Tuesday, June 2
TOPICS 30/40

Teacher: Ms. Leroux Contact: See contact sheet

It's June! ONE. MONTH. LEFT. You've got this! There has been a slight change in plans, so you now have only 2 work packages left: Today's package then one more on June 9. And just a reminder that work can be handed in until June 19. We are not expecting that you finish everything in every course. That's really hard when you're working from home. We are just expecting that you do YOUR best. Whatever your best looks like right now. Any work that you complete is valuable and worth it.

So, hang in there. As you have probably heard on the news, teachers now get to go back to working at school this month. Although this does not mean that students will be allowed in the hallways/classrooms at Powerview, it does give you the chance to stop by the school and chat with me (in the lobby) if you need some help or just want to say hello. I miss seeing all of your faces! You can also now phone me at the school anytime between 9:00 and 3:30.

What's New This Week?

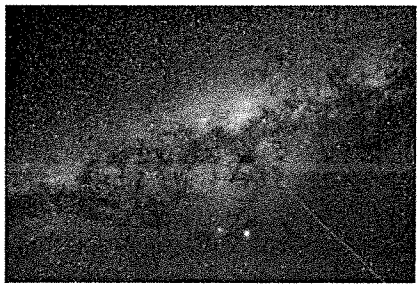
This week you will be reading the May 2020 Edition of Science News and answering the questions that go with each article. Remember to make sure you answer in FULL SENTENCES and explain your reasoning in the "critical thinking" questions. These questions should be a minimum of two sentences for your answer.

This Week's Assignments:

Science News – May 2020	Read the articles then answer the questions on the corresponding sheet in your assignment booklet.

ASTRONOMY

The Edge of the Milky Way



How big is our galaxy? The answer to this question isn't as obvious as it seems. Most of us have seen pictures of galaxies, which are huge groupings of stars. They typically form a flat-looking disc-like shape—like a pancake or spiral—with a bulge of bright stars at the centre.

The Milky Way is the galaxy we live in. It is a spiral galaxy with our Sun found along one of its spiral arms. Scientists have long known that the **luminous** part of the galaxy—the part we can see—is about 120,000 **light years** across. That is about 1,135,000,000,000,000,000 kilometres in total.

But that is not the entire galaxy. Scientists believe galaxies are also surrounded by a halo of dark matter. This is matter that doesn't give off much light—so we can't see it from far away using telescopes. How far does this halo of dark matter extend? That would tell us the real size of our galaxy.

Alis Deason is an **astrophysicist** at Durham University in England. She and a team of researchers have come up with a way to locate the outermost edge of the Milky Way. They estimate that our galaxy is actually 1.9 million light-years across. That is about 15 times bigger than the part of the galaxy we can see.

But if dark matter can't be seen, how can we tell how far it extends? Scientists can tell using gravity. Deason and her colleagues used a **computer simulation** of how large galaxies like the Milky Way form. The computer simulations are based on the equations for gravity developed by Albert Einstein.

The simulations predict the gravity of a large galaxy like the Milky Way will have a noticeable effect on the speed of nearby galaxies. In particular, large galaxies will tug on small nearby galaxies (called satellite galaxies), slowing them down. The simulations found that the velocities of satellite galaxies will drop sharply just beyond the edge of the large galaxy's dark matter halo. That is how the scientists came up with their 1.9 million light-year estimate.

As telescopes and computers keep getting better, scientists expect to locate the edge even more precisely. They will be able to detect more satellite galaxies, and even some dim stars at the Milky Way's edge. In turn, this will give them even better data to feed into their computer simulations. ★

DID YOU KNOW

Scientists have found about 60 small galaxies orbiting around the Milky Way.

To view videos, go to: http://resources.dynamic-classroom.ca/books/brmj

Video

WORD POWER

LUMINOUS: Something that gives off light.
LIGHT YEAR: The distance that light travels in one year.
ASTROPHYSICIST: A scientist who studies how stars, galaxy, and space forms and works.
COMPUTER SIMULATION: The use of a computer program to study how objects or systems of objects behave as conditions change.

