# St Benedict's SCIENCE NEWS *Monthly*

## Welcome to the April 2022 issue

**SCIENCE NEWS *Monthly* is produced by the Science Department, St Benedict's Catholic Secondary School, Bury St Edmunds, Suffolk, UK.**

## CLIMATE CHANGE – WORLDWIDE PASTA SHORTAGE!

At the outset of the COVID pandemic it was noted that panic buying in shops led to severe shortages of some items – notably, toilet rolls and pasta. However, although most shop supplies are now back to somewhere near normal, there is a continuing shortage of pasta that has led to a significant increase in prices and reduced availability.

### This is as a result of climate change causing a catastrophic failure of the pasta harvest at the end of last year.

The majority of the world's pasta is grown in northern Italy where, historically, the climate has been ideal for growing the various trees and vines that produce the wide variety of pasta types we see in our shops. Selective breeding of the pasta plants over the last 200 years has enabled growers to produce perfect pasta, from *anelli* to *ziti* and all the types in between. I'm sure that you all have a favourite pasta and will be astonished to find that they are actually produced by plants.

The photo on the right shows Mrs Bella Ricciolini at work during the autumn harvest on her family's farm in the Parma province of northern Italy. Pasta plants typically have been bred to grow enthusiastically during warm, wet summer months but then require cooler temperatures during the harvest season – Oct-Nov. This allows for the final maturation of the pasta prior to picking it off the stems. This is why Parma is a major pasta producing region.

Unfortunately, with climate change giving rise to much warmer weather late in the year, this has had a drastic effect on the crop of all types of pasta and yields are significantly reduced.

For the agriculturalists among you, here is an interesting question: have you ever wondered why individual strands of spaghetti are always the same length when packaged? Well, the answer lies in some very clever selective breeding and plant hybridisation. As mentioned earlier, pasta plants have been selectively bred over the last 200 years and this has resulted in a perfect spaghetti plant – one that produces hundreds of strands of spaghetti that are all exactly the same length, as seen in the photo of Mrs Ricciolini!

Pasta harvesting is not without its dangers as it is mostly harvested by hand even to this day, especially spaghetti which grows in trees! The photo above shows Mrs Ricciolini balanced precariously up a ladder, being helped by her son and daughter, Agnoli and Fiori.

This is yet another reason why it is imperative that we, as a global nation, unite to reduce our greenhouse gas emissions and protect not just our future on Earth, but the future of pasta too!

Although the UK climate is not particularly conducive to the cultivation of pasta plants, the editor does have a limited supply and will happily give them out free-of-charge to keen gardeners on a strictly first-come-first-served basis. Please email……aprilone@everbeenhad.suffolk.sch.uk

# MARINE ARCHAEOLOGY – Ernest Shackleton's Endurance ship found at last

**Scientists have found and filmed one of the greatest ever undiscovered shipwrecks 107 years after it sank.**

For most of the general public the continent of Antarctica is forever associated with the name, Robert Falcon Scott, and his ill-fated attempt to be the first to reach the geographical South Pole. However, there is another Antarctic explorer who deserves to be equally recognised – Ernest Shackleton.

The first substantial UK expedition to Antarctica was the *Discovery* mission, 1901-1903. This was led by Scott, and Shackleton was chosen as a crew member; Scott was 32 and Shackleton 27. At the end of the expedition, *Discovery* became stuck in sea ice and had to be rescued – a forewarning of similar problems that would affect Shackleton's later *Endurance* expedition.

Scott and Shackleton returned to the UK in 1904 and over the next two years both men, separately, began planning an expedition to reach the South Pole. This led to a rather unfortunate falling out between the two.

After Scott's successful attempt to reach the South Pole ended in tragedy in March 1912, Shackleton mounted his own expedition, the grandly-titled *Imperial Trans-Antarctic Expedition*, in 1914. Its aim was not just to reach the South Pole, but to traverse the entire Antarctic continent from the Weddell Sea to the Ross Sea – 1800 miles.

