



# OVER *REACTING*

Featuring...

**The Life of  
Women in  
STEM**

**A New  
Pandemic:  
Pet Obesity**

**A-Z of Foods**

**Facts You  
Didn't Know  
You Needed**

**Film Review:  
Radioactive**

**Issue 2 - Copper sulfate**

# Editorial

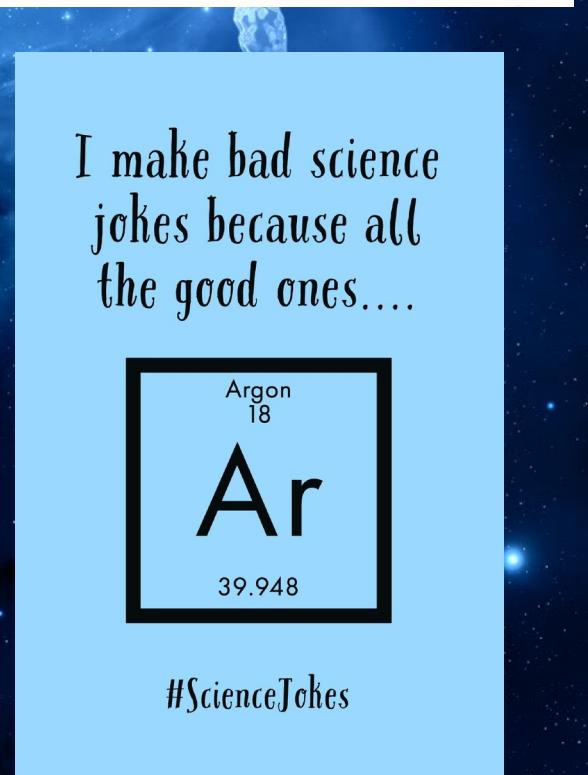
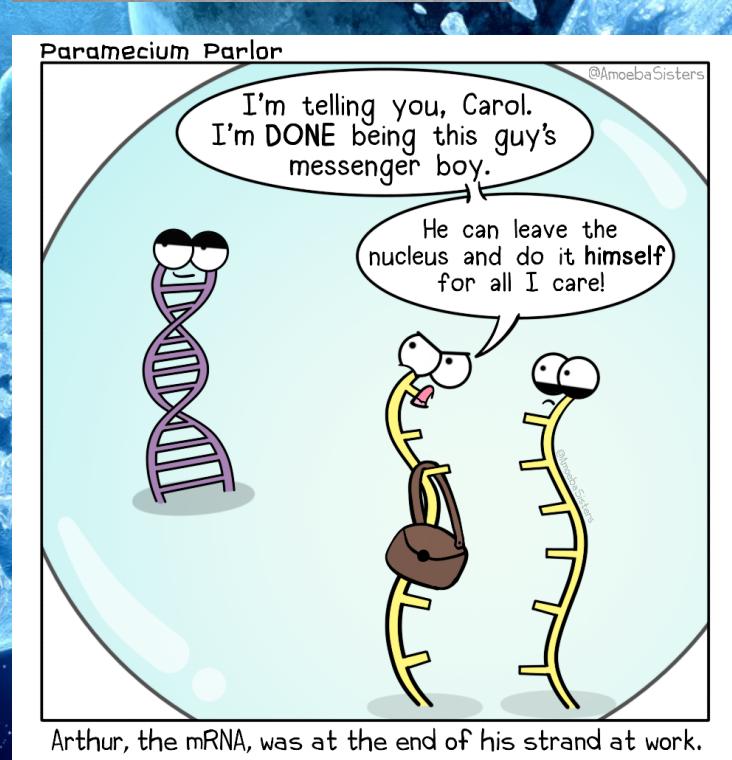
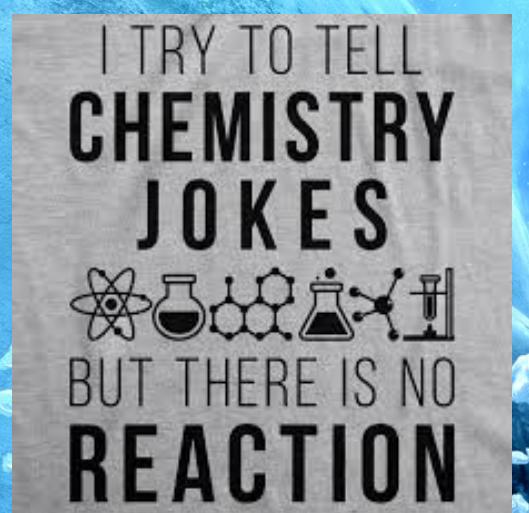
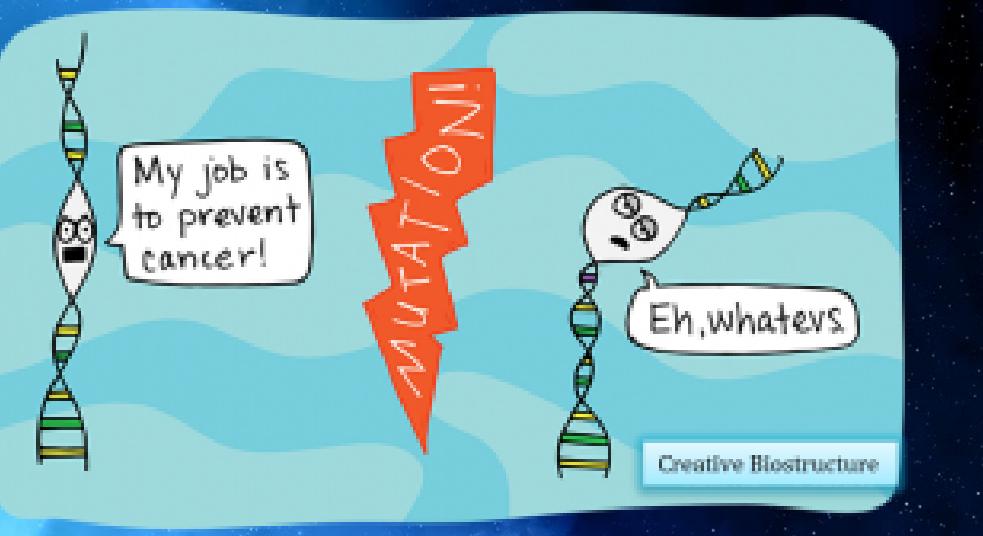
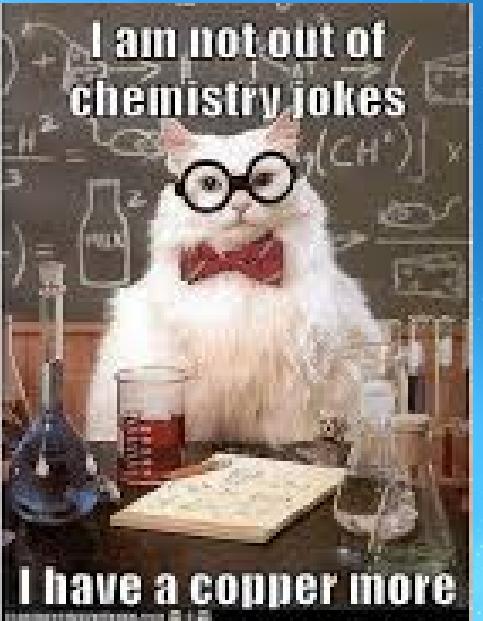
Welcome to our second issue of the Over Reacting magazine! This issue includes new scientific discoveries and fun experiments you can do at home, like rock candy and lava lamps. Additionally, we have exclusive interviews with a dentist and a sports physiologist from the University of Northampton.

