



TEDDIES talks
BIOLOGY



Can we cure malaria?

Should contact rugby be banned at school level?

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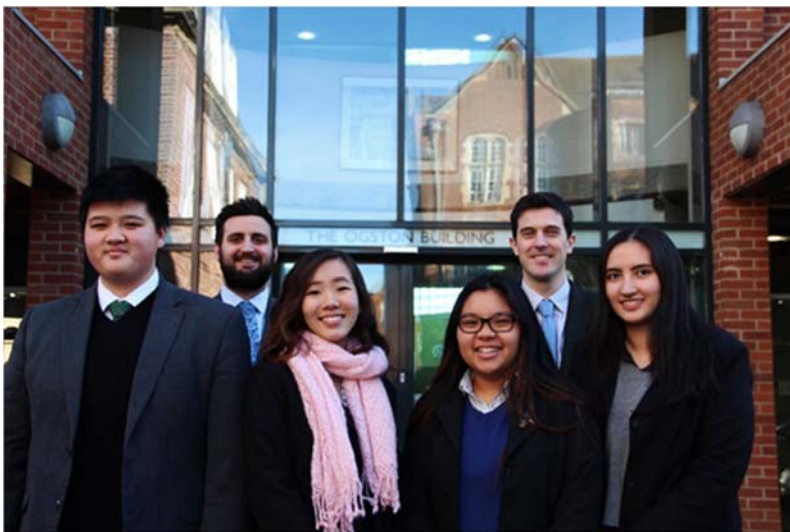
Is entomophagy the diet of the future?

Editorial:

This is the 4th issue of “Teddies talks Biology” and as ever there is an amazing diversity to the articles on offer.

I am delighted that pupils from across the school have contributed to the current issue, from the new Shells to the Upper Sixth stalwarts who have been the backbone of this magazine since its formation. They have now passed the reins over to the current Lower Sixth and we are excited to see how they will drive the magazine on next term.

If you wish to get involved in future issues please email me and I'll add you to our mailing list (waringa@stedwardsoxford.org). Involvement is great both for your wider biology education and for those higher up the school, bulking out your UCAS form!



Front row from left to right:

Ben Wan, Jenny Hu, Danielle Lim, Huda Khalaf

I hope you enjoy the read,

Mr Alex Waring & Mr Rick Storey

Biology



Front cover:

Courtesy of <http://seeninthesea.com/portrait/>

Table of Contents:

4. Can We Cure Malaria?
Anish Mehta - L6th
6. Screens vs. Sleep
Gwendy Davenport – 5th Form
7. Scoliosis
Reha Soni - L6th
8. Should Contact Rugby be Banned at School Level?
Tinka Hughes - L6th
9. Selective Breeding with Pigs
Gini Hope - 4th Form
10. The Healthier Drug: Marijuana or Alcohol
Huda Khalaf and Danielle Lim - U6th
11. What is Life?
Leo Wilson - 4th Form
12. Entomophagy : The diet of the future
Joyce Yao - L6th
13. The Purrwerful Power of Cats
Jenny Hu - U6th
14. Boils: An Agonising Skin Sore
Isabel Degroot - L6th
15. Twins
Robin and Guy Wheeler - Shells
16. The Effects of Caffeine During Exercise
Chandos Neville - Shells

Can We Cure Malaria?

Anish Mehta - L6th

Malaria is one of the most ubiquitous diseases in the world with more than 214 million cases of it reported in 2015. It causes the most fatalities of any parasitic disease and is responsible for the deaths of 438,000 in 2015 (90% in Africa).

Cause:

It is caused by parasitic protozoans, a type of single-celled microorganisms, that live in mosquitoes. Mosquitoes carry these parasites in their salivary glands in the thousands and so when humans are bitten by such mosquitoes (blood is their source of food), they are transferred into the bloodstream. Once they have entered, they then travel to the liver, where they enter the liver cells to hide themselves from the immune system. For up to a month they feed off their host cell taking in as many nutrients until they become small drop-like merozoites. They reproduce with great fecundity and then burst out of the cell to look for their next unfortunate host - red blood cells. What is truly barbaric about these parasites is that they cover themselves with the previous host's cell membrane – this allows them to stay hidden from our immune system.

Once they find a red blood cell they enter, reproduce and burst out of the red blood cell. The cycle repeats until there is a build-up of dead cells and this increases the quantity of toxic materials. Subsequently, the immune system reacts ferociously causing high fevers, sweats, convulsions and if untreated it can be fatal.



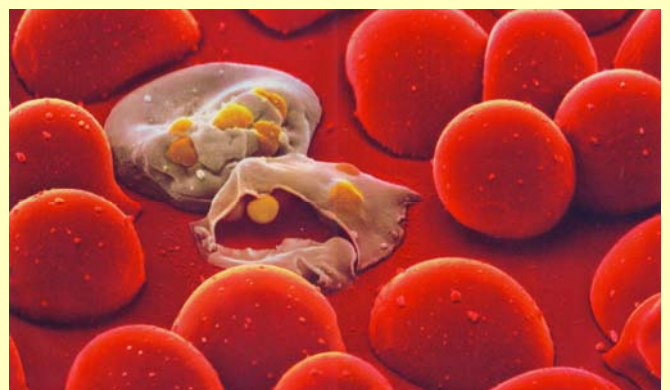
The major problem with mosquitoes is that there are trillions of them and they can lay up to three hundred eggs at a time. These factors combined with their ingenious camouflage under cell membranes means that malaria has been very hard to eradicate.

