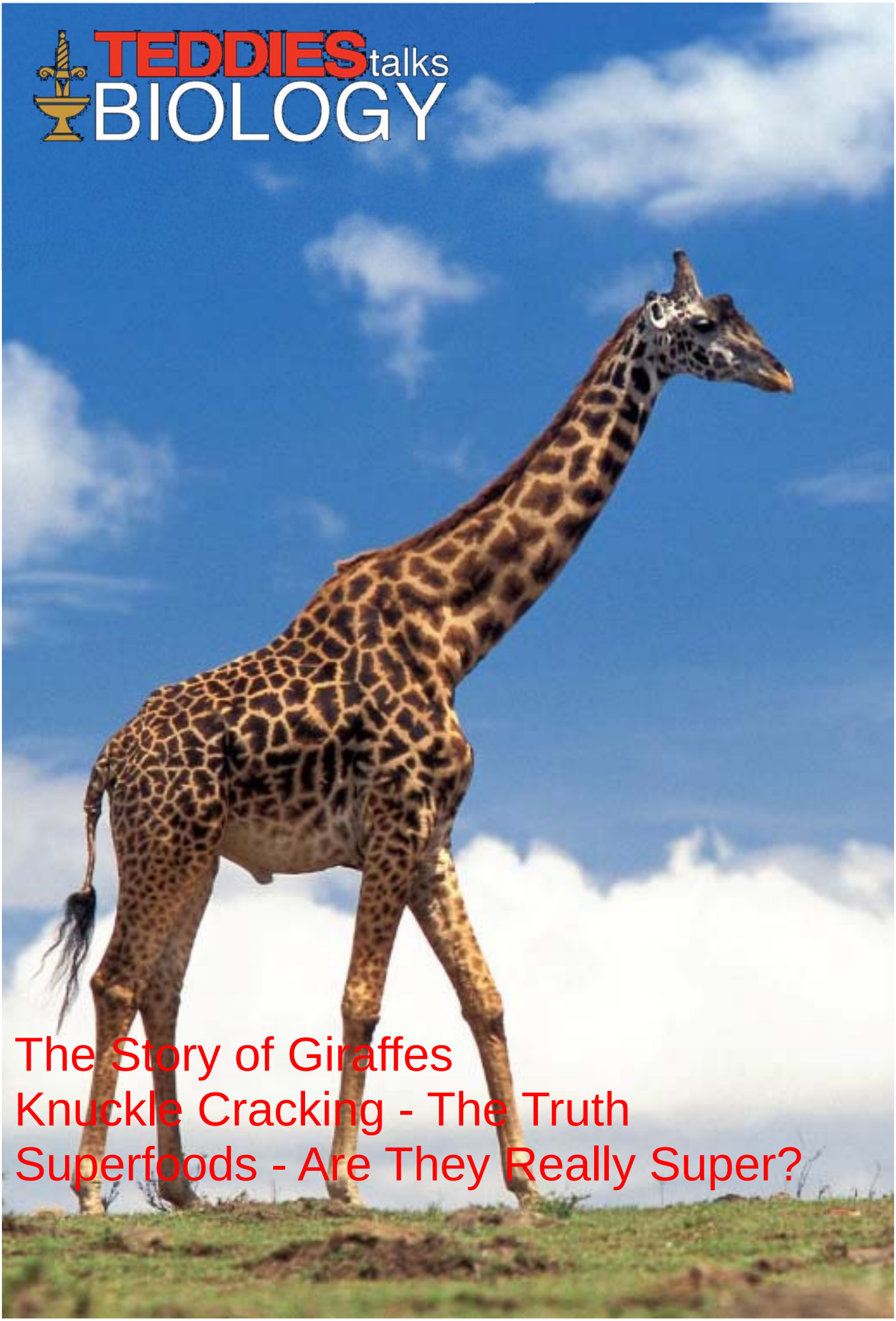
TEDDIES talks BIOLOGY



The Story of Giraffes
Knuckle Cracking - The Truth
Superfoods - Are They Really Super?