## THE TEAM

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# Five FUN FACTS ABOUT COPPER!

1. Copper is an essential element for human nutrition. The mineral is critical for blood cell formation and is found in many foods and most water supplies. Foods high in copper include leafy greens, grains, potatoes, and beans. Excess copper can cause jaundice, anemia, and diarrhoea (which may be blue!)
2. Copper is a natural antibacterial agent. It is common to use this antibacterial agent for brass doors handles in public buildings (brass being a copper alloy) because they help prevent disease transmission. The metal is also toxic to invertebrates, so it is used on ship hulls to prevent the attachment of mussels and barnacles. It is also used to control algae.
3. Copper is used to make rose gold. Rose gold is a mixture of yellow gold, copper and silver. The copper gives it a redder colour than yellow gold naturally has. The silver helps to tone down the redness of the copper, achieving a subtle pink shade.
4. New York's Statue of Liberty is made of more than 80 tonnes of copper from Norway's Visnes Copper Mines. It was made by French artisans and it withstood the journey from France to America and resisted the salty sea air. The natural, green patina has protected it from corrosion since 1886.
5. A firework's colour depends on its ingredients, and copper contributes blues. By introducing chemicals and metals ground into tiny particles, different colours can be created for a fireworks display. When the firework explodes, the metal particles start oxidising, which creates the heat needed to excite the particles so they emit light and colour.



# **DR MAIRI MULVENNA**

## **LECTURER IN SPORT PSYCHOLOGY**



The University of Northampton offers a variety of different courses to choose from if you are interested in a STEM career. If you would like to undertake a psychology course in the future or consider lecturing in a STEM subject, this interview we conducted with Dr Mulvenna would benefit you.

### **What prompted you to choose sports psychology as a career?**

I've been immersed in sports since I was a little girl and so, it was going to be a natural career path for me to pursue in some format. I started off studying my undergraduate degree in Sport & Exercise Science (at St Mary's University, Twickenham) to keep my options relatively broad for a career in sport. However, throughout those three years, I developed a passion for the sport psychology modules and content that we covered. I was fascinated by the integral role the athlete's mind can play towards influencing their physical performance and general sense of well-being, and to this day, I can still confidently say, I feel the same way. I stayed on at St Mary's after my undergraduate to study for an MSc in Applied Sport Psychology, before undertaking my Doctorate studies (PhD) at Coventry University where I refined my area of research expertise, examining athlete motivation, well-being and performance in sport. This allowed me to achieve my dream job role of 'Lecturer in Sport Psychology' where I currently work at University of Northampton.

### **What do you think the future of your field holds?**

It is difficult to predict what will come in the years that lay ahead for

our field of sport psychology. There is no doubt there will be continued developments, changes, challenges, advanced specialisms, ground-breaking research, and much more, but my hope is for sustained recognition for the important role the psychology of an athletes functioning contributes to their overall physical performance. There are some podcasts on this very subject that you can check out to hear the thoughts of field experts and I will happily provide some direction on this for you if desired.

### **What A-levels did you do?**

The A-Level subjects I studied were PE, Biology, & IT.

