28/02/25

THE LAB REPORT

Today's joke

Two blood cells met and fell in love....

Whale, whale, whale....

BIOLOGY

Often, humans are differentiated from the rest of the animal kingdom by the use of language and sophisticated communication. However, current studies show that our language isn't as unique as we thought it to be. All human languages follow the same pattern; the most common word is used twice as much as the second most common word, the second most common word is used three times as often as the third most common word, and so on. This statistical rule is called Zipf's law and has never been found in any non-human species. Though recently, an international team of researchers discovered that humpback whale song shares this same pattern. This breakthrough research occurred by comparing the way babies learn words in speech, to 8 years' worth of whale song data collected the south-west Pacific Ocean. Furthermore, what makes this discovery even more intriguing is that, like humans, Whale song is culturally learned; whales have to learn song through interaction. Scientists have theorised that the Zipf's distribution makes it easier to learn and pass down language between generations. Despite the commonality between the statistical distribution of human and whale communication, whale song isn't considered a language due to its lack of semantic meaning (unlike words, the sounds whales make don't have specific definitions attached); It is more comparable to human music which is also shares this pattern but without semantic meaning. So, we're sorry to say that we won't be speaking whale any time soon- but this doesn't make this amazing discovery any less exciting!

Did you know... if you laid end to end, an adult's blood vessels could circle Earth's equator four times!

What's that 'sus' smell from metals...?

CHEMISTRY

The tangy and acrid smell of metal is synonymous with loose change in our pockets or lifting dumbbells, handling nails, wearing jewellery or even playing the guitar . The smell is not particularly pleasant but very familiar for most of us and most assume the smell is coming from the metal. However, you can't smell metal.... it's impossible.

We smell things when gas or vapour from the object is released and detected by our nose. But the bonds in metals are so strong that they don't release any vapour at all or are said to not be volatile (evaporative) . And even in the rare case when a metal can release vapours, for instance mercury, they fail on the other requirement, sensitivity. Humans can't recognise and smell vapours that come off of these metals. That's what makes working with mercury so dangerous.

So then, what on earth are we smelling on our hands after touching metals? Well, it turns out the smell comes from the oil and sweat in our hands, creating chemical compounds with the metal, especially 1-octen-3-one along with a range of other smelly compounds that combine to make this infamous smell. The metals iron, zinc and copper are really the only metals capable of creating these chemicals with our skin oils, and they happen to be the metals we find in our coins, brass and railings where we find the smell.

You can even test this at home. Wash a coin with soap and pick it up with a paper towel so as to avoid contact. You won't be able to smell anything. Then rub the coin between your fingers for a bit and then smell the coin. The distinct smell will appear. And in case you didn't know, Sam and Ron's love for metal is aluminum-ting!!

Fun Fact

Every hydrogen atom in our body is 13.5 billion years old. Because they were created at the birth of the universe.

Glasma Balls

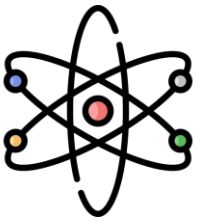
PHYSICS

As you all know, the leading theory as to what created the universe was the Big Bang. However, matter was not created as one might at first presume. In the few microseconds after everything exploded, the only thing in existence was quark gluon plasma. This is essentially what's called a "quark soup", which is the building blocks of matter. The smallest particles are, in fact, NOT electrons but are even smaller – quarks, which are the fundamental particles that make up protons and neutrons, and gluons which glue them together.

Quark gluon plasma (lovingly named QGP) is the hottest thing to ever exist. It hit an astounding temperature of 5.5 trillion degrees Kelvin. It is possible to produce the temperature and density of QGP in laboratory conditions so that we can study the characteristics of the very early universe.

This can be achieved by colliding heavy ions, like lead or gold, at ultrarelativistic speeds (very close to the speed of light!). This creates a 'fireball' effect in the rare event that it actually works, and the nuclei collide – however, this is difficult to do. It has been achieved before at CERN in Switzerland, using their Super Proton Synchrotron.

The most recent development in the quark gluon plasma world is the theory that something may have existed before this, mere nanoseconds after the Big Bang. This is 'glasma', a shapeless sort of cloud made of mainly gluons. At the moment, it is purely hypothetical, but scientists are calling it a new state of matter. Understanding this could be a step towards working out how our universe came to be! How cool is that?



Did you know?

A teaspoonful of neutron star would weigh billions of tons on Earth.

