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**ARCHAEOLOGY**

# Nero's Theatre Discovered in Rome

Archaeologists have made an exciting discovery. They have found ancient ruins in the heart of the city of Rome, Italy. The ruins are of a theatre especially built for the Roman Emperor Nero.

The ruins were first discovered in 2020 when construction began on a new luxury hotel. **Archaeologists** were quickly brought onsite to carefully excavate and preserve the ruins.

The ruins date back almost two thousand years, to first-century **CE**. They are located close to **Vatican City**. Archaeologists working for Italy's Ministry of Culture dug out an area about the size of one city block.

They found two buildings. One had a cavea—a semicircular seating space shaped like a horseshoe. The seats are arranged in tiers that descend toward a stage area. Ancient Greek and Roman theatres were often built this way. The stage had a decorated background that was covered in marble and gold leaf. These expensive materials would only have been used for a building built for members of the Imperial family.

A second building, close to the first, is believed to have had rooms for stage equipment such as sets and costumes. In addition to the buildings, archaeologists found artifacts, including glass goblets, coins, and pieces of musical instruments.

It is believed the theatre was used by Emperor Nero who lived from 37 CE to 68 CE. Nero loved the arts, and enjoyed performing in theatres as a singer, musician, and actor. (He is also famous for having been an especially cruel and terrible leader. He squandered tax money on his personal pleasures, and had many Christians tortured and killed.)

Archaeologists think the newfound theatre was a private place where Nero could practice his poetry and music in front of small, select audiences. Later, he would perform these pieces in public theatres elsewhere in Rome. Writers from the time when Nero was alive describe such a theatre—but that theatre's location was unknown. With this discovery, archaeologists think they may have solved that mystery.

**DID YOU KNOW**

There is a famous story that Emperor Nero "fiddled while Rome burned," meaning that he played the violin during Rome's great fire in 64 CE. The story is used to describe someone who deliberately ignores a problem even when it is urgent and obvious. However, archaeologists say there is no actual evidence that Nero did this or was even in Rome when the fire occurred.

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**WORD POWER**

**ARCHAEOLOGIST:** Someone who studies human history through the excavation of sites and the analysis of artifacts

**CE:** Common Era; the current time period we are living in

**VATICAN CITY:** A independent city within Rome that is home to the leaders of the Roman Catholic Church

**Science News Q & A**

**ARCHAEOLOGY**

# Nero's Theatre Discovered in Rome

1. When were the ruins first found? What was done at that time?

2. How old are the ruins? Where are they located?

3. What two buildings were found?

4. Who is believed to have used the theatre? Why do they think it is his?

5. How do archaeologists think Nero used the theatre?

## CRITICAL THINKING

1. Do you think the archaeologists are correct in thinking the theatre belonged to Nero? Explain your answer.

2. What are your thoughts on Nero being someone who loved the arts and theatre, but also being a cruel and terrible leader?

# Roman Emperors

Below is a list of the Roman emperors from the first century CE, along with brief descriptions.

**Augustus** (31 BCE – 14 CE) was born Gaius Octavius (also known as Octavian). He was the adopted son and heir of Julius Caesar. In 31 BC, Octavian became the first Emperor of Rome and took the name "Augustus" (exalted). He put in place a taxation system and called a census. He founded a postal service and a regular police force and fire brigade in Rome. He also expanded the empire to include Egypt, part of Spain, areas of central Europe, and lands in the Middle East.

**Tiberius** (14 CE – 37 CE) was one of the greatest generals of the Empire. He was considered an excellent ruler during the first half of his reign, but later became a dark and gloomy ruler. The reason for this change in his behavior was probably the death of his son Drusus. In 26 CE, Tiberius moved to the Isle of Capri and left administration in the hands of Praetorian Prefect Sejanus, who acted as the leader of Rome. Sejanus also plotted against Tiberius and murdered people who opposed him. When Tiberius was told, he removed Sejanus from his position and executed him.

**Caligula** (37 CE – 41 CE) began his reign as a noble and moderate ruler, but after two years he became known as a cruel and extravagant emperor. He killed people for his amusement. After reigning for four years, he was assassinated by members of his bodyguard and the Roman Senate.

**Claudius** (41 CE – 54 CE) was the nephew of Tiberius and the uncle of Caligula. Claudius had some kind of disability in speech and walking, and his family kept him away from the public until he was 38. For this reason, he was not considered a serious threat. Claudius was proclaimed emperor because he was the last adult male of his family. He proved to be a good administrator and a great builder of public works. The empire was expanded under his reign. He was succeeded by his adopted son Nero.