### **What skills are required in your position?**

There are many skills required for the job of a Lecturer but some of the most important ones include:

- Professionalism, preparedness and confidence in teaching delivery, in seminar, workshop and supervisory contexts.
- Expertise in using digital devices, applications and services for teaching.
- Ability to work collegiately as part of a team.
- Excellent communication skills.
- Ability to show empathy, understanding, rise to challenge and strong collaboration skills.
- Research active and publications portfolio (if on a teaching and research contract).

### **What do you do on a typical day?**

A normal day during the academic year (and under normal circumstances pre Covid-19) would involve a morning arrival at the University of Northampton's Waterside Campus (approximately 8am) followed by a day full of teaching, student and staff meetings, possibly marking depending on the time of year, playing email-catch-up and

other administrative responsibilities. It is a busy job, so colleagues & I always try to make time to switch-off for short periods when we can to catch some lunch, a cup of tea, or get active by taking a walk around our beautiful campus.

### **What sort of athletes do you work with (ability wise or type of sport?)**

In order to work with athletes in the role of a sport psychologist, there is some additional training and qualifications required to pursue a career in this field. I have not done this yet, but it is something I am hoping to do in the future, when I have some more time. Registered sport psychologists can work with all athletes, from varying sporting backgrounds, abilities and ages. Through the sport psychology modules at University of Northampton, we love to give students hands-on experience of what it is like to work in the role, and so often assessments are tailored to reflect this (e.g., applied case studies), as well as inviting field practitioners to come in and deliver guest sessions to our students – it all contributes to an exciting & excellent student experience.

### **What advice would you give to students who would like to pursue a career in sport psychology?**

Go for it! If you are thinking about pursuing a career in sport psychology, I would advise you to start preparing yourself for the job early - broaden your understanding of the field by engaging with reading (research articles, text book chapters, blogs), watch videos or documentaries on the subject (there are some great resources on YouTube for example), listen to podcasts, assist with research opportunities, volunteer coaching, attend workshops or conferences if possible, and aim to communicate with current sport psychology experts (academics or applied practitioners). Professional social media platforms (e.g., Twitter, LinkedIn) provide excellent opportunities to network, keep up-to-date with the latest developments within the field of sport psychology (research & events) and importantly, get your name

out there – you never know what doors it may open or avenues it may create for the future. During your studies, be sure to apply yourself to lectures, workshops, seminars, assessments & the extra work required outside of your face-to-face contact with staff, but also remember you are a human being too, so find time to ‘switch-off’ and engage with activities you truly enjoy – a hobby, spending time with family and friends, exercise - always remember your studies and career are part of your life, not your whole life, so be sure to strike the balance right and not let it consume you (sometimes easier said than done!).

### **How big of a role does mental health play in an athlete's performance?**

Athlete mental health is rapidly receiving increased attention in the sports-based literature and applied fields (e.g., with sport psychologists, the sport medicine community). While participation in sport has the potential to yield wide-ranging benefits (physically, psychologically, socially, emotionally), the very nature of competition can provoke, augment or expose psychological issues in, and extreme challenges for, athletes. Specialised training is required of applied practitioners to deal with the mental health disorders that can present themselves in athletes (e.g., eating disorders, depression and suicide, anxiety and stress, overtraining, sleep disorders and attention-deficit). It is important to recognise that, whilst some aspects of an individual's psychological functioning (e.g., certain personality traits) can aid in athletic success, these same traits can also be associated with mental health disorders and as such, this can be a complex scenario for all involved. However, with the professional support of specialist practitioners, athletes can be equipped with a set of coping tools that enables them to flourish in both their personal and sporting lives.

### **Would you say that more male or female athletes suffer from stress and anxiety?**

Experiences of stress and anxiety, just like many other sport psychology constructs, are not exclusive to male or female athletes.

Everyone's experience is individualised and whilst there may be similarities in certain cases, a sport psychologist will always treat each client with a tailored approach, seeking to identify and implement a specific intervention (consisting of a set of techniques) that will help the athlete best manage and control these experiences, so they do not have a detrimental impact on performance. That being said, there exists research to support that typically, females tend to report higher and/or more frequent anxiety experiences in sport.

### **Do you find that in athletes, performance anxiety is common and what do you normally recommend to overcome it?**

Performance (or competitive) anxiety is a very common experience for athletes. No matter the age, gender, skill level, competition (the list goes on), it would be rare to find an athlete that hasn't felt anxious at some stage of their sporting career. But these feelings of anxiety are not necessarily a negative thing, in fact, theory and research tells us anxiety experiences can be beneficial for performance, so long as the athlete can view them in a positive and adaptive way and can control them at a level which will allow them to reach their optimal or peak performance. There are many different sport psychology techniques athletes can use to help them control their anxiety – some of the most common include relaxation strategies (such as mindfulness or progressive muscular relaxation), self-talk, and imagery.

