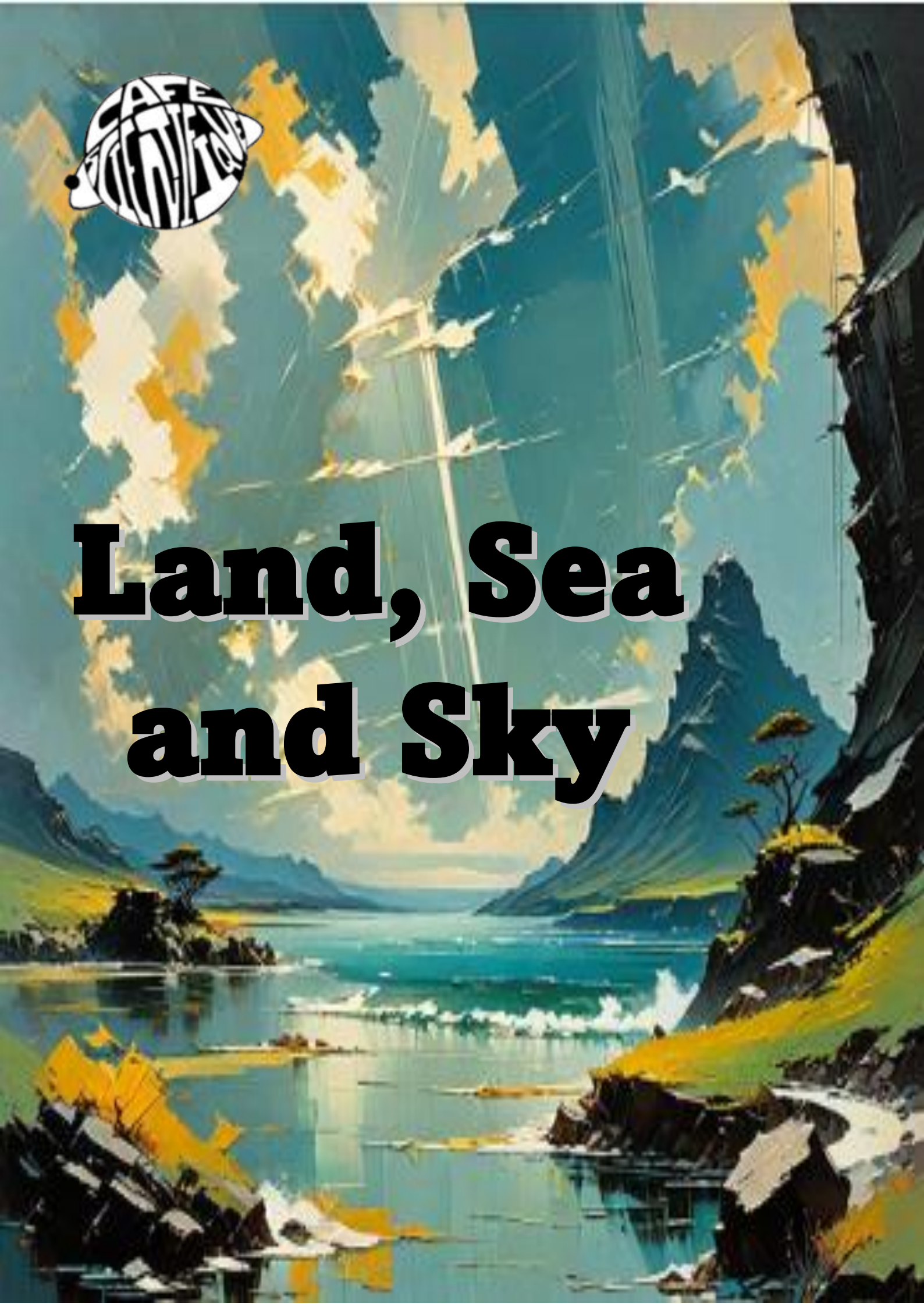




Land, Sea and Sky





**Café Scientifique
Newsletter**

Summer Term

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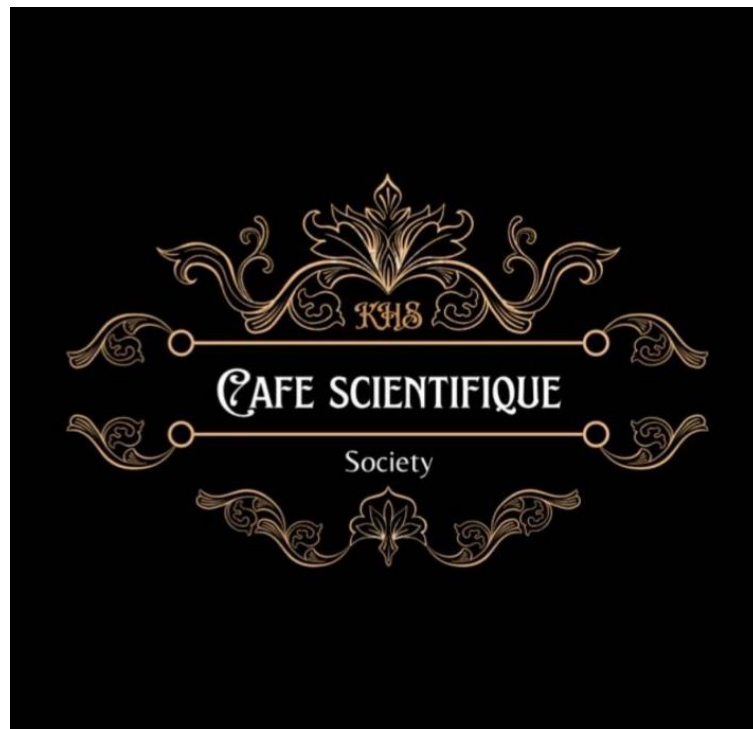
Recommendations

Acknowledgements

Final note from the
2023-2024 editors

Land, Sea and Sky

Welcome to the last edition of the newsletter for this academic year. This term the newsletter's theme is 'Land, Sea and Sky'. The newsletter features articles on a series of fascinating topics from KHS and WS students, as well as articles about the science events held at King's High this term. This newsletter also features a section dedicated to articles written by Warwick Preparatory School students as well as a section dedicated to the King's High Engineering Society.



The Café Scientifique Podcast!!!

We would like to take the opportunity to advertise 'The Café Scientifique Podcast'. This project is led by Neha who is in charge of producing the podcast. The podcast is available [here](#) for you to listen to at your own leisure! (logo for the podcast is shown above)



Science at School

The following section of the newsletter showcases some of the various science-related activities that have been held at King's High School this term.

VISITING WARWICK SCHOOL'S ANIMALS WITH THE ANIMAL AWARENESS CLUB

On 4th June, Animal Awareness Club had a fantastic time visiting the mixture of reptiles, small mammals, fish and insects at Warwick school.

We saw animals such as the Russian Steppe tortoise. We learnt that these tortoises have an exceptionally large lifespan and can live for up to 80 years.

We also saw snakes. These were corn snakes which were brother and sister, Nancy and Sid. Rachel, caretaker of the animals at Warwick School said, "The snakes both have very different characters, Sid is very calm and isn't bothered by human touch, however his sister Nancy can sometimes bite." We were also told that the snakes were not venomous which seemed a relief for some until we found out that the two corn snakes, despite their small size, enjoy eating a whole mouse.



We also loved meeting the two degus called Wasabi and Twitchy. They both seemed very energetic, enjoying the attention by showing us their hamster wheel with the occasional fight in between. Rachel also showed us a small box full of dry, flaky dirt. "The degus use the dirt/soil as they once did in the wild. As they were in warmer climates, they would use the dirt to roll in, in order to get rid of any mites or bugs in their fur. Elephants also do this." Rachel explained.



Overall, Animal Awareness Club had a fantastic trip to Warwick School and very much enjoyed learning about all the different animals. Special thanks to Mrs Pitchford for organising us to go over, and to Rachel for giving up her time so we can see all the amazing animals.

Article by Arabella

Finally, we came across a leopard printed lizard and some fish, however these fish were quite unique as they liked to move their surroundings. "The fish move objects such as the snail shells we have here." Rachel indicated. "They use these so they can lay their live young. And different to other fish species, they like to protect their young rather than eat them or their very small size."





THE WELLBEING AND SCIENCE FAIR

The fair on Friday was a fun experience for all. The alpacas enjoyed munching on grass and getting attention from many of the students and the helter-skelter was a very popular activity for all, including the teachers having gos when most of the students had gone.

Other activities such as Guess the Weight of Parsnip which was won by Erika, the Animal Quiz won by Laura and Lauren and Guess the Name of the animals with the alpaca going to Rose and the panda going to Dr B.

Many participated in all the activities and enjoyed a hot sunny afternoon.

Article by Rhiannon



CAFE PHILO X CAFE SCIENTIFIQUE DEBATE

On the 20th of March, Café Philo, and Café Scientifique hosted their first (and hopefully not the last) joint event. The topic of conversation was whether vaccines should be mandatory, and from the packed science lecture theatre produced, there were some very thought-provoking and insightful ideas from both scientific and philosophical viewpoints, which we wanted to share with you.

The points raised from a more scientific perspective:

Those that argued vaccines should be mandatory mentioned the importance of herd immunity in protecting the more vulnerable population who are not able to take vaccines, emphasising that mandatory vaccinations are a vital tool in preventing the spread of infectious diseases.

However, opposing arguments mentioned the high death rate of COVID vaccines in the EU, suggesting that mandatory vaccines would be harmful to those that suffer from allergies or other factors which would increase their chances of death.

Additionally, the importance of autonomy, which is one of the pillars of medical ethics, was mentioned several times.

Making vaccines mandatory could take away patients' autonomy and right to decline medical treatments, which many viewed as unethical and a breach of medical ethics.

The points raised from a more philosophical and political perspective:

If there was increased education about vaccines, then less people would be opposed to vaccines and there would be no need for vaccines to be mandatory.

People are being misled by facts about vaccines out of context. It was said that this causes members of the public to catastrophise about side effects that are rare and manageable.

Mandatory vaccines would be an infringement on people's human rights but in a way that is not much more extreme than the way people's right to individual liberty is currently being infringed on by the government.

Since it has been a long time since some diseases that caused epidemics have been ramped, people feel less urgency to get the vaccines for them. So, to correct this, people should be educated on how severe these diseases can be and were, so that sense urgency is restored.