Shackleton, commanding the ship *Endurance*, sailed into the Weddell Sea in December 1915. Deep in the Weddell Sea, conditions gradually grew worse until, on 19 January 1915, Endurance became frozen fast in an ice floe. On 24 February, realising that she would be trapped until the following spring, Shackleton ordered the abandonment of ship's routine and her conversion to a winter station. She drifted slowly northward with the ice through the following months. When spring arrived in September, the breaking of the ice and its later movements put extreme pressures on the ship's hull. Until this point, Shackleton had hoped that the ship, when released from the ice, could work her way back out onto open water. However, on 24 October, water began pouring in. After a few days Shackleton gave the order to abandon ship, saying, *"She's going down!"*; and men, provisions and equipment were transferred to camps on the ice.[89] On 21 November 1915, the wreck finally sank. Although its position was recorded as 69° 5' S, 51° 30' W, it came to rest on the sea bed at a depth of about 3000 metres (10,000 ft) and has lain there, undiscovered, ever since....until now.

Using remote-controlled, submersible vehicles fitted with lights and cameras the wreck was discovered on 5th March and, astonishingly, it was almost perfectly preserved. Endurance had been crushed in the ice before she sank so had sustained significant damage, but much of the ship was intact. Crucially, because there are no trees on Antarctica there are also no wood-boring worms, so the ships timbers are almost "as new". *"Without any exaggeration this is the finest wooden shipwreck I have ever seen - by far,"* said marine archaeologist Mensun Bound, who is on the discovery expedition and has now fulfilled a dream ambition in his near 50-year career. *"It is upright, well proud of the seabed, intact, and in a brilliant state of preservation,"* he told BBC News.

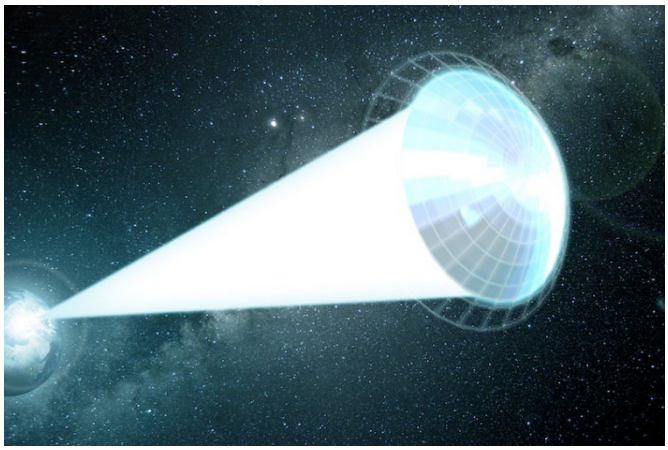

Although Endurance sank, Shackleton and his 27-man crew had already evacuated the ship and its supplies onto the adjacent ice floe and eventually made it by boat to Elephant Island. But there they were stranded. The good news is that, eventually, all were rescued. By a heroic feat of courage and endurance, Shackleton, with 5 companions, set off in a small sailing boat to try and reach the island of South Georgia where there was a permanently-manned whaling station. From there he would organise a rescue expedition to save the crew left behind on Elephant Island

To cut a long story short, Shackleton successfully rescued the remaining crew of the Endurance – a feat that has become legend in the annals of British exploration.

Shackleton embarked on what would be his final expedition to Antarctica in 1921. However, after arriving at South Georgia he suffered a fatal heart attack on 15th January 1922. He was buried in the Grytviken cemetery, South Georgia, after a short service in the Lutheran church.

https://www.bbc.co.uk/news/science-environment-60662541

## SPACE SCIENCE – sailing to the distant stars using the power of light!



Outer space is big. Really, really, really big. And that's why NASA has no plans at present to send a spacecraft to any of the several thousand known planets beyond our solar system. But, if we were to plan a trip, Alpha Centauri is an obvious target. It's the nearest star system to our sun at 4.3 light-years away. How soon could we reach Alpha Centauri? Could we reach any of the nearest stars, in a reasonable amount of time? However, ordinary rockets won't work for star travel. They are much too slow – the answer may lie in a giant sail.....and lasers!

German astronomer Johannes Kepler noticed as long ago as the early 1600s that a comet's tail always points away from the sun, and he hypothesised that the pressure of the sun's light might be responsible. Light exerts pressure on objects on which it shines. If collected on a large enough surface, the pressure of light can be used for space propulsion. Light sail craft have already been tested in Earth orbit and could also be used for interplanetary or interstellar travel.

