



# Climate, Ecology & Sustainability



## Café Scientifique Newsletter

### Half Term I

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# Climate, Ecology and Sustainability

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Welcome to this year's first edition of the Café Scientifique newsletter. This term's focus has been on exploring climate, ecology, and sustainability and this newsletter is a collation of various articles, book recommendations and activities on this topic, which have been produced by our pupils and teachers.

#### Meet The Team

We would also like to take the opportunity to introduce this year's Café Scientifique Team.



Along the back row (going from left-right):  
Elisia Sellar, Alais McCluskey, Bella Forsythe, Millie Barker.

Along the front row (going from left-right):  
Scarlet Sykes, Neha Neil, Tamika Pillay, Amelia Kanwar, Lucy Jennings



# Sustainability in School

Over the course of this half term numerous School events and clubs have been massively contributing to promoting sustainability and climate action. Amongst these are the Gardening Club, the Animal Fair, and the Beekeeping Club, who are here to tell us more about their work.

## GARDENING CLUB

Gardening Club is a great way to spend some time outdoors and to get involved with helping to grow produce. This year, we have been busy harvesting the produce that we sowed last year – we have had tomatoes, cucumbers, onions, potatoes, courgettes, and cabbages to name a few. Christophe Charpentier and his amazing kitchen team then turn these into delicious side dishes for us to enjoy at lunchtime. We also have a wonderful greenhouse, where we can plant seeds and watch them grow through the winter, so there is never a dull moment.



It has been proven that gardening has positive benefits on our mental health and there is nothing more rewarding than seeing something that you planted as a seed grow into either a beautiful flower or a tasty vegetable.

All are welcome at the club – Friday, 2<sup>nd</sup> lunch.

Teacher Article:

By Miss Gilbert



## **BEEKEEPING CLUB**

Beekeeping on a Wednesday lunch time involves visiting the bees and learning how to look after them. You don't need a bee suit, but it is ideal if you have a pair of wellies and some suitable gloves!

Last year, we started the beekeeping certificate which involves a creative task, a 6-week diary and a knowledge of things on the British Beekeeping Association (BBKA) Junior beekeeping certificate syllabus. Due to the bad weather, we never managed the 6-week diary so are continuing it this year. We have started from the beginning with the lessons about the things on the syllabus such as knowing parts of a beehive and knowing how to catch a swarm. This was as a recap for those who were there last year and so the ones that weren't know what is on the syllabus and the things they need to know for it.



It is really rewarding to see all the honey the bees have made while you've helped look after them, especially when you get the opportunity to extract the honey from the frames and get a free jar.

The aims of the club are to teach the girls involved how to identify different bees (queens, drones and workers), as well as to be aware of varroa, what you can do to try and prevent it and what to do if the hive gets it. Beekeeping also aims to get the 6-week diary done, complete the syllabus to eventually do the certificate and possibly if they pass, which I'm sure will happen, be qualified in beekeeping.

Student Article:

By Rhiannon Grist



## ANIMAL FAIR

The animal fair on Wednesday 4<sup>th</sup> October in the hall had fun activities and despite many of the activities being free, we still managed to raise £82.10 for Warwickshire Wildlife Trust.

One of the competitions was Guess the Close-up of the Animal, which was overall quite hard. Many of us were unsure, though nonetheless we enjoyed it and had fun, despite us thinking one was a giraffe rather than being a nose of a wolf that was upside down.

Furthermore, there was a tombola that I believe was definitely the most popular thing there, with nearly all the prizes going including soft toys, stationery and other fun things



Also, at the fair, you could guess the name of the leopard and guess the name of the bear. With this, people for a change chose their own ideas for a name of the bear and the leopard where people came up with great ideas and suggestions.



Additionally, there were pieces of paper for people to attempt drawing anteaters, and koala colouring ins were available for people to enjoy, with the best colouring and best drawing getting prizes. All the anteaters and koalas were amazing.





Guess the weight of the egg had many entries with the true weight of the egg was around 720g. Some guesses were close; the closest was 750g whereas some were further away from the answer.

Lastly, always remember that 'Big or small, we love them all'.

