

Wellington's science magazine

176176174SCIERCEONONTHE SCREEN



To Break the Ice... Question: What is Bacon?

Answer: Thinly sliced pork!





Not to be confused with BaCoN, the student-led science magazine. This issue aims to 'shake up' the typical structure of BaCoN, focusing more on readability and inclusion.

This includes a number of firsts, including picture pages, games and our first ever article from outside Wellington College.

We sincerely hope that you, the reader, enjoy this edition of BaCoN.

— The BaCoN team





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For any future submissions, email baconmagazine@wellingtoncollege.org.uk

Medicine and Television

by Kapee T. (Trainee Doctor)

ictional medical television programs have long been an essential part of television programming, and they remain popular until today. City hospital was the first medical show to be aired. Since the success of the show Dr Kildare in the 1960s, the medical drama has been one of television's most popular genres, but how accurate are these in reflecting the medical profession. Medical dramas since then seem to have dispensed with realism, embracing ever-wilder and dramatized storylines. Despite Medical dramas often using medical advisors who help the writers to stay as medically accurate as possible.

Medical literature portrayed in these programs use a span of unusual case studies that do not need to be fictionalised for entertainment purposes, reviewing cases with practicing doctors or nurses will bring an abundance of realistic entertaining stories fit for any medical drama.

While some aspects of the shows are plausible, due to the need to compress a full story line into an hours episode, the reality is blood tests can take hours and scheduling non-urgent CT scans take several days and not mere minutes as portrayed.



Due to the success of ER, it paved the way for medical schools in United States where students were shown effective patient interaction and reviewed certain cases.

Medical shows have had immense impact on not only health care providers, but the perception of patients. Recent study showed viewing fictional medical television programs had a negative influence on viewers' health-related knowledge, expectation, perceptions and/or behaviour.

As an example the show House has contributed to some misconceptions; we can see in an episode where Dr House performs gastroscopy which is generally done by a Gastroenterologist and on the following episode he does a brain biopsy which are done by highly skilled and specifically trained Neurosurgeons. Despite the unrealistic depiction of the doctors who part take in all procedures, Dr House's duties go beyond the hospital and expand to breaking into patient homes solving mysteries. This does not only show an unlikely representation of the medical profession but crosses borders of illegal activities both for patient care and society.

An article on BBC reported 'A team of medical researchers recently watched 271 episodes of primetime hospital drama and observed more than 1,000 individual examples of unprofessional behaviour'.



The most unrealistic of these the is the cardio-pulmonary resuscitations; 40% of patients who receive CPR in a hospital survive, however only 20% survive long enough to be discharged. Only in medical dramas can you see a patient walk out of the hospital on the same day following successful CPR. Even if the CPR is successful- a patient needs to be monitored and a cause needs to be identified. In medical dramas 75% of people who receive CPR are alive immediately afterwards and discharged within the same day.

During the peak of the COVID pandemic-fully operational ventilators from the Holby City set arrived at the new Nightingale Hospital. It was cheaper for the show producers to purchase a fully functional ventilators than to create a model. Another example of the extent to which these producers will go in order to make it more realistic is shown in the program Call the midwife, which spent £5000 per prosthetic baby.



Although the current medical dramas are getting more realistic, like any other dramas exaggeration is inevitable in order to clasp the attention of viewers. However, it is the responsibility of the viewers to recognise that the aim of the medical dramas is for entertainment purposes and should not overlook the logic and dramatization. While medical students can pick up on certain aspects of the show, students should be prepared for years of dedication and hard work to become a successful medical professional. Diagnosis should be made from patient interaction, biopsy performed by the dedicated expert but breaking into patients homes only result in prison sentence; should be noted by Dr House!

BaCoN Summer 2022

Dear BaCoN enthusiast...

This is the first ever BaCoN 'quickfire page'. In an effort to receive more input from outside the BaCoN team and improve readability, we decided to include some shorter articles alongside the longer ones. These articles don't have to adhere to the

Photoelectric Effect:

Continuous light hits onto electrons, but they don't budge and get knocked out of their atoms, why is that the case?

It turns out that no matter the length of time the electron is under light (or photons) for, the light has to meet a specific threshold frequency in order to ionise electrons.