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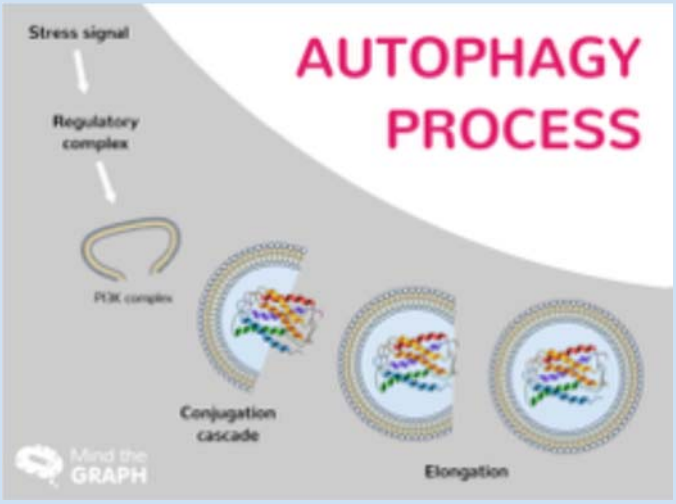
Survival Mode

Izzy Degroot - L6th

People can be put in survival mode for many reasons; whether it be voluntary or not. Our bodies are equipped to deal with the most extreme conditions, but what really does happen when we put ourselves under extreme stress? We often become victims of extreme stress and anxiety, experiencing the fight or flight mechanism.



This is because the primitive part of our brain, near the spinal chord, has become overbearing and in charge, rendering the rest of the brain shut off and not in use. This allows our body to react instinctively, rather than through decision-making. Your body learns to enhance the things that are most important to your survival, and to shut-off parts of you that are least important to your survival. Blood flow, oxygen retention and energy will be your body's main factors to keep going, while your immune system, reproductive system and your digestive system will be shut off, reducing the total energy your body uses. This allows energy to be used elsewhere. In stressful conditions, where our body's resources are low, and the environment is unforgiving, our bodies release catecholamine hormones, which puts the body on high alert status. This is often referred to as the 'fight or flight' mode, or hyper arousal. This allows reactions and processes necessary for survival to become the body's priority. Firstly, these hormones cause acceleration of the cardiac and respiratory system, to allow maximum oxygen to reach every part of the body.

People in survival mode will often breath faster, be anxious, hyperventilate and changes to the colour of the face. Next, the body's auditory and visual systems slow down, to allow your body to focus on what needs to be done to survive. The body's fat and glucose reserves are used up when no food has been taken in for a number of days. The body essentially starts to use itself as a means of energy to keep the body going. This process is known as autophagy and results in dramatic weight loss, loss of muscle strength and incoherency, as the body works itself around the body, trying to find what resources it can to keep itself alive.

Body weights, genetics, general health and hydration play a major role in survival chances. These all play a role in slowing down the body's metabolism and gearing the body, so that it has the best chance of survival.

Not many people often find them in this position, but it is important to understand how our complex body can organise itself to allow for optimum survival..

Bombardier Beetle

Josh Moore - L6th

There are many species of bombardier beetles all over the world, they are particularly interesting because they have developed unique defensive mechanisms. For example some have non-explosive, foamy excretions of chemicals, while others like the African bombardier beetle are able to aim their explosive spray in virtually any direction.

The African Bombardier beetle has this ability because within its abdomen there is a chamber that holds a mixture of hydrogen peroxide and chemicals called hydroquinones. When the beetle feels threatened, the contents of this chamber move into another one where catalysts cause a reaction to occur. Here the hydrogen peroxide breaks down into essentially oxygen and boiling water while the hydroquinones oxidize into benzoquinones (which are strong irritants).

The beetle can fire this mixture at high speed in order to debilitate smaller attackers

and spook larger predators.

Despite the seemingly rare mechanism, the chemicals (hydrogen peroxide and hydroquinones) are commonly found naturally occurring chemicals in insects. Hydrogen peroxide is a byproduct of metabolism (in almost all living creatures) and quinones are used by insects to harden their shells. The impressive aspect of the adaptation is how the bombardiers have evolved to store these chemicals instead of breaking them down or using them in other processes.