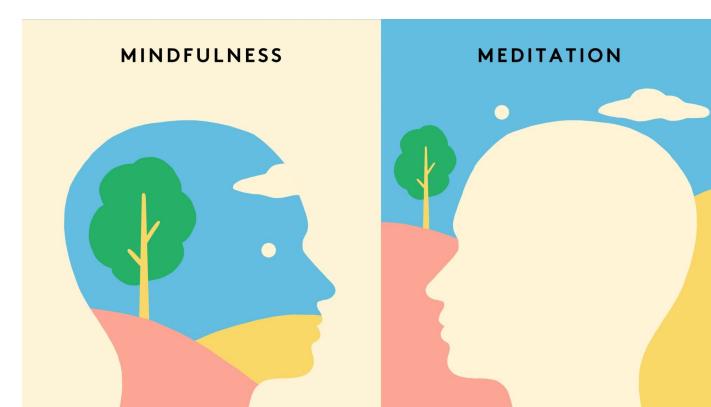
### **Do you believe that controlling or supportive coaches help to develop an athlete's abilities in the long run?**

Coaches should always seek to be supportive in their role when interacting with athletes (and the wider sporting community), not just in terms of their leadership style, but also in the environment they create (at training or competition for example). I examined exactly this in my PhD research and found that although some coaches may believe that controlling strategies are necessary to maximise results (i.e., on occasions, it may seem that controlling contexts, or certain elements involved within a controlling environment, appear to be adaptive in that

they evoke desired behaviours and achievement patterns), they must be aware these short-term benefits come with long-term costs. This includes eventually hindering athletes' development of intrinsic motivation, capacity to self-regulate, and overall optimal functioning or sense of well-being. When athletes are encouraged to pursue their goals in a supportive environment led by the coach, enhanced performance will result.

### **What are your favourite and least favourite aspects of your job?**

Without a doubt, developing a special relationship with my students across all years of study and watching how they grow & develop as individuals, as academics, and as professionals. To be part of that journey and contribute to their progression from when they join us at Level 4 to start their studies, through to the completion of their undergraduate degree is very special and rewarding. There is nothing I don't enjoy about my job, I can honestly say I feel very blessed to be working within my dream career role, but that doesn't mean it is easy, or comes without challenge. There are certainly some testing times throughout the year but with the support network of a fantastic group of colleagues around you, it makes it that little bit more manageable to cope with.



# How COVID-19 is Contributing to the Pet Obesity Pandemic

By Serena Keenlyside (6F1)

The word 'coronavirus' is something that everyone has become familiar with this past year, which is understandably why it was the second most searched word in 2020. The global pandemic is still very much present and is still affecting the economy, small and large businesses, relationships and mental health. It's almost impossible not to think about how consequential coronavirus has been for us all. In this challenging time, it seems that we are focused on our lives more than ever before, but have we ever stopped to think about another evolving pandemic? Pet obesity.

Obesity is defined as the 'abnormal or excessive fat accumulation that presents a risk to health'. The BMI (body mass index) of a human or animal indicates the severity of obesity. Having a BMI over 30 is considered obese, compared to a healthy BMI of 18.5-24.9. Animal obesity has always been present, there's no question about that, however, in my opinion the topic of obesity should be explored fairly due to the several factors that can influence this. The likelihood of obesity varies between species and different breeds, for instance, dogs. The average pet owner may have no idea that different breeds and neutered dogs have a higher risk of obesity compared to others. Another significant factor to be

considered at risk of obesity is age. There is a positive correlation between increasing age and obesity risk. This linkage to obesity and age is highlighted also in the sex of dogs. Apart from older age in dogs, it is also reported that obesity in female dogs is much more likely than in males. Despite this, the role of the pet owner during Covid-19 has significantly affected the rate of obesity in pets.

Many studies highlight that coronavirus and the role of a pet owner seem to be the real culprits in the evolving pet obesity issue. In a recent survey, Hill's Pet Nutrition disclosed that coronavirus had undoubtedly escalated this. It was stated by veterinarians that over 71% of pet professionals say that the pandemic has influenced the manner of how pets eat. In addition to this, with an estimated 60% of people working from their homes in 2020, it is obvious that those with pets will be spending more time with them than in their pre-covid lives. The combination of staying at home along with treats, has consequently led to a new term. 'Treat love' shines light upon treats being given as a form of love which, you guessed it, results in overfeeding. A pet owner's role is to take sole responsibility over their furry companions, whether that be providing the right nutritional needs, regular health checkups and, without a doubt, love. With half of pet owners announcing that they had been giving their pets treats for no reason, surely this counteracts the owner's duty of sustaining a well balanced diet? Since all pets rely on their owner for food, it is critical that the owner delivers meals with the right nutritional value instead of convenient high calorie treats. Many foods eaten by humans can be consumed by dogs, cats and several other pets. Some safe and more healthy alternatives are: spinach, boiled chicken, carrots, green beans and broccoli. These statistics surrounding pet obesity are due to escalate much further, especially during holiday seasons. Close to 64% of pet owners admitted to spoiling their cats or dogs during this period, leading to 60% of vets expecting to see the dogs and cats more

probable to be overweight/obese after the holiday periods. These statistics can't be generalized for every household, but despite this, the pet owner is transparently the prime reason for pet weight gain throughout the pandemic.

Quite often, pet obesity is caused by the lack of knowledge from pet owners, rather than the intent to cause weight gain. When you think about overweight animals you probably think of portion control which, the lack thereof, is unquestionably a source of weight gain. This explains why overfeeding has been linked to reflect an owner's own behaviour with food. It was stated that overweight dog owners are much more likely to overfeed their pet as portion size is often much larger than needed, fueling weight gain. Since the beginning of the coronavirus pandemic, 33% of pet owners confirmed that their pets became overweight, which only increases the high obesity statistics in pets even more.