Student Article:

By Rhiannon Grist





# War and its effects on the Environment

The war in Ukraine has impacted many people in different ways. This section of the newsletter will focus on how this conflict has effected ecology and sustainability as well as its interference in the conservation of Amur Leopards.

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## **HOW DOES THE WAR IN UKRAINE AFFECT ECOLOGY AND SUSTAINABILITY?**

Ukraine ranked low on environmental indicators like air quality and ecosystem health even before the full-scale invasion was launched in February 2022, considering the information above the environmental situation in Ukraine will most likely be worse than ever.

Ukraine takes 35% of Europe's biodiversity, there are over 70,000 rare and endemic flora and fauna.

16% of Ukraine's land area is covered by forests, explosions from the artillery will likely cause fires in the forest, which have already burned 20,000 hectares of the Luhansk region in 2020.

Current statistics show, that more than 12,000 square kilometers of Ukraine's major nature reserves have now become a war zone.

Population of rare species, that have been protected in Ukraine for years have now suffered great losses, birds were forced to change their their usual migration routes, and abandon their homes.

Moreover, due to the use of various weapons in this war, the carbon footprint will be raised, locking more greenhouse gases into the atmosphere, which will unfortunately put Ukraine at an even higher risk of climate change- related disasters such as rising sea levels, supercharged storms and higher wind speeds.

Majority of international observers and journalists describe the damage as ecocide.

Explosions of Russian missiles cause not only physical destruction, but toxic damage as well. After every single one of many daily explosions particles of lead, mercury, and depleted uranium are released into air, water and soils. When heavy metals penetrate underground waters and poison water sources, killing all life in rivers, seas, ponds, lakes, etc. Furthermore, ingested explosives such as TNT, DNT, and RDX, cause illness. Fights in heavily industrialized cities lead to spills of tailings and fuel, that poison vast territories, including Europe and Russia.



One of the biggest ecological issues Ukraine has faced during this war is the gamma radiation in the Chernobyl zone being approximately 28 times the annual limit, due to heavy vehicle movements.

Shelling ruins Ukraine's fertile soils, leaving a long-term effect. The highly fertile chernozem, which made Ukraine one of the world's largest grain exporters, suffers from pollution with heavy metals, chemicals, lubricants, and spent fuel.

Vegetation grown on contaminated land absorbs these pollutants and transfers them to humans via the food chain.

To conclude, the war in Ukraine has a major impact on ecology and sustainability, not only in Ukraine, but also in Europe, and all of the damage caused has already ruined efforts of decades-long conservation projects, air quality, biodiversity production and has also contributed to climate change.

Student Article:

by Olya Glushko



## **AMUR LEOPARDS**

I have been sponsoring since I was in Year 7 an Amur leopard through the world wildlife fund and was pleased to hear that the numbers have risen from 30 in 2007 to as many as 125 in 2022. That means that numbers of Amur leopards have quadrupled in my lifetime.

However, I received in the post today a letter from Becki May, senior program advisor, that I can no longer sponsor these beautiful creatures. The reason was 'most of our work with Amur Leopards has taken place in Russia, where the vast majority are found. However, WWF's activities are now designated as 'undesirable' by the Russian Government. That means no one in Russia can work with us or receive funding from us. Breaking these rules can come with severe penalties.' WWF Russia has been forced to close. This shows another awful consequence of the Invasion of Ukraine on the environment.

Student Article

By Lucy Jennings





# Climate change and Ecology in the UK

The effects of climate change can be seen almost everywhere in the world however this section will focus specifically on how it is affecting the UK.

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## **CLIMATE CHANGE AND HOW IT IS AFFECTING ECOLOGY IN THE UK**

Climate change is a global situation that has far-reaching consequences for our environment. In recent years, the United Kingdom has experienced significant changes in weather patterns and ecosystems due to the effects of climate change.

How is climate change affecting the ecology of the UK?

### **Rising Temperatures and Changing Habitats**

As global temperatures continue to rise, the UK is witnessing the consequences to its habitats. Many species are struggling to adapt to the changing climate, as their natural habitats become unsuitable for their survival. For example, certain bird species are finding it difficult to cope with the warmer temperatures and are migrating to cooler regions.