The Story of Giraffes

Thomas Turner - 4th Form

Ever since Charles Darwin's origin of species we have accepted that giraffes have a long neck because the giraffes with longer necks could reach the leaves in taller trees making them more successful then their shorter relatives. Thereby they have a better chance to survive and raise offspring which carry their genetics and so this became a textbook case. However, there is just one problem; according to a study in 1996 by The American Naturalist they found that in the summer when competition in the Savanah is at its height giraffes feed on low shrubs rather than tall trees that begs the question why they reach 5 ½ meters tall which is 2 meters taller than all other animals in the Savanah. This is surprising as having a neck on average half the height of its body can lead to serious issues with circulation as it increases the strain on the heart and as it has the same amount of vertebrae as a human (7) they have grown to 25.4 cm long they can easily have neck problems late in life. So in recent years scientists have came up with 3 new theories.

Firstly and most notably, male giraffes compete with other males for females by violent act of neck fighting in which giraffes use their skulls to whip into the necks of other giraffes to establish dominance and the longer necks give the males a distinct advantage as a longer neck provides torque and gives them more range. This is a major issue as even in the tiny population of giraffes in the population in the Republic of Niger on average 2 giraffes die because of neck fighting each year. And the explanation of why females have the same elongation is the correlation of sexes in evolution which is very common. However, this theory neglects the fact by fossil discoveries we now know that the giraffe started to evolve during the time that the grassland in Africa become more contested by other creatures.

Secondly, scientists have theorised that the long neck could be used as a warning system for predators. This could be used to protect giraffes however there are 3 main caveats. Firstly, giraffes can use kicks with deadly force and can run at speeds up to 30 mph. Secondly, scientists believe if being taller was a significance advantage other animal would have followed suit. Finally, giraffes only have 2 natural predators, lions and crocodiles, and they already evolved much more efficient ways of protecting themselves most notably their speed and their kicking ability.

Thirdly, the long neck, like the elephants ears could be an instrument of heat loss however if this theory is correct is likely to be a small factor and not the main factor as just like in the second theory there are more efficient ways of losing heat such as large extremities like ears or by vasodilation techniques. So although it could have played a part it likely wasn't a major factor in evolution of the giraffes neck.

Like with many evolutionary tales we cannot say for sure any of these theories are true however after 140 years since Darwin's discoveries we have still have no definitive answer and researches are still confused about the tallest animal on land all we know is that it is not as simple as you might have been told.

The Biology Behind Attraction

Grace Flynn - 4th Form

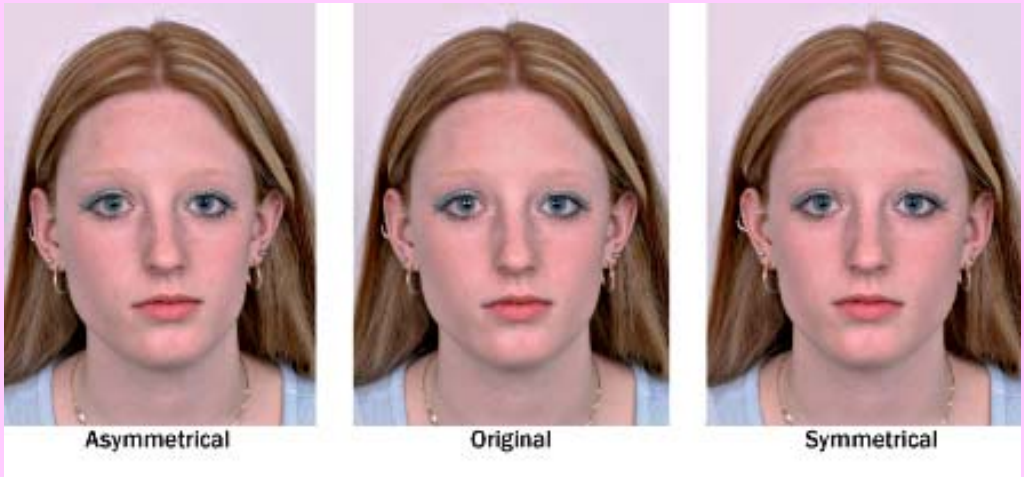
Why are certain physical attributes appealing to us? Why will men usually prefer women with longer, thick hair to women with shorter, thinner hair? Why do most women prefer men with beards or stubble to men with clean-shaven faces?

The answer is in fact, much more primitive than it is indoctrinated. We like to believe that physical idealisms are being force-fed down our throats through Hollywood and social media broadcasting certain 'perfect' body types, but actually, the root of our physical idealisms comes from a far deeper place embedded in the brain.