Our PowerPoint consisted of both question slides and slides providing context. You can find the slides below (the makers of this PowerPoint think it's best thing ever, so we hope you enjoy :)

Café Scientifique Context:

Located on slides 2, 3, 7 and 10

Café Philo Context:

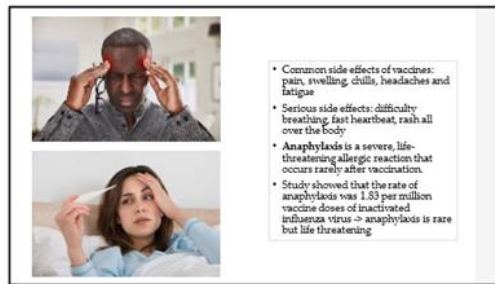
Located on slides 5 and 7

We loved preparing for and hosting this event and are looking forward to hosting some future ones...if we can find the time whilst studying for our summer exams and writing our UCAS applications 🟡 ⬜ ⬜ ⬛ ⬛ ⬛

Article by: Joana (Co-chair of Café Philo) and Tamika (Co-chair of Café Scientifique)



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6

There Is A Human Right To Health, And This Is How It Works

The right to health contains the freedom to say no to medical treatment, it entitles people to a system of health protection, including the prevention, treatment and control of diseases and access to essential medicines.

Right to health: This right is enshrined in the UDHR and the International Covenant on Economic, Social and Cultural Rights (ICESCR), which guarantee the right to make decisions regarding one's own health and well-being, including medical treatment and reproductive choices.

Freedom from Torture and Other Inhumane or Degrading Treatment or Punishment: This right, articulated in the UDHR and various other international treaties, prohibits any form of forced medical treatment or experimentation without consent, including sterilisation, but only over short periods.

Pillars of Medical Ethics

- **Beneficence** - Guideline for how medical professionals should carry out their work and also use it to make ethical judgements of a situation
- **Autonomy** -> the right of patients to make decisions about their own medical care without the undue influence of healthcare professionals

7

IS MANDATING VACCINES A VIOLATION OF INDIVIDUAL RIGHTS OR A NECESSARY PUBLIC HEALTH MEASURE?

Café Philo x Café Scientifique

8

ARE THERE SPECIFIC GROUPS OF PEOPLE/INDIVIDUALS WHO SHOULD BE EXEMPT FROM VACCINATION, OR ON THE OTHER HAND, FORCED?

Café Philo x Café Scientifique

9

Measles

- Recent outburst of measles in England -> 739 confirmed cases as of 1 October 2023
- Causes for the outbreak: young primary school children who have had both MMR vaccines is below WHO targets (85% compared to 95%) -> some cities (Liverpool, Manchester and Nottingham) are only 75%
- More than 3.4 million children in England aged under 16 are unprotected against measles
- Concerns of children being autistic due to the vaccine was the most cited reason for parents not giving their children the vaccine

10

WHAT CAN BE DONE TO REDUCE THE CONCERNS ABOUT THE SAFETY AND EFFICACY OF VACCINES?

Café Philo x Café Scientifique

11

GARDENING FOR WELLBEING

Hi! I attended the Gardening for Wellbeing Club at school. It was so much fun! We planted a variety of vegetables, like tomatoes, carrots and potatoes. We learned how to prepare the soil by digging it up and mixing in compost to make it rich and healthy for our plants. In the greenhouse, we planted cucumbers and peppers. It was amazing to see everything start to grow. Plus, spending time outdoors with my friends made me feel really happy and relaxed. I can't wait to see our garden flourish over the summer!

Article by an attendee



Rocket Club reaches the National Finals!

It's been an exciting journey this year for the Eggstronauts rocket team!

Mr Tarver approached the school just before Christmas with the idea of starting up a Rocket Club and entering the UKROC competition. Having quickly read up on this, I realised that we were somewhat behind the curve, since most teams had started their planning in September! Not to be deterred, however, Mr Tarver and I advertised the idea and soon got together a crack team of L6 Physicists who were eager to give this a go!

Meeting each Friday after school, the team quickly bonded and threw themselves into the design phase and built an impressive rocket incredibly quickly. After just one test flight, we were headed to Chippenham for the Regional round of the competition. The rocket flew beautifully and the judge praised the team for their design. To be honest, this is as far as we expected to get in the competition so we were incredibly excited to be told we had qualified for the National Final in June!

Another mini-bus marathon saw us arrive at Buckminster BMFA (after a slight detour when I had the wrong post-code!). 20 other schools had qualified (from over 230 entries) and the atmosphere was buzzing as the last-minute set up and adjustments were made. It was a windy day, just on the cusp of the legal limit for rocket flying but even in these tricky conditions, the rocket flew magnificently. The side wind limited our altitude to 709ft, short of the 820ft target, but the flight and descent was otherwise perfect and the egg was unscathed. 50% of the competition was judged on a presentation that the team had to give on the design process. The guest judge from Airbus congratulated the team on being the best in this section, not to mention being the only all-girls team.

In the end, we finished 9th – a significant achievement in such a short time. We learned an awful lot about rockets and team work and the students are eager to pass on their tip to next year's team – watch out UKROC, King's are coming for you!

Article by Mrs Sims





Land Sea and Sky

This portion of the newsletter features articles that can be tied in some way to this term's overarching theme of 'Land, Sea, and Sky'.

THE CONSTRUCTION OF THE BURJ AL ARAB

The Burj Al Arab is one of the tallest hotels in the world. Its 321 metres high and is built 270 metres off the coast. Its name means 'Arabian Tower'.

The chief Architect to this amazing design was Tom Wright he had a vision of the building looking like a sail brewing in the wind and he wanted this building to rise out of the water like a massive yacht. One of the main issues to tackle was to ensure that the $\frac{1}{4}$ of a million tonnes of structure would be held firm against earthquakes and gulf storms.

In order to keep the island low, concrete blocks were used to reduce the impact of the waves however these blocks had never been used before, so intense testing was needed to ensure that these rocks were suitable. After 3 weeks of testing the hollow blocks were found to be fine to use.



The construction team built the island with steep rock slopes then covered this with concrete armour to absorb the force of the wave. The rocks act as a sponge when the wave hits the rock water passes inside the space and turns around on itself and the force is largely dissipated. The island now rises 7.5m above the waves.

In the centre of the island the workers drive large amounts of steel 20 meters into the ground. This creates a triangular steel wall which will become the outside of the hotel basement. The weight of the sea produces a huge force on the seabed this pressure forces the water through the sand and threatens to flood the island from beneath. To prevent this an engineer decided to inject liquid cement into the sand.

One of the big issues that the team was faced with was that the hotel had slender concrete walls and these walls were not capable of withstanding forces such as the wind. In order to fix this the team came up with the idea of an exoskeleton which is a series of vast diagonal crosses which tie to steel bows to the concrete core at the back of the building. The exoskeleton needed to be able to withstand the wind's force. In order to ensure that the exoskeleton structure was strong enough to withstand these dangers the team decided to test with wind tunnels. These tests revealed that the exoskeleton structure wasn't strong enough to withstand the force of the wind.

The engineers were worried about vortex shedding so to prevent this they installed 11 tuned mass dampers at vulnerable points in the exoskeleton.

When vortex shedding occurs these would then vibrate instead of the structure. During the construction the architects decided they wanted a restaurant that was 200m above sea level at the top of the building. This 'Ultimate Sky view restaurant' was to be built outside of the building's central core with no visible means of support this meant that it was to be built outside of the centre of gravity of the hotel which would be hard to construct. In order to achieve this the engineers must find a solution. They decide to cast a series of embedments in the concrete core at the back of the building. 10 steel girders radiate off the embedments. These beams form the base of the steel floor. The entire restaurant is enclosed in aluminium and glass. This structure is now resistant up to winds of 160kmh.

The Burj Al Arab is now one of the most popular tourist destinations in Dubai with approximately 1.9 million visitors each year.

Article by Mia

KIN SELECTION AND GROUP SELECTION

As part of the Assessments and Interviews Programme open to Lower Sixth Students from King's High and Warwick School, we were invited to research a topic of our choice and research it. I decided to research the topic of kin selection and group selection, which I believe is a fascinating topic to explore when looking at altruistic behaviour in animals.

What is altruism?

Altruism is often considered to be helping something out, sharing something or sacrificing something, but this is not what it means in sociobiology. In sociobiology altruism is defined as actions where the average consequence is a reduction in the reproductive success of the actor and a direct increase in the reproductive success of the recipient. The main debate surrounding altruism is whether traits that can be found on a whole societal level are a consequence of Darwin's Theory of Evolution or whether there is something else causing the behaviours.

What is group selection? - Examples and limitations

Group selection argues that natural selection occurs not just on the individual level but also on the group level. Selection pressures and forces not only act on individuals but on competing groups of individuals, and the individuals do not need to be related to each other for this to occur.

An example can be seen in social insects such as ants, bees, termites and wasps. There is only one individual which can reproduce, known as the queen. All of the workers are unable to reproduce so have a personal fitness level of 0. However, they massively help to increase the reproductive success of the queen by constructing the nest and protecting it, by finding food and by tending to the larvae. These workers are not contributing to their own reproductive success but to the reproductive success of another individual to ensure the survival of the species.

However, there is a limitation to this theory, which is known as the 'subversion from within' (Dawkins), and this can be applied to the example of meerkats. Usually, co-operative breeding occurs in groups of meerkats with up to 40 helpers raising the young.

In addition, sentinel behaviour such as climbing to a high point to scan for predators increases when more pups are around. However, it would only take one slightly more selfish individual for this 'subversion from within' to occur. Within meerkat societies, when lower-ranking female meerkats get promoted, they begin to breed by also kill all the infants of the other meerkats, which some would argue would lead to the elimination of altruism in the population.

What is kin selection? - Examples and limitations

Kin selection is a much newer theory and states that the selectiveness of altruism towards related individuals allows for altruism to survive in the population, such as those who the individual shares 50% of their DNA with.

Haldane's Quip

Haldane's Quip theorises that the closer the relationship between two individuals, the higher the evolutionary incentive to help each other.

Hamilton's Rule

Kin selection can also be represented using an equation called Hamilton's Rule.

$$rb > c$$

- b is the effect on the reproductive success of the recipient.
- c is the cost to the actor's own reproductive success.
- r is the coefficient representing the statistical association between the genes of the actor and the genes of the recipient.

Example

Wild social dogs such as jackals exhibit kin selection. When a juvenile is present, it is almost always the sister of the newborn which will help to raise their younger sibling. The relation between the two individuals can be seen in the fact they are members of the same family.

Limitations

1. Hamilton's Rule some consider to be too simplistic in explaining the nature of altruism.
2. Some Scientists argue that Kin Selection is just a special case of Group Selection.
3. Some cases do not fit Hamilton's Rule such as different species adopting members of another species. For example, in 2013, a bottle-nosed dolphin was adopted by a group of sperm whales or when a lioness in Samburu National Park adopted a baby oryx.
4. Relatedness is not always relevant- male chimps in the wild often patrol their territory and 1/3 of the time confront rival groups, sometimes leading to violent fights. 1/4 of the male chimps patrolled despite having no relatives in the group.