**Nero** (54 CE – 68 CE) improved diplomacy and trade. He had theatres built and promoted athletic games. In 64 CE, most of Rome was destroyed because of the Great Fire of Rome. Nero accused Christians of the fire and started to persecute them. Nero was driven from the throne in 68 CE and committed suicide before he could be assassinated.

**Vespasian** (69 CE – 79 CE) was a successful military commander. After Nero's death, the empire was plunged into civil war and Vespasian was one of the four emperors who were fighting for control. Vespasian won. He is best known for financial reforms, the successful campaign against Judaea, and for building the Flavian Amphitheatre, known today as the Colosseum.

**Titus** (79 CE – 81 CE) was the son of Vespasian. He was a successful military commander who ended the Jewish rebellion and besieged Jerusalem in 70 CE. He destroyed the city and the temple. For this, he received a triumph: the Arch of Titus, which still stands in the area of the ancient Roman Forum. As a ruler, Titus is mainly known for completing the Colosseum. He died of a fever after ruling two years.

**Domitian** (81 CE – 96 CE) was the younger brother of Titus. He was emperor for 15 years. He was known for strengthening the economy. He also expanded border defenses and started rebuilding

the damaged parts of Rome. A "cult of personality" was created around Domitian and he was seen as an idealized and heroic emperor. He was popular with the people and the army, but was considered a tyrant by the Roman Senate. He was assassinated in 96 CE.

**Nerva** (96 CE – 98 CE) was an advisor to Domitian. He was declared emperor by the Roman Senate on the day Domitian was assassinated. He vowed to restore freedoms that were taken away by Domitian. His brief reign was marred by financial problems and his inability to assert his authority over the Roman army. He died of natural causes and his greatest success was appointing his adopted son Trajan as his successor.

Match each emperor with the correct fact about him.

| | |
|---|---|
| Augustus | Had some kind of disability in speech and walking |
| Tiberius | Destroyed Jerusalem and the temple |
| Caligula | Moved to the Isle of Capri and left administration to Praetorian Prefect Sejanus |
| Claudius | Winner of the civil war between four emperors |
| Nero | First Emperor of Rome |
| Vespasian | A "cult of personality" was created around him |
| Titus | Accused Christians of starting the Great Fire of Rome |
| Domitian | Greatest success was appointing Trajan as his successor |
| Nerva | Known as a cruel and extravagant emperor |

PSYCHOLOGY

# How Laughter Is Used in Social Situations

Why do we laugh? The answer may seem obvious. We laugh when something is funny to us. **Psychologists** point out that humans also use laughter as a form of communication.

Just like our ability to talk, laughter is an **evolutionary trait**. In fact, many other mammals also laugh. Chimpanzees, dogs, rats, and dolphins are all known to have the ability to laugh.

For mammals, laughter is a play signal. It is a way to communicate to others that some activity is fun and harmless. It is a way to keep that fun going. Humans use laughter in more complicated ways. It doesn't always mean we are having fun. In fact, it can sometimes mean the opposite.

Humans use laughter to smooth over difficult social situations. For example, people will laugh during what psychologists call a "**benign** violation": a situation that could represent a threat such as an awkward exchange or misunderstanding. In these cases, laughter is intended to prevent the situation from getting worse—by telling the other person to relax because there is no harm done or offence taken.

Adrienne Wood, an assistant professor of psychology at the University of Virginia, looked into this phenomenon a little deeper. She and a team of researchers did a study where they had participants talk to ten strangers in a series of one-on-one conversations. Talking to strangers can often be awkward. The researchers made some interesting discoveries.

First, the tendency to laugh seems to be unrelated to who you are talking to. Participants tended to laugh at about the same rate, regardless of which stranger they talked to.

The researchers also found that people who tended to laugh more actually enjoyed their conversations less. Clearly, this laughing was not a sign of enjoyment. Rather, it was being used to smooth over the awkwardness of the moment.

Wood's team went on to classify laughter based on three types of communication. The first is reward laughter. This is the laughter we make when we are truly amused and want to signal our enjoyment of a playful interaction.

A second type is affiliation laughter. This is laughter we use to smooth over a difficult situation. It is laughter we use to reassure, appease, and soothe. We use it even when we are not experiencing pleasure.

Finally, there is dominance laughter. This is used when we want to tell someone we don't think they are worth taking seriously.

**DID YOU KNOW**

Scientists have observed laughter in 65 different animal species.