It is a psychological fact of life, that when it comes to finding a mate, humans have primitive instincts that will undeniably emerge. For example, women will want their man to win a fight. Even if the woman herself is against physical violence, there will still be a part of her that want him to win. This is not because she wants to show off that her man is stronger, it is actually because by him winning, he is *showing her* that he is a suitable mate that will be able to physically protect her in dangerous situations. This notably is a primitive instinct, as in earlier ages, the man would have protected the family from danger while the woman would raise the children.

Why do we find symmetric faces more attractive than asymmetric faces?

The main reason for this also dates back to prehistoric instincts in humans. When choosing a mate, we will subconsciously look for signs of health in their body frame and face. The reason for us doing this is quite simple; our brains have evolved to correlate healthy faces and frames with strong genetics. We want our offspring to survive, and so even nowadays, men and women will pick out more average, measured faces from the crowds. While it is true that certain enhancement trends are also attractive, we instinctively look for more median signs of health in our partners. So, while having high-set cheekbones and a slim figure is desirable, actually having an average weight and facial build should be just as much so.



Depression

Tinka Hughes - L6th

What is it?

Depression is a mental illness that negatively effects how you feel and the way you might act. It is a common condition and can be very serious in some cases. An estimated one in 15 adults are affected in any given year, and one in six people will experience depression at some point in their life. There are a lot of symptoms of depression that will vary, from mild to severe cases. But generally, when someone who has depression will not feel themselves at times. The symptoms range from a loss of interest in pleasurable activities, changes in appetite, a loss of energy, or even extending to feeling worthless and guilty, having difficulty thinking or thoughts of suicide and death.

Factors that play a role in depression:

Someone's biochemistry and the differences in certain chemicals in the brain can lead to the symptoms.

Genetics will also influence whether someone will have depression, as it can be passed down through the family. For example, if one identical twin had it, then the other twin has a 70 per cent chance of having the illness sometime in their life.

Personality may affect it, as someone could be very pessimistic and have a very low self-esteem and therefore will be more likely to experience depression.

Finally, environmental factors, such as violence, abuse or poverty may make some people more vulnerable to this illness.

How can it be treated?

Depression is a very taboo subject that people avoid talking about. It can appear at any time, but usually can start in your late teens or mid-20's. Sometimes it can be very helpful for the person to just simply talk about it with someone, to tell them their problems and have someone there to reassure them and just listen. If people don't, this could lead to larger and more concerning causes such as suicide.

Medication is also used to reduce symptoms and increase energy levels. But do antidepressants actually work?

Most people benefit from taking antidepressants, relieving the person of the symptoms relatively quickly. Research from The Royal College of Psychiatrists estimated that 50-65% of people treated with an antidepressant will see an improvement, compared to 25-30% for those taking a placebo. Showing that it mostly does benefit people.

It can sometimes help with people to self-help and copes with it themselves, especially when they are older and can control it via methods such as regular exercise, to release endorphins, eating healthily and avoiding alcohol (which is a depressant). This mostly reduces symptoms for a lot of people, and you can see the difference in a person because of this.

Overall, depression should be talked about, and this is shown through current campaigns by many mental health charities. It is so important for people to express their emotions, so it doesn't get trapped inside and people feel like they are alone. Also, it needs to be pointed out that depression is not grief or bereavement, which is a temporary feeling of losing a loved one or a job, it is a medically given condition that is able to be diagnosed by a doctor.

Depression Quiz:

1) Which of the following is not linked to depression?

   A) Back pain

   B) Upset Stomach

   C) Kidney Stones

   D) Headache

2) Which of these symptoms is more likely for women

   A) One too many glasses of wine

   B) Wanting to stay at home instead of book club

   C) Dwelling on something that makes you feel guilty.

3) Is sadness the same as depression?

   A) Yes

   B) No

4) What is the average age that depression effects?

   A) Teenage Years

   B) Since Birth

   C) At any Time

   D) Mid-life

5) What's the best way to overcome depression?

   A) Medicine

   B) Stay with friends

   C) Councillor

   D) Exercise

Answers:

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

Eye Surgery

Benjy Bailey - L6th

The most common eye disease are all age related - as we get older the number of people affected increases. The most common eye diseases are Cataract, Glaucoma and AMD. I spent the afternoon with an ophthalmic surgeon to see how these three common eye diseases are treated. Because the eye has no immune system all the implements he used had to be sterile and the environment clean.