MOUNT ETNA BLOWS SMOKE RINGS INTO THE SKY

Where is Mount Etna?

Mount Etna is Europe's largest and most active volcano found on the island of Sicily, near the town of Catania. The area around the volcano is a UNESCO world heritage site. The volcano erupts fairly often but has rarely caused damage or injury in recent decades. It last erupted in 2023, and there was a major eruption in 2021 which caused Etna to grow in height by 30m due to the volcanic material emitted*.

Recently Mount Etna has been puffing smoke rings into the sky, which is a particularly unusual sight.

Some of these smoke rings can be seen on this video:

<https://www.bbc.co.uk/news/av/world-europe-68752290>



So, what are these smoke rings?

Since the beginning of April, Mount Etna has been puffing rings of what looks like smoke. These rings are called **volcanic vortex rings** and actually are not smoke but are gas which escapes from underground magma. For them to form, the gas must quickly rise upwards in a narrow, round, and regular vent, such as after the explosion of a gas bubble in the magma. Then the gas must rise faster in the centre of the vent than at the edges due to the force of friction. Finally, the gas must rotate around itself causing a ring shape to form.

While other physical conditions such as temperature under which volcanic vortex rings are formed are unknown, scientists believe they are as a result of rapid gas release and the regularity of the crater. They are thought to be formed from condensed water vapour and cold air.



Mount Etna produces more gas rings than any other volcano in the world. It emitted 5000 rings in 2000 and scientists have been able to count many rings since.

What has caused these rings in April 2024?

The current rings are coming from an opening on the north-eastern rim of the Southeast Crater (SEC on the diagram). This opening occurred on 2nd April and has since produced hundreds if not thousands of rings.

The opening of this crater has created the conditions for the smoke rings to form.

*Please note: this picture I took in May 2018, before the major eruption so the volcano has an even higher peak now!

<https://www.bbc.co.uk/news/av/world-europe-68752290>

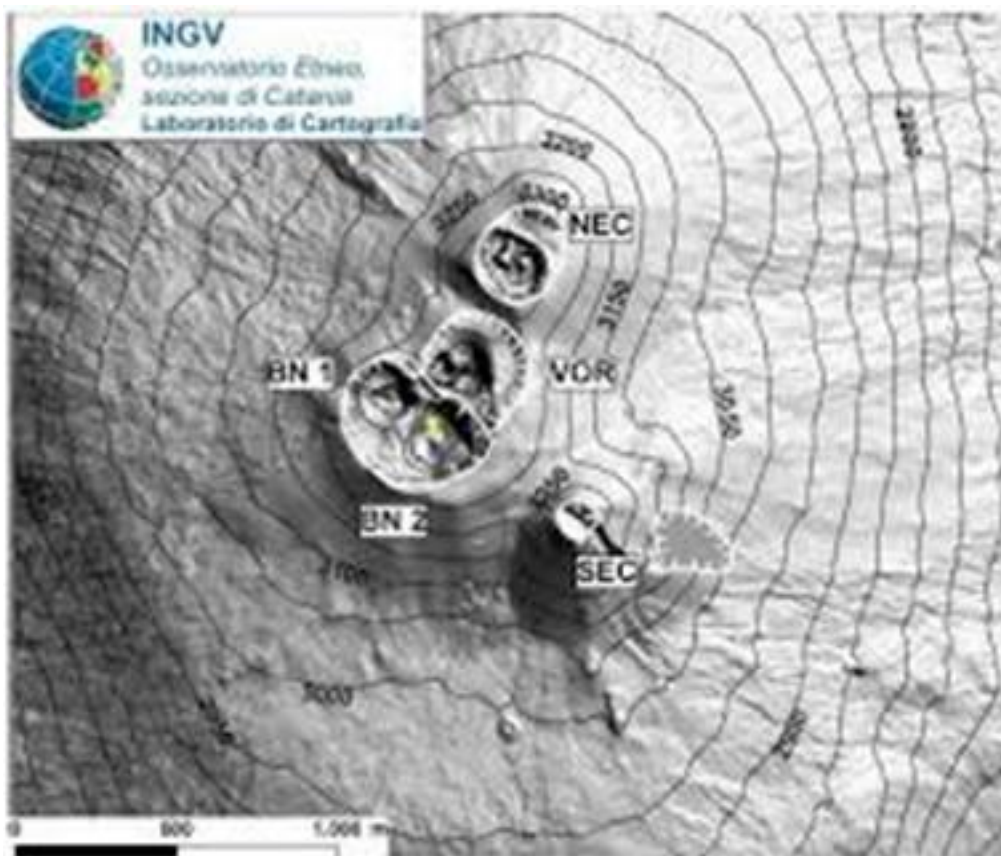
<https://etnaway.com/en/the-rings-of-mount-etna/>

<https://www.forbes.com/sites/jimdobson/2021/04/09/the-27-most-active-volcanoes-in-the-world-and-what-could-erupt-next/>

<https://www.bbc.co.uk/news/world-europe-56170278>

<https://www.euronews.com/green/2024/04/09/what-are-volcanic-vortex-rings-mount-etna-blows-spectacular-smoke-rings-into-the-sky>

Article by Lucy



RABIES

Rabies or lyssa (the name of the viral particle) is the deadliest disease known to mankind (and mammal across the world), with a perfect 100% fatality rate and no cure. So, why aren't we all dead? There are several reasons for this, but first I will explain what makes lyssa so deadly.

Lyssa enters the body through saliva, usually a bite, and immediately attacks the nervous system, using each neuron and synapse as a direct highway to the brain, the cytotoxic killer t-cells which is the immune systems main defence against viral infections are helpless to stop lyssa moving through the body as nerve cells have the capability to resist apoptosis. Once the brain is infected the patient has no chance of survival, lyssa then infects the salivary glands and collects there ready to be transferred to a new organism before its current host dies. Modern science currently has no idea what causes the brain to shut down and the body to die, however a prominent explanation is that rabies causes a swelling of the brain, that eventually kills the organism.

Once again you must wonder why rabies hasn't already wiped out every human on earth.

This is due to a few key factors about both lyssa and humans themselves; lyssa is incredibly slow moving through the nervous system and unless it reaches the brain, treatable by medicine. As, although there is no cure, the body is able to react to a vaccine with a primary immune response, create enough memory cells, then mount a secondary more effective immune response to destroy the lyssa particle. However, if for whatever reason, a vaccine isn't administered in time to destroy the virus before it reaches the brain, we are able to stop the spread of rabies through one very simple aspect of human nature: No human in recorded history has ever bitten another person, keeping the whole population safe from the deadliest virus in the world.

Article by Edith

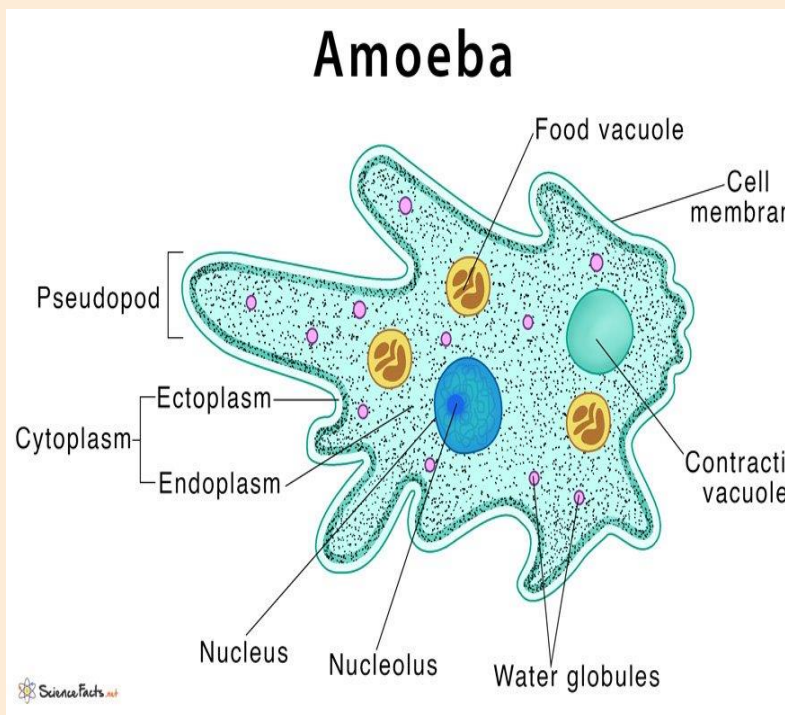
BRAIN EATING AMOEBEA



Where is it found?

It is found in soil, freshwater lakes, rivers and ponds. It can also be found in poorly maintained swimming pools and other recreational venues. It is found in typically warm climates.

What is an amoeba?



Domain	Eukarya
Kingdom	Protista
Phylum	Protozoa
Class	Rhizopoda
Order	Amoebida
Family	Amoebidae

How does the amoeba work?

The amoeba typically enters the body through the nose when contaminated water is forcefully sniffed or inhaled, such as during activities like swimming or diving.

Symptoms

Including headache, fever, nausea, and vomiting. As the infection worsens, symptoms may include confusion, seizures, hallucinations and coma.

Reducing risk

To prevent infection, it is essential to avoid swimming or diving in warm freshwater. The amoeba can also be present in stagnant or poorly chlorinated water. Using nose clips or holding your nose shut can reduce the risk of water entering through the nasal passages.

Complications if not treated

- Severe brain inflammation
- Neurological damage
- Coma
- Seizures
- Respiratory failure
- Death

Article by Arun

THE EFFECT OF DENTAL GRILLS ON ORAL HEALTH

What are dental grills?

Grills are decorative covers for teeth, typically made of gold or other precious metal base which can then be left plain or encrusted with jewels like diamonds.

Grills are made from custom dental molds. For more expensive grills, a dentist will take a mold of the person's front teeth with a quick set alginate. Alginate is an elastic impression material which is simple, cost-effective and indispensable part of dental practice.



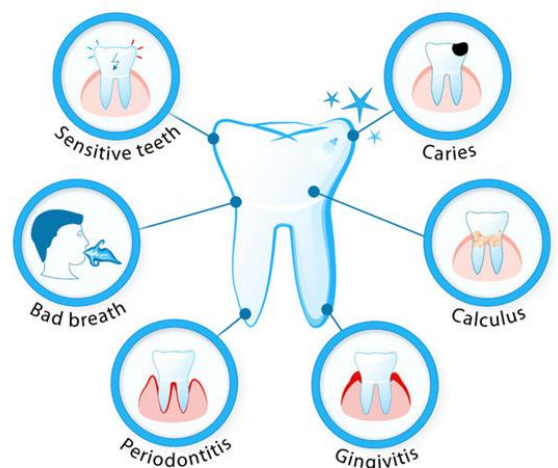
Oral health impacts of using grills

The American Dental Association (ADA) actually says no studies have shown grills as harmful. But they also haven't found any studies that have proven them to be safe either.