BIOCHEMISTRY

Spring Is in the Air

You might have heard the phrase "spring is in the air." It is based on the idea that spring has a distinctive smell or feel. But is this true? Can we actually smell spring in the air?

Scientists have traced the "smell of spring" to a chemical compound found in soil. The chemical is called geosmin. Humans recognize it as the earthy smell of fresh soil.

Human noses are very sensitive to geosmin. We can detect a geosmin molecule at 100 parts per trillion. That means we can smell geosmin even when there are only 100 geosmin molecules mixed up with one trillion air molecules. In other words, people can detect geosmin better than sharks can detect blood.

As spring arrives and temperatures rise, the soil in our lawns and gardens starts to unfreeze and loosen. This allows the geosmin to rise up and reach our noses.

Scientists in Sweden and the U.K. have dug deeper into this phenomenon. They wanted to understand how geosmin gets in the soil in the first place, and how it spreads around. They found it happens because of a connection between bacteria called *Streptomyces*, and an insect called a springtail.

Streptomyces are bacteria found in soil. *Streptomyces* produce a variety of **organic compounds**. Some compounds, like geosmin, create a smell other animals can detect. Others are used by *Streptomyces* as weapons to fight off other organisms in the soil. Because these compounds can kill other bacteria, some can be used as **antibiotics**.

For their experiment, the researchers created *Streptomyces* "traps." They wanted to see what animals were attracted to their smell. They discovered that springtails were powerfully attracted to geosmin.

Unlike other organisms like worms and fruit flies, springtails are resistant to *Streptomyces* antibiotics. They don't die when they eat the bacteria. As a result, springtails are able to spread the bacteria in one of two ways. One, they eat the bacteria in one part of the soil and poop out **bacterial spores** in another. Two, *Streptomyces* spores can cling to the springtails' bodies and be spread that way.

Geosmin is actually a form of chemical communication. *Streptomyces* releases it to attract springtails. For springtails, this helps them find a good source of food. For *Streptomyces*, it helps the bacteria spread its spores throughout the soil. ★

DID YOU KNOW

About 80 percent of antibiotics used by doctors come from *Streptomyces*.

To view videos, go to: http://resources.dynamic-classroom.ca/books/brmj

Video

WORD POWER

ORGANIC COMPOUND: Something consisting of molecules, like carbon, that are important to making living things.

ANTIBIOTIC: A medicine that can be used to kill harmful microorganisms like bacteria and fungi.

BACTERIAL SPORE: An inactive form of the bacteria that has a strong exterior shell that allows it to resist damage from the environment.

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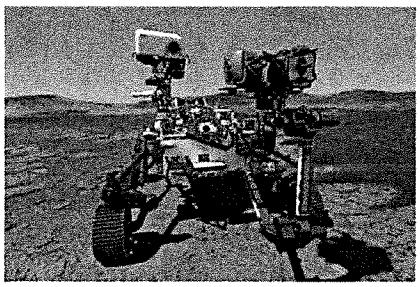
ENGINEERING

Mars Perseverance Set to Launch



NASA is preparing to launch a Mars **rover** named Perseverance. The mission is scheduled to launch three months from now, on July 17. Preparing for a launch like this is very complex. Even now, scientists and engineers are hard at work at the Kennedy Space Center in Florida. They are testing both the rover and the spaceship that will carry it into space. The rover will be launched using a powerful Atlas V rocket.

The rover is like a robotic scientist. It weighs over 1000 kilograms. It has six wheels that are specially adapted to move across the sand and sharp rocks found on the Martian surface. Perseverance also carries a camera and many different scientific instruments. These instruments will enable Perseverance to search the Martian soil for signs of **microscopic life**. They will also enable the rover to study Mars' **geology**.

In addition, Perseverance contains some unique tools for life on Mars. One is a solar-powered helicopter. The Mars helicopter will be the first aircraft to fly on another planet. The rover will also test a piece of equipment that can create oxygen from Mars' thin, mostly carbon-dioxide atmosphere.

Perseverance will help scientists better understand the red planet and how to survive there. This will help pave the way for NASA's plan to eventually send humans to Mars.