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**WORD POWER**

**PSYCHOLOGIST:** Someone who studies how we think, feel, and behave and can help treat mental, emotional, and behavioural problems

**EVOLUTIONARY TRAIT:** A trait that is inherited from previous generations and that serves a purpose toward our survival

**BENIGN:** Something that is not harmful

**PSYCHOLOGY**

# How Laughter Is Used in Social Situations

1. What is laughter for mammals?

2. How do humans use laughter?

3. When talking to strangers, Is laughter related to who you are talking to?

4. What did researchers discover about people who laugh more?

5. What are the three types of laughter?

## CRITICAL THINKING

1. What are some of the things that make you laugh?

2. Do you agree that laughing can help to smooth awkward situations? Explain your answer.

TECHNOLOGY

# Biometrics and How You Walk

Have you been home alone when someone comes in, and you can tell who it is simply by listening to the sound of their footsteps? Just as we have distinctive faces, voices, and fingerprints, a person's gait—how they walk—tends to be unique and identifiable.

Scientists at the University of New Brunswick are studying this phenomenon to see if it can be used in biometrics. Biometrics is the use of a person's unique physical characteristics for identification purposes.

Biometrics can be used to keep your belongings or accounts secure. In some ways, they are better than passwords that can be forgotten or hacked. Biometrics are already widely used this way—many smartphones use **facial recognition** or fingerprint scanners so you—and only you—can quickly unlock your device.

Biometrics can also be used by governments and other organizations for security reasons. For example, facial recognition technology is used in some countries to spot criminals in a crowd.

The most common characteristics used in biometrics are people's faces, **retinas**, voices, and fingerprints. These characteristics are very unique from person to person. Erik Scheme, the associate director at the University of New Brunswick's Institute of Biomedical Engineering thinks a person's gait may be similarly unique.

To study this possibility, Scheme and a team of researchers have created a laboratory. Within this laboratory, they have installed electronic floor tiles that can record a person's footfalls—how far apart they are, how much pressure they put on the floor, and so on. Using this data, researchers can even generate a **heat map** of the pressure distribution of someone's feet as they walk. With these data, the researchers are studying the gaits of different people to see if they can identify aspects of how they walk that are distinctive from others.

One of the advantages of this form of biometric identification is it would be quick and contactless. It could be useful in busy places like airports and office building lobbies. People wouldn't even have to stop to be identified.

There are some challenges to this form of biometric identification. While a person's gait tends to be unique, what happens if they are carrying a heavy object, if they have recently sprained their ankle, or if they are walking slowly because they are distracted? The team is studying whether a person's gait can still be identified under these conditions.

**DID YOU KNOW**

Canadians have been unlocking iPhones with their fingerprints since 2013.

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


**WORD POWER**

**FACIAL RECOGNITION:** The identification of a person in an image or video using measurements of features of their face

**RETINA:** The interior, back surface of the human eye that contains a unique pattern of blood vessels

**HEAT MAP:** An image of data shown by different colours or shades of colour, with darker colours often showing higher or more intense values

**TECHNOLOGY**

# Biometrics and How You Walk

1. What is biometrics?

2. How can biometrics be used? Why are they helpful?

3. What characteristics are used in biometrics? Why?

4. Describe the laboratory that Scheme and his team have created.

5. What are some challenges to this form of biometric identification?

## CRITICAL THINKING

1. Do you think that it is possible to identify a person by the way that they walk? Explain your answer.

2. What are some possible uses for this form of biometric identification?

# Measuring Your Stride

Stride length is the distance covered when you take two steps, one with each foot. Start with your two feet together and start walking. You can start with either foot, but if you start with your left foot:

- Lift your left foot up and step forward.
- Now both feet are on the ground with the left foot ahead of the right one.
- Lift your right foot and swing it forward past your left foot, and place it on the ground.
- Now both feet are on the ground with the right foot ahead of the left one.

The distance travelled during that motion is your stride length.

A step length is the distance covered when you take one step. Start with your two feet together and start walking. You can start with either foot, but if you start with your left foot:

- Lift your left foot up and step forward.
- Now both feet are on the ground with your left foot ahead of your right one.

The distance your left foot travelled (from the toe of your right foot to the toe of your left foot, or from the heel of your right foot to the heel of your left foot) is your step length.

**How to calculate your step and stride length**

If you are doing this calculation outside, bring a piece of chalk and a measuring tape. If you are doing this inside, have a tape measure and some masking tape.