Grills can lead to oral health complications such as bad breath, tooth decay and gum disease. Also, they can cause problems with teeth cleaning and can attract plaque, which can cause decay underneath. Dentists have long warned about the potential dangers of grills.

Grills made of base metals may irritate the skin or trigger allergies.

Dental problems



Here are some of the oral health impacts of using grills

- Food, debris, and bacteria: They can all be tightly packed and trapped between your teeth and grill, which can lead to tooth decay, gum disease, and bad breath.
- Glue: Any glue adhesive containing certain chemicals needed to attach a grill to your teeth could cause harm to your teeth and gums
- Abrasion: Grills could easily scrape away the enamel needed to keep your teeth healthy
- Chewing and speaking: A large grill in the wrong position could negatively affect your chewing and speaking.
- Wearing grills for an extended length: can lead to teeth shifting out of the correct position, and as a result may cause them to need cosmetic dentistry or orthodontic braces to correct their teeth.

What has caused a surge in getting dental grills?

- Social media influencers – Kanye West, Rihanna and Katy Perry caused a large increase in popularity

- With increased public awareness, the importance of tooth jewellery, a cosmetic dentistry procedure, in which a diamond or stone is attached to the teeth, is increasing.
- Dental grills have cultural significance, especially in communities where they are seen as a status symbol. They are often associated with success, luxury, and a distinctive personal.



Maintaining good oral health with dental grills

- Remove your grill before eating and cleaning your teeth.
- Along with thorough brushing, floss daily to help remove trapped food and plaque.
- Clean your grill daily to rid it of bacteria and debris
- Wear your grill sparingly as needed
- Follow the advice your dentist has on your grill materials, allergic reactions, and cost.

Article by Guvan

TASTE BUDS

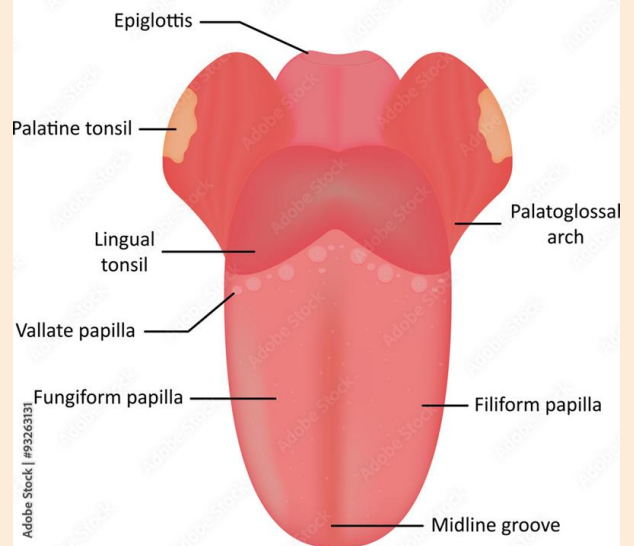
What is a taste bud and what do they do?



This above is a scanning electron microscope image of the surface of the tongue. You will notice there are finger-like projections coming off the tongue, these are called papillae, and they house your taste buds. On our tongue, they just look like bumps. Humans have around 10,000 taste buds at birth, most of which are on the tongue. These taste buds contain 3 types of cells. These are called gustatory (taste) receptor cells, basal cells and sustentacular cells. For the purposes of our presentation, I will only be focusing on the most important of these 3 cells: the taste receptor cells, however the basal cells and sustentacular cells are also important. Sustentacular cells act as supporting cells and basal cells are stem cells; these become taste receptor cells and are replaced every 10 days. However, to really understand what a taste bud is and what it does, we need to zoom out and look at the organ which contains the most taste buds: the tongue.

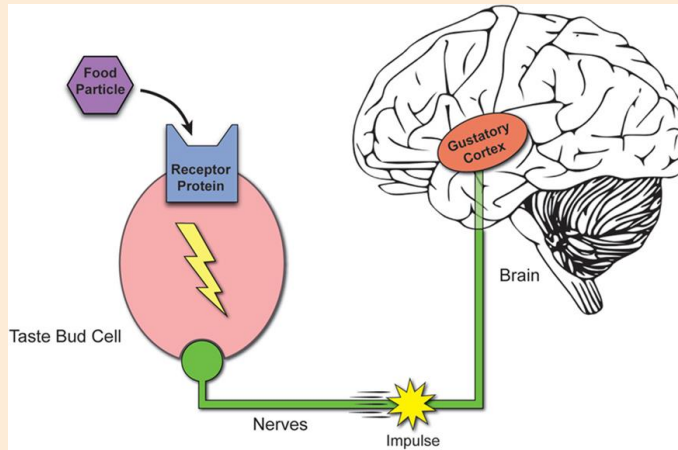
The tongue as an organ of taste

Anatomy of the Tongue



The tongue is a multi-functional organ involved in our sense of taste, food texture perception, linguistics, swallowing and also in our innate immune surveillance. It is comprised of interlacing skeletal muscle, connective tissue, adipose tissue, oral mucosa, mucous and serous glands. In most humans, the tongue is about 10cm long. There are 3 major parts of the tongue: the fungiform, right at the front of the tongue, the foliate (in the middle) and the circumvallate (at the back of the tongue). Most of the taste buds are situated at the front, so in the fungiform, however some taste buds can be found further back. It is important to note that there are not parts of the tongue which detect certain tastes: this is a myth, however popular it may be. The whole tongue can detect the same 5 tastes, however there are more taste buds in some regions of the tongue than others.

The brain and taste



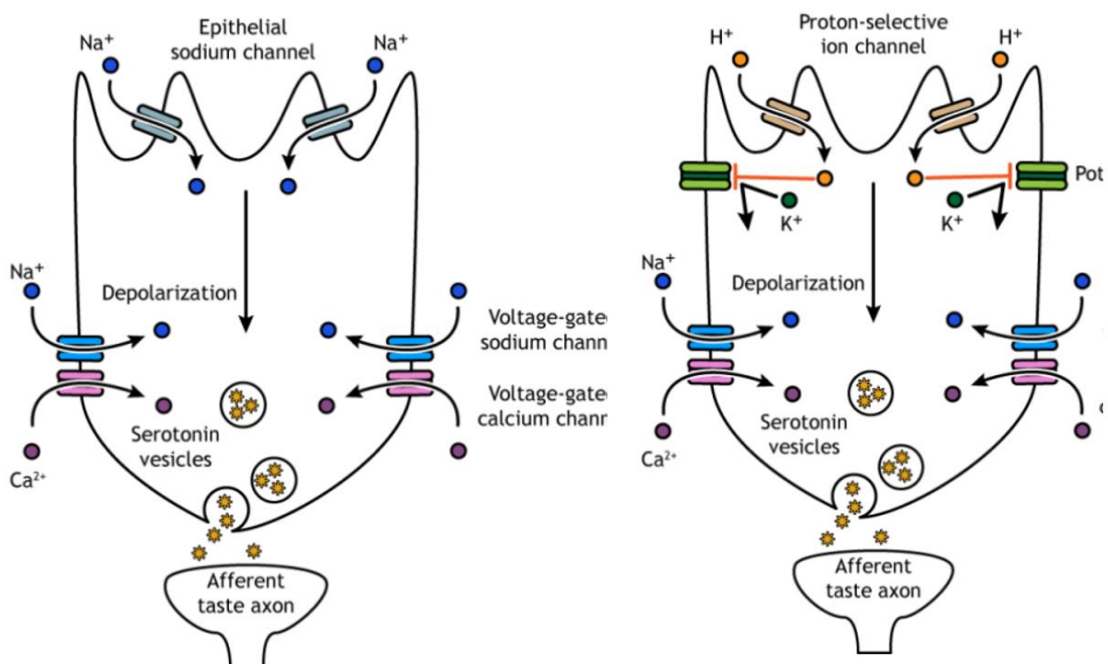
Taste is a complex sense, particularly as it is detected in many areas of the brain. The main area is called the gustatory cortex, and this can be seen in the diagram. It has been shown in studies of mice that bitter and sweet tastes are detected in two separate parts of the cortex, situated mere millimeters apart- they are not detected together. However, it is not just the gustatory cortex which detects taste.

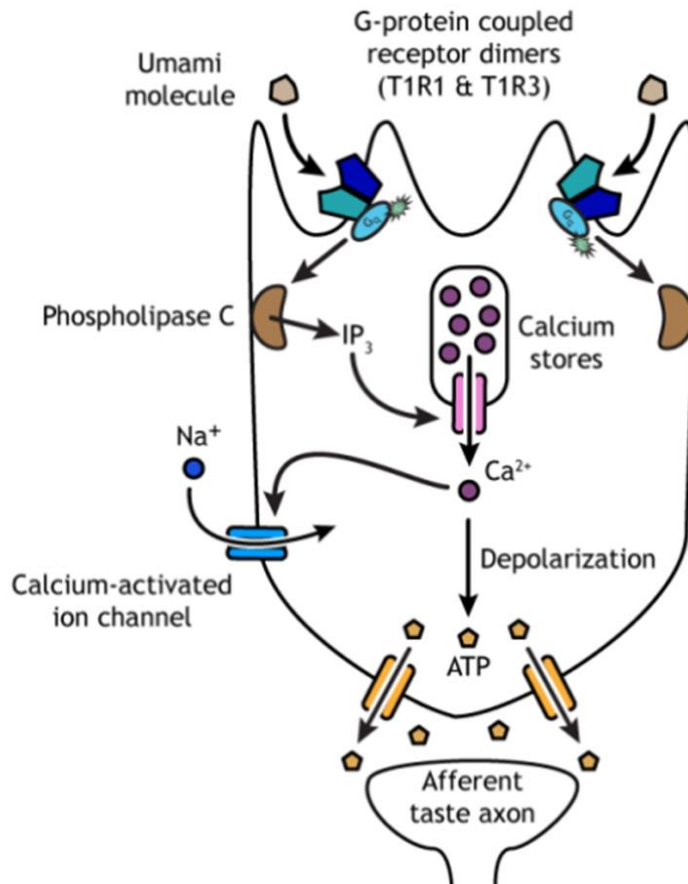
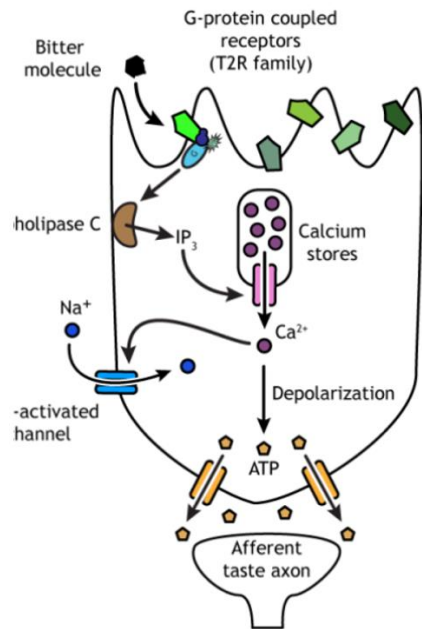
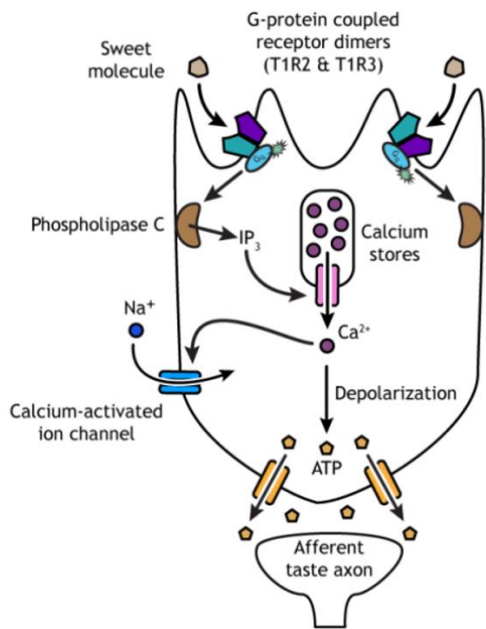
Other regions of the brain help too, for example the olfactory bulb, which helps us to identify the odours which come from our food. We have receptors in our nose too which help perceive taste. Sight, sound and touch are also involved in tasting. Therefore, we could be asking, are taste buds unimportant?