This effect could not be explained by the wave nature of light, thus when Einstein suggested the wave-particle duality nature of light, all the pieces came together. This is because light rays falling below the necessary frequency, also the necessary energy (Energy = Planck's constant x frequency) would not be able to be ionised out of the energy levels of atoms no matter the length of time. The idea is that the electron instantaneously absorbs and emits the photon and therefore a singular electron would need the necessary energy instead of cumulative amounts of energy of multiple sources. This concept would not work with light being a wave due to the continuous energy transfer of wave not allowing time for the electron to reemit photons.

- Rain (M)



'main theme' of the issue. The picture should have a short explanation. Anywhere from 50-200 words will do! Submissions are open at all times. Simply send your image alongside your caption to: baconmagazine@wellingtoncollege.org.uk.



Location: Winton, Queensland. Photographer: Mr Evans

In the photo above, there are four large footprints .These footprints likely belonged to a large carnivorous dinosaur, a therapod named Tyrannosauropus. The footprints are around half a metre long. This large dinosaur seems to have disturbed a group of over a hundred *coelurosaurs* (two-legged turkey-like dinosaurs) called Skartopus and the larger emu-like Wintonopus. There are therefore footprints from three different species preserved here, and it is currently the only example of a dinosaur stampede in the world. The footprints were preserved by rising water levels which covered these tracks with sandy sediment before the mud had dried. This sandy sediment eventually formed rock, preserving the footprints until they were discovered by a local farmer in the 1960s. Even though the stampede likely lasted no longer than four minutes. we can still see evidence of this 95 million years later. This supposedly inspired Steven Spielberg's famous stampede scene in 1993's Jurassic Park.

- Mr Evans, Deputy Head (Academic)

Quickfire Page

Pangolins

Pangolins are solitary creatures that are native to Southeast Asia and Sub-Saharan Africa. These anteaters are the only mammals that are completely covered in scales. When under threat, the pangolin rolls into a ball and is protected by their scales.

In traditional Chinese and Vietnamese medicine their scales are used to 'treat' cancer, alongside other ailments. Their scales are made of keratin, also found in hair and the horn of a rhino. In 2017. Chinese officials confiscated more than 13 tonnes of pangolin scales (~30,000 pangolins). This was one of the largest seizures on record. They are also sold for their meat, with some estimating that all eight species could be extinct within a decade. It is estimated that 100,000 pangolins are smuggled every year into Southeast Asia to form part of the illegal wild-life trade. The UN estimate it could be worth up to 23 billion dollars annually, making it the fourth most lucrative industry after narcotics, human trafficking and arms dealing. The trade of pangolin species has since been banned.

This photo was taken by Brent Stirton and won first place at the Sony World Photography Awards in 2020.

- Mrs Edmunds, Head of Biology





Blue Morpho Butterfly Wing-Nipam Patel

Colour blue

When you look up at the sky, all you can see is blue. It envelopes our whole globe, yet naturally, blue pigments are very rare. Most blue things in nature aren't actually blue. From birds and butterflies, to blueberries— these are not truly blue. So what is it that makes it appear blue? This is nature solving biological problems with engineering.

First of all, what are pigments? These are chemicals produced by organisms resulting in selective colour absorption. A human can see light in the visible part of the spectrum from the 400nm region to 750nm region. However, in the the example of most butterflies and birds. there is no chemical to selectively absorb certain wavelengths. The things that blue are the makes it microscopic structures. The blue morpho butterfly's wings are made up of tiny scales. Within these scales are microscopic ridges with branched structures similar to that of a Christmas tree. Each wavelength of light will reflect off a certain branch at different part of the structure. These light phases out and are not seen by the eye. However, blue light has the perfect wavelength, being reflected. We then perceive the colour of these wings as blue. From a different angle, the colour and shading of the wings of these morpho butterflies will appear slightly differently.-Deuce, OW (T)

Ozone: the Double-Edged Molecule

By Patrick (Easthampstead Park School)

zone is a molecule that is both a threat and a saviour. A molecule that can cause widespread damage and at the same time make life on Earth possible. It just depends on where it is. Most people have heard of ozone at some point, but what actually is it and how does it help and hinder the Earth?



Ozone is a simple molecule with the molecular formula O_3 . It consists of three oxygen atoms arranged in a bent shape with a bond angle of around 117°.

Two types of ozone exist on Earth: stratospheric, which makes up the ozone layer, and ground-level, found on the Earth's surface. Most people's experience of ozone will be through talk of the ozone layer - whether that be at home, on the news, or in popular culture. The ozone layer protects us from harmful ultraviolet (UV) radiation from the sun. This crucial property of the ozone layer is due to the formation and destruction of stratospheric ozone which makes up the ozone layer.