- Using the tape measure and the chalk (outside) or the masking tape (inside), measure and mark off a specific distance, such as seven metres.
- Start walking about three metres before one of the marks to get up to speed in your natural walk.
- When you hit the first mark, start counting your steps, stopping your count when you hit the second mark.
- Divide the number of metres in your measured distance by the number of steps you took from the first mark to the second. Distance in metres/number of steps = step length. For example, if it took you 16 steps to cover seven metres, your step length would be 0.475 metres (47.5 centimetres).

To calculate your walking stride length, divide the number of steps you took by 2 and divide that number into the measured distance. If it took you 16 steps to cover seven metres, divide the number of steps (16) by 2 to get the number of strides. Then take the answer (8) and divide it into the distance. Distance in metres/number of strides = stride length. In this case, you took 8 strides in seven metres, so your stride length would be 0.875 metres (87.5 centimetres).

If you want a more accurate measurement, use a longer distance:

- Mark your starting point and walk until you have counted 50 steps.
- Mark the end of your last step.
- Measure between the two marks.
- Follow the same calculations as above: distance in metres/number of steps = step length and distance in metres/number of strides = stride length.

For even more accuracy, do the longer distance three or four times, and then average the results.

**ENVIRONMENT**

# Will Canada's Forests Recover?

It has been a smoky summer in Canada. Researchers say wildfires this year are on track to destroy four times more land than any previous year on record. This level of devastation has many wondering—why is this happening, and will Canada's forests recover?

As for the why, there are the usual suspects: lightning strikes and careless human behaviour (such as cigarettes tossed into dry brush or campfires not put out properly). This is being made worse by hot and dry conditions.

Behind it all, experts say climate change is why the wildfires are getting worse. As the planet warms, Canada is experiencing hotter and longer springs and summers. Along with decreases in how much snow and rainfall some regions receive, Canada's vast **boreal forests** are experiencing ripe conditions for wildfires to start.

As for whether the forests will recover, Edward Struzik says Canada's boreal forests are well adapted to fire. Struzik is an author, educator, and **fellow** at the Queen's Institute for Energy and Environmental Policy. Struzik points out fire is part of the natural cycle for Canada's boreal forests and vegetation can grow back very quickly.

However, Ellen Whitman, a forest fire research scientist, says with forest fires happening more often, the dense, **conifer** forests could end up being replaced by more open landscapes with fewer trees and more fire-resilient vegetation. This would be good for some animal species that prefer that kind of landscape, like bison and moose. However, it would be bad for caribou that prefer the dense boreal forest.

Struzik says the southern end of Canada's boreal forest likely won't survive global warming. He suggests rather than replanting conifer trees, Canada should look to restore more wetlands in these regions. Wetlands act as natural fire barriers and offer refuge for animals and birds.

Indigenous Peoples who have a deep connection to the cycles of the land could also help—bringing their Indigenous knowledge and approaches to forest management. One example is the Secwepemcúl'ecw Restoration and Stewardship Society (SRSS) near Kamloops, British Columbia. The SRSS has been working with the government to help restore nearly 200 000 hectares of forest on Secwépemc territory that was badly burned in 2017. The SRSS works with Indigenous communities to identify tree, plant, and animal species to put back onto the land after a wildfire so the forest can return to its historical roots. ★

**DID YOU KNOW**

Canada's boreal forest is vast, covering 270 million hectares of land—about 60 percent of all the land in Canada.

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**WORD POWER**

**BOREAL FOREST:** Large forests adapted to northern climates in Canada, Alaska, and Russia

**FELLOW:** A senior member of a college or university

**CONIFER:** A type of tree that has needle-like leaves that don't fall off in winter and that are adapted to regions that are dry and cold

**ENVIRONMENT**

# Will Canada's Forests Recover?

1. Why are the wildfires getting worse?

2. Will the forests recover from the wildfires?

3. What does Ellen Whitman have to say about how the forest fires are affecting the forests?

4. What does Struzik say should be done to the southern end of the boreal forest?

5. What is one example of how Indigenous knowledge could help?

## CRITICAL THINKING

1. Why are the boreal forests important for Canada?

2. What are some ways in which the boreal forests could be kept strong and healthy?

BIG IDEAS

# What Is the Central Nervous System?

In human beings, the main parts of the central nervous system (CNS) are the brain and spinal cord. It is a vital part of who we are and everything we do.

The CNS is made up mainly of special cells called neurons. These are cells in the body capable of conducting electrical impulses from one part of the body to another.