So, does this make taste buds unimportant?

The answer to that question I would say is no! they are very important, for specifically allowing us to identify particular molecules in what we are eating. Whilst the olfactory system may pick up on particular volatiles, taste receptor cells can detect particular molecules present in the food itself.

The mechanism of taste can be seen in the following diagrams:

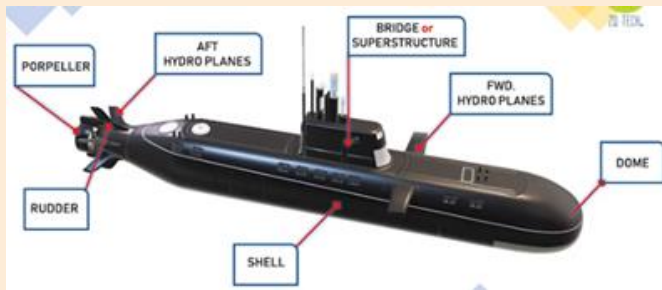




Article by Lucy

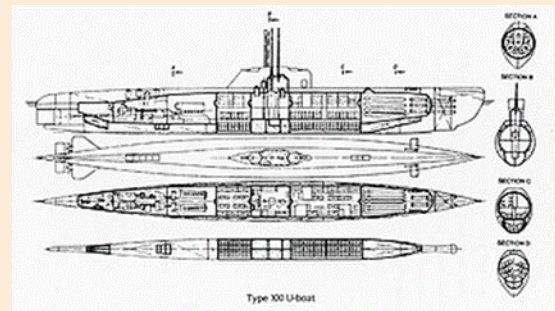
THE EVOLUTION OF SUBMARINE ENGINEERING

The first submarine was prototyped in 1578 by William Bourne. It was an enclosed wooden boat covered in waterproof leather. It was meant to be submerged and rowed beneath the surface although there were no distinct areas for crew and no life support. This has now been improved on a lot and we can use modern day submarines for all sorts of investigations in the deep sea.



They are important for national defense by gathering information on underwater infrastructures and enemy builds through sensors like sonar. Sonar is a navigation which uses sound propagation to measure distances, detect objects and communicate with objects on or under the surface. So, the submarine's sonar senses sound coming from objects and emits pulses itself to then listen for echoes. Submarines are also able to travel to the poles as they are not affected by the ice on the surface and are built to withstand huge pressures and therefore temperatures too. Other than military use, submarines are also used for: search and rescue when people are lost or stranded, deep sea diving to repair undersea cables using remotely operated vehicles and exploring ocean depths for mainly scientific reasons.

Submarines must tackle being able to stay underwater for months whilst still being able to surface and keep all the crew and equipment within the sub safe. So, submarines have very strong engines for their propulsion systems which can be powered through diesel, battery powered motors and even nuclear power sources. They also have large tanks called ballast tanks which fill with water to give the submarine the mass to sink to low ocean depths, and they release the water and fill it with air to give it enough buoyancy for the submarine to float back up to the surface. They also must provide oxygen, remove carbon dioxide, and manage waste for crew survival.



The external pressure exerted on the submarine increases the lower it gets. Every 10metres that it descends means an increase in pressure by 1 atmosphere. This makes it harder to maintain the internal pressure. The external pressure exerted on the submarine increases the lower it gets. Every 10metres that it descends means an increase in pressure by 1 atmosphere.

This makes it harder to maintain the internal pressure. This is why the material strength of submarines must be so high. The submarine has two major components which are called the submarine hull together. They maintain pressure, structural integrity, and hydrodynamics. The outer (non-watertight) hull is called the casing which provides an efficient shape for hydrodynamics. The pressure hull is the inner part which maintains the difference between outside and inside pressure.

To learn more visit: [Defensebridge article](#) , [wikipedia - submarine hulls](#)

Article by Krithi

A SCIENCE IN ACTION TALK ON THE FUTURE OF TRANSPORT SAFETY AND FORENSIC ANALYSIS BY DR CHRISTOPHE BASTIEN

We were very lucky on 10th May 2024 to attend a fascinating talk by Dr Christophe Bastien, a lecturer at Coventry University during our Friday Afternoon activity, Science in Action.

Dr Bastien first began by informing us of his previous studies which took place all across the world including in France, the Ivory Coast and here in the UK. He had also worked for Matra Datavision, MSV International and Corus, focusing his study on car safety features, especially as collisions can be incredibly high-speed events. At 25 mph, it takes a car just 0.1 seconds to hit a pedestrian- that is half the time it takes for the average human to blink. Airbags work even quicker than that- it takes just 30 milliseconds for airbags to be deployed.



We also learnt about the importance of seatbelts in this talk. Seatbelts are now compulsory to have in all European cars (although this is not the case in America), where the seat belt is the opposite way round in the UK to in the rest of Europe. This rotates the wearer slightly. In addition, seatbelts keep you in the car, which is especially important in the unfortunate case of a roll-over (where the car rotates 360 degrees in the air).

In a roll-over with seatbelts, the person remains in the car, increasing survival chances and decreasing the severity of injuries. Without a seatbelt, centrifugal force may cause the person to move around the car, which may result in solar plexus and collar bone damage, or in the worst-case scenario, the passenger or driver being ejected from the car through the window (the size of the window is irrelevant).



Dr Bastien did tell us that seatbelts are designed for people taller than women of the 5th percentile, which is an average height, he explained of a 14-year-old girl. This is one of the main reasons why child seats are used and why it is recommended to sit small children in the back of the car. In my own mind, this raised the question of whether seatbelts should be adapted even more so people of a smaller stature have the same safety within a car as taller individuals.

Dr Bastien's research-optimising frontend vehicles

Dr Bastien's team received a grant of £4.2 million to design a recyclable vehicle with aerodynamic features to reduce drag. The team also needed to reach a compromise between the mass of the car and its safety on the road and found that their predictions for the size of the car were very good, however the torsion was slightly high. Using a large hard drive, the team were able to create a metamodel comparing 17 variables, approximately 6 of which were discounted in optimisation as they were not significant enough to make major changes to the car. This project was successful- the team managed to decrease the mass of the car by nearly 30kg and met all their design targets.

Dr Bastien's research into hit and run accidents and his use of AI

Dr Bastien began a project in 2015 to investigate if when given a post-mortem, the vehicle speed could be calculated, particularly in hit and run accidents. His funds for this project were considerably lower and the main problem he faced was attempting to gather evidence at accidents involving humans, as this would require paramedics to perhaps take measurements either while or instead of treating the patient (EDRs, videos, skid marks- from if the car did not stop- and throw distance).

Dr Bastien's research into hit and run accidents and his use of AI

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The Abbreviated Injury Scale (AIS) from 1-7 is a scale based on severity of injuries and their threat to life, rather than the patient's pain. Patients who have been killed in road traffic accidents are rated at a 7, whereas patients who suffer only minor injuries would be rated as a 1. Dr Bastien used for his experiment 48 cadaver tests previously completed, however this was not able to validate against trauma. Computerised models and crash test models proved to be useful as they could provide the probability of injury and were also used in his research.

Dr Bastien's team, with collaboration with the police, developed an AI based tool called Pedestrian Collision Forensics Evaluator (PACE AI) which was found to give incredibly accurate values on the speed of cars in hit and run accidents in their samples, however, Dr Bastien stated that they would need to carry out more tests to refine the AI technology.

In conclusion, Dr Christophe Bastien's talk on the Future of Transport Safety and Forensic Analysis was a very insightful talk into the potential uses AI could have in forensics and the safety of the way we travel. It was a very interesting talk which I was fortunate to attend.

Editor's article by Lucy and Amelia

WORK EXPERIENCE AT THE UNIVERSITY OF WARWICK

For anyone who is considering doing science at university, I would highly recommend gaining work experience. I was lucky enough to spend 3 days in the School of Life Sciences at the University of Warwick. Here is a brief overview of what I did:

Day 1:

- I looked at leaf movement to explain circadian rhythms in nodular plants. Nodular plants are plants which have a symbiotic relationship with nitrogen fixing bacteria such as *Rhizobia*.
- I was able to see nematode worms under high resolution microscopes and how they are used in experiments into ageing.
- I was also able to visit the greenhouses to see the university's genetically modified and propagated plants.

Day 2

- I was able to learn how to split the roots of plants between two different plant pots using the plant *Medicago truncatula* so different conditions could be investigated.
- I was able to see one of the lasers a PHD student had built and run a sample of *B. subtilis* through it.
- I was able to see the mass spectrometers in the proteome lab.
- I was able to observe some third year students carrying out a quantitative polymerase chain reactions.



Day 3

- I was able to see how the university were using zebrafish and also got to observe human placental stem cells under a microscope.
- I was able to see where the university kept their animals for use in investigations.
- I was able to visit the Flow Cytometry Lab and helped to set up the equipment so it could be used to separate cells in a sample.
- I also got to crush and pick up 300 *Medicago* seeds!

It was an amazing experience as I was able to see all aspects of the department, including the parts not shown on Open Days. I was also able to talk to students and staff, whilst learning about university life and the fascinating course this university has to offer.