However, with the invention of CRISPR/Cas9, a new technique whereby we can edit the genes of an organism, we are now able to offer new

methods to eradicate this disease. Scientists have tried to edit the genes of mosquitoes so that they are immune to the malaria parasite by adding an antibody gene that allows the mosquitoes to kill the protozoans. Therefore, this meant that that specific mosquito will

never spread malaria again. However, scientists found that this wasn't enough because only half of the offspring will be immune. This occurs because there are two copies of every gene and at most only half the offspring will be immune – this isn't enough when there are trillions of mosquitoes present.

Fear not – there is hope. A genetic engineering method, called the gene drive, makes the gene for immunity dominant in the following generations. With this new method, 99.5% of the offspring of that genetically modified mosquito will be immune.



As most of the population of mosquitoes become immune, the protozoans will not be able to evolve quickly enough and so they should, in theory, die out very quickly.

This altogether sounds like a great idea as the mosquitoes do not use the protozoans in any way and so they would be unharmed. However, with such a new and unknown method that is only four years old, we must be wary when gene editing a whole species.

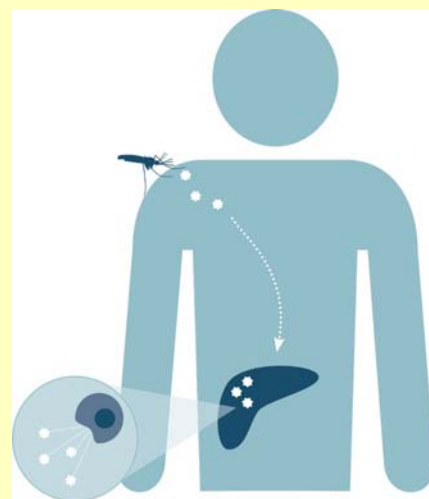
A project of this undertaking has never been done before and if we go ahead without knowing all the facts and something goes wrong then there is no stopping it. There are fears that the protozoans will adapt in a negative way to be-

come resistant or, at best, nothing will happen.

I think that we must implement this theory as soon as possible but first we must know all the possibilities and be very thorough. We don't need to exacerbate the problem. Therefore, I am confident to say that we should be able to implement this theory within this century – there is hope.

Malaria Quiz:

- 1) There are four types of malaria that can infect humans . They are all spread by what?
 - A) a mosquito bite
 - B) a rat bite
 - C) humans
 - D) dogs
- 2) What part of the body do these malaria parasites feed on?
 - A) White blood cells
 - B) Red blood cells
 - C) The Brain
 - D) The Heart
- 3) How long must a malaria parasite grow in its host before infection can be spread to a human being?
 - A) Two Weeks
 - B) One month
 - C) A Week or more
 - D) Two to three months
- 4) Once malarial parasites enter a person's blood they then travel to which organ?
 - A) The Liver
 - B) The Kidneys
 - C) The Eyes
 - D) The Heart
- 5) Of the four types of malaria, 'falciparum malaria' is the most deadly. This type of malaria is most prevalent in what place?
 - A) Southeast Asia
 - B) South Africa
 - C) subSaharan Africa
 - D) South America



1. A, 2. B, 3. C, 4. A, 5. C

Answers:

Screens vs. Sleep

Gwendy Davenport - 5th Form

As teenagers, we all like to stay up late watching our favourite TV shows or scrolling through Instagram. However, studies have shown that the blue light emitted by our digital devices has a detrimental effect on our sleep. A study was done in Israel where 19 volunteers spent two hours on a digital device (each with different light exposures) before they went to bed. While they slept, the researchers recorded how many times each person woke up and how long they slept overall. They found that people exposed to more blue light woke up more often and on average, their sleep was cut by about 16 minutes. This is because blue light disrupts our body clock as it makes one more alert at night. Also, the blue light emissions affected how much melatonin each person made (this is a hormone that makes people sleepy.) Melatonin is usually secreted into the body in the evening and people exposed to more blue light didn't make as much melatonin and therefore found it more difficult to fall asleep or become tired.

Another study done in Boston demonstrated that even room light can affect the body's production of melatonin, and therefore one's sleep. They found that for the people who stayed in a lit room before bed, melatonin started to be secreted 23 minutes before bedtime, whereas for the volunteers in dim

light, the melatonin secretion started 1 hour and 57 minutes before bedtime.

As we are busy people, it is very hard for us to avoid a lit room before going to bed. However, if we can, it's a good idea to wind down in the evenings by reading a book, doing some homework, or looking at your phone with 'night shift' on. This just encourages melatonin secretion and therefore gives you a better chance of having a good night's sleep.



Scoliosis

Reha Soni - L6th

Scoliosis is the lateral curvature of the spine and is common in an estimated 3% of the population. In scoliosis the spine has an abnormal side-to-side curve that varies from the usual curvature of the spine usually located at the neck, upper or lower spine. This curve usually causes the spine to twist and leads to you having a twisted body or uneven shoulder blades. In most cases scoliosis is only small and so there would be no visible signs or symptoms as the curve would be 25° or less. Sometimes scoliosis is acute and in these cases the curvature is more than 25° . In these cases the symptoms are usually visible and treatment needs to be taken in order to prevent the curve from deteriorating.