If there is a centre of the CNS, it is the brain. The brain is the most complex organ in the human body. The brain weighs only 1.5 kilograms yet consumes 20 percent of all the oxygen we breathe in. It uses this oxygen to create energy needed for the brain to work.

The brain is responsible for our ability to think, have memories, and feel emotions. It also receives electrical impulses from the spinal cord and other nerve cells that are responsible for our senses: our ability to feel touch, hear sound, to see, to smell, and to taste.

The brain also sends out electrical impulses to our muscles, causing them to move. Some are reflexive—for example, the brain automatically sends out regular electrical impulses that keep our heart beating and our intestines digesting. The brain is also responsible for voluntary motor functions—sending impulses to muscles whenever we want to move: to walk, run, catch a baseball, or sing.

The spinal cord connects to the brain and runs down through our neck and the middle of our back to the tailbone. It consists of a bundle of nerves that carry electrical impulses to and from the brain to the rest of the body.

Both the brain and spinal cord are important to our survival and so they are protected by hard bony structures. The brain is protected by the skull, while the spinal cord is protected by a series of interlocking bony structures called vertebrae.

While these bony structures do a good job of protecting our CNS, the brain and spinal cord can be damaged. Damage to the spinal cord can result in pain or **paralysis**. Damage to the brain often comes in the form of a **concussion**. There are also diseases that can damage the CNS. For example, neurodegenerative diseases like Alzheimer's, Parkinson's, and ALS occur when cells in the brain die or stop working. These diseases can result in **cognitive** problems and problems with movement and muscle control.

**DID YOU KNOW**

The brain consists of an estimated 100 billion neurons.

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


**WORD POWER**

**PARALYSIS:** The loss of the ability to move (and sometimes to feel) part of the body

**CONCUSSION:** Damage to the brain caused by a violent blow to the head

**COGNITIVE:** Having to do with our ability to think

**BIG IDEAS**

# What Is the Central Nervous System?

1. What are the main parts of the central nervous system?

2. What are neurons?

3. What does the brain do?

4. What are the two types of electrical impulses the brain sends out?

5. What is the spinal cord?

## CRITICAL THINKING

1. Why is the central nervous system important?

2. What are some things you can do to protect your brain and spinal cord?

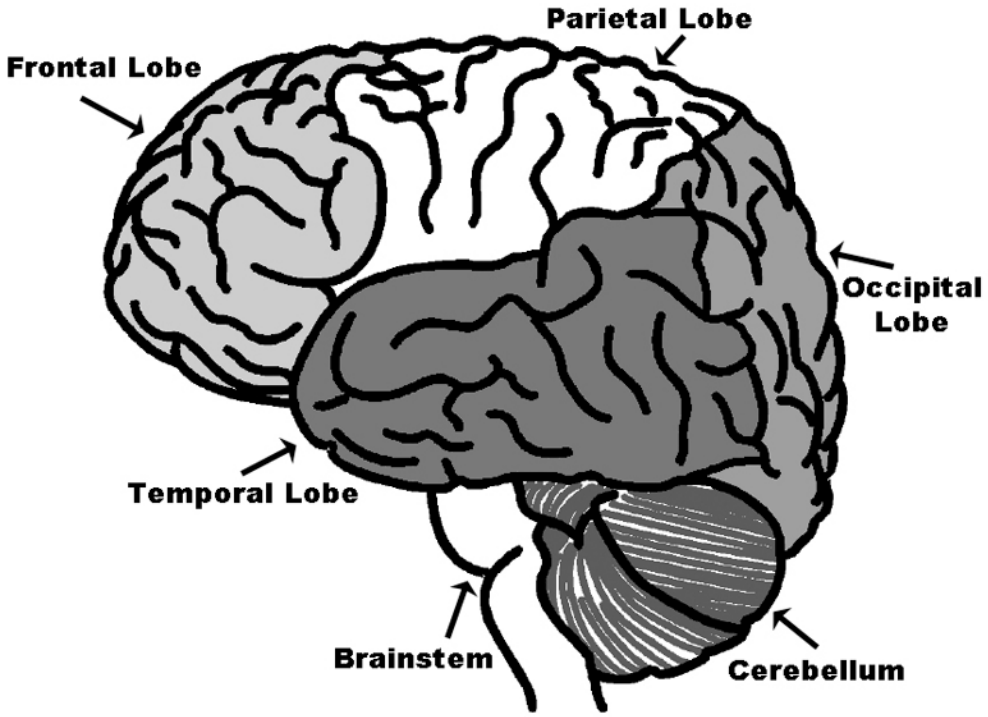
# This Is Your Brain

The brain is the most complex part of the human body. Although the blood may be responsible for some functions, this three-pound organ controls just about everything you do, even when you are asleep. The brain is also the location of all reason and intelligence, and has parts that are responsible for perception, concentration, memory, and emotions.