Article by Lucy

THE LIVER

Introduction

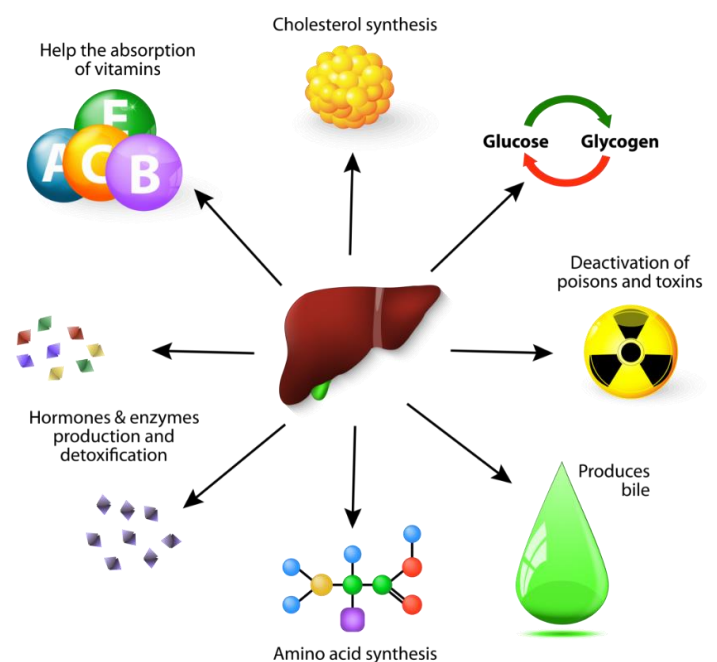
The liver is an organ that is dark reddish brown in colour and weighs around 1.5kg. It gets its colour as at any given moment 13% of the body's total blood supply can be found in the liver. The liver is held in place by several ligaments including the Falciform ligament which splits the liver into the anatomic left and right along the anterior (front) aspect.

The liver receives its blood supply via the hepatic artery and hepatic portal vein. 75% to 80% of the blood volume comes from the hepatic portal vein and 20% to 25% comes from the hepatic artery. The hepatic artery brings oxygen-rich blood to the liver. Blood coming from the digestive system enters the liver through the hepatic portal vein which carries nutrients, medications, or toxins.

The liver's functions

- The liver serves as both an exocrine organ and an endocrine organ. The exocrine functionality of the liver is mainly in the synthesis and excretion of bile salts into the common hepatic duct as well as the conjugation of bilirubin and its excretion into the gut. The endocrine functions of the liver include involvement in glycemic control (the effect that food has on blood sugar (glucose) levels after consumption) via the hormone's insulin and glucagon.

- It receives absorbed nutrients.
- It detoxifies absorbed drugs.
- It synthesizes important proteins (such as fibrinogen) and modifies enzymes and peptide hormones.
- It participates in fatty acid metabolism and synthesizes lipoproteins, cholesterol, and phospholipids.
- It is involved in the metabolism of lactic acid and converts ammonia to urea.
- It is involved in the metabolism of carbohydrates including storing glycogen and gluconeogenesis (using amino acids to make glucose).



Hepatocytes

Hepatocytes are the predominant cell type in the liver making up approximately 80% of the liver. Hepatocytes have an average lifespan of 150 days and have a round shape. They contain a nucleus and an abundance of cellular organelles associated with metabolic and secretory functions. These organelles include endoplasmic reticulum (smooth and rough) and Golgi apparatus for secretory functions. Also, there are high numbers of mitochondria to provide energy to support the many metabolic functions of the liver.

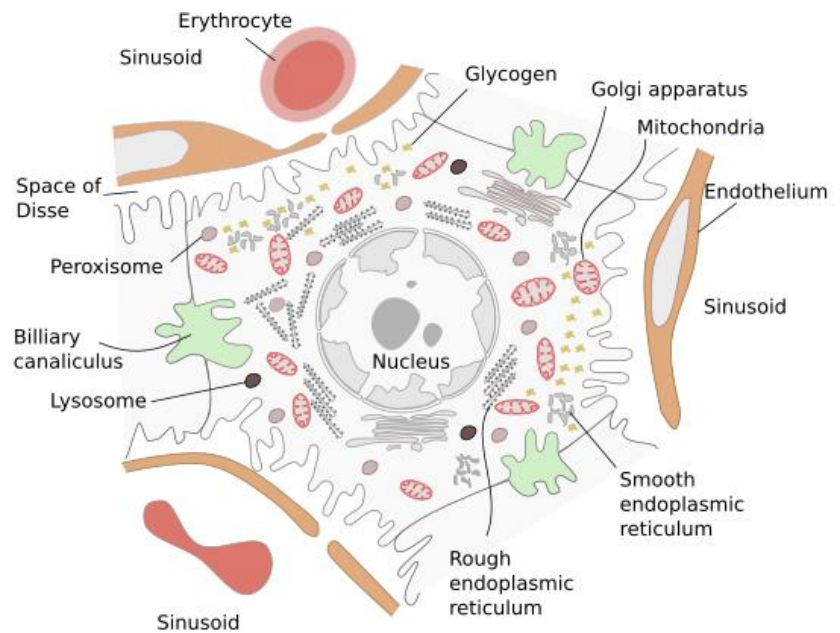
The hepatocytes have lateral surfaces and sinusoid surfaces. Their lateral surfaces are in contact with the neighbouring hepatocytes and form anastomosing plates. These plates of hepatocytes are arranged radially around a small central vein. In addition, a portion of the lateral surfaces is modified to form bile canaliculi.

Some of the most important functions of hepatocytes include:

- Exocrine function - secretion of bile components.
- Gluconeogenesis - conversion of amino acids into glucose.

- Detoxification - breakdown and conjugation of ingested toxins, including many drugs.
- Deamination - producing urea from amino acids.
- Storage - of glycogen, lipids, iron.

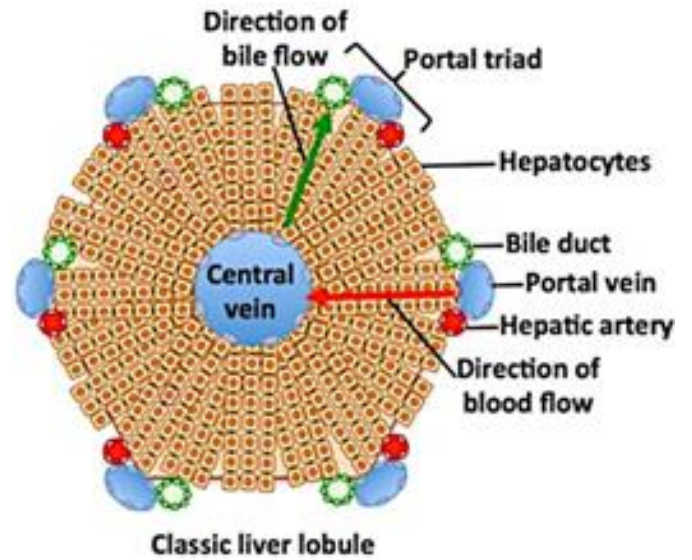
Hepatocytes also activate innate immunity against invading microorganisms by secreting innate immunity proteins. These proteins include bactericidal proteins that directly kill bacteria, iron-sequestering proteins that block iron uptake by bacteria and several soluble factors that regulate lipopolysaccharide signalling.



Lobules

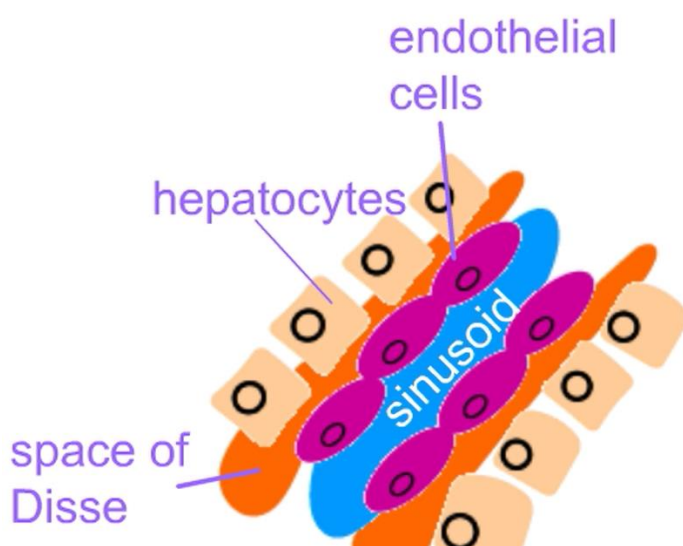
Anatomically the liver has four lobes: right, left, caudate, and quadrate. The functional unit of the liver's lobes are called the lobules. Liver lobules are collections of hepatocytes which form hexagonal shapes with the centre being a central vein. Within the lobules, the hepatocytes are arranged in cords, and in between the cords is a vascular space with a thin fenestrated endothelium (tiny openings, or pores) and a discontinuous membrane called a sinusoid.

Sinusoids contain Kupffer cells which are the resident macrophage of the liver and stellate cells which are hepatic lipocytes. The sinusoids are the site of exchange in the liver. Worn-out red blood cells, bacteria, detoxified substances, metabolic end products and other debris are removed in the sinusoids and nutrients like glucose are either added to the blood or removed from it in order to be stored.



Situated around the perimeter of the lobules are branches of the hepatic artery, hepatic portal vein and bile duct. These cluster together at the "corners" of the lobule forming what is called the portal triad. As previously mentioned at the mid-point of the lobule is the central vein. Blood flows out of the sinusoids into the central vein which later joins with the hepatic vein allowing the blood to be transported out of the liver. Bile that is produced by the hepatocytes drains into tiny channels called bile canaliculi (singular *canaliculus*). These drain into bile ducts located around the lobule perimeter.

Article by Amelia



ANTIBIOTICS

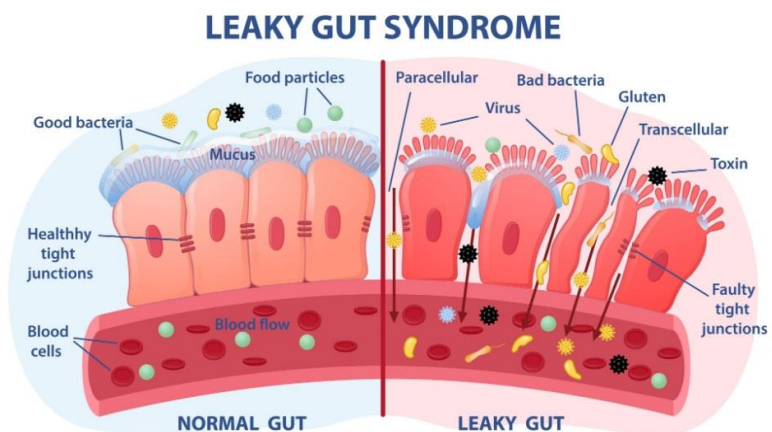
What are they and how are they administered?