## **Life Cycles**

Climate change is disrupting the balance of ecosystems in the UK. Seasonal and biological shifts, such as earlier springs and delayed autumns, migrations, egg laying, flowering and hibernation are disrupting the life cycles of various plant and animal species. For example, the flowering times of plants are no longer synchronized with the arrival of their pollinators, risking the survival of both

## **Increasing Risks of Extinction**

The pace of climate change poses a significant risk to biodiversity in the UK. As habitats change and species struggle to adapt, the risk of extinction increases. This is particularly concerning for rare and endangered species that are already under threat due to human activities.

## **. Altered Ecosystem Services**

Ecosystem services, such as pollination, seed dispersal, and natural pest control, are important for maintaining the balance of nature in the UK. However, climate change is altering these services, impacting the functioning of ecosystems. For example, changes in temperature and precipitation patterns can affect the timing and efficiency of pollination, which can then impact crop yields and food security.

## **Coastal Erosion and Sea Level Rise**

Rising sea levels and increased storm intensity are causing coastal erosion, threatening important habitats such as salt marshes and sand dunes. These habitats provide shelter and food for a wide range of species in the UK, including migratory birds. The extinction of these animals would have severe consequences for biodiversity.

## **Conclusion**

Climate change is having an increasing impact on the ecology of the UK. Rising temperatures and risk of extinction, disrupted life cycles, altered ecosystem services, coastal erosion, and rising sea levels are just some of the affected areas of the UK wildlife that is becoming increasingly difficult to ignore.

Student Article:

By Millie Vaux





# Innovative Ways to tackle the Climate Crisis

The development of technology has allowed us to introduce new innovations into the world that can help us fight the ongoing crisis of climate change. This ranges from solar panel train tracks to clothes made from pineapples!

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## COULD YOUR UNIFORM IN THE FUTURE BE MADE OF PINEAPPLE LEAVES?

Fast fashion is having a massive impact on our planet. PVCs used to manufacture the clothes you wear harm the waterways and wildlife. Chemists have come up with a way of tackling this with sustainable alternatives.

According to the Royal Society of Chemistry, the answer could be pineapple leaves. It states that 'Dr Raquel Prado and her team at Ananas Anam have developed 'Piñatex' fibres from pineapple leaves to be used to make clothing and shoes. Piñatex is the first material of its kind that can be used as a direct alternative to current, more harmful materials, and it's changing the world we live in, one pineapple at a time'.

Also, a chemical scientist at Imperial College in London has found a way to convert sugars in plant wastes to biofuels and biochemicals. This is low cost and a sustainable process which separates the sugars usually wasted from forestry and farming.

What do you think: would you want your school uniform in the future to be made out of pineapple leaves?

Student Article:

By Lucy Jennings



## SALT POWDER



Clean Energy Innovation Set to Light Up Communities Lacking Electricity - [adsofbrands.net](http://adsofbrands.net). This is a portable device suited for remote communities that do not have complete access to internet or electricity all the time. It can convert seawater (or urine if saltwater is unavailable) into electricity/light for 45 days. This is due to the reaction between the sea water and the copper and magnesium plates on the inside of the lamp to produce energy. This is a recyclable and sustainable way of generating light that produces no harmful greenhouse gases and therefore does not contribute to the increase in global warming. It is especially helpful for coastal nations as they have an easy access to salt water.

Student Article:

By Tamika Pillay

## SUN TRACKS

This is when the train tracks are replaced with durable solar panels that can harness the power of the sun and convert it into electricity. A German rail operator and a British energy company have been trailing the use of this system on railway lines in Saxony. According to the British energy company, if deployed across Germany's entire rail network, the panels could generate as much electricity as five nuclear power plants combined. This natural renewable energy, once again, will decrease the amounts of greenhouse gases that are emitted into the atmosphere.

Student Article:

By Tamika Pillay



## **CARBON-CAPTURED SCENT**

A major Cosmetic company, Coty, developed what it claims to be the world's first perfumes made from the capture and fermentation of carbon emitted by industrial activity before it is released to the atmosphere. This will be beneficial as it will act as a quick and easily accessible way for individuals to help with the climate crisis.