The **brainstem** controls basic survival functions, such as heart rate, breathing, digesting food, and sleeping. The cerebellum is responsible for balance and muscle coordination.

The **cerebrum** is the largest part of the brain. It holds memories and allows you to plan, imagine, think, recognize friends, read books, and play games. It controls your voluntary muscles. It is divided into two hemispheres and each hemisphere is divided into sections (lobes).

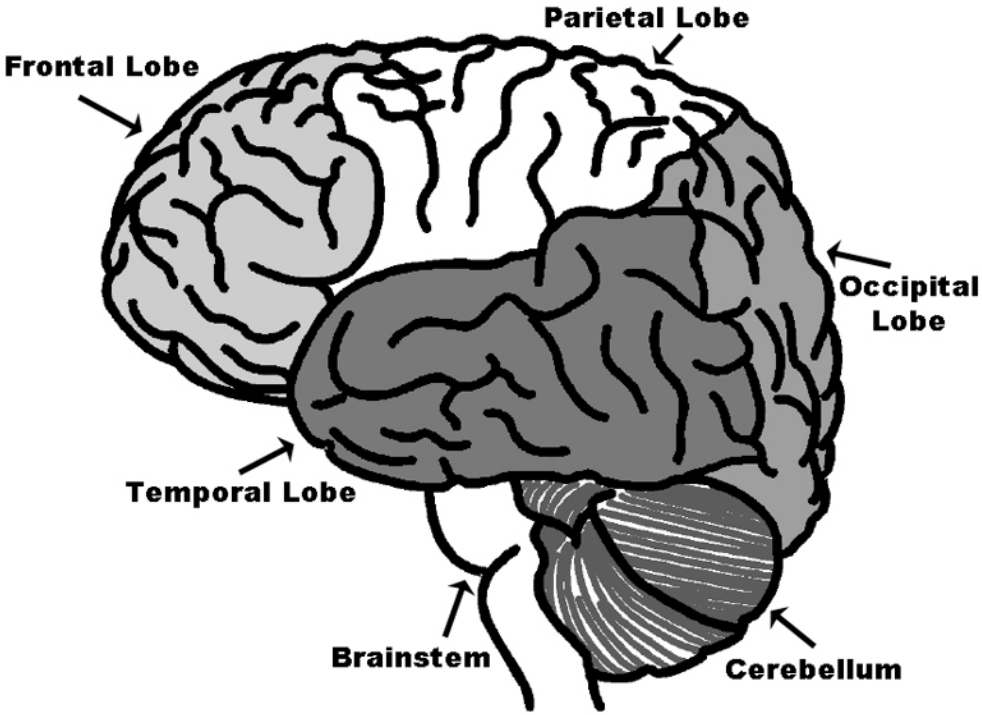
- The **parietal lobe** receives and processes sensory information from the body, including touch, pain, and calculating location and speed of objects.
- The **occipital lobe** processes images from the eyes and links that information with images stored in memory.
- The **frontal lobe** is involved in motor skills (including speech) and cognitive functions. When you plan a schedule, imagine the future, or use reasoned arguments, the frontal lobe does most of the work.
- The **temporal lobe** controls memory storage area, emotion, hearing, and language.



**Connect each description with the correct part of the brain.**

1. Controls memory storage area and emotion

2. Receives and processes sensory information




3. Responsible for balance and muscle coordination

4. Controls basic survival functions

5. Processes images from the eyes

6. Involved in motor skills and cognitive functions

# Science News Quiz

## NERO'S THEATRE DISCOVERED IN ROME

1. The ruins date back almost _____ years.

2. Archaeologists think the theatre was a private place where Nero could practice his poetry and music in front of small, select audiences.

   True False

## HOW LAUGHTER IS USED IN SOCIAL SITUATIONS

1. Humans use laughter to smooth over difficult social situations.

   True False

2. Which of the following is not one of the classifications the team used for laughter?

   A. Reward laughter B. Aggression laughter C. Affiliation laughter D. Dominance laughter

## BIOMETRICS AND HOW YOU WALK

1. Biometrics is the use of a person's DNA for identification purposes.

   True False

2. The researchers are studying the _____ of different people to see if they can identify aspects of how they walk that are distinctive from others.