Cataract: With age the natural lens inside the eye can turn cloudy eventually blocking light from reaching the retina. The only solution is to remove the cloudy lens and replace it with a specially designed implant. About eight million people have this surgery every year and they tend to be elderly. The patient was awake during the procedure and it only took fifteen minutes to complete. Even though the cloudy lens was 11mm, he only used a 2.5mm incision into the eye to remove and replace the lens. I watched it all on video screen while the surgeon used a microscope to do the operation under 25 times magnification. When he opened the capsule that holds the cloudy lens, he then started breaking up the lens and sucking them up using an instrument. He then injected a new one through the same incision and the lens unfolded and expanded to 6mm to fill the pupil using the original capsule to suspend the implanted lens.

A photo that I took of a cataract surgery being performed, specifically the lens capsule being opened up.

Glaucoma: The eye has a natural pressure inside. When you have glaucoma the pressure is much higher than normal and it damages the retina at the back of the eye. To treat the problem the doctors try to lower the pressure using drugs or if this does not work they do surgery. The second operation I watched was on a patient with glaucoma.

To lower the pressure the patient had a drain inserted into the front of the eye, the anterior chamber, to allow the aqueous humor to drain out faster than normal and reduce the internal pressure. The drain had stopped working so the surgeon removed the drain and made a partial depth hole in the side of the eye – Through the white part – to drain the fluid and reduce the pressure. The sclera has a lot of blood vessels in it and the surgeon did use some tiny sutures.

AMD: This disease is called Age-war elated Macular Degeneration. The Macular is a part of the retina and in this disease it gets damaged usually because cells start to grow in that area. Ophthalmologists treat this problem by injecting drugs into the vitreous – the jelly like substance in the back of the eye – near the retina. These drugs stop the cells growing and slow down the damage.

he surgeon used a tiny needle and pushed it through the sclera and got the end of the needle close to the retina before injecting the drug. It only took a few minutes.

Genetic Modification in Human

Ben Courtney-Guy - 5th Form

Genetic modification has installed itself as one of the most prominent and controversial issues of the modern world, due to the constant pushing of mankind's technological limits in the twenty-first century. Whilst it's potential does go far and beyond almost anything else biologically, it certainly comes with a plethora of flaws, and for this reason genetic modification is certainly not without opposition.

These flaws become evident when looking from a solely ethical viewpoint. Pope Francis has spoken out against genetic modification, and went on to say, "our immense technological development has not been accompanied by a development in human responsibility, values and conscience." The Catholic leader has a clear message here- that before we, as a race, start to meddle with the very fabric of our characters- our DNA- we must refine our morals, and adhere to our conscience on the matter, to prevent the range of problems that come with a lack of said morals.

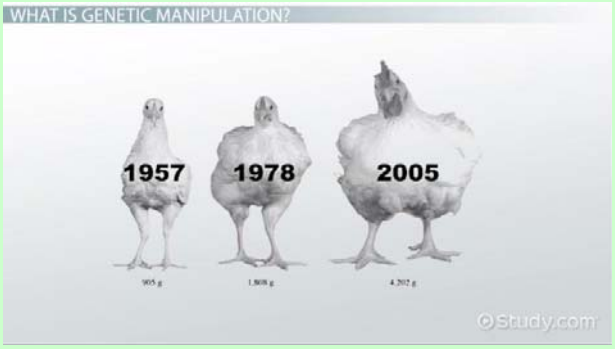
This can be boiled down to the common worry that we may start to 'play God'. Christians may ask questions about the ethics of altering people to meet our desires, and removing, in the process, God's right to do so. It is true- this is an unnatural process, and Christians certainly are correct to be sceptical based on their beliefs. This is in fact true for virtually any theistic religions, and that is more than half of the world's population.

However, as an atheist it is not this issue that provokes my scepticism- rather the ramifications that this has on the world. Referring back to Pope Francis' disapproval of genetic modification, a man who is regarded as divine and infallible by over a billion people, that is over a billion people that would, in theory, stand by his thoughts and oppose it. From here originates a concern. Even with the immense potential of this science (i.e. curing genetic defects), can we really install it into a society based on religion? It does not seem likely.

What does seem likely is the introduction of genetic engineering being poorly received by the church, it being only available in MEDC's that are more secular, and the rift between the church and the state that has become more apparent with the legalisations of things like same-sex marriage and abortion to expand further. This only has negative connotations- with an increase in religion-based conflict in western states looking probable.