Another concerning cause for weight gain is the owner's inability to spot it. The most common signs of overweight/obese pets are: a non visible waist, sagging belly and excess fat covering the ribs, spine and hip bones. Fat accumulation can also present itself on the prominent areas such as the neck, arms and legs. Needless to say, weight gain happens over a period of time so spotting it can be challenging and undetectable, especially as owners and their pets spend all their time together. In addition to a pet owner's inability to realise weight gain and overfeeding, adequate daily exercise, which not only ensures optimum physical health but also mental, is required. It is recommended that dogs be walked at least twice a day (1 hour) and cats receive an average of 30 minutes of exercise daily; unfortunately this isn't always maintained.

Despite that fact that 73% of pet owners felt confident in



recognizing if their pet was overweight, veterinarians on the other hand certainly disagree. Shockingly, only 12% of pet owners actively express concerns about their pet's weight at the vets. Furthermore, over 64% of pet owner's act surprised or defensive, according to nearly two-thirds of veterinarians, whilst learning about their pet's unhealthy weight. Ultimately we must question: Is the most effective way to prevent obesity through the increased attention of the owner?

As the pandemic of animal obesity is becoming vastly concerning, the issue of animal health and wellbeing is surely the most concerning consequence from obesity. Many of the diseases prevalent from pet obesity will be undoubtedly overfamiliar seeing as these troubles also occur in humans: cardiovascular disease, diabetes, high blood pressure, respiratory distress, metabolic abnormalities and endocrinopathies (hormone problems like hyperthyroidism and hypothyroidism). This list of health issues continues, calling attention to other more serious problems like cancers and functional alterations, for instance joint disorders and the decreased function of the immune system. All of these diseases and several more are no less than detrimental to a pet's health, and naturally, the bond between a pet and an owner if a disease is victorious.

So, with the research and possible causes of obesity explored, there really are only a few methods to ensure the long lasting optimum health of your pet, not only during this pandemic (however long it will last), but after it as well. Routine health checkups with veterinarians, balancing nutritional needs and exercise, and seeking help from specialist animal nutritionists, if needed, is very much the way to go.

# Chocolate... Could You Live Without It?

## Chocolate and Craving Facts

- The smell of chocolate increases theta brain waves, which triggers relaxation.
- Studies show that small portions of dark chocolate can have many benefits to your health, especially your heart. Because cocoa reduces risk of heart disease by reducing cell damaged caused by heart disease.
- Flavanols (which are present in cocoa) have been shown to lower blood pressure and make your heart, veins, and arteries work better.
- However, It's important to remember that chocolate is still candy, and it has extra calories, sugar, and fat. Eat it sparingly.
- According to experts, up to 90% of us experience food cravings on a regular basis, and chocolate is one of the prime culprits.
- If you are trying to reduce your chocolate intake, or stop eating it completely, eat plenty of fibre and protein-rich foods to keep you feeling satisfied.
- Eating chocolate stimulates the brain's reward centres, triggering the release of 'feel-good' chemicals, so the more you eat and more often you have it, the more your brain drives you to seek it out.

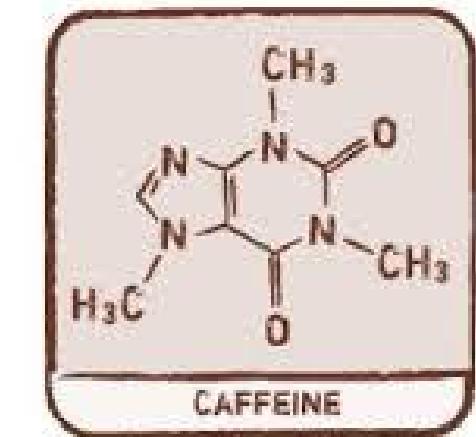


• Chocolate is an emotional comfort, it makes you feel calmer, happier and reduces levels of anxiety and stress. This is because it has the ability to increase levels of the neurotransmitter, serotonin, however too much serotonin can cause shivering and diarrhoea.

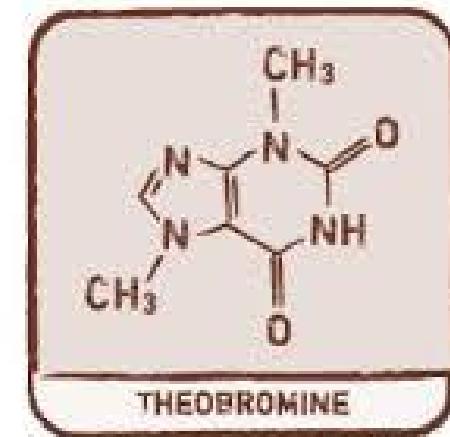
• Chocolate also contains small amounts of a compound called phenylethylamine, which acts like an amphetamine, stimulating your brain cells to release dopamine

To fully experiment and explore this topic, I went on a 2 week chocolate-free trial.

At first I thought that it would be really hard to avoid chocolate for two weeks, and that I wouldn't be able to complete it as I normally ate chocolate everyday. In the first few days, I did crave some chocolate, I also found that I did more snacking of other foods such as fruits or crisps to supplement my craving. However, as the experiment continued, I found it easier and easier to not eat any chocolate. By the end of the experiment, I felt healthier and cleaner.



CAFFEINE



THEOBROMINE

# Rice, rice, baby

When you go to the supermarket, have you ever thought of which type of rice is good for you? Well, you're in luck because here are some facts about each type of rice and the science behind it.