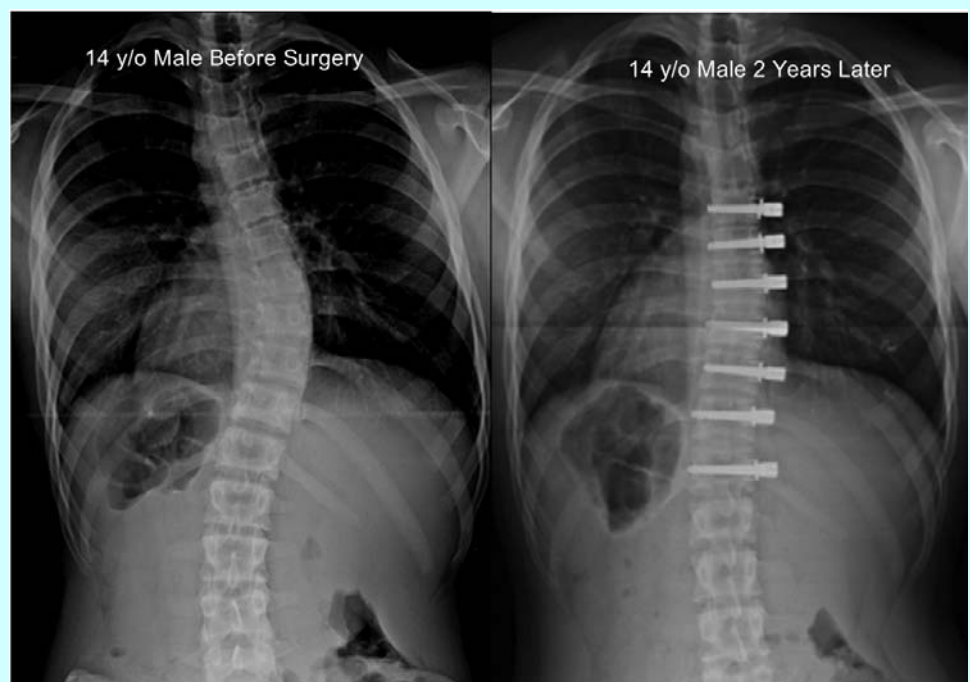
Scoliosis can be caused by many conditions for example: genetic conditions and cerebral palsy. In most of these cases the curvature is acute and so immediate action is required to prevent further degeneration. However, every 8 in 10 cases of scoliosis are idiopathic cases meaning that the cause of them is unknown. Idiopathic scoliosis can't be prevented, as they have not been linked to things like posture, diet or exercise. 80% of these idiopathic cases are found within adolescents suggesting that the curvature is most likely to develop around the stages of puberty.

Luckily most scoliosis cases are treatable. If the case of scoliosis is not that acute than most of the time the only thing that could be done is observation to ensure that the curvature does not become worse over time. In most cases the curvature stays the same or in the rare occasion the body is able to correct the curve itself. As the curvature in these cases is so minor it means that it does not affect the functioning of the rest of the body and so can be left.

On the other hand, if you are still growing and there is the chance of the curve getting worse than a spinal brace is used to reduce the progression. The brace holds the curve at the same position whilst the child is growing and prevents a rapid deterioration of the curve during this period. The brace is removable and is fitted to the child depending on the type and degree of the curve. The brace is strapped on and usually has to be tightened to a certain point to ensure that the curve stays the same.

If the brace doesn't help restrict the curve then surgery is considered, this usually happens if the curve is beyond 25° as after this the curve could affect the respiratory and cardiac system and prevent it from working efficiently. The surgery is called spinal fusion where the spine is fused with usually titanium rods and screws in order to stabilise and straighten your spine. This surgery is very effective and is able to reduce the curvature successfully.

Fortunately, 90% cases of idiopathic scoliosis never have curves that progress enough to require a brace or even surgery.



Should contact rugby be banned at school level?

Tinka Hughes - L6th

Throughout the months of March and July 2016, medical officers and doctors called for tackling and other forms of harmful contact to be removed from school level rugby. Will Carling, former captain for England, suggested that, "organising children in weight categories, not age" should be an alternative, which is a system used previously in New Zealand. Contact in some sports can be a big risk, but it can also be something which is beneficial for some people, and this is why it is such a popular sport.

The negative aspects of contact in rugby:

Rugby Union is the third most popular contact sport in the world, but has one of the highest number of reported incidents of injuries amounts in all sports.

In the Welsh team there were 24 serious injuries during the season from 2010-11.

Injuries such as shoulder injuries and concussion are highly risky in the sport of rugby. Concussion happens when your head is hit and passes your skull and the spinal fluid protecting your brain from being knocked, as it is a very soft tissue. It is a high risk during contact sports, especially rugby. This also means that more money is being spent on sport related injuries instead of more serious problems which cannot be helped.