This simply branches out into more issues. As religion and state move apart, the state gains more sovereignty over its ethics and morals, tied down less by the church. As mentioned before, this will likely have the effect of human modification being completely available in western states like the USA or Britain. Now, being realistic about mankind we mostly consider our needs before our conscience, and so the opportunity for people to quite literally design their own babies will be extremely popular. So, what we are left with is a western world with a designer population and a third world with nothing like this, once again, breaking the world apart.

In conclusion, I cannot help but stand with the Pope on this, despite not being religious. If we are to start reforming ourselves, we must reform our morals first- otherwise the dangers that we expose ourselves to could have no coming back from.



Superfoods-Are They Really Super

Reha Soni - L6th

In this current day and age, people are trying and consuming different diets in order to stay in shape and keep healthy. One of the different types of diet that has become very popular in the past few years has been superfood. Superfoods have become more of a trend and more and more people prefer to eat superfoods to traditional balanced diet. But are superfoods really that super?

The main examples of superfoods are blueberries, salmon and kale. Superfoods are seen to be the type of food that are nutritionally dense and so are thought to be good for ones health. It can be thought that superfoods are actually just an urban myth and that they are just invented by brands in order to market food. Large companies use labels such as superfood in order to boost sales and so that people believe that they food is healthier and better for them. The word 'super' implies that it has a magical ability to make you healthier forming the stigma that in fact it helps with you diet and body.

The idea of superfoods is that they give us the nutritious boost that we need in order to improve our immune system and body. It is thought that the idea of their nutrition content is more beneficial than any other food. However, is there enough scientific evidence for this to be believable?

Blueberries are one of the most well known superfood and scientific studies shows that it's high concentration of antioxidants make it have different health properties in comparison to other fruits. These antioxidants prevent growth of cancerous cells and protect the cells from harmful substances, which are naturally produced during metabolism. This means that the cells are able to renew themselves and that they become less likely to gain age-related diseases such as diabetes or heat-disease. Other fruits that are commonly labelled as superfoods have these properties as well.

The idea that superfoods have nutritious value is not necessarily a positive thing however, as it means that people consuming this diet are receiving more calories than required for a normal diet. This could have negative implications on a people in the long term, as it would not be attainable to keep it going for so long. At the moment scientists are researching the effects on superfood on rats and it is thought that there could be multiple different health a physiological effects of consuming them.

There is currently not enough scientific evidence on whether superfoods have such a positive impact on your body in the long run as at the moment the interest and hype about it is only fuelled by public interest. If scientists begin to do more research then in the long run then we might be able to find out more and be able to make an informed judgement over the actual benefits of changing your diet. For the moment, however, I think it is safe to say that superfoods are simply labelled by media and that the actual health benefit are not that clear at the moment.

Knuckle Cracking

Gwendy Davenport – 5th Form

We all love cracking our knuckles – in class, at home and even in exams (much to others' annoyance.) How do we do it? Is it harmful? And why is it so addicting?

Why do we crack our knuckles?

Around 35% people do it, but why!? It's all addiction. Knuckle cracking provides relief for some and may relieve stress. It's simply a habit.

What happens when you crack your knuckle?

The joints in your finger are called synovial joints. They are surrounded by synovial fluid which lubricates the joints so you can move your fingers easily on a day to day basis. The liquid is contained in a capsule and when you crack your knuckles, your finger stretches. This in turn stretches the capsule, decreasing pressure in it. The liquid has dissolved nitrogen gas in it and when stretched, a bubble of this forms and then pops, causing a very loud noise.

It takes around 20 minutes for the bubble to form again which is why you can't crack your joints more than once in a short period of time.

Is cracking knuckles harmful?

Every knuckle-cracker has heard the phrase "you know, that gives you arthritis." You stop and worry for a moment, regretting your knuckle-cracking past but it never stops you. But, is it bad!?

No study has found a direct correlation between knuckle-cracking and arthritis or any other joint issue. A doctor called Donald Unger cracked his knuckles on his left hand for 60 years, leaving his right hand alone. After this time, there was no difference and no signs of arthritis in either hand. Therefore, crack on!