## White rice vs Brown rice

### Brown rice

Brown rice is a whole grain rice which has the nutrients to keep your heart healthy. It is a rich source of fiber which can reduce the risk of death from heart disease. If you are trying to lose weight brown rice is a great alternative to white rice because it is low in carbohydrates, which is good

for weight loss. Studies have shown that eating brown rice extends your healthy years and lowers your cholesterol.

### White rice

Unlike brown rice, white rice is highly processed and missing its hard layer of coating, bran (outer layer), and germ (nutrient rich core). Due to this, brown rice has more nutrients. Although white rice is lacking on advantages so far, here are some reasons why white rice is better than brown rice. Although the vitamins have been stripped off,

manufacturers usually enrich the rice or replace some of the vitamins after the processing. The white rice was refined, polished and stripped of its bran and germ so that it would have better cooking quality, shelf life and better tastiness.

## Chemistry in Cooking

Have you ever wonder how rice goes from being hard and crunchy to a pillow texture? Well that is all due to gelatinisation. Gelatinisation is the chemical process by which starch granules absorb a bunch of water and lose their crystallinity. When heat and water is present, that is when

gelatinisation can occur. Not only does gelatinisation happen, but pasting occurs after it. Continued heating or stirring of starch will break down the swollen granules. Broken granules leach amylose out to the surrounding water which results in increased stickiness of the surrounding liquid. This is why rice sometimes gets sticky.



# STEM CAREERS



## Dr Rama Kodavali Dentist

### Why did you choose dentistry as a profession?

Throughout my childhood and schooling, I always wanted to work in healthcare. While doing my GCSE's, I talked to my uncle, whose children all attended medical school. He recommended dentistry as a profession because dentistry is a speciality of its own and can require shorter training than other specialised fields in medicine.

### What did you have to do in order to get into medicine/become a dentist?

I went to university in India, which requires a slightly different process to getting into medical

school in England. For GCSEs and A-levels, we needed good grades in Biology and Chemistry and I chose Physics for my 3rd subject, but Maths is also a good option. We had to then take an exam, known as the Common Entrance Test, which was very competitive. Tens of thousands of people from my state entered, but only the top 1000 people were selected for medical school.

### What are the benefits of a career in dentistry?

Dentistry/ medicine in general is a very secure job. Dentistry is more or less the same throughout the world, and there are always people needing dental care. Dentists get paid reasonably well. Additionally, there are different fields you can specialise into, such as orthodontics . You can also choose to own your own clinic or work for a larger company such as the NHS. One of the benefits of my career as a general dental practitioner is that I get to talk to lots of patients, which is good for someone who is social.

### What would a regular day of work for a dentist consist of?

As a general dental practitioner, I have a list of



people who I see once every 6-12 months. In a 7-hour day, I see around 25 patients. I do a regular checkup of their dental health and see if any treatments are needed. These treatments include fillings, extractions, teeth whitening which we then perform.

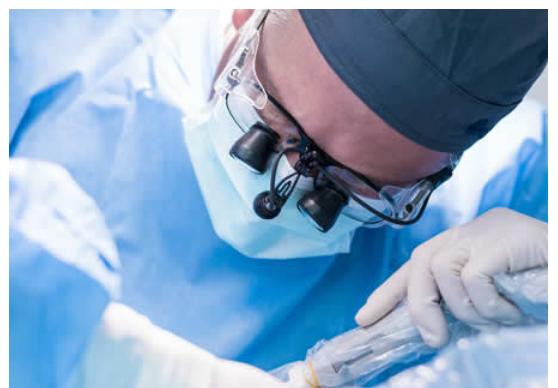
#### How has your work been affected by the pandemic?

Initially, our work was suspended for around two months, due to the Covid risk. During this time, new infection control guidelines were made. Once we returned, we could only see emergency patients whilst wearing more PPE (personal protective equipment) which we had to change after seeing each patient. All routine checkups were postponed and after seeing each patient, we had to have a fallow period for 30 minutes which

involved opening windows and switching on ventilation systems to allow the removal of droplets in the air. After that half an hour, someone would come in and sanitise the room and surgical instruments. All of these procedures meant that we were working at only 45% of our previous work level.

#### What advice would you give to someone considering a career in dentistry?

There many opportunities to specialise. For example you could work in a hospital or be a freelance dentist. Also, dentistry is a demanding job - it requires a lot of skill and patience, so if you are choosing this career path, make sure you enjoy it. Additionally, medicine and technology are advancing very fast, so some aspects of dentistry may not even exist at the moment.



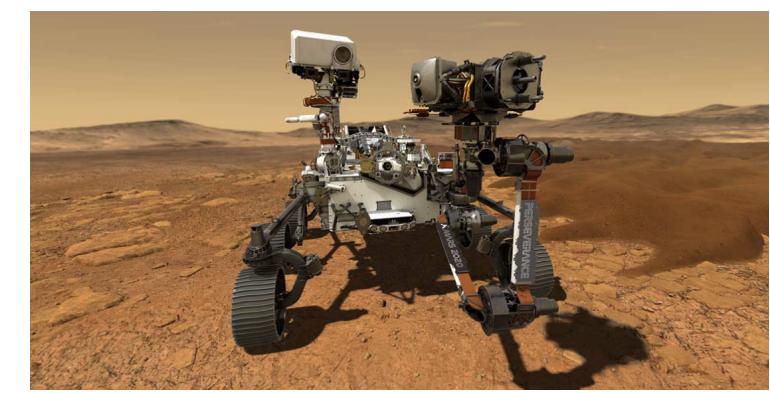
# Breaking NEWS

Brazil's first entirely home-built satellite, the Amazonia-1, was successfully launched from a base in India, joining the fleet of spacecraft monitoring threats to the Amazon forest. Now, the country is part of a selective group of about 20 nations that have managed the whole chain of satellite design, production, and operation. Combining data from Amazonia-1 and existing satellites will enable near-daily updates on the world's largest rain forest's deforestation and agricultural activity. Researchers hope to use the new data to predict fire spread and have a more accurate picture of crop and pasture growth. But they also fear the current government might not use the satellite information to act on deforestation, as they have been facing an unsupported administration and repeated budget cuts in the agencies responsible for the Amazon monitoring.

