely large number, which we can call c . Then, you only tell the world that you have the number c , but you keep a and b only for yourself. You also give them a smaller number of your choice which we can call d (actually there are rules on how to choose d , but let's not delve too much on hard mathematics). The numbers c and d are called a “public key”, because you will distribute them with everybody.

Any sort of message that you want to send can be represented with numbers. Once you have your message in “number form”, you can use the numbers c and d to “encrypt” it, or make it secure. If someone wants to get your original message back, they actually need to find what a and b were. However, with all the calculations involved, if a and b are big prime numbers then it becomes super hard to retrieve them! Finding the prime factorization of very big numbers is a difficult problem which takes a lot of time. As of today, these prime numbers are about as big as 10 followed by more than 300 zeros. The name of this method is called RSA Encryption (in honor of its inventors' names: Rivest, Shamir and Adleman), and it depends entirely on prime factorization. It is all thanks to this prime factorization encryption system that most of our information is kept safe.

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Talking In Code

Writing by LEAH LEVIN • Editing by PAIGE ORNER • Design by ELYSSA CHOU

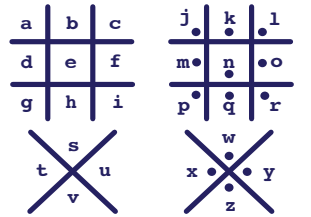
A cipher is a method for hiding a message in some type of code. After encryption, only those who know the cipher can use it to reveal the secret message. Ciphers have been used to conceal information throughout history, and they are still widely used today.

Caesar Cipher

Julius Caesar, a leader of ancient Rome, used this cipher to conceal secret messages from his enemies. It works by shifting each character in the message by a fixed amount. For example, if we had to shift “A” by three letters in the alphabet, our cipher would represent “A” with “D,” the third letter in the alphabet after “A.” Let's say you have the encrypted word “FCJJM.” At first glance, it is very difficult to decipher, but try shifting each letter of the word by two in the alphabet. What do you get? If you got “HELLO,” you cracked the Caesar cipher!

Pigpen Cipher

The Freemasons are members of a worldwide secret society that originated in the Middle Ages. To secretly communicate, chapters of the Freemasons created the Pigpen cipher, a cipher that substitutes a symbol for a letter. These symbols are located on a grid with dots, resembling tic-tac-toe boards. To encrypt a letter with this cipher, locate the letter and eliminate it from the grid. Then, trace the lines that surrounded the letter. If there is a dot in the box, include it in the same location. For example, to encrypt “Hello,” we would write **ΠΟΛΛΕ**



Atbash Cipher

One of the oldest among the ciphers, the Atbash cipher was first developed in ancient Israel. It was originally developed for the Hebrew alphabet, and there are even some encrypted words found in the Torah, the Hebrew Bible. Atbash uses the alphabet backwards, like so:

a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z
z	y	x	w	v	u	t	s	r	q	p	o	n	m	l	k	j	i	h	g	f	e	d	c	b	a

In this cipher, the letter “Z” corresponds to “A,” “Y” corresponds to “B,” “X” corresponds to “C,” and so on. When decrypting, you find the letter from your message on the bottom of the chart and write down the corresponding letter from the top row. Now, let's put your skills to the test. What does “XRKSVIH ZIV UFM” encode?

Book Cipher

Books aren't just for reading; they can also be used as keys for secret messages! The most common book ciphers use a triple-coordinate system created in 1586 by Blaise de Vigenere, a French diplomat and cryptographer. With this technique, the first coordinate refers to a page number, the second refers to a line, and the third refers to the location of the letter in that line. For example, (15, 4, 2) refers to the second letter on the fourth line of the fifteenth page. To try this with a friend, find two copies of the same book. Now, using this system, practice encrypting and decoding each other's messages. Good luck!