High energy UV rays from the sun are absorbed by O_2 molecules in the stratosphere. This breaks the covalent bond and leaves two O atoms. These molecules collide with other O_2 molecules to form O_3 (ozone). A similar process happens when ozone is destroyed: the UV rays split an O_3 molecule into an O_2 molecule and an O atom. The O atom then collides with another ozone molecule to form two O_2 molecules. This creates a constant cycle of ozone formation and destruction which absorbs a lot of the UV radiation that would otherwise hit the Earth's surface and cause increased levels of cancer and global death of organisms. Life practically relies on ozone.



Ozone

The cycle of stratospheric ozone formation/destruction is very delicately balanced. It is extremely vulnerable to human activities, as has already happened. In the 1970s a hole in the ozone layer was first discovered, a worrying find that warranted further research. It was found that chemicals called CFCs (chlorofluorocarbons) were mainly to blame. They accelerate the destruction of the ozone layer through the release of chlorine radicals when they absorb UV radiation. Radicals are atoms, ions and molecules with at least one unpaired electron on their outer shell. Chlorine radicals in this instance act as a catalyst for the destruction of ozone in the ozone laver. This causes the balance to shift, which results in the depletion of the ozone layer. Holes in the layer also form. like the one that forms over Antarctica every year, as seen right.



The Montreal Protocol, a treaty adopted in 1987, aimed to reduce the use of and ultimately phase out CFCs. After this date, virtually all use of these chemicals was stopped. Since then, scientists have noticed the ozone layer repairing itself year on year. However, the global threat of climate change threatens the recovery of the ozone layer for future generations. So while the ozone layer is a shield to Earth against harmful UV radiation from the sun, it is vulnerable and must be protected.

Whilst ozone in the stratosphere is vital to life on Earth, it can be very toxic when at the surface level. Ground-level ozone, as this is known, has harmful effects on agriculture and human health. Ground-level ozone is formed when nitrogen oxides from fuel combustion and volatile organic compounds from paint and solvent manufacturing react with UV light. Therefore there are higher concentrations of ground-level ozone in more urban areas than in rural ones. Ozone has many negative impacts on plant and animal health. In humans, it can cause and worsen many respiratory conditions such as bronchitis, emphysema and asthma. Consequently, ground-level ozone is a major pollutant for the environment.

Particularly vulnerable are crops used in agriculture, especially wheat, rice and maize. Ozone damages and kills these plants, like other plants, by diffusing into their leaves and creating reactive oxygen species which break down membranes and tissues used in gas exchange and sugar production. East Asia is currently experiencing a problem with ground-level ozone pollution affecting crop yields.



World governments must aim to reduce ground-level ozone pollution when discussing their responses to the climate emergency or major food sources for an ever-increasing global population will be put at risk. So ozone on Earth is a double-edged sword. Up high it is a molecule that protects life. Down low it damages and destroys.

Putting the "Sci" in Sci-fi

By Adam (Bn)

he concept of space is not unfamiliar to the big screen. Blockbusters such as "Interstellar", "Gravity" and "Star Wars" fit this theme. While each film is rated highly among reviewers, not all of them are rated highly among astronomers. In this article, I will explore the ups and downs of "movie science" with a specific focus on space. Oh, **spoiler alert.**

First up – Star Wars. This movie tends to be inconsistent with science. The first, and arguably most obvious, mistake was made by the sound team. No matter how huge the explosion, sound cannot travel in space. Sound is made by the oscillation of particles in a medium (air, oil, lead, etc.). The closer the particles in the material are packed, the better sound travels. Space is not tightly packed at all, hence the name. However, not only should explosions not make any noise in space, but they should not be able to happen at all. There is not much oxygen in space, again, hence the name.



Next up – Interstellar. Unlike Star Wars, this movie is based almost entirely in space. The movie follows the journey of Professor Brand and his crew, and their mission to find a new, habitable planet. This mission needs to be completed quickly; this requires faster-than-light travel. The method of choice? Wormholes.

The concept of a wormhole is when two points of space-time are contorted to come close enough together to form a wormhole. This creates a hyperspatial 'shortcut', meaning a journey that would usually take millions of years at light speed takes no more than a few seconds, depending on how close the two points in spacetime are to each other. The question – do they exist? The answer – we will probably never know. The problem with a wormhole is that they would be very hard to detect. If wormholes look like regular spacetime, the only way we would find one is by accidentally falling into one.