## PERSEVERANCE ROVER

On the 18th February 2021, a new rover landed on mars by the name Perseverance. This rover will go on to explore the Zezero crater and hopefully tell us more about past signs of microbial life on mars. The Zezero crater is significant because it is where scientists believe that it is where an ancient river by the name of the 'river delta' was.

The main aim for this rover is to purely focus on life on Mars. Although life on Mars will probably be microscopic it will be groundbreaking to scientists. The rover is also trying to discover ways of getting oxygen from the martian atmosphere so they have a better understanding for astronauts in the future.



# MARIE CURIE

## THE HISTORY BEHIND THE PRIZE

Marie Curie was a Polish-born physicist and chemist and one of the most famous scientists of her time. Together with her husband Pierre, she was awarded the Nobel Prize in 1903, and she went on to win another in 1911.

Marie Skłodowska was born in Warsaw on 7 November 1867, the daughter of a teacher. In 1891, she went to Paris to study physics and mathematics at the Sorbonne where she met Pierre Curie, professor of the School of Physics. They were married in 1895.

The Curies worked together investigating radioactivity, building on the work of the German physicist Roentgen and the French physicist Becquerel. In July 1898, the Curies announced the discovery of a new chemical element, polonium. At the end of the year, they announced the discovery of another, radium. The Curies, along with Becquerel, were awarded the Nobel Prize for Physics in 1903.

Pierre's life was cut short in 1906 when he was knocked down and killed by a carriage. Marie took over his teaching post, becoming the first woman to teach at the Sorbonne, and devoted herself to continuing the work that they had begun together. She received a second Nobel Prize, for Chemistry, in 1911.

The Curie's research was crucial in the development of x-rays in surgery. During World War One Curie helped to equip ambulances with x-ray equipment, which she herself drove to the front lines. The International Red Cross made her head of its radiological service and she held training courses for medical orderlies and doctors in the new techniques.

Despite her success, Marie continued to face great opposition from male scientists in France, and she never received significant financial benefits from her work. By the late 1920s her health was beginning to deteriorate. She died on 4 July 1934 from leukaemia, caused by exposure to high-energy radiation from her research. The Curies' eldest daughter Irene was herself a scientist and winner of the Nobel Prize for Chemistry.



# HOME EXPERIMENTS

## Making rock candy to show the process of crystallization!

### You will need:

- Sugar
- Water
- A pot for boiling
- Few wooden sticks
- Food colour dye e.g red
- bamboo skewers



### Make sure you ask an adult to help!

1.Bring two cups of water to boil in a large pot on the stove. Next, stir in four cups of sugar. Boil and continue stirring until sugar appears dissolved. This creates a supersaturated sugar solution. This is also the time to add in any flavor enhancements, such as vanilla or peppermint. Make sure to allow the solution time to cool for 15-20 minutes.

2.While waiting for the solution to cool, prepare your wooden

sticks for growing the rock crystals. Wet the wooden sticks and roll them around in granulated sugar. Make sure you allow the sugared sticks time to completely dry before continuing. You'll need around one stick per jar.

3.Once the sugar solution is cool, add in food coloring to create rock candy of your preferred color. Leave this step out for clear-colored crystals.

4.Pour the cooled solution into a glass jar (or jars) and insert the sugar-covered wooden stick into the center of the glass. Make sure that the stick is not touching any part of the jar. If it does, the candy crystals could get stuck to the bottom or to the sides. You can divide the sugar solution across several smaller jars or use one large mason jar, depending on how many sticks of rock candy you'd like to make.

Once in place, secure the stick in place using a clothespin. Cover the top of the glass with a paper towel. You may have to poke a hole in the paper towel for the wooden stick to poke through.

5.Place the glass in a cool and quiet place. Loud noises and a lot of movement can disturb the crystal making process. Every day, the candy crystals will grow larger. They will reach their maximum growth potential by two weeks. When you have a good amount of rock candy crystals, remove the stick and place it on a sheet of wax paper to dry.. The typical time it takes for the rock candy to grow is two weeks, so it turned out more pink than red!



# HOME EXPERIMENTS

## Making a lava lamp!

### You will need:

- A wide bottle (or a fancy drinking glass / wide glass vase)
- Food coloring
- Vegetable oil
- Water
- An Alka-seltzer tablet.

1. Fill the container about 3/4 with vegetable oil.

You can choose the size of the container depending on how much vegetable oil you have.

2. Fill the rest of the container with water, leaving 2-3 inches at the top. Watch the water fall through the vegetable oil and settle at the bottom. Water is more dense than oil. Water

molecules are "polar" and oil molecules are "non-polar", so they are not attracted to each other.

3. After the water has settled for a minute or so, add food coloring. 10 drops should be suitable. Watch as each drop falls through the oil and sits on top of the water layer. Wait until all of the water droplets break through the oil/water line and burst into the water.