Rugby is a highly competitive sport and this can be highly pressurising, causing anxiety and panic attacks for all ages, through the pressure of winning a game, to worrying about the team and how one plays in the game. This can lead to rare but more serious cases, like suicide or depression.

Positives of it being a contact sport:

Increases physical health, cardio vascular conditioning, strength and endurance.

The physical contact of the sport can release endorphins and makes people want to play more, and this is why it is such a popular sport.

And clearly if people didn't like the contact, they wouldn't play rugby. So people who don't like the contact sport don't need to play it, as there are plenty of options of sport, as it is a loved sport because of the rough aspect of it. Because it is such a physically demanding and tactical sport, it also decreases the risk of obesity.

It also shows children that they can improve their performance and skills though hard work and practice.

As well as this, not only do children and adults learn to protect themselves, but they also gain confidence through having that physical contact they remain throughout school. Furthermore, for children who find it hard to socialise, it can be a release and a way for them to be free doing a sport they love.

For example, some autistic people don't feel physical pain and it is good for them to have that sport and area of school life or in general they can exceed in.

Every sport that one plays has an injury and dangerous risk, so why should rugby be the main focus sport to be banned?

Overall, in my opinion tackling in school rugby shouldn't be banned, as it is good for children to learn the physical and mental state of an athlete and how they should push through pain in life, even though it may cause some injuries. It is still one of the most popular sports in the world.



Selective Breeding within Pigs

Gini Hope - 4th Form

Selective breeding, often referred to as artificial selection, is a frequently used method in which humans can breed a new generation of any organism with their selected characteristics. Selective breeding can take place with nearly all animals, but I have decided to look closely at this process within one of our major meat suppliers, pigs. Pigs, or as they are scientifically known as 'genus sus', are part of the Eurasian and African Boar family, alongside wild boars and many others.

In addition, I am going to specifically look at pigs produced for meat, the way in which they are chosen and the complications that come with this gruelling process.

There are multiple ways in which these pigs can be selectively bred, but the most commonly used method is to fast breed them for their pork. This is the fastest and easiest process but can have many complications alongside it. This system works by firstly picking the characteristics which are desirable to the use of the animal you have chosen. So in this case where a pig is to be used for meat, one selected characteristic is a good, full and round curve of the bottom and hind leg. This means the pig will have plenty of good meat. Another desirable characteristic is the need for a broad back,

more flat and firm rather than round, as this is a good indication of less back fat which would be wasted when retailed.

The next stage of this selection method is to find two pigs which represent your chosen characteristics and breed from them. Once bred, you would pick the best offspring from the parents to breed the next generation. The rest of the piglets would be left to grow and fatten up ready for the market, after which they go to the butchers to then be sold.

Lastly, there are many complications that come with selective breeding in pigs.

One of the main issues is lameness. This is because

pigs are now selectively bred for fast growth and they are unable to support their quick weight gain. Statistics show that around 15% of pigs suffer from lameness. Another major complication of this process can be a loss of genetic variation and sometimes a lot of discomfort in the animals' lives.

In summary, selective breeding is well and alive throughout the UK through a variety of animals not just the obvious types such as breeds of dogs. This process is happening more frequently as breeding goes on as it is the easiest way to make our desired next generation. However, this is not without many problems and has become quite a controversial topic in the animal industry.



The Healthier Drug: Marijuana or Alcohol?

Huda Khalaf and Danielle Lim - U6th

Although there is stigma surrounding the consumption of alcohol and marijuana, there are still some health benefits to be considered when taking these substances in moderation. One of the biggest arguments is between the benefits of alcohol against marijuana. Marijuana is a mixture of dried flowers of *Cannabis sativa*, and it is most often smoked. Whereas, alcohol is a legal sedative drug which is most commonly consumed as a beverage.

Advantages of Alcohol

There are quite a few benefits to consuming alcohol in moderation, and here are some of the few ways in which they can be good for our health. One way in which alcohol was found to be beneficial to our health was that it was found to lower our risk of cardiovascular disease. This is because it raises the levels of high-density lipoprotein, which can also be known as 'good cholesterol'. This is associated with better protection against heart disease. Other ways in which alcohol consumption can be beneficial in moderation is that in a study conducted for the *Journal of Sexual Medicine*, it was found that it could in fact improve libido in men as their chances of erectile dysfunction was reduced by 25- 30%. Finally, another benefit which was found in a Dutch study, stated that healthy adults who drank one to two glasses per day have a decreased chance of developing type 2 diabetes, in comparison to those

who do not drink at all.

Advantages of Marijuana

The most obvious benefit of marijuana is its medicinal use for the treatment and prevention of diseases. An example would be for Glaucoma, a disease in which an increase

in pressure in the eyeball causes damage to nerves and a loss of vision. Studies in the early 1970s showed that marijuana, when smoked, lowered intraocular pressure in people with normal pressure and those with glaucoma.

Marijuana has also been known for its usage in controlling seizures, cannabinoids like the active ingredient in marijuana, tetrahydrocannabinol (THC), control seizures by binding to the brain cells responsible for controlling excitability and regulating relaxation. In 2007, a study conducted by the California Pacific Medical Centre found that cannabidiol stops cancer by turning off a gene called *Id-1*, the study, found that cancer cells make more copies of this gene than non-cancerous cells, and it helps them spread through the body, this means it may be used for prevention or as a treatment for cancer. Furthermore, a recent study on mice showed that the active ingredient in marijuana (THC) has been known to help treat dementia, a disease which affects around 47 million people worldwide.