## WILL CANADA'S FORESTS RECOVER?

1. Edward Struzik points out fire is part of the _____ for Canada's boreal forests.

2. Ellen Whitman says the dense, conifer forests could end up being replaced with what?

   A. Marsh lands B. More open landscapes C. Denser forests D. Lakes

## WHAT IS THE CENTRAL NERVOUS SYSTEM?

1. What are the main parts of the central nervous system?

   A. The brain and spinal cord B. The brain and heart C. The heart and lungs D. The blood and nerves

2. The brain receives _____ from the spinal cord and other nerve cells.

# Science News Answer Key

## Nero's Theatre Discovered in Rome

1. **When were the ruins first found? What was done at that time?**
   The ruins were first discovered in 2020 when construction began on a new luxury hotel. Archaeologists were quickly brought onsite to carefully excavate and preserve the ruins.
2. **How old are the ruins? Where are they located?**
   The ruins date back almost two thousand years, to first-century CE. They are located close to Vatican City.
3. **What two buildings were found?**
   One had a cavea—a semicircular seating space shaped like a horseshoe. The seats are arranged in tiers that descend toward a stage area. The stage had a decorated background that was covered in marble and gold leaf. A second building, close to the first, is believed to have had rooms for stage equipment such as sets and costumes.
4. **Who is believed to have used the theatre? Why do they think it is his?**
   It is believed the theatre was used by Emperor Nero who lived from 37 CE to 68 CE. Nero loved the arts, and enjoyed performing in theatres as a singer, musician, and actor.
5. **How do archaeologists think Nero used the theatre?**
   Archeologists think the newfound theatre was a private place where Nero could practice his poetry and music in front of small, select audiences. Later, he would perform these pieces in public theatres elsewhere in Rome.

## Roman Emperors

**Augustus:** First Emperor of Rome
**Tiberius:** Moved to the Isle of Capri and left administration to Praetorian Prefect Sejanus
**Caligula:** Known as a cruel and extravagant emperor
**Claudius:** Had some kind of disability in speech and walking
**Nero:** Accused Christians of starting the Great Fire of Rome
**Vespasian:** Winner of the civil war between four emperors
**Titus:** Destroyed Jerusalem and the temple
**Domitian:** A "cult of personality" was created around him
**Nerva:** Greatest success was appointing Trajan as his successor

## How Laughter Is Used in Social Situations

1. **What is laughter for mammals?**
   For mammals, laughter is a play signal. It is a way to communicate to others that some activity is fun and harmless. It is a way to keep that fun going.
2. **How do humans use laughter?**
   Humans use laughter to smooth over difficult social situations. For example, people will laugh during what psychologists call a "benign violation": a situation that could represent a threat such as an awkward exchange or misunderstanding. In these cases, laughter is intended to prevent the situation from getting worse—by telling the other person to relax because there is no harm done or offence taken.
3. **When talking to strangers, is laughter related to who you are talking to?**
   The tendency to laugh seems to be unrelated to who you are talking to. Participants tended to laugh at about the same rate, regardless of which stranger they talked to.
4. **What did researchers discover about people who laugh more?**
   The researchers also found that people who tended to laugh more actually enjoyed their conversations less. Clearly, this laughing was not a sign of enjoyment. Rather, it was being used to smooth over the awkwardness of the moment.
5. **What are the three types of laughter?**
   The first is reward laughter. This is the laughter we make when we are truly amused and want to signal our enjoyment of a playful interaction. A second type is affiliation laughter. This is laughter we use to smooth

over a difficult situation. It is laughter we use to reassure, appease, and soothe. We use it even when we are not experiencing pleasure. Finally, there is dominance laughter. This is used when we want to tell someone we don't think they are worth taking seriously.

## Biometrics and How You Walk

1. **What is biometrics?**
   Biometrics is the use of a person's unique physical characteristics for identification purposes.
2. **How can biometrics be used? Why are they helpful?**
   Biometrics can be used to keep your belongings or accounts secure. In some ways, they are better than passwords that can be forgotten or hacked.
3. **What characteristics are used in biometrics? Why?**
   The most common characteristics used in biometrics are people's faces, retinas, voices, and fingerprints. These characteristics are very unique from person to person.
4. **Describe the laboratory that Scheme and his team have created.**
   Within this laboratory, they have installed electronic floor tiles that can record a person's footfalls—how far apart they are, how much pressure they put on the floor, and so on.
5. **What are some challenges to this form of biometric identification?**
   While a person's gait tends to be unique, what happens if they are carrying a heavy object, if they have recently sprained their ankle, or if they are walking slowly because they are distracted?