AN EXPENSIVE VOLCANO

GEOLOGY

A branch of Africa's Great Rift Valley, located in Ethiopia, is expected to split open a new ocean far sooner than expected. The area is a hot-spot of seismic activity, being at the junction between the Nubian, Somalian, and Arabian plates, which make up part of the East African Rift zone. The zone is the largest seismically active rift system on Earth today, with most of the activity occurring in the Afar depression.

The rift has been widening for 25 million years, with periods of high activity and periods of dormancy. However, in 2005, a violent earthquake quickened the movement. A series of 420 earthquakes triggered a 60km-long rift in just a few days. This kind of geological movement normally takes hundreds of years. This specific rupture is now 10 metres deep and continues to widen at an increasing rate.

This phenomenon is thought to be creating a new ocean (an extension of the Red Sea) within one million years. With the Arabian plate moving away from the African plates at 2.5cm/year, and the Somalian and Nubian plates separating at 0.5cm/year, the continent will be carved in two from the Red Sea to the Gulf of Aden. This will pose risks as well as benefits. It will increase biodiversity by creating new, separate habitats. New marine resources may be found, and shipping routes can be developed. However, it will alter the climate, disrupt local communities, and productive land will be lost.

As Cythia Ebinger says "rifts feature highly in the geological history of the Earth" so there is little we can- or should- do to stop the split of the continent.

FUN FACT

Not all diamonds are transparent. They come in a variety of colours called fancies and can include yellow green and even brown

This section of the magazine will be for students with a passion for science who want to pursue a career in STEM but aren't sure on the jobs available to them. In Each edition there will be an overview of a different career, including a description of what it entails, as well as the qualifications needed to get the job.

CAREERS

Aerospace engineering

What do they do?
Aeronautical engineers are the brains behind the flashy achievements in all things airy and spacey, from designing rockets and space suits to weather prediction systems. As an aerospace engineer you can get involved in the designing, modelling and testing of some of the most cutting-edge technology in the world. The role includes:

· Designing, developing, and adapting aircraft, spacecraft, satellites, and weapons
· Work with other professionals in the field to improve the safety and functionality of various aerospace technologies
· Conducting research and analysis of current materials and techniques used via simulations and computer aided design software

If you like the sound of getting humans to Mars, you'll need to reschedule naptime during physics and maths lessons! A standard offer to study at a top UK university is A*AA, and every uni requires Maths A-level. Physics is also mandatory for some, whilst others accept Physics or Chemistry as other subjects. Although not always required for application, many competitive universities expect you to have a high number of grade 7-9s at GCSE, some even specifying grade 8-9 in Maths or Physics. What about the payout? Starting wages for an aerospace engineer range from £25,000-£34,000 a year, whilst very senior positions will earn you from around £45,000- £80,000+, tempting?

REVISION TIPS

Teaching

Every week we have given you a different revision technique, often things that you can do in the comfort of your bedroom, hiding away from everyone. However, this method requires you to put yourself in the mind of some of the people you see 5 days a week; your teachers! Teaching someone else the subject that you are trying to revise is a tried and tested way of ensuring it stays all up in your head. Whether that be truly pretending to be your English teacher, whiteboard and all as you explain to your dad the plot of the play you're studying, or just inciting a conversation around the dinner table about the Tudors; play it however you like best!
This way, you can involve your friends and ensure that the conversation isn't completely distracting you from the hour of studying in the library after school ("I promise that we'll get work done" - we've all been there!). Especially for those of us now preparing for GCSE's and A-Levels, ensuring that all gaps are filled by talking through topics with our peers means that everyone understands the topic to a full extent!
Being able to explain a topic in such a detail that someone outside of the subject can understand it shows how much you have remembered and is a culmination of all your hard work using the techniques that you've read about in our previous editions of The Lab Report!

Today's joke
...Alas, it was all in vein

Find out about 👀
The Lab Report Competition on the next page

Want to get involved in The Lab Report? Now's your chance!

We're challenging you to write a science-based article in an area that interests you, and we'll pick the best two to publish next issue. The article must be around 200 words, complete with a picture, and sent to TheLabReport@ccgrammarschool.onmicrosoft.com by Friday 14th March. Please make sure you credit yourself with your name and form group. Good luck!

That's all from us , see you in our next issue !

April McGowan, Clove Gater, Emily Ford, Freya Windle, Samuel Johnson, Eloise Martin, Hermione Redwood, Ron Zaki , Delaena Debre