Hippo Therapy

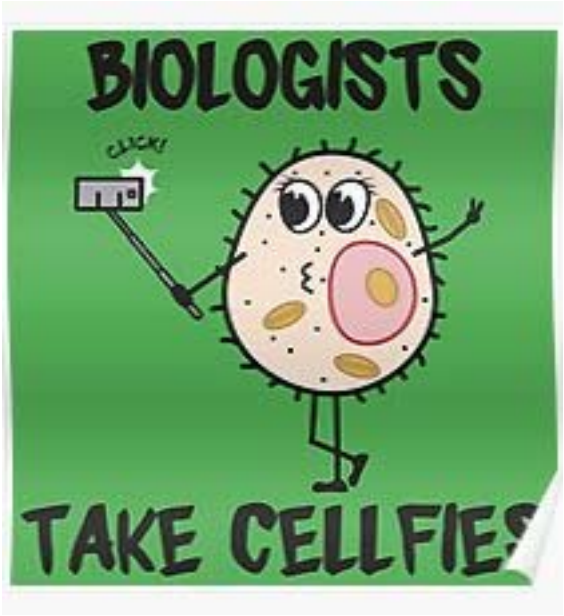
Gini Hope - 4th Form

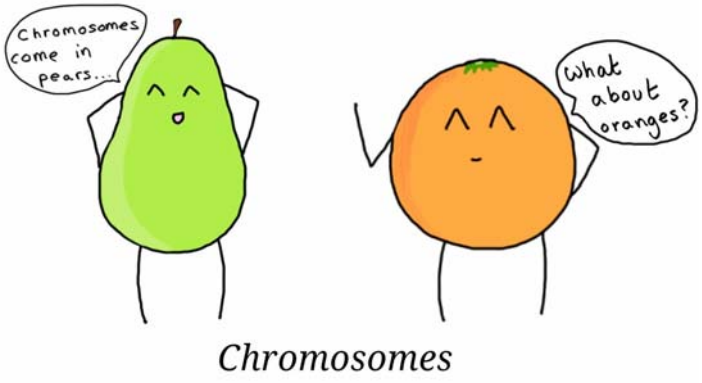
Hippo therapy is a new and exciting therapeutic treatment, which uses horse riding to help people, especially children with disabilities. “Hippos” comes from the Greek word meaning horse, therefore this kind of treatment can formally mean, therapy aided by a horse. I believe this is a modern and fascinating technique which is becoming more common especially in the US. I have decided to focus my research on how it works and helps many people.

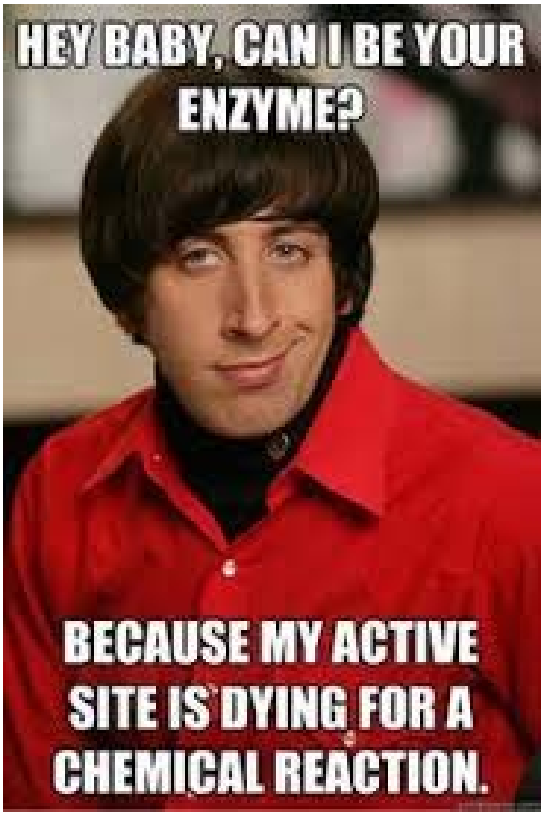
Firstly, Hippo therapy is a form of physical and speech therapy, where the therapist uses the characteristic movements of a horse to provide sensory input to achieve functional outcomes. This can also be referred to as a form of neuromuscular therapy, that can improve posture and coordination, specifically for children with disabilities. This is because of the horse’s movement which provides multidimensional movement for the rider. The rhythmic and constant movement stimulates muscles and helps to build muscle memory for the pupil of this therapy. Moreover, the horse is there to provide an active base of on-going support. This makes it easier for strengthening the child’s upper body, increasing their balance and also addressing any weight bearing.