The launch date is very important. Perseverance must launch during a 20-day window of time between July 17 and August 5. If they miss this window, scientists must wait 26 months—until September 2022—before they can try again. The reason for this is that the rover must be launched when Earth and Mars are close to each other. As they orbit the sun, Earth and Mars are sometimes on the same side of the sun and sometimes on opposite sides. The spacecraft doesn't have enough fuel to reach Mars if it is too far away.

After launch, it will take seven months for Perseverance to travel to Mars. Once it lands, Perseverance will join its sister, Curiosity, as a robotic explorer on Mars. Curiosity is a similar rover sent to Mars by NASA in 2011.

DID YOU KNOW

Approximately 28,000 students in the United States, from kindergarten to Grade 12, entered NASA's "Name the Rover" essay contest. They sent in their best ideas for the rover's name. In the end, NASA chose "Perseverance" from an entry by Alexander Mather of Lake Braddock Secondary School in Burke, Virginia.

To view videos, go to: http://resources.dynamic-classroom.ca/books/brmj

Video

WORD POWER

ROVER: A vehicle specially designed to explore the surface of an extraterrestrial surface, like the Moon or Mars.

MICROSCOPIC LIFE: Organisms like bacteria that are too small to see with the naked eye.

GEOLOGY: The study of what a planet is made of, and how that changes over time.

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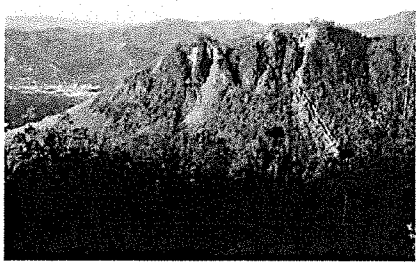
ENVIRONMENT

Can Rain Do More Damage Than Wind?



A new study may revolutionize how hurricane damage is predicted and understood. Conducted by **ecologists** at Columbia University, the study involved forests in Puerto Rico that were damaged by two hurricanes in 2017.

Hurricane Irma hit with high speed winds and 300 millimetres of rain in September 2017. Two weeks later, Hurricane Maria dumped 1500 millimetres of rain on the island over 48 hours in one of Puerto Rico's worst tropical storms in a century.

The ecologists used satellite images and **ground surveys** of 25 plots of forest. They looked at images from one year before the hurricanes and images taken shortly after each hurricane. The damage was measured by how many trees were broken, uprooted, or killed, and by how many leaves or branches were stripped from the trees. Damage in windy areas (like hilltops) was compared to damage in areas with more rainfall (such as valleys).

Overall, an estimated 10.44 million tonnes of forest were destroyed. Areas with more rainfall and more water in the soil had more damage than areas that were exposed to wind. Hurricane Maria, which brought much more rain, caused much more damage than Hurricane Irma. Part of the damage was caused by heavy rains breaking the forest canopy and knocking over trees. Even more damage was caused by water loosening the soil, which left trees more vulnerable to being uprooted by wind.

Normally, when forecasting the damage that could come from a hurricane, scientists look at wind speed, areas exposed to wind, and structure of the soil, but many forecasts are inaccurate by about 17 percent. According to the new study, including rain could make future forecasts more accurate.

The ecologists who published the study said their findings raised concerns about global warming and animal habitats. Dense old-growth trees like mahogany, which provide homes for local wildlife, were more likely to be damaged than flexible, fast-growing palm trees. Additionally, rising ocean temperatures lead to more moisture in the air, and more rainfall. This could mean wetter hurricanes and worse damage for tropical forests in the future.

Another concern has to do with **carbon dioxide**. Living trees help reduce global warming by absorbing carbon dioxide in the atmosphere. As fallen trees decompose, they release carbon dioxide. Too many fallen trees could mean more carbon dioxide being released than is absorbed.

DID YOU KNOW

Tropical forests account for 70 percent of the carbon dioxide absorbed by forests each year.

To view videos, go to: http://resources.dynamic-classroom.ca/books/brmj

Video

WORD POWER

ECOLOGISTS: People who study ecosystems, or the natural relationships between air, land, water, animals and plants.

GROUND SURVEY: A process in which an area of ground is measured and details such as ground makeup and angles are assessed.