4. Drop your Alka-seltzer tablet in! The Alka-seltzer water reaction produces carbon dioxide gas bubbles which stick to the water droplets. The water/gas combo is less dense than the vegetable oil, so they rise to the top. The gas bubbles then break and are released into the air and the water sinks back down to the bottom to start over again!



# Can acid slow the browning of meat?

"Acid in the blood slows the reaction between the haemoglobin protein and the blood sugar, browning meat is the same chemical process, which means it should also be slowed by acid" - House S6 E2

So, once I heard the quote written above in an episode of House, I completely ignored it, that is, until I realised that I had to write an article about 'The Chemistry of Cooking', at which point I immediately thought "Hey! This happened!" so here we are.

After attempting to research the reaction between the haemoglobin protein and blood sugar, I figured out that not only did I not understand anything that I was reading, it wasn't exactly relevant to what this article should be about; does acid slow the browning of meat? A little bit more research led me to the Maillard reaction, which is a chemical reaction between amino acids and reducing sugars that gives browned food its distinctive flavor - so basically, the chemical reaction that relates to the browning of meat, which is what I needed to find out about.

When meat is roasted or seared, the browning reactions that occur are complex and are mostly caused by Maillard browning (with contributions from other chemical reactions).

Knowing this information makes me think that it's fairly likely that this is the reaction that House was talking about.

Now, some more information that relates to this, specifically the "does acid slow the reaction?" part of this, is the information that I found about the Maillard reaction in archaeology (taken from the Maillard reaction Wikipedia page); "In archaeology the Maillard process occurs when bodies are preserved in peat bogs. The acidic peat environment causes a tanning or browning of skin tones and can turn hair to a red or ginger tone. The chemical mechanism is the same as in the browning of food, but develops slowly over time due to the acidic action on the bog body".

The most important thing about this is the last sentence "The chemical mechanism is the same as in the browning of food, but develops slowly over time due to the acidic action on the bog body", which tells us that the acidic action slows the reaction. This means that yes, theoretically acid *can* slow the browning of meat (like vinegar did in that episode of House).

# Radioactive film review



The film 'Radioactive' follows the life of Marie Curie and her groundbreaking scientific discoveries.

Over the weekend I watched a film on Amazon Prime called 'Radioactive'. I would give this film 5 stars, it presented the life of Marie Curie in an understandable, interesting way.

After being turned down from her job she was forced to fend for herself and provide her own equipment. She ended up finding two more elements with the help of her husband.

I would 100% recommend watching this film, especially if you are interested in chemistry. Marie Curie is a strong female role model who has made fundamental scientific discoveries.



# A-Z IN FOODS

A - Asian pine nuts are either elongated or triangular in shape and are much cheaper than European nuts.

B - Bananas float in water as they are less dense in comparison

C - Coconut milk is used in a range of things, for example it's commonly used in beauty products and added as an extra in drinks.

D - Dragon fruits calories are very low - 100g equals no more than 36kcal

E - Eskimo ice cream is made up of cloudberry, sugar and sea oil and is often eaten in Alaska and Northeastern Russia.

F - Flaxseed is shown to reduce breast cancer growth.

G - Garlic is a naturally occurring antioxidant that improves heart health.

H - Haggis is made out of a sheep's heart, liver, lungs and kidneys with onions and oats.

I - Ice cream can be eaten everywhere, even in space, any flavour can be freeze dried into a brick for astronauts to enjoy!

J - Jerky is dried meat, dry meat isn't supposed to be tasty but when it is cut and seasoned it magically turns delicious.

K - KFC chicken cooks for 3 minutes in oil at a temperature of 170 degrees celsius!

L - lentils were first found in the ancient egyptian tombs in 2400 BC.

M - Maca is a cruciferous vegetable native to Peru.

N - Noodles were first made in China 4000 years ago

O - Oxtail is a gelatin rich meat from the tail of a cattle

P - Processed meat is sometimes treated with carbon monoxide to make it look fresh

Q - Quinoa grows in many conditions, such as high altitudes, freezing temperatures and even drought

R - Rainbow trout improves mood and helps to lower high blood pressure.

S - Sun tea is a type of iced tea originated in Arizona, but has a possibility of growing bacteria.

T - Turnips turn purple due to being exposed to the sun.

U - Undercooked chicken can give you salmonella

V - Vinegar is a preservative and is also a good substitute for salad dressings.

W - Wakame is a sea vegetable which is often eaten as seaweed with a strong flavour and texture.

X - Xigua popsicles are made from african watermelon which are cut up and put straight in the freezer.

Y - Yeast is a microorganism that is used in food products for different purposes.

Z - Zest is used to flavour food

## WORD SEARCH

Unscramble the anagrams and find the words in the word search



selbbbu

dica

unsben urbern

kalial

mota

steinEin

teemlne

dicpreoi lebat

stet betu

lsunecu

gsmuanem

repcop

cuomlele

## Last issue's quiz answers

1.  $5.972 \times 10^{24}$  kg
2. The sky appears as short waves of blue light are scattered more than any other colour in the sky, which means the sky appears blue to the human eye
3. Airplanes are able to fly as they generate a force called lift which moves the plane upwards
4. There are 118 elements on the periodic table
5. The smallest bone in the body is the stapes bone, which is found in the middle ear.

*"Everything is  
theoretically  
impossible, until  
it is done.*

*-Robert A.*