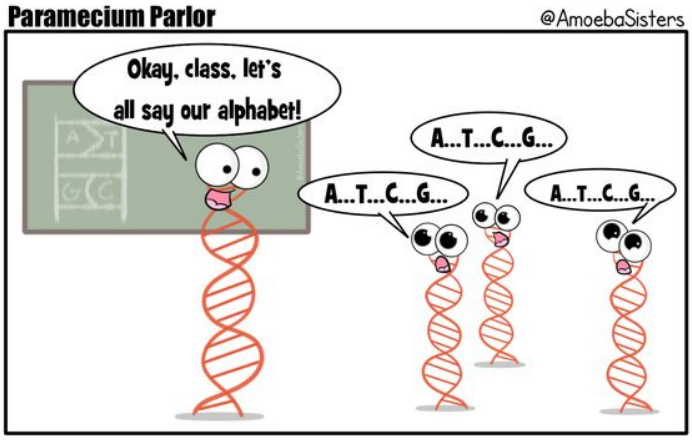
Furthermore, this form of therapy can particularly help children with any disabilities or syndromes. The horse’s movement and the ways in which the child will have to steer and do a variety exercises whilst on the horse increases their attention span and has positive effects on the child, and especially helps them during school life. In addition, this therapy can increase their overall happiness and enjoyment because it gives them a chance to engage with a different animal in a different environment, which is different to any other normal therapy clinic.

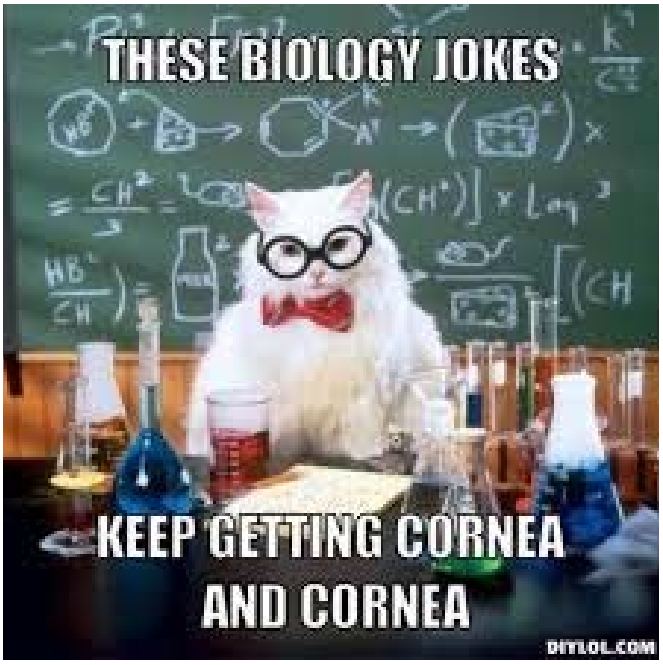
In conclusion, I believe this is an incredible technique, which uses the glorious movement of this four-legged animal to connect with the child not just physically but also increases their happiness. It has outstanding outcomes so far, and is starting to spread globally. Also it helps children with a variety of life threatening illnesses, making their lives just that much happier and smoother. This is a life changer.

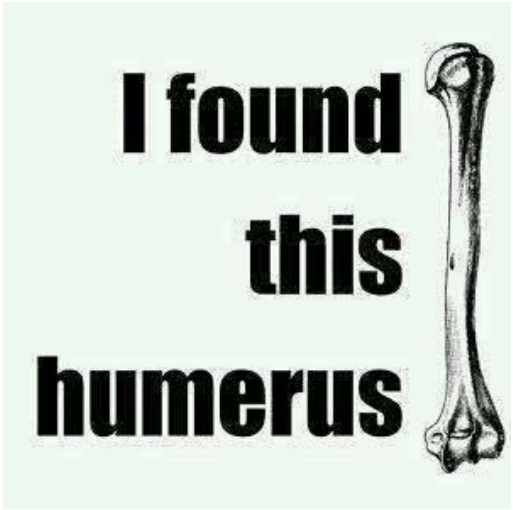












Have a great summer!!