Student Article:

By Tamika Pillay



## **COULD SEAWEED BE THE SOLUTION TO THE WORLD'S PLASTIC PROBLEMS?**

We all know that single use plastic is damaging to the environment. King's High has removed plastic cups, cutlery and plates as of this term, and staff across the foundation are encouraged to bring in their own Tupperware. What we need though is an alternative and chemical science may have found one.

Biodegradable polymers made from seaweed and other plants is a possible solution. As the Royal Society of Chemistry states, 'Seaweed is quick growing and uses the same manufacturing processes as plastic from fossil fuels. Notpla, which sprung from Imperial College London, creates truly sustainable packaging solutions from seaweed and plants that disappear naturally, giving consumers the convenience of single use, without the plastic waste. Their products include its edible liquid packaging, Ooho, its takeaway box coating and single-use film sachet replacements. For some time, BASF been helping companies optimise packaging with innovative chemistry and reduce food waste by improving processes to make them more efficient.



And UK research and development company Mimica has developed a product called Bump that uses gel chemistry to reduce unnecessary food and drink waste. It encourages consumers to store food at the right temperature which maximises the shelf life, saving perfectly good food from being wasted'.

We could all help with this one by reducing food waste, single use plastic usage and recycling where possible around school.

Student Article:

By Lucy Jennings



## **ELECTRIC CARS**

Do you or your family have an electric vehicle? Does this mean planning your journey around places such as service stations, where you have to sit whilst the car charges? Echion technologies is introducing 'a niobium-based material into lithium-ion cells which has reduced the charge time to six minutes and increased the lifespan from 1,000-2,000 cycles, to 10,000-30,000' (RSC). Also, at the University of Birmingham, they are using a microorganism similar to apple mould to 'separate and purify the different materials in lithium-ion batteries in electric vehicles' so they can be reused or recycled.

Student Article:

By Lucy Jennings

## **NATURAL ABSORBERS OF CARBON**

Global warming is the most topical issue we face in Ecology today. Events that took place every 50 years pre-industrial times now happen 4.8 times in the same 50 year period. In the media, we are often exposed to technological breakthroughs that help sustain climate change. However, underneath the umbrella of global warming hides lesser-known facts about the Natural absorbers of carbon that our planet cleverly curated to be implemented during periods of climate change. This article will explore natural carbon capture methods.

### Natural Absorbers

It is theorised that all vegetation on Earth has deep rooted connections to a fungal network that forms a symbiotic relationship in the soil; among which fauna and fungi exchange carbon, water, and mineral ions that they draw from the air such as nitrogen. One special type of fungi that benefits from this symbiotic relationship is called Mycorrhizal Fungi which take up carbon by attaching to plant roots where they will then store this carbon in their plant tissue, therefore reducing the volume of carbon in the atmosphere. It is estimated that more than 13 gigatonnes (around 71.5 million blue whales) of carbon is stored in these fungi every year.



You might already know that the ocean is the largest carbon sink in the world, however, this leads to the question of why that title has come to be. Inside the ocean are over 20,000 species of phytoplankton that range between 1-100 micrometres in length.

These microscopic marine organisms absorb around more carbon than any other fauna on land combined taking in 30-50 billion biometric tons of carbon each year



Forest fires have been some of the most devastating natural disasters to happen in recent times, however it has been found that an Alaskan forest after having burnt it's mostly coniferous trees is growing a new generation of deciduous- coniferous mix which has been found to offset a large volume of carbon released during the fires.

Forests have the possibility to be one of the largest carbon sinks in the world, however if a fire burns too deep into the soil, trees could start releasing more carbon into the atmosphere that they would be able to store until the growth of new wood.

This poses a significant question to the reliability of natural methods of storing carbon. Although trees have evolved to be the most efficient species of their kind, does this sudden increase in carbon stretch their biological capacity of storing carbon? A recent study undertaken by scientists from the University of Santa Barbara explores the idea that although forests can adapt to climate change, they will not adapt quickly enough to meet the demands of society. The study focuses on climate change-induced droughts which show positive signs of adaptation where they have found individual trees can alter their activity, physiology, and gene expression to adapt to new conditions.