Antibiotics are chemicals that act as antibacterial agents. The name antibiotic stems from 'anti' meaning against and biotic meaning 'life'. They are used to treat bacterial infections by either killing the bacteria (bactericidal drugs) or by inhibiting the bacteria's growth (bacteriostatic drugs). They are usually taken orally as a pill or liquid or in severe cases where hospitalization is required, they may be taken through an injection. If the bacterial infection is in the skin, then an antibiotic cream may be prescribed. Antibiotics that attack a wide range of bacteria are called broad-spectrum antibiotics and antibiotics which will attack a specific pathogenic strain are called narrow-spectrum antibiotics.

Antibiotics are used to treat life threatening infections such as meningitis (inflammation of the lining around your brain and spinal cord.) or pneumonia (an inflammation of the lungs). Urine infections also use antibiotics for treatment to prevent the infection spreading to the kidneys.

How do antibiotics effect the gut?

All humans have their own unique gut microbiome in which "good" bacteria thrive and carry out processes which benefit the human. Unfortunately, these "good" bacteria can also be killed when using antibiotics. By losing these 'good' bacteria it can give other types of bacteria room to multiply, leading to an opportunistic infection. Sometimes an opportunistic infection happens when bacteria from the environment get into your body and overrun friendly bacteria which have been damaged by an antibiotic. Other times an opportunistic infection begins when antibiotics disturb the balance of your resident microbes, and bacteria which are normally friendly multiply too quickly and become harmful. These infections can cause large cracks or holes in the gut lining which allows partially digested food, toxins, and pathogens to penetrate the tissues beneath it (leaky gut syndrome).



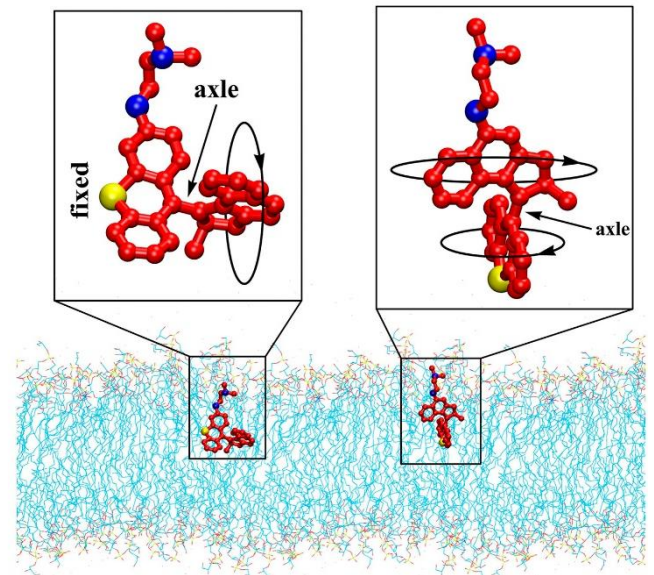
One common cause of opportunistic infection is the bacteria, *C. difficile* which live in the environment and do not normally harm healthy people. However, when antibiotics kill too many friendly bacteria in the intestine, *C. difficile* multiplies and produces toxins which make the person feel sick and develop a fever, nausea, diarrhoea, and inflammation.

Molecular machines and antibiotics

Researchers from Rice University in Houston, Texas, and at Fundación Instituto de Investigación Sanitaria Islas Baleares in Palma, Spain investigated the effects of tiny, spinning molecular machines and whether they could be used as an alternative to chemical antibiotics.

Molecular machines are a class of molecules typically described as an assembly of a discrete number of molecular components intended to produce mechanical movements in response to specific stimuli, mimicking macromolecular devices such as switches and motors.

The molecular machine which is less than 1 nm wide binds to the phospholipid membrane of the bacterium. When light is applied it starts drilling. This is because when the light is absorbed by the motor part of the molecule it causes that part to undergo a change in shape and this puts a strain on the bonding between the motor part and the rotor part.



This causes energy to be mechanically transferred and released as movement in the form of a spinning action. The spinning action forces the machine through the cell membrane. All the cellular components inside the cell leak out and the cell dies.

Initially the molecular machines were tested on small invertebrates like insects, and they were effective. In the follow up experiment pig nails were used. They were infected with the fungi that causes athlete's foot. The scientists compared the effects of using anti-fungal chemicals and anti-fungal chemicals in combination with the molecular machines as treatment and found that when the molecular machines were used in conjunction with the antifungal chemicals there was significantly less fungi remaining on the pig nails than when only antifungal chemicals were used.

However, there is currently no clear or obvious path on how molecular machines could be translated to a real-world clinical setting.

Article by Amelia



Warwick Preparatory School

Articles

This term, the Café Scientifique team led an assembly which encouraged Year 5 and Year 6 girls from Warwick Preparatory School to explore their interests and contribute their own articles on the theme of 'Land, Sea, and Sky' to this edition of the newsletter. The following section showcases these articles.

SEAHORSES

This piece of text will talk all about seahorses and about their reproduction, habitat, diet, predators and their characteristics. I did my information page on seahorses because I find them really interesting and love finding out about what we have discovered about them and what we are aiming to discover in the future.

Overview

A seahorse is any of the 46 species of small marine fish in the Genus "Hippocampus". It comes from the Ancient Greek Hippokampos, itself from Hippos meaning "horse"

And Kampos meaning sea monster or sea animal.

Habitat

Seahorses are mainly found in shallow tropical and temperate salt water throughout the world, from about 45 degrees North to 45 degrees south. They live in sheltered areas such as seagrass beds, estuaries, coral reefs and mangroves. Four species are found in Pacific waters from North America to South America.



Diet

Seahorses mainly eat small crustaceans like amphipods and other invertebrates. Adult seahorses eat 30 to 50 times a day if available. Seahorses do not have a stomach or teeth, instead, they suck their prey in through a tubular snout, or a fused jaw, and then passes through their inefficient digestive system.

Predators

Fully grown seahorses are presumed to have few predators due to their excellent camouflage, sedentary lifestyle and their unappetising bony plates and spines. However, they have been found in the stomachs of large pelagic fishes such as tuna and dorado. Seahorses are also eaten by skates and rays, penguins, and other water birds.

Reproduction

One really big difference between seahorses and humans is that male seahorses give birth instead of the female seahorses! Seahorse fathers incubate their developing embryos in a pouch located on their tail. The pouch is the equivalent of the uterus of female mammals. It contains a placenta, supporting the growth and development of the baby seahorse.

Characteristics

Seahorses are very unique in terms of appearance, with their horse-like head, prehensile tail, independently moving eyes and their brood pouch. Seahorses have long tubular snouts and small toothless mouths.

Article by Freya 6SW

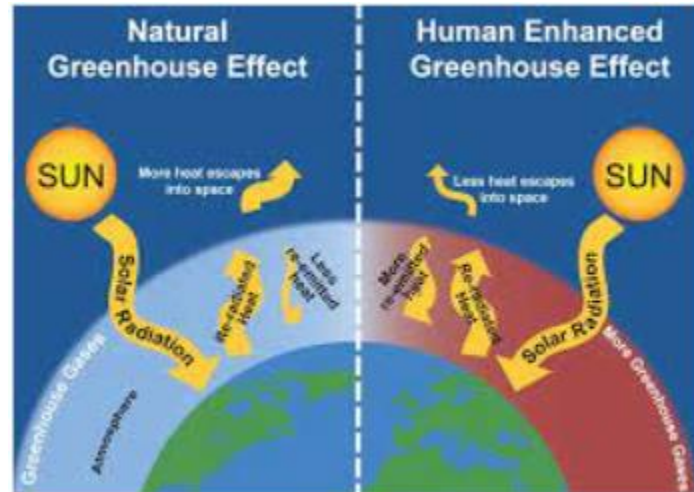


EDITOR'S NOTE

Global warming is a massive issue facing our planet, and its cause is partially the increase of greenhouse gases in the atmosphere. These greenhouse gases trap heat from the Sun and help to keep the Earth at a temperature which allows for life to exist on the planet. However, humans, through processes such as burning non-renewable energy resources, are increasing the concentration of greenhouse gases in the atmosphere, leading to more extreme weather events such as droughts, heatwaves and more frequent flooding. In this article, Olivia in Year 5 offers her advice on what we can do, both at home and in school, to reduce our individual carbon footprint and slow the rate of global warming.

THE GREENHOUSE EFFECT

When heat comes into the earth, it should normally bounce out, but in the greenhouse effect it's not like that. You see the sunlight comes in but since we have so many greenhouse gases* in our atmosphere, the heat can not get out. That is how we end up with global warming.



Climate change is a subject hopefully everyone knows about since it is quite a serious subject and relies on what we do now. There are big differences and small ones, but they all make a difference whether it is for the good or the bad.

Picking up litter at break: you might think that it is no biggie, but it is. You could have just saved the life of a fox, or a deer or any type of animal!

Another one is using a wipe. Yes, sometimes you have to but other times, just use the sink as it could possibly kill any type of sea life since after you put it in the bin, it could be shipped into the ocean. Sea life might get caught in it and die.

I could go on for ages with things you can do but here are some easy ones.

Don't leave the tap running.

Turn off the lights.

Turn devices off.

Less TV time as it uses a lot of energy.

Don't leave plugs on.

Eat fewer exotic fruits as they are transported on planes.

Take less foreign holidays (planes again).

Have a wild patch in your garden (for animals and insects).

*Carbon dioxide and methane

Article by Olivia 5KC



The Engineering Society

The following section of the newsletter is dedicated to King's High Schools' Engineering Society and features articles about the events that have been held by the society this academic year.

AN INTRODUCTION TO THE ENGINEERING SOCIETY

We are a society that made our start at the beginning of this academic year. So far, it has been rather quiet for us as getting a new society running has been quite the challenge. However, so far this year we have been able to put on talks from professionals in the engineering field from companies such as LucasFilm and Jaguar Land Rover. Both talks have been inspirational and exciting.

The society was created to get more girls within King's High School more interested and involved in engineering. This is because as a society we felt there wasn't enough advertising of the different paths that can be taken within engineering and therefore, it was overlooked as a career path by many girls due to the stereotypical engineer being a male who works within the automotive industry. We aim to increase knowledge and understanding of engineering for the girls at King's High, through talks and events that promote different career paths in engineering.

Not everything to do with engineering is related to cars, there are many paths such as architectural engineering, sports engineering, food engineering, fashion engineering, sound engineering and much more! If these careers were something you weren't aware of or are interested in finding out more about them, it would be great to see some new faces attending the events by the Engineering Society.