Vigenere Cipher

Despite its name, the Vigenere cipher was created by Giovan Battists Bellaso in 1553. To encrypt a message, use the tabula recta, shown below. Each row represents the alphabet shifted by a certain amount. First, you and your correspondent must pick a secret key. For example, let's pick “code.” Then, position this keyword over your message, which should be converted to uppercase. If our message is “I like to read,” we would have

C O D E C O D E C O D
I L I K E T O R E A D

Finally, encrypt your message using the table. Letters in the codeword correspond to rows, while letters in the message correspond to columns. For example, the letter “I” in the message pairs with “C” in the codeword. Put a finger on row “C” and another on column “I.” Bring them together to see where they intersect (at letter “K”). Now, “I” becomes “K.” To encrypt the entire message, repeat this process for each letter. You should end up with KZLOGHRVGOG.

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A
C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B
D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C
E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D
F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E
G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F
H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G
I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H
J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I
K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J
L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K
M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L
N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M
O	P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N
P	Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Q	R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
R	S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
S	T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
T	U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
U	V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
V	W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
W	X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
X	Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
Y	Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
Z	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y

ANSWER KEY: FUN ARE ARE CIPHERS ARE

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And Then There Was Agatha Christie

Are you a fan of stories full of secrets, detectives and mysteries? Then look no further! Agatha Christie was and still remains one of the world's most renowned novelists of all time. Her collection spans over 66 detective novels, 14 short stories, and 1 play. Her detective novels are known for their simple and straightforward prose, with a focus on characters, plots, and dialogue. Her two most famous detectives are Hercule Poirot and Miss Marple. Mr. Poirot is a Belgian private detective who has keen intuition of what goes on in a criminal's mind. Miss Marple is known as a sweet old lady from a small village who can blend in very well with her surroundings and make sharp observations about human nature. Read on to find some of Christie's most famous books to add to your reading list!

1. And Then There Were None

It is 1930, and ten strangers are invited to meet in a mansion located on an isolated island. As they socialize, they quickly find out that they all have something in common...they all are harboring guilt over committing a murder in their past. Suddenly, one by one, each of them is killed...who could be the one responsible for these murders?

2. Murder on the Orient Express

(Hercule Poirot Mystery)

All aboard the Orient Express! Detective Hercule Poirot, along with a group of individuals from different backgrounds, boards the Orient Express with service from Istanbul to London. However, just after midnight, the train stops in the middle of its route due to a large snowstorm. As all the panicked passengers bustle around the train, suddenly a large scream is heard! One of the wealthy passengers aboard the train has been stabbed multiple times. Without a doubt, one of the passengers is the murderer...but who? Now it is up to Detective Poirot to solve the mystery!

3. Death on the Nile

(Hercule Poirot Mystery)

While aboard a luxury cruise down the Nile River in Egypt, everything is peaceful until a young, beautiful heiress is shot through the head. Detective Poirot is tasked with solving the mystery and finds himself entangled in a complicated love triangle!

4. The A.B.C. Murders

(Hercule Poirot Mystery)

A serial killer is on the loose! Interestingly, the names of the killer's victims all fall in alphabetical order...A is for Mrs. Ascher in Andover, B is for Betty Barnard in Bexhill...How could these random victims possibly be connected? It's up to Detective Poirot to connect the dots and catch the serial killer before they target the next victim in the alphabet.

5. A Murder is Announced

(Miss Marple Mystery)

In the daily newspaper of the small town Chipping Cleghorn, an announcement is posted that reads: "A murder is announced and will take place on Friday, October 29th, at Little Paddocks at 6:30pm". Is this a practical joke? Unable to resist this mysterious invitation, several villagers show up to Little Paddocks and as the clock strikes 6:30pm, without warning, the lights go off and a shot is fired and someone is found dead on the floor! How is this even possible? Someone call Miss Marple! Only she can solve this mystery.

6. Sleeping Murder

(Miss Marple Mystery)

Perhaps one of Christie's most chilling novels, this mystery serves as Miss Marple's last case in her long career as an amateur detective. Newlywed Gwanda moves into a new Home and starts renovating in anticipation of her husband's arrival. She quickly finds herself uncovering moments from her past and is somehow embroiled in the case of a crime committed years ago. It is now up to Miss Marple to turn into a ghost hunter to uncover shocking evidence that made this a "perfect" murder.

Happy reading! These are just a handful of some of Christie's mysterious and captivating novels. And who knows, maybe you will pick up a few sleuthing tips and tricks to hide up your sleeve the next time you encounter a secret or mystery!

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