The trees with all the adaptations will win natural selection, and their offspring will form more climate-adapted forests in the future. However, none of this will happen overnight, it would take decades or over a century for all our forests to take forth these adaptations.

Overall, natural absorbers of carbon are excellent Carbon sinks; however, they do not tackle the bigger problem of preventing large volumes of carbon from being emitted into the atmosphere.

Student Article:

By Jashany Akilan



## **SHARKS AND AVIATION**

The information in the article below comes from :

<https://www.basf.com/gb/en/who-we-are/change-for-climate/Learning-from-sharks.html>

As the fight against climate change increases rapidly, scientists are coming up with more and more ideas to help reduce the amount of carbon dioxide released into the atmosphere. Aviation is a key contributor to the release of carbon dioxide in the atmosphere with the International Council on Clean Transportation (ICCT) reporting that in 2019 920 million tons had been released because of commercial aviation. In response to this, scientists have decided to look into more unusual ways of helping reduce CO<sub>2</sub> levels. One of these ideas is adapted from sharks and how they can easily glide through the water at high speeds.

This article focuses on how sharks have adapted to their environment to greatly benefit the speed at which they travel when swimming. This leads into how we can benefit from sharks' adaptations by engineering our planes to have similar designs and therefore increasing the speed of planes.

This will help improve our planet by 'saving fuel and cutting emissions' because the sharkskin technology will increase the speed at which our planes can travel and reduce the levels of CO<sub>2</sub> released.

So how do scientists plan on recreating the design of a shark onto a plane? After many hours of research, it has been discovered that sharks have lots of tiny 'ribs' that reduce drag and allow them to swim faster. Alongside the help of Lufthansa Technik, they have designed a way to modify planes without needing to completely redesign them. They will do this by installing a film, containing millions of microscopic 'riblets' (tiny ribs) to the exterior of the plane. This will increase the speed of planes, making them more aerodynamic, and therefore reduce the levels of carbon dioxide being released into the atmosphere.

They predict that on a large, long-haul aircraft, more than 1000 tonnes of CO<sub>2</sub> will be cut each year. In addition, cutting down 1170 tonnes of CO<sub>2</sub> per plane each year. The scales will reduce drag by 1.1% and they expect to reach 3% shortly. They will save 370 tonnes of kerosene per plane per year. Finally, for commercial aviation they expect to save 11 million tonnes of CO<sub>2</sub> per year.

Vjosa Schmidt, BASFs business manager for riblet films says, “it is one of the few inventions in the aviation industry that reduces all climate-relevant emissions including carbon and cuts costs.”

Student Article:

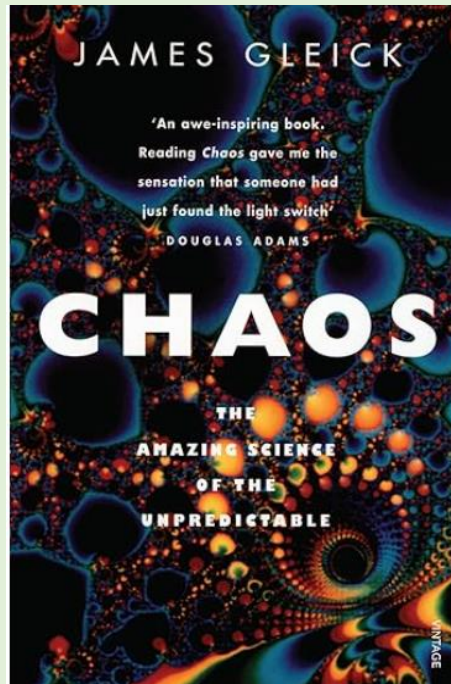
By Alais McCluskey





# Recommendations

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## Book Recommendation from Mrs Scott

### Chaos, by James Gleick

This highly readable book first introduced the concept of “chaos theory” to the public. This is a relatively new field in physics, which uses mathematics to explain complex natural systems. Published in 1997, it remains one of the best books on the subject. In the book, many phenomena are discussed, from the butterfly effect to meteorology – hence the link to this half term’s Café Scientifique theme of climate. The weather (and longer term, the climate) is a chaotic system, where small changes in the initial conditions grow rapidly and affect the predicted outcomes. The importance of scientific education is also strongly stressed! This is a good book for anyone wanting to understand the weird and wonderful world of chaos!