Spacecraft propelled by light pressure would require a giant sail made from thin, reflective material. The sail can be square and supported by radial masts, or in the form of a ring or disc. By passing close to the sun, a light sail could pick up enough speed to travel to a nearby star in only 1,000 years. An interstellar sail would be very large, perhaps 62 miles (100 kilometres) or more across. However, 1000 years is still an awfully long time and would itself present huge problems in sustaining successive generations of crew for the duration of the flight.

But in February 2022, researchers at Penn Engineering and the *Breakthrough Starshot* initiative in the US said they're working on a new, improved type of light sail. The space probe that it powers will not be large enough to carry humans – it will be an unmanned probe the size of a microchip. The newly planned, miniature probe will be fitted with an incredibly thin sail, 1000 times thinner than a sheet of paper, composed of ultrathin sheets of aluminium oxide and molybdenum disulphide. The light propulsion will not come from the sun, but lasers based on Earth which will accelerate the probe. The researchers say this tiny probe from Earth could eventually reach a speed of **1/5 the speed of light**. That's fast enough to **reach Alpha Centauri in 20 years**.

EarthSky | New solar sail may travel to Alpha Centauri

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## TECHNOLOGY - flying robots protect endangered wildlife...and collect whale snot!

Drones collect snot from whales, snap photos of rare monkeys, count penguins and more.....

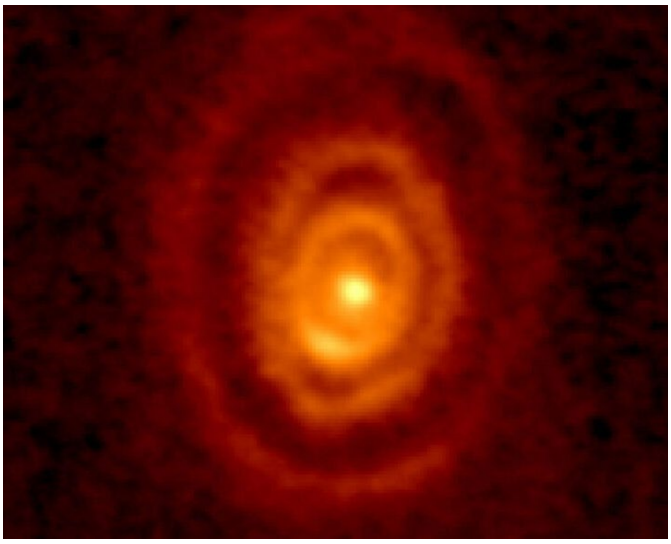

Wildlife researchers often trek through jungles and underbrush to find animals. They may peer at whales from boats or fly in helicopters to view animals from above. Such flights are very expensive and sometimes dangerous. Plus, their noise may scare animals. And helicopters can't fly very far out over the ocean because there's nowhere to land or refuel. Back in 2011, Lian Pin Koh and Serge Wich wondered if there might be an easier way to get similar types of data. *"We both realized that counting animals is such an enormous effort,"* says Wich. *"We thought, 'What if you fly over them with a flying camera?'"* Wich is an ecologist and conservation expert at Liverpool John Moores University in England. Koh is an ecologist at the National University of Singapore. Together, they cobbled together a drone from a remote-control model airplane, hacked camera equipment and sponges. The sponges absorbed the drone's vibrations, explains Wich.

That was over 10 years ago – nowadays drone cameras are very hi-tech and relatively cheap. They are being used to track rare monkeys in remote forest locations and to count penguins in their huge colonies. They are used much more widely but perhaps their most novel use is in collecting snot from whales! Named **"SnotBot"**, the drone flies over a whale as it breaks the surface to take a breath. All of a sudden, *whuffff*! The giant whale sends up a cloud of snot that completely soaks the hovering drone.