CARBON DIOXIDE: A chemical compound that exists in the earth's atmosphere and acts as a greenhouse gas, which means that it traps in heat.

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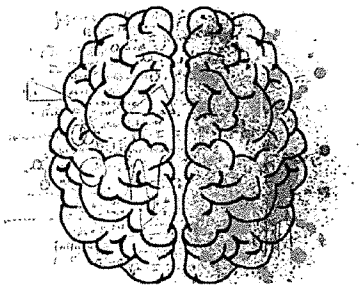
NEUROSCIENCE

Where Does Creativity Come From?



Scientists sometimes talk about people as being "left brained" or "right brained." People who are left brained are described as being more logical. People who are right brained are described as being more creative. Is this true? Does creativity come from a particular part of the brain? A recent study led by **neuroscientist** Dr. David Rosen took aim at this question.

The human brain has two halves—a left hemisphere and a right hemisphere. People tend to have a half that is more dominant—a half that plays a larger, controlling role in how we learn, behave, and act.

To study creativity and brain activity, Dr. Rosen and his team of researchers worked with some musicians. A group of 32 jazz guitar players volunteered to take part in the experiment. They each played six jazz songs and they were asked to musically **improvise**. The scientists recorded the songs, as well as electroencephalograms (EEGs) for each player as they played. EEGs provide a map of a person's brain activity.

The researchers had four expert jazz musicians review each of the musical recordings and rate each player's songs for creativity and quality. The scientists then compared the EEGs associated with highly rated performances versus those associated with lower-rated performances. What they found was that for highly rated songs, there was higher brain activity in the left hemisphere. For lower-rated songs, there was higher brain activity in the right hemisphere.

Does that suggest creativity is actually associated with the left hemisphere—not the right? It wasn't quite that simple. Experience also makes a difference. The 32 jazz guitar players had varying levels of experience. Some had played for many decades, including major performances in public. Others were fairly inexperienced with very few public performances.

Taking this into account, the scientists found a very different pattern to the EEGs. It turned out that for musicians of similar experience, the most creative performances were associated with increased activity in the right hemisphere.

Ultimately, the scientists learned that both hemispheres are important in creativity. The left side of the brain is vital in enabling an artist to use her experience in creating a high-quality work of art. However, it is the right side of the brain that allows a person to creatively deal with new and unfamiliar situations. ★

DID YOU KNOW

The human brain contains about 86 billion neurons. Interestingly, an elephant has even more—about 257 billion.

To view videos, go to: http://resources.dynamic-classroom.ca/books/brmj

WORD POWER

NEUROSCIENTIST: A scientist who studies the brain and how it works.

IMPROVISE: To create and perform something spontaneously and without preparation.

TOPICS 30/40

Ms Leroux

Science News – May 2020 Edition

(June 2 – 9)

NAME (first and last): _____

ASTRONOMY

The Edge of the Milky Way

1. Describe the Milky Way.

2. What makes up the rest of the galaxy?

3. How big does Alis Deason and her team estimate that our galaxy actually is?

4. What did the team use to determine the size of the galaxy?

5. How was gravity used to estimate the size of the Milky Way?

CRITICAL THINKING

1. Do you think that they have actually found the edge of the Milky Way? Explain your answer.

2. Why is finding out facts and distances about space so difficult?

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BIOCHEMISTRY

Spring Is in the Air

1. To what have scientists traced the smell of spring?

2. How sensitive are humans to geosmin?

3. What did scientists in Sweden and the U.K. want to understand? What did they find?

4. What are *Streptomyces*? What do they produce?

5. How do springtails help the bacteria?

CRITICAL THINKING

1. What are your thoughts on bacteria and insects creating the smell of spring?

2. What are some other ways in which bacteria can be helpful?

Science News Q & A

ENGINEERING

Mars Perseverance Set to Launch

1. For what is NASA preparing?

2. Describe the rover.

3. What are some of the unique tools that Perseverance contains?

4. What is the purpose of Perseverance?

5. Why is the launch date so important?

CRITICAL THINKING

1. What do you think it would be like to live on another planet?

2. Why do scientists want to study Mars and other planets?

ENVIRONMENT

Can Rain Do More Damage Than Wind?