# Activities and Puzzles

Why not try these puzzles, activities and links to music inspired by Science and the climate?

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## Ecology

### Across

[3] a community of organisms in an environment

[4] the place organisms live

[7] organism that can produce their own food through the process of photosynthesis

[9] organism that breaks down chemical compounds made by living things

[11] very similar organism that can interbreed and produce fertile offspring

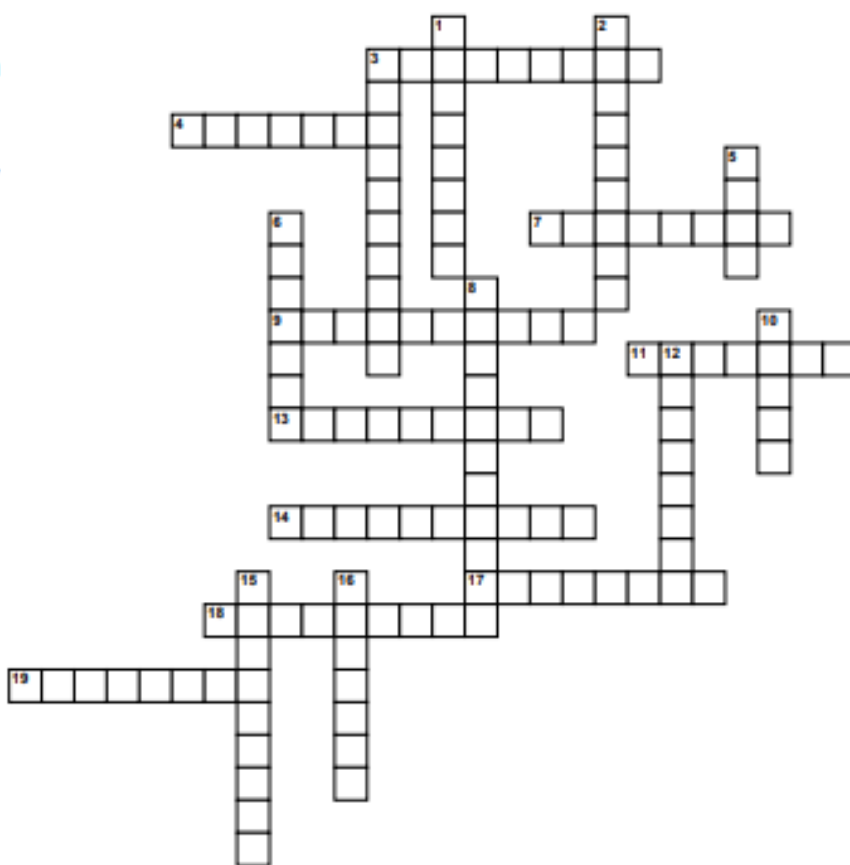
[13] the part of the Earth in which life can exist

[14] a group of organisms of the same species living in an ecosystem

[17] organism that consumes both plant and animal tissue

[18] energy links between different organisms in an ecosystem

[19] an individual living thing composed of one or more cells



### Down

[1] organism that must obtain nutrients and energy from eating other organisms

[2] organism that consumes only plant tissue

[3] The complete destruction of every member of a species

[5] the animal hunted by other animals

[6] the overlapping of food chains in an ecosystem

[8] the interaction between two organisms that require the same resource

[10] a major ecological community occupying a large geographic region

[12] animals that hunt for other living animals

[15] all living components of an ecosystem

[16] the study of the relationships and interactions of living things with their environment

## **WHERE'S FRANCES H ARNOLD?**

Frances H Arnold is a chemical engineer who developed enzymes to make new medicines and renewable fuels.

Can you locate her in the image below?