What is Life?

Leo Wilson - 4th Form

What is life? You are alive, but what are you, fundamentally? Are you your body, are the cells inside your body even alive? On the molecular level everything is "dead" but together they make what we deem "life". Is there a line where you stop being you?

We can define life and we decide what is allowed and isn't alive. In this we consider ourselves alive, but not our cells which make us up? When you think about it you are just a brain inside a skeleton overlapped with a layer of skin with cells and processes inside working to keep you alive you can't directly control. Cells exist solely to sustain us.

Since you have begun reading this about 200,000,000 million cells in your body have died and been replaced. Over a 7 year period almost all of your cells would have been replaced. Are you still the same person you were 7 years ago, or somebody completely different? At any point in time you are a snapshot of your individual self. So a part of you is constantly dying.

Going deeper, what if cells don't want to die? We call this Cancer, and cancer is fundamentally when cells refuse to die. They start to duplicate in order to preserve themselves, they essentially become immortal. This is a part of your own body that's refused to die and actively tries to look out for itself and not you, its original host. Is this cancer still "you", or an entirely different entity?

A tale which will blur the line even more is that of Henrietta Lacks. Henrietta was a cancer patient who died age 31 in 1931. When Henri-

etta's cancer cells when placed on a petri dish they actively reproduced and were essentially immortal.

Over the next couple of days they doubled again and again. There are now over 20 tons of her cells "alive" in the world. So there are millions of cells of a person around the world who has been considered dead for over 6 decades, how much of Henrietta are in these cells?

What makes you "you" anyway? Is it DNA? It used to be thought that all cells had the same DNA. This has turned out to be incorrect and in extreme cases neurons in your brain can have over 1000 mutations not present in other parts of the brain. So every cell is different, alive yet not, you yet not you.

Let's take a step back, we know that you're made up of trillions of little things which some consider "alive" which are made up of even smaller things which are not alive which are constantly changing. Even though the little things are not alive, they are not static, that are dynamic. They are constantly changing and being different. What if we are all an individually self-sustaining conscious without clear borders that gained self-awareness at one point in time that just happens to live in our body or at least the snapshot of it in this moment. Or we could all be overthinking this and the simple truth is you are alive and we can rest easy.



Entomophagy: The diet of the future

Joyce Yao - L6th

As we know cow farming is one of the main producers of methane gas. Similar to carbon dioxide, it is a greenhouse gas and it can trap UV rays with long wavelengths in the earth's atmosphere, causing an overall rise in temperature. However the negative effect of methane gas is 23 times more powerful than carbon dioxide. According to the Food and Agriculture Organization of the United Nations (FAO), agriculture is responsible for 18% of the total release of greenhouse gases worldwide. In other terms, a cow produces 70-120kg of methane on average per year and there are proximately 1.4 billion cows in this world. That's approximately 133 billion kg of methane gas produced by cows every year!

People don't realize how farming animals, especially cows can cause a big impact on today's environment. Are there any other alternatives for farming livestock? The answer is yes, insects!

The reason why insects are the answer to this question is because insects are packed full of high quality proteins, vitamins and amino acids for our diet.

There is diversity in edible insects therefore if insects become the future source of food; we



will have a variety to choose from. More importantly it doesn't have as many requirements



as raising livestock. For instance, a cricket requires 6 times less food than cattle. This is due to their 'high food conversion rate' meaning that yields from harvesting insects require a lower level of input, such as food and water. On top of this insects release less greenhouse gases than cows!

It is estimated that there are at least 2 billion of people basing their diet on insects, more than 1,900 species of insects are consumed by people around the world. For example in certain African communities insects form 5%-10% of their protein consumption.

However there are also disadvantages of using insects as a source of protein for human consumption. Similarly to other foods, insects can be vehicles for certain hazards. These hazards are mainly due to parasites, viruses, bacteria and their toxins that insects may carry.

Farming and production conditions would also need to be carefully monitored to ensure control of any health risks.

Insects are a potential alternative and it would greatly solve the problem of methane gas production by farming livestock. However new problems would

arise and it is completely up to personal choice, whether to incorporate it into our diets.

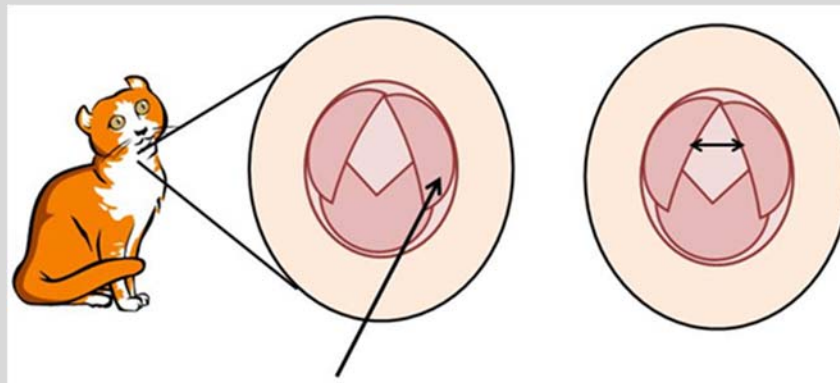
The Purrwerful Sound of Cats

Jenny Hu - U6th

Imagine waking up in the morning, bits of your dream still spiralling in your head and your pet cat is purring loudly in your ear, pawing your pillow. Most cat owners have experienced this situation with their own personal feline friends, but realize the same thing: they should probably feed their cats.