SnotBot has a petri dish on board. Now, that dish contains whale snot, also known as whale blow. It contains mucus and the DNA in that mucus can give scientists important information about whales. SnotBot also carries a camera to take pictures and videos of whales from directly above. This enables researchers to get a better understanding of how whales swim, how they behave, how they interact and how many travel in a group.

https://www.sciencenewsforstudents.org/article/drones-protect-endangered-wildlife-ai-conservation

## ASTRONOMY - A new image captures enormous gas rings encircling an aging red star



Anyone who has watched or listened to Professor Brian Cox over the last 10 years will know that everything on Earth, including ourselves, is made of "stardust". It has been known for a hundred years that the fusion process in stars, using hydrogen and helium, is creating new, heavier elements. We also see in the Universe that the heaviest elements of all are created in highly explosive events like supernovae, or when neutron stars and black holes collide. But what about all the elements in between?

For example, consider carbon and nitrogen, whose atomic masses are 12 and 14 respectively (hydrogen = 1). Both elements are extremely common and important as far as we are concerned: all life that we know is based on carbon, and nitrogen makes up 78% of our atmosphere. How such elements get distributed throughout space, though, has never been fully understood. Now we have an important clue.....

The huge radio astronomy observatory in Chile, known as ALMA – the Atacama Large Millimetre Array – has given us some ground-breaking images of distant stars since it was commissioned in 2013. A new image shows a red giant star going through an end-stage of its life as it transforms into a white dwarf. The important thing is that as it does so it is losing mass. This mass is seen in the form of three concentric rings being literally blown away from the central star.

*"It's definitely going through its metamorphosis,"* says Raghvendra Sahai, an astronomer at NASA's Jet Propulsion Laboratory in Pasadena, Calif. *"Such ringlike structures have never been seen in any object like this before."* . Observations of the three concentric rings, all ejected from the star during the last 800 years, could help astronomers understand how giant stars lose mass toward the end of their lives and seed the cosmos with planet- and life-building elements. Born roughly twice as massive as the sun and lying about 1,300 light-years from Earth, the star, known as *V Hydrae*, is what's known as an asymptotic giant branch star. It once fused hydrogen in its core, as the sun does. But now it is a cool, brilliant, puffed-up star that alternately burns hydrogen and helium in shells around a carbon-oxygen core. Such stars cast lots of material into space. *"The processes by which this happens are not well-understood,"* says Sahai, who has studied V Hydrae since the 1980s.

https://www.sciencenews.org/article/star-red-giant-age-gas-rings-new-image-white-dwarf

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## PHYSICS - Owl-inspired technology may be key to reducing noise pollution

Researchers have taken inspiration from nature to design super-quiet airfoils that increase aerodynamic performance and reduce noise pollution.....and it's all thanks to owls!

Swooping down on their unsuspecting prey, owls can achieve near-silent flight thanks to specialised feathers with a serrated edge. Positioned on the leading edge of the wing, these serrations are comb-like structures that influence airflow by disrupting high frequency, turbulent swirling eddies of air, making them smaller and quieter. In owls, these serrations are more developed in nocturnal species as opposed to diurnal (daytime) species.

Suppressing noise pollution in urban areas is an important environmental goal for many, and in turbine engines (such as those in wind turbines, aeroplanes and drones), it's the trailing-edge noise that is the dominant source of unwanted sound. Now, a team from Xi'an Jiaotong University in China have examined the unique features of owl wings to inform a new airfoil design to reduce this trailing-edge noise, in a new study published in the journal *Physics of Fluids*.

*"Nocturnal owls produce about 18 decibels less noise than other birds at similar flight speeds due to their unique wing configuration,"* said author Xiao Min Liu. *"Moreover, when the owl catches prey, the shape of the wings is also constantly changing, so the study of the wing edge configuration during owl flight is of great significance."*

The researchers conducted a series of studies using noise calculation and analysis software applied to airfoil designs with features inspired by the serrated edges found on nocturnal owl wings. Not only did they find that noise was suppressed, but also that asymmetric serrations had a greater effect than symmetric ones. *"At present, the blade design of rotating turbomachinery has gradually matured, but the noise reduction technology is still at a bottleneck,"* explained Liu. *"The noise reduction capabilities of conventional sawtooth structures are limited, and some new non-smooth trailing-edge structures need to be proposed and developed to further tap the potential of bionic noise reduction."*

https://www.sciencefocus.com/future-technology/owl-inspired-technology-may-reduce-noise-pollution/

## ARCHAEOLOGY – Saffron Crocus was First Domesticated in Ancient Greece

At more than £4 per gram, saffron is, and always has been, the world's most expensive spice. But exactly where it originated is not known for sure. Iran, Mesopotamia, Assyria, ancient Greece….?