## Environmental Science Word Search

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

Acid rain

Aerosols

Aquifer

Atmosphere

Biodegradation

Biodiversity

Biomass

Biome

Biosphere

Biotic

Carbon cycle

Carcinogen

Climate

Conservation

Ecosystem

Environment

Erosion

Greenhouse

Habitat

Indicator

Nitrogen cycle

Pollution

Recycling

Smog

Stressor

Tolerance

Toxicology

Waste

Water cycle

Weather



## **JUST FOR FUN... WHERE SCIENCE MEETS MUSIC!**

### **THE SCIENTIST-COLDPLAY**

<https://www.youtube.com/watch?v=yw20p3dzcel>

*Did you know?: this song is about a Scientist that gets too caught up in his work and neglects his girlfriend.*

### **DNA- BTS**

<https://www.youtube.com/watch?v=MBdVXkSdhwU&t=2s>

*Did you know?: this song contains a flow of scientific references serving as a metaphor for a romantic connection.*

### **REACH FOR THE STARS- WILL I AM**

<https://www.youtube.com/watch?v=XUUKNOY4WHO>

*Did you know?: this song was based on when NASA managed to land a rover on Mars. Will I Am was fascinated by this.*

### **WE ARE ALL MADE OF STARS- MOBY**

<https://www.youtube.com/watch?v=x1rFAaAKpVc>

*Did you know?: the song is relatively scientifically accurate and Moby said 'just remember there is not a single part of you that was not present in the first half second of the Big Bang.*

*Technically we're all 13,600,000,000 years old'.*

### **AND FOR THE TEACHERS... THE ELECTROMAGNETIC SPECTRUM SONG**

<https://www.youtube.com/watch?v=bjOGNVH3D4Y>

*Did you know?: this song has received 3.3 million views and has made it on tiktok!*



## **MESSAGE FROM THE EDITORS OF THE CAFÉ SCIENTIFIQUE NEWSLETTER**

AND NOW WE NEED YOU FOR THE NEXT EDITION!

The Christmas half term theme is Science Around Us.  
We are looking for articles from all year groups on  
what interests you in Science.



This can be anything from pets to the science of food, sport to art  
and music. We would love to hear from you.

Contributing to the Science newsletter not only shows that you are  
interested in Science in the world around us, but can also be used  
as part of personal statements or changemaker awards.

Please send any articles, photographs or quizzes to  
[lu.jennings@kingshighwarwick.co.uk](mailto:lu.jennings@kingshighwarwick.co.uk) and  
[a.kanwar@kingshighwarwick.co.uk](mailto:a.kanwar@kingshighwarwick.co.uk).



Thank you in advance,  
The Café Scientifique team



## **Acknowledgements**

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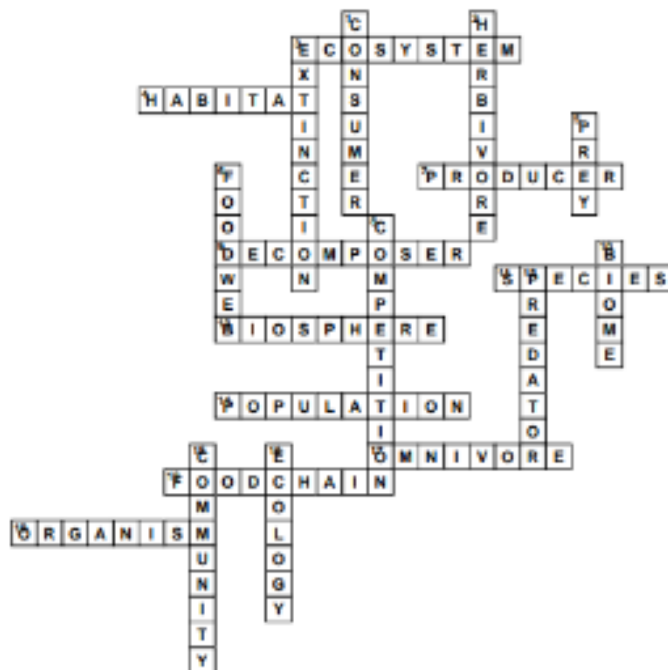
Editor/ Producer of Newsletter: Lucy Jennings Year 12

Authors: Various (see articles for specifics)

Activities: Neha Neil Year 12, Tamika Pillay Year 12

## **Activity Solutions**

### **Solution**





## Environmental Science Word Search