It seems that they are able to camouflage a high-pitched sound with their low-pitched purring that urges cat owners to feed/tend to the cat's need. This high pitched was measured to be 220-550 Hertz, and was within the range of a baby's cry of 300-600 Hertz. McComb also suggested that this trick was an alternative to a

As it turns out, purring is a multi-use tool for cats to apply to their everyday lives with humans and/or feral lifestyle. It can be used to comfort either themselves or others, to communicate, or even act as a healing agent. But, let's step back from the big picture, and ask ourselves: *How do cats purr?*



cat meowing loudly for food; it seems that cats are the ones controlling us!

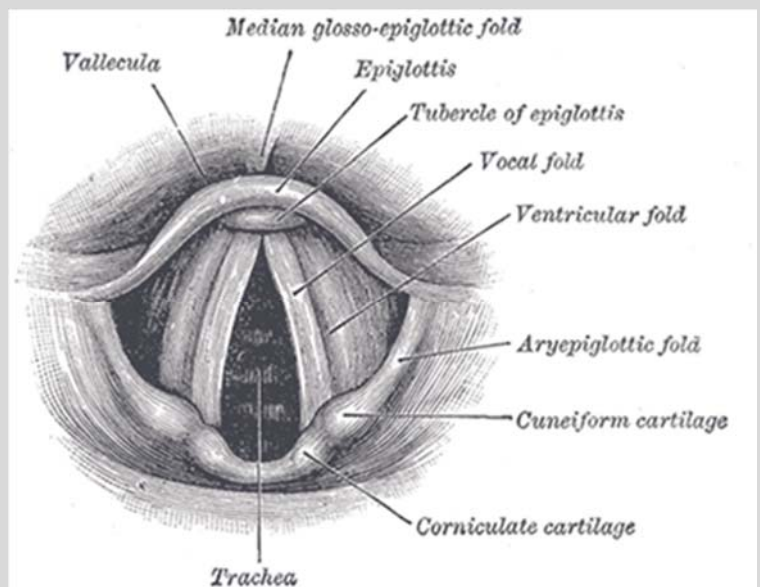
Despite cats being able to manipulate our minds, it seems that they can

It all starts with the physiology of the feline's throat and diaphragm. The larynx, also known as the voice box, plays a large role in the purring sound of cats; the muscles (laryngeal muscles) contracts and relaxes in alternating turns with the diaphragm. They act like an antagonistic pair-when the laryngeal muscles contract, the diaphragm relaxes, and vice versa-so that air movement is created within the larynx. The air builds up pressure, and once there's enough pressure, the air goes through the glottis, which consists of the vocal chords and slit space between them.

soothe us as well. A survey done by Cats Production in line with the Mental Health Foundation showed that 87% of cat owners felt that their cats placed a positive impact on their lives. This may be because of the soothing sound of a cat's purr; it is typically around 25-140 Hertz, which is a vibration that stimulates healing properties for both the owner and the cat. So whenever you feel a little bit down, just curl up with a cat and the soft purrs relax you!

This process repeats every time the felines exhales or inhales, and each time air moves through the opening of the glottis, it causes the vocal/ventricular folds to vibrate, causing the 'purring' sound our human ears pick up.

According to research done by Dr Karen McComb at the University of Sussex, cats have an underlying secret with their purring;



Boils: An Agonising Skin Sore

Isabel Degroot - L6th

Boils are a painful, gruesome skin infection that result in large, red, infected mounds anywhere on the skin. They normally start out of a hair follicle or oil gland where bacteria can live. Deeper infections in the skin are known as skin abscesses, but boils mainly occur on the surface of the skin. The area starts becoming red and tender, and the body sends white blood cells, which mix with bacteria and proteins to form pus which can be extracted through squeezing. The

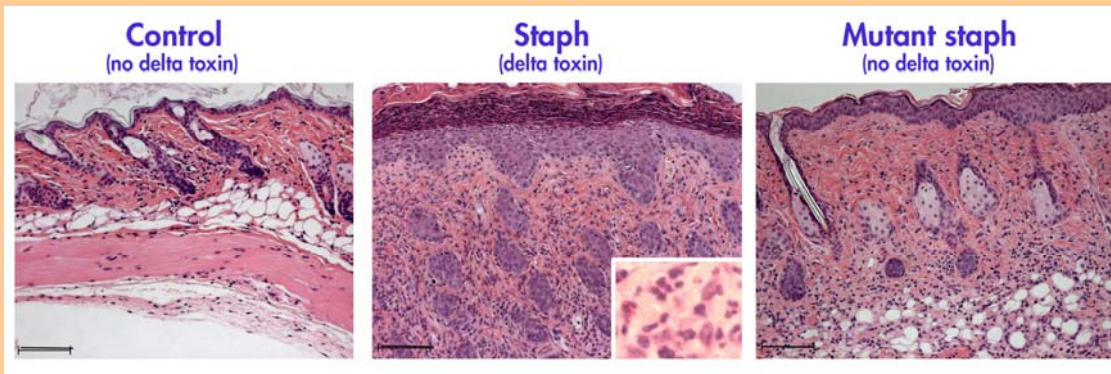
many courses can lead the pathogens to become resistant to the antibiotic, and could make the patient more severely sick.