On the other hand, if wormholes are beyond the event horizon (black part) of a black hole, the only way to discover whether the black hole is a wormhole is by entering it. However, once passing the event horizon of a black hole, nothing can escape. Regardless of if this black hole is a wormhole or not.

Space on TV

Interstellar also touches on the idea of general relativity. First theorised by Albert Einstein, this theory states that time travels slower for an observer in а larger gravitational field. When exploring a planet orbiting a black hole, Brand and the crew are in the presence of a very large gravitational field. This should mean that the crew age slower than anybody on earth. Interstellar got this spot on, as when Brand returns from this planet, he realises that he has aged much faster than others back at home. Fun fact the 'ticking' noise in the background of the "Tick-Tock" soundtrack represents a whole day passing on earth. Scary.



Last, and certainly least, Gravity. A satellite orbiting earth is hit with a missile. Debris everywhere. This debris crashes into other things in orbit, causing more debris to be generated. This snowballs until a cloud of debris orbits earth, wrecking anything in its path. Let's start with the things they did get right, despite being few and far between. The idea of the "Kessler Syndrome" is noting new. Since humanity started putting things in orbit, scientists have worried about what happens when we run out of space (literally).



Now, onto the things they got wrong. In the movie, they claim that the debris cloud orbits once every 90 minutes, meaning that the debris will hit them every 90 minutes. The issue? Clooney, Bullock, and the ISS are also orbiting once every 90 minutes, meaning that the debris should not reappear every 90 minutes. It would also be unlikely that they even see the debris, given the sheer size of space. This brings me onto my next point. Space. Is. Huge. There is no way that George Clooney could've transferred between space stations with nothing but a jetpack. Even if the jetpack has enough fuel, the amount of calculation required to intercept the orbit of another space station is hardly mental maths.

In conclusion, space is hard to understand. This, however, is what allows Hollywood to change the rules for dramatic effect, without drawing attention away from the movie. Nobody bats an eye when the space shuttle launches upside-down, or when the sun is the wrong colour. So, as you go on to watch space or sci-fi movies in the future, challenge some of the science – and who knows? You may just ruin the movie for yourself.

Across

- 1 The basis of all life (3)
- 4 Confirmed, Plausible, Busted! (11)
- 5 Black + White Based in Seattle Washington A&E (11)
- 7 Zimbardo's study (10)
- 8 West African Virus 2014 (5)
- 9 Nasa's _____ Programme 1981-2011 (12)
- 11 Monster maker (12)
- 13 A neutral compound used to season food (Chemical Symbol) (4)



Down

- 1 The job of helping humans (6)
- 2 The vegetable inspired cloud formed by an explosion (8)
- 3 The part of a plant cell that contains the green pigment (12)
- 4 Walter White's blue crystals (C10H15N) (4)
- 6 Pioneering Female Scientist who won 2 Nobel Prizes (Found Radium) (10)
- 10 Icon of a Queen song (8)
- 12 Scientist, hit by a fruit (6)

Meet the Editors

Cyrano

Sufficient = Insufficient

Under the trance of pensive ponder, Cyrano contemplated upon his purpose in life. In which direction should he navigate? Which pathway should he pave? Which unbeaten track should he exploit?

nd then he was born. After 2005 years since the birth of the previous messiah, the earth was graced with the presence of the charismatic character Cyrano, otherwise, as known by his companions, CJ. Born in Chelsea-upon-Thames, Cyrano has been known as a *'ladies man'*



since his birth, by virtue of his stunning good-looks and scintillating charm. Voted as 'Baby Universe', a cousin show of 'Miss Universe', Cyrano was destined for a life on the model runway, however he chose a different path in life.



A keen feminist, he took interest in global studies from a voung age studying politics. socioeconomics. and environmental science; suckling at the teat of knowledge, until he was ripe enough to partake in co-editing recent BaCoN editions. 'Looking good is cool and all, but yo, there's more important things in life. You feel me?' - said Cyrano in an interview dating from 2017. CJ has taken academia very seriously with his fundamental scholarly inspiration being the late great Isaac Newton. He takes general daily inspiration from ex-cricketer Ian Botham as he believes in a 'No Nonsense' practice of mentality. In an interview in 2018, regarding Botham, Cyrano uttered, 'Beefy's always been an inspiration, for real. Since day one! His 'Rock and Roll' vibes and 'No Nonsense' mentality has inspired me to work hard, all whilst maintaining my swagger.'.