1. Which two hurricanes hit Puerto Rico in 2017?

2. What did the ecologists look at? How did they measure the damage?

3. What were the results of their study?

4. How could their results impact how hurricane damage is forecast?

5. What concerns did the ecologists raise?

CRITICAL THINKING

1. What are your thoughts on the damage caused by wind versus rain?

2. What are some other examples of the damage that water can cause?

Deadly Storms

Below is a list of the top 10 worst hurricanes from around the world.

NAME	LOCATION	YEAR	DEATH TOLL
Bhola Cyclone	Bangladesh	1970	Estimated 300,000-500,000
Haiphong Typhoon	Vietnam	1881	300,000
Typhoon Nina	China and Taiwan	1975	171,000
The Great Hurricane	Barbados	1780	22,000
Galveston Hurricane	Galveston, TX	1900	12,000
Hurricane Katrina	Gulf Coast U.S., New Orleans	2005	1,200
Labor Day Hurricane	Florida Keys	1935	500
Hurricane Ike	Cuba and Texas Gulf coast	2008	103
Hurricane Harvey	Southeast Texas	2017	70
Hurricane Andrew	The Bahamas and Florida	1992	55

1. What was the name of the hurricane that occurred in 1780?

_____

2. Where did the 1881 hurricane hit?

_____

3. Where did Hurricane Katrina hit?

_____

4. What was the death toll of Typhoon Nina?

_____

5. Which hurricane hit the Bahamas and Florida in 1992?

_____

6. Choose one of the hurricanes from the list above and do some further research on it.

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NEUROSCIENCE

Where Does Creativity Come From?

1. What is the difference between being left brained and right brained?

2. What are the two halves of the brain?

3. Describe the study that Dr. Rosen and his team conducted?

4. What did the researchers do with the recordings and the EEGs?

5. What did they discover when they took into account the musicians' levels of experience?

CRITICAL THINKING

1. Do you think you are left brained or right brained? Explain the reasons for your answer.

2. Why do you think that experience impacted the results?

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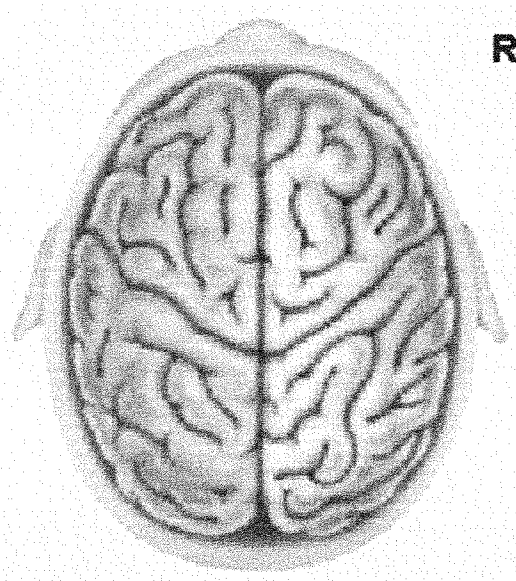
Two Sides of the Brain

The human brain is divided into two parts or hemispheres, which are connected by the corpus callosum. Although equal in size, these two sides are not the same and have different functions. The right hemisphere is responsible for control of the left side of the body. It is the more artistic and creative side of the brain. The left hemisphere is responsible for control of the right side of the body. It is the more academic and logical side of the brain, and performs tasks that have to do with logic, such as in science and mathematics.

LEFT BRAIN

- Analytic Thought
- Logic
- Language
- Reasoning
- Science and Math
- Written
- Numbers Skills
- Right-hand control



RIGHT BRAIN

- Art Awareness
- Creativity
- Imagination
- Intuition
- Insight
- Holistic Thought
- Music Awareness
- 3-D Forms
- Left-hand control

See if you can tell what hemisphere is being used in each task!

1. Drawing a picture of your dream house
2. Doing your math homework
3. Daydreaming when you should be studying
4. Talking to a friend
5. Listening to a parent or teacher
6. Writing a letter to a friend telling them about your birthday
7. Writing a story