Special soaps, such as Hibiclens or Hibiscrubs can be used to kill the harmful bacteria on the skin.

Staph infections can vary from small boils forming on the skin to septicaemia (infection of the blood). Depending on how deep the bacteria gets, this determines whether you would be

dealing with a boil, or a life-threatening disease. This bacteria normally enters the body through breaks in the skin.

Most of the time, it is advised not to squeeze boils,



main bacteria is commonly known as staph, which is Staphylococcus. It enters the body through small breaks in the skin or through gaps in hair follicle openings.

Boils are not contagious, but the staph bacteria is, and this can travel to other parts of the body through skin contact or through the blood or through wearing previously worn clothes.

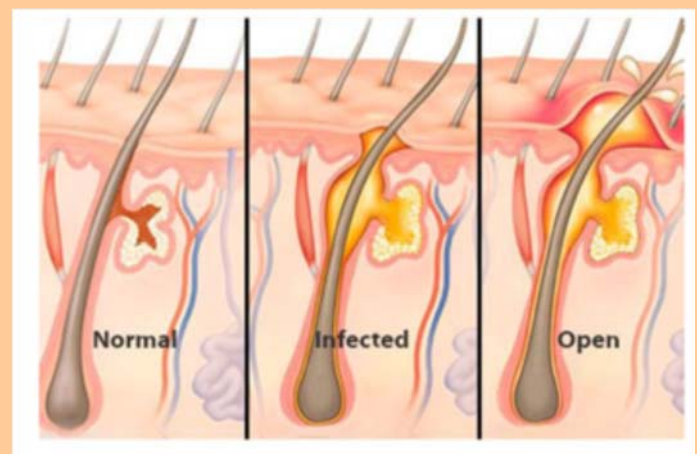
People with particularly weak immune systems are more likely to develop boils, as the body is unable to fight off the bacteria.

Applying heat to boils increases circulation in the area, forcing the body to bring white blood cells and antibodies to fight the infection. Also, a hot compress can help draw out the pus.

If a patient struggles with multiple accounts of boils, antibiotics can be administered, as the body's immune system needs help fighting off the bacteria. But, if multiple courses of antibiotics do not get rid of the boils, administering too

as they will eventually drain themselves. Although it may relieve a lot of pain by draining the boil, it may cause the bacteria to be pushed into the blood, where it could travel to other parts of the body and cause more boils or other issues.

This infection can be prevented by keeping open skin clean, and taking extra precautions if you suffer with a weak immune system.



Twins

Robin and Guy Wheeler - Shells

The two types of twins are Monozygotic and Dizygotic twins which are more commonly known as identical and fraternal twins. The most obvious differences are that identical twins look identical and are the same gender, hence the name, and fraternal twins can look similar or different, the same way that siblings can look similar or different, and they can be different genders.

Identical twins, or monozygotic twins, are very rare, roughly there are only 3 in every 1000 pregnancies. No one knows why the zygote splits so most believe it is just an accident during the early stages of pregnancy. Due to the monozygotic twins being from the same fertilised egg cell they have the same DNA hence why twins look the same.

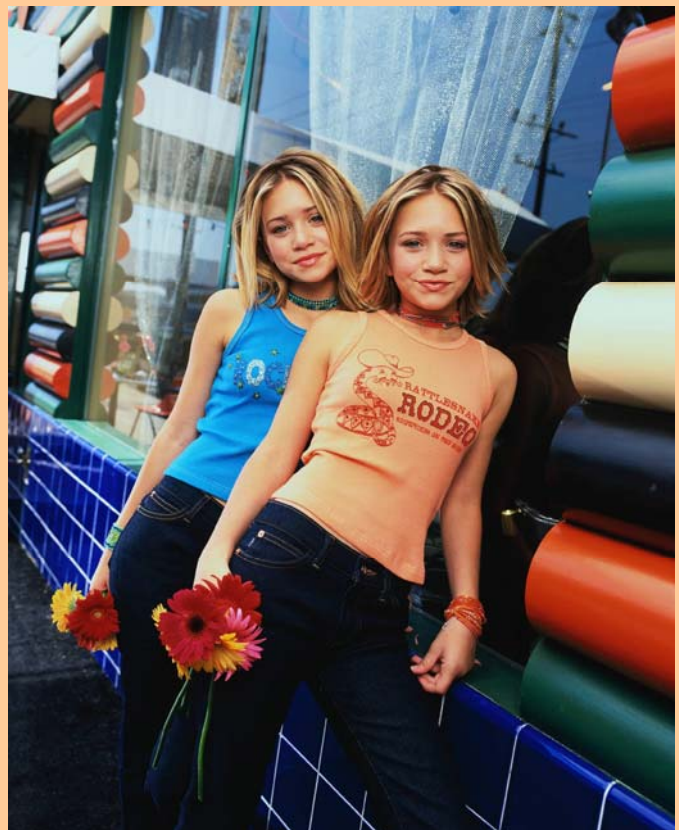
Identical twins form very early in the process of pregnancy when the zygote is still just a cluster of cells. When twins split from one fertilised egg this is called monozygotic. There are also dizygotic twins which are commonly known as fraternal twins and occurs naturally due to the female releasing two eggs and the male's sperm cells fertilising both eggs.