Article by Chloe
(Chair of the Engineering Society)

THE TALK WITH JLR AND THEIR APPRENTICESHIP PROGRAMME

We were lucky enough to chat with Ana Heloisa and Chantelle from JLR this June. They talked to us about their experience working at JLR and how they got there, due to the steps from getting in as a Graduate compared to an Apprentice is very different. Chantelle is a current apprentice in her final year and Ana is a product engineer who entered JLR through the graduate programme.

Apprenticeships are being pushed a lot at JLR because it allows students to enter straight into the workforce and still learn their chosen courses, coming out with a degree. This means JLR can teach you the specific qualities to working with them and any similar work environment giving you a jump start to work whilst being shown the way every step you take.

This is a great option for many people who know what sector they want to go into after school/sixth form. Apprenticeships are becoming even bigger in engineering sectors more than any other which means it's a great way to get into the career as it's recognised in big companies like JLR, the National Grid, RAL etc.

Article by Krithi

THE TALK WITH LUCASFILM

We were very proud to host a talk with Adam Sawatzki from Lucasfilm last March. Adam is a mechanical engineer and now the designer for the SFX team at Lucasfilm. He's worked on many movies and TV shows, like the Star Wars franchise, by precisely engineering explosions and movement of large objects like replicating vehicles on a bumpy terrain whilst the driver is in combat. It was very interesting to see the behind the scenes of how everything is made from props, make up, explosions and digital VFX.

Adam talked to us about how he came into the film world and the steps to take. You can get into the film industry in many different ways so it's best to just do what you enjoy. The difficult part is just getting involved initially as it's such a huge industry, so Adam shared his experience with working at a small effects company and slowly working his way up until he got into the large production company of LucasFilm and became their head designer here in the UK.

We hope to host more creative talks like this in the future to widen the perspective on engineering.

Article by Krithi

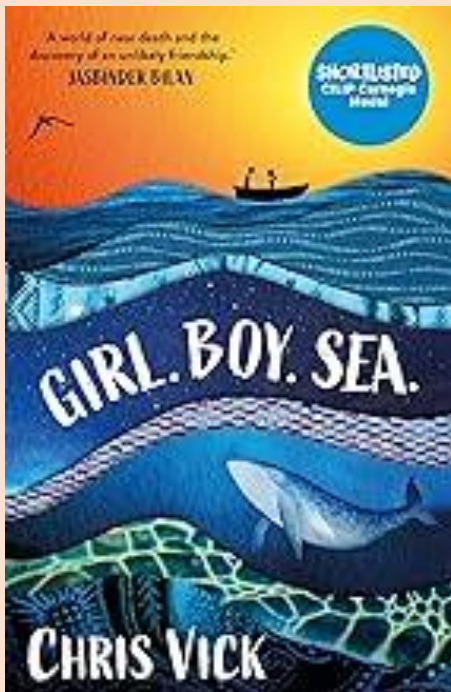


Recommendations

Reading can help you relax and enhance your scientific understanding further. Therefore, this section of the newsletter features several fiction book recommendations that relate to the theme of 'Land, Sea and Sky'

BOOK RECOMMENDATIONS FROM MRS BURMAN

KS3 Recommendations

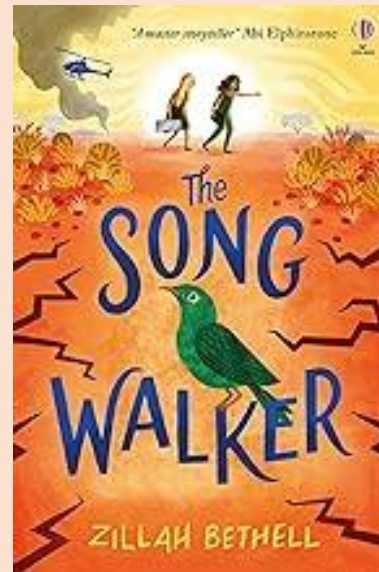


A British boy narrowly survives the sinking of his yacht in a huge storm off the coast of Morocco. After days alone at sea in a tiny rowing boat Bill rescues a girl clinging for her life to a barrel. Aya, from the nomadic Berber tribe, was escaping to Europe when her migrant ship was destroyed in the same storm. Through endless days and star-spangled nights, they drift – mere specks on the vast, empty ocean – weakened by fear, hunger, and burned by the unforgiving sun. Aya tells Bill about The Arabian Nights, and Shahrazad, who told 1001 stories to save her life. As hope of rescue begins to fade, they find strength in these tales of magic, brave heroes, wily thieves, greedy sultans, and courageous girls.

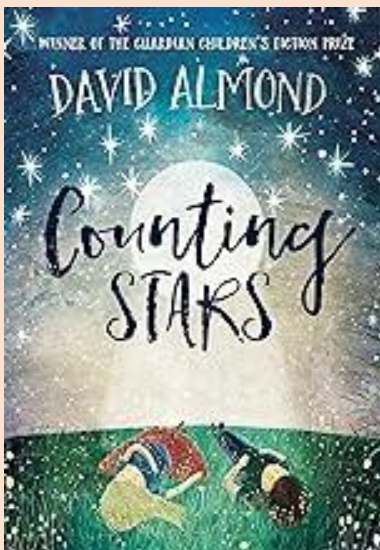
When they land on a desert island, they're surprised to be confronted by a stranger who is not what he seems... and back out on the waves once more in the dark deep, a shadow follows...

When a young girl wakes up in the middle of the desert, she has no idea who she is. She's wearing one shoe, a silky black dress, and she's carrying a strange, heavy case.

She meets Tarni, who is on a mysterious quest of her own. Together, the two girls trek across the vast and ever-changing Australian Outback in search of answers. Except both are also hiding secrets...

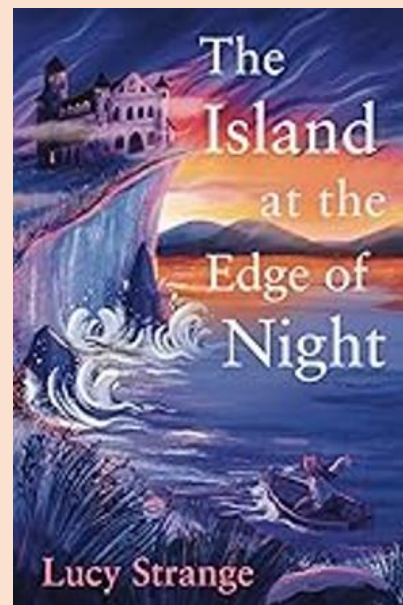


These beautifully written stories grow out of David Almond's childhood in the streets and fields of Tyneside. They're funny and sad, realistic and strange, and are suffused with a profound sense of mystery and wonder. They show that the ordinary world is filled with extraordinary possibilities, that the local really does contain the universal.

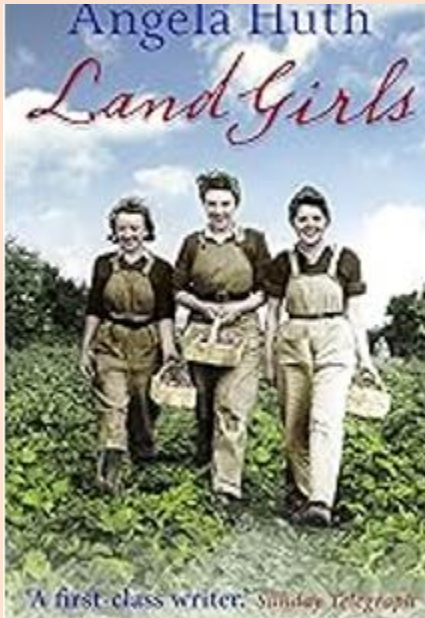


Abandoned at a boarding school on a bleak and remote Scottish island, Faye discovers that she and the other pupils have been sent there for doing something wicked. But what is it that Faye has done?

She might be bold enough to explore the prison-like island but has she the courage to face a secret deep within herself?



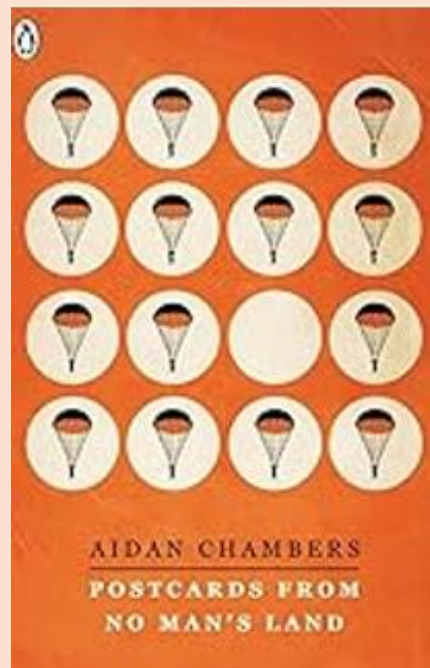
KS4 Recommendations



Jacob, aged 17, is abroad on his own for the time, visiting his grandfather's grave at the commemoration of the Second World War Battle of Arnhem in Holland. Jacob's life-changing experiences are interwoven with the extraordinary wartime story of passion and treachery that he learns from Geertrui, whose family is linked to Jacob's in a way he never suspected.

Stella arrives at Hallows Farm in her Rayon stockings, having just waved goodbye to the love of life - naval officer Philip. Agatha has just graduated from Cambridge; life on the Farm is certainly going to offer her a different kind of education. Prue, a hairdresser from Manchester, is used to painting the town red, not manual labour.

Work is hard and the effects of war start to take their toll on the three women. But as the bonds of friendship start to form and excitement builds as the RAF dance looms, maybe life in the countryside isn't so bad after all?





One of the greatest novels of the 20th century by one of the greatest writers in American history - THE BOOK THAT WON ERNEST HEMINGWAY THE NOBEL PRIZE FOR LITERATURE

Set in the Gulf Stream off the coast of Havana, Hemingway's magnificent fable is the story of an old man, a young boy and a giant fish.

Here, in a perfectly crafted story, is a unique and timeless vision of the beauty and grief of man's challenge to the elements in which he lives. Not a single word is superfluous in this widely admired masterpiece, which once and for all established his place as one of the giants of modern literature.

Written when landing on the moon was still a dream and made into one of the most influential films of all time, 2001: A SPACE ODYSSEY remains a classic work of science fiction fifty years after its original publication. The discovery of a black monolith on the moon leads to a manned expedition deep into the solar system, in the hope of establishing contact with an alien intelligence. Yet long before the crew can reach their destination, the voyage descends into disaster . . .



Acknowledgements

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Editor/ Producer of Newsletter: Lucy Year 12

Authors: Various (see articles for specifics)

FINAL NOTE FROM THE 2023-2024 EDITORS

Thank you for reading our newsletters - we hope you have enjoyed them. The contributions we have had from staff and students have been incredible and we thank you for your support.

We would like to wish the new editors all the best in continuing the newsletter and we look forward to reading next term's issue.

Lucy and Amelia