In a review paper published in the journal *Frontiers in Plant Science*, researchers followed ancient arts and recent genetics to trace the evolutionary origin of the saffron crocus (*Crocus sativus*), a triploid flower crop and source of the spice and colourant saffron – it all points to ancient Greece.

Saffron is extracted from the flowers of the saffron crocus, a species of flowering plant of the Crocus genus in the iris family Iridaceae. Between 15,000 and 16,000 flowers, requiring between 370 and 470 person-hours to collect, yield a single kilo of saffron, worth more than £4000.

The Mediterranean is considered as the emergence site of many Crocus species, with Greece and Turkey possessing the highest number. Investigating ancient texts and artworks in these regions can help finding more information on early saffron domestication. The first use of the word 'saffron' dates back to the 12th century to the old French term *safran* that consecutively originated from the Latin *safranum*, the Arabic *za'farān*, and the Persian *zarparan* with the meaning 'gold strung.'

While the use of crocus-based pigments can be traced back about 50,000 years ago to prehistoric cave paintings in north-western Iran (today's Iraq), early signs of cultivation and domestication were found later, at about 1700 BCE, during the time of the Minoan civilization in Crete. As saffron's high medicinal value and antioxidant ability were recognized, its commercial value as a spice increased over the next eras, leading to its spread across the Mediterranean. *"Both ancient artworks and genetics point to Bronze Age Greece, in approximately 1700 BCE or earlier, as the origin of saffron's domestication,"* said Ludwig Mann, a Ph.D. student at Technische Universität Dresden. Finding out where and when saffron was first domesticated isn't straightforward: the species is difficult to study genetically, because it has three copies of every chromosome instead of the usual two, and a large genome containing a high percentage of difficult-to-sequence repetitive DNA.

As there are no ancient crocus remains preserved from ancient times, we revisit ancient artworks that depict saffron-like plants, as these could point us to specific regions. Artworks from the Minoan civilization are likely the oldest to depict domesticated saffron. For example, the dense patches of crocus flowers on the fresco *'The Saffron Gatherers'* from the island of Santorini (approximately 1600 BCE) suggest cultivation. In Egypt, tombs from the 15th and 14th centuries BCE depict how ambassadors from Crete brought tribute in the form of textiles dyed with saffron.

An origin in Bronze Age Greece agrees with results from genetic studies from 2019, which showed that *Crocus cartwrightianus*, which only occurs in mainland Greece and Crete, is saffron's closest wild relative.

http://www.sci-news.com/archaeology/saffron-crocus-domestication-10607.html

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## WORD(S) OF THE MONTH:

# CELLULOSE (noun, *"Sell-YOO-lohs"*)

**Cellulose is a chain of sugar molecules. In particular, it is made up of linked molecules of the sugar glucose. That chain structure makes cellulose a polymer. In fact, it is the most abundant natural polymer on Earth. Plants, algae and some bacteria make cellulose. Some bacteria ooze this stuff and form biofilms. These are communities of bacterial cells that form a sticky slime and stick onto surfaces. In plants and algae, cellulose is the main building block of cell walls. It makes those cells stiff, which is why plant stems and tree branches are so sturdy. The purest natural form of cellulose is cotton. Over 90 percent of cotton is cellulose. Wood, meanwhile, is about 50 percent cellulose.**

**Plant-eating animals like cows and sheep can digest cellulose, but people can't. However, cellulose is still a key part of our diet. Why? Cellulose is a source of dietary fibre. That fibre keeps food moving through the gut, preventing digestive traffic jams. Cellulose is also important for many types of manufacturing. Cotton is used to make clothes like t-shirts and jeans. Cellulose from wood gets turned into paper. This polymer also goes into making cardboard, plastic wrap, coffee filters, sponges and many other products.**

https://www.sciencenewsforstudents.org/article/scientists-say-cellulose

## BIOLOGY - Bringing back extinct creatures may be impossible

Although it was seen as a theoretical possibility for many years, the hugely successful 1993 film *Jurassic Park* captured the attention of the general public – using ancient, "fossilised" DNA to clone a previously extinct species.

To bring back an extinct species, scientists would first need to sequence its genome, then edit the DNA of a close living relative to match it. Next comes the challenge of making embryos with the revised genome and bringing them to term in a living surrogate mother. So far, scientists have sequenced the genomes of about 20 extinct species, including a cave bear, passenger pigeon, and several types of mammoths and moas. But no one has yet reported re-creating the extinct genome in a living relative. And, according to new research published in the journal *Current Biology*, this step may actually prove to be impossible.

Biologists now refer to the bringing back of an extinct species as *de-extinction*. Much publicity has emerged around the attempt to restore the Woolly Mammoth to its original, arctic tundra habitat. Putting a key animal back into its original habitat could also help restore ecosystems. The mammoth once kept arctic shrubs and trees under control and fertilised grasses with their manure. On the other hand, some argue that artificially restoring a species millions of years after its extinction could equally have a damaging effect by interfering with the modern ecosystem. This may all be academic.

The latest study concerns the Christmas Island Rat that became extinct only 100 years ago, and has a very close living relative, the Norway Rat. In theory we should be able to recreate the Christmas Island Rat's genome, but it has turned out to be much harder than anyone anticipated. Researchers extracted DNA from the skins of two preserved Christmas Island rats and sequenced it many times over to get as much of the genome as possible. They achieved more than 60 times' coverage of it. Old DNA only survives in small fragments, so the team used the genome of the Norway rat as a reference to piece together as much as possible of the vanished rat's genome. However, comparing the two genomes revealed 5% of the Christmas Island rat's genome was still missing.

The lost sequences included bits of about 2500 of the rat's estimated 34,000 genes. The recovered DNA included the genes for the Christmas Island rat's characteristic rounded ears, for example, but important immune system and olfaction genes were also either missing or incomplete. Perhaps the dream of de-extinction will remain just that – a dream.

https://www.science.org/content/article/bringing-back-woolly-mammoth-and-other-extinct-creatures-may-be-impossible

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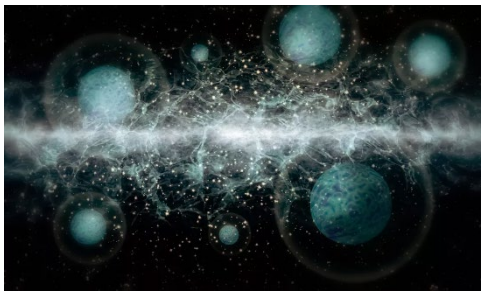
## PHYSICS - Mathematical discovery could shed light on secrets of the Universe



How can Einstein's theory of gravity be unified with quantum mechanics? It is a challenge that could give us deep insights into phenomena such as black holes and the birth of the universe. Now, a new article in *Nature Communications*, written by researchers from Chalmers University of Technology, Sweden, and MIT, USA, presents results that cast new light on important challenges in understanding **quantum gravity**.

*"We strive to understand the laws of nature and the language in which these are written is mathematics. When we seek answers to questions in physics, we are often led to new discoveries in mathematics too. This interaction is particularly prominent in the search for quantum gravity – where it is extremely difficult to perform experiments,"* explains Daniel Persson, Professor at the Department of Mathematical Sciences at Chalmers university of technology.

An example of a phenomenon that requires this type of unified description is black holes. A black hole forms when a sufficiently heavy star expands and collapses under its own gravitational force, so that all its mass is concentrated in an extremely small volume. The quantum mechanical description of black holes is still in its infancy but involves spectacular advanced mathematics.

The new article may also offer new insight into mysterious **dark energy**. In Einstein's general theory of relativity, gravity is described as a geometric phenomenon. Just as a newly made bed curves under a person's weight, heavy objects can bend the geometric shape of the universe. But according to Einstein's theory, even the empty space – the 'vacuum state' of the universe – has a rich geometric structure. If you could zoom in and look at this vacuum on a microscopic level, you would see quantum mechanical fluctuations or ripples, known as dark energy. It is this mysterious form of energy that, from a larger perspective, is responsible for the accelerated