Cyrano broke up with long-term girlfriend Marissa in 2020,

after two months of arduous dating. He has since taken a break from dating to 'work on himself' and he has wholeheartedly immersed himself into charity work. In an interview with Paula Stevens following the heart shattering break-up of the couple, CJ quotes: 'Marissa was the love of my life, but heyo, I guess the stars weren't aligned. No more women for me, only orphans and malnourished children.'.- Said Cyrano in reference to his charity work. This meandering lifestyle brings us to today, where Cyrano has published the Summer 2022 edition of BaCoN science magazine.

Meet the Editors



Jonti The Man Behind the Mountain.

Jonathan mused as he finished another submission, his work was approaching completion. He let out a wry smile. The cloud of fog began to lift from his mind...

An accomplished academic and fashion enthusiast, Jonti enjoys time outside often going on long walks through undulating rolling pastures and meadows. In his smidgens of precious free time on the weekend Jonti enjoys river fly fishing and can

often be found wading in a babbling brook somewhere in the Chilterns. Currently, Jonti has turned his hand to editing and journalism working on the copy of the most recent BaCoN article. With dashing good looks, only matched by his superior intelligence, one must simply ask:

But how did he become the esteemed scientific academic we know and love today?

He was born in a quaint town in the northern regions of Scotland. When asked about his place of birth he stated, 'culture was always key to me as a young nipper, as anyone with my diverse African and Celtic heritage would agree. From when I learnt to read around the age of 3, I found poetry a wonderful tool to catalyse the expression of character if you will'. He spent many a starry night a top of a verdant heath debating life's scepticisms. After reaching the brink of manhood, he bivouacked across the continent until



he reached his distant fatherland of Northern Matabeleland which he tenderly refers to as 'daal van die sterrehemel' or 'land of the starry skies'. On his arrival it is recorded the 'heavens opened' and the 'drought ended'. He spent years there beginning to live of 'the fat o' the land' and perfecting his poetry and writing his first ecological paper: 'Aardvarks: Nosy Friend or Nosy Nemesis? – Life in the Underbrush'.

As a young adult, Jonti moved to the urban jungle 'hustle' of Londinium. After turning his hand at trading in the city (rather successfully I may add) he began to turn heads in the poetry world becoming unparalleled in his poetic expertise.

After refusing many a tenure in various sciences at renowned universities, he reinitiated his love for the sciences after noteworthy education he became a freelance high-level speaker and tutor to great professors namely of which (David Baltimore and Neil deGrasse Tyson).

His most recent venture of course joining the team here at BaCoN, we hope he can definitively call this home and enlighten our charming readers with even just a morsel of his far-reaching intelligence.

Meet the Editors

Adam

The Father of BaCoN.

"Man cannot discover new oceans unless he has the courage to lose sight of the

shore." - Is a quote that a young,

naïve, and adventurous Adam aspired to live by. The "new oceans" in his case were a brand-new BaCoN editors' team and new writers. This short prose describes his tumultuous journey of uncovering the hidden gems that make up this edition of BaCoN.



But first, a short background.

Adam can often be found indulging in one of his many pastimes, including finger painting, habitat restoration, and yoga. Adam takes pride in his aligned chakras, giving him a go-with-the-flow attitude and "chill vibes". However! Do not be fooled by his easy-going aura, as he is no stranger to hard work and commitment.

To fully understand the BaCoN story, we need to go back to the beginning. The very beginning. He was brought up just outside of Reading in a small town called Pangbourne. Here, he would spend his childhood frolicking in the fields and woods. As he lived no more than a short walk away from the Thames, he would often splash around in the river. Here, he discovered that he was able to non-verbally communicate with the local geese.

During his teenage years, Adam learnt crucial survival skills, such as making drinking water, building shelter, and hunting. Then, with nothing but the clothes on his back and the knowledge in his head, he left his childhood home in the middle of the night, leaving a note saying, "I hope I'll make you proud, mum". This was the beginning of Adam's journey to BaCoN.

From here on, Adam set out to build his dream, to challenge fate, knowing full well that he may not succeed. He knew he had to build a team to support him and his ambitions. After 3 years of searching with no luck, he met two incredible chaps with similar dreams to his. This would later become the team of Jonti, Cyrano, and Adam, responsible for the management and editing of BaCoN.

Since gaining the title of "Editor", Adam urges his readers to explore beyond their comfort zone, without fear of failure.







The BaCoN team

This issue was made by submissions from:

Kapee Rain Mr Evans Mrs Edmunds Deuce Patrick

And Editors: Cyrano Jonti Adam