Having monozygotic twins is not hereditary although having dizygotic twins can be hereditary for the gene which means the female releases two egg cells instead of one can be passed on.

After birth twins can sometimes develop a language of their own. This phenomenon is called cryptophasia and both dizygotic twins and monozygotic twins can develop this due to their constant interaction.

In ancient times twins were seen as magical for there was no explanation as to why or how twins

occurred. This led to many myths being made up as to whether twins were lucky or unlucky, good or bad. For instance, the Dakota-Indians in North America saw twins as a sign of good luck and they believed that twins came from a special place called twin land and were shown a lot of respect. However, many cultures believed that twins were evil for instance the native South-Americans, the Ainu (the natives of Sakhalan), in old Peru and in the middle ages if a woman gave birth to twins it was bad and either one or both twins died or the twins were killed and the parents punished.



The Effects of Caffeine on the Body During Exercise

Chandos Neville—Shells

Caffeine is a plant-based product which comes from the cocoa beans among other plants like tea leaves. Coffee is the most widely used stimulant in the world dating back from before the 1700s. The average American drinks two cups a day. Coffee is a nutritional ergogenic aid meaning it can enhance physical performance in sport. Intake is monitored in lots of professional sporting events as it is a



form of drug.

When you consume coffee, it is hastily absorbed in the gut and enters the bloodstream about one to two hours after first consuming it. Caffeine can easily be absorbed by our body tissues, the remaining caffeine then circulates around your body before the liver can break the caffeine down during excretion in the form of urine.

When it comes to endurance, caffeine is the main option because it is a nutritional ergogenic aid. When you exercise your body uses glucose to respire to create the energy you need to ride a hundred miles, swim ten kilometres or run a marathon. However, we only have a limited amount of glucose and after time you will fatigue as your glucose levels decrease. This is referred to by professional

athletes as “hitting the wall.” This is when caffeine comes into play as it can increase an athlete’s endurance, accuracy, and speed. But caffeine does not provide any tangible factors like strength or power. Although it can help to increase glucose levels as it makes it easier for the body to turn fat into glucose this is referred to as mobilising fat stores. Also, being a brain stimulant, it can help us think clearer and so we can pace ourselves better.

These benefits caused caffeine to be banned in 2003 by the World Anti-Doping Agency in professional cycling although caffeine is still monitored.

Since caffeine enters almost all our tissues including the brain. Caffeine acts as a stimulant and wakes you up, which means that when you consume it, your senses will feel more heightened, you will be more alert and react faster. This means drinking caffeine before an event can actually help reduce the perception of pain in the event allowing you to push harder.



Artificial Sweeteners

Benjamin Wan - U6th

Aspartame and Acesulfame K. What are they? These are two of the most common artificial sweeteners especially prevalent in sugar-free fizzy drinks but are also in sugar-free gum and table-top sweeteners. This includes Diet Coke, Coke Zero, Sprite Zero and Fanta Zero. There are many rumours that these artificial sweeteners are detrimental to the body and they can trigger migraines and can cause cancer. However, a lot of follow up studies have been conducted and have dismissed the previous controversial studies that suggested that artificial sweeteners were harmful.

A study into aspartame in 2013 by the European Food Safety Authority (EFSA) conducted an in-depth review of the evidence and concluded that aspartame was safe for human consumption, including pregnant women and children. Very little Aspartame enters the bloodstream, as it is broken down into phenylalanine, aspartic acid and methanol. However, people who suffer from the condition of phenylketonuria (PKU), where the individual cannot breakdown phenylalanine. The NHS suggests that the acceptable daily intake of Aspartame is 40mg per kg of body weight.

Acesulfame K has also come under fire for possibly being carcinogenic and potentially affecting pregnancy. However, the European Food Safety Authority has dismissed this. Acesulfame K is not broken down when taken into the body. It is simply absorbed and excreted chemically unchanged. The NHS suggests the acceptable daily intake of Acesulfame K is 9mg per kg of body weight.

In conclusion, these two artificial sweeteners are safe to consume and if they did pose as carcinogenic they would not be used in our drinks. They

can also be extremely good substitutes for sugar for people trying to reduce their intake of sugars. They are also good substitutes as they do not cause tooth decay and reduce number of calories consumed. Soft drink brands have increased their focus into sugar free/ reduced sugar options to target the increase in obesity in the population. These drinks rely on sweeteners as a substitute to sugar, as there has been significant research into the possible negative effects of sweeteners. The research has shown that at the level we are consuming these sweeteners on a day to day basis, it should have any adverse effects



Happy Easter!!!



How's your first flight son?

Feels great, Dad! Everyone was clapping for me!



Hey all! Wanna hang out?

I can't mix with you guys.

Hydrophobe!