## Will Canada's Forests Recover?

1. **Why are the wildfires getting worse?**
   Behind it all, experts say climate change is why the wildfires are getting worse. As the planet warms, Canada is experiencing hotter and longer springs and summers. Along with decreases in how much snow and rainfall some regions receive, Canada's vast boreal forests are experiencing ripe conditions for wildfires to start.
2. **Will the forests recover from the wildfires?**
   Edward Struzik says Canada's boreal forests are well adapted to fire. Struzik points out fire is part of the natural cycle for Canada's boreal forests and vegetation can grow back very quickly.
3. **What does Ellen Whitman have to say about how the forest fires are affecting the forests?**
   Ellen Whitman says with forest fires happening more often, the dense, conifer forests could end up being replaced by more open landscapes with fewer trees and more fire-resilient vegetation. This would be good for some animal species that prefer that kind of landscape, like bison and moose. However, it would be bad for caribou that prefer the dense boreal forest.
4. **What does Struzik say should be done to the southern end of the boreal forest?**
   He suggests rather than replanting conifer trees, Canada should look to restore more wetlands in these regions. Wetlands act as natural fire barriers and offer refuge for animals and birds.
5. **What is one example of how Indigenous knowledge could help?**
   One example is the Secwepemcúl'ecw Restoration and Stewardship Society (SRSS) near Kamloops, British Columbia. The SRSS has been working with the government to help restore nearly 200 000 hectares of forest on Secwépemc territory that was badly burned in 2017. The SRSS works with Indigenous communities to identify tree, plant, and animal species to put back onto the land after a wildfire so the forest can return to its historical roots.

## What Is the Central Nervous System?

1. **What are the main parts of the central nervous system?**
   In human beings, the main parts of the central nervous system (CNS) are the brain and spinal cord.
2. **What are neurons?**
   These are cells in the body capable of conducting electrical impulses from one part of the body to another.
3. **What does the brain do?**
   The brain is responsible for our ability to think, have memories, and feel emotions. It also receives electrical impulses from the spinal cord and other nerve cells that

are responsible for our senses: our ability to feel touch, hear sound, to see, to smell, and to taste. The brain also sends out electrical impulses to our muscles, causing them to move.

4. **What are the two types of electrical impulses the brain sends out?**
   Some are reflexive—for example, the brain automatically sends out regular electrical impulses that keep our heart beating and our intestines digesting. The brain is also responsible for voluntary motor functions—sending impulses to muscles whenever we want to move: to walk, run, catch a baseball, or sing.
5. **What is the spinal cord?**
   The spinal cord connects to the brain and runs down through our neck and the middle of our back to the tailbone. It consists of a bundle of nerves that carry electrical impulses to and from the brain to the rest of the body.

## This Is Your Brain

1. **Controls memory storage area and emotion**
   Temporal lobe
2. **Receives and processes sensory information**
   Parietal lobe
3. **Responsible for balance and muscle coordination**
   Cerebellum
4. **Controls basic survival functions**
   Brainstem
5. **Processes images from the eyes**
   Occipital lobe
6. **Involved in motor skills and cognitive functions**
   Frontal lobe

## Science News Quiz

### NERO'S THEATRE DISCOVERED IN ROME

1. The ruins date back almost **TWO THOUSAND** years.
2. **Archaeologists think the theatre was a private place where Nero could practice his poetry and music in front of small, select audiences.**
   True

### HOW LAUGHTER IS USED IN SOCIAL SITUATIONS

1. **Humans use laughter to smooth over difficult social situations.**
   True
2. **Which of the following is not one of the classifications the team used for laughter?**
   B. Aggression laughter

### BIOMETRICS AND HOW YOU WALK

1. **Biometrics is the use of a person's DNA for identification purposes.**
   False – Unique physical characteristics
2. The researchers are studying the **GAITS** of different people to see if they can identify aspects of how they walk that are distinctive from others.

### WILL CANADA'S FORESTS RECOVER?

1. Edward Struzik points out fire is part of the **NATURAL CYCLE** for Canada's boreal forests.
2. **Ellen Whitman says the dense, conifer forests could end up being replaced with what?**
   B. More open landscapes

### WHAT IS THE CENTRAL NERVOUS SYSTEM?

1. **What are the main parts of the central nervous system?**
   A. The brain and spinal cord
2. The brain receives **ELECTRICAL IMPULSES** from the spinal cord and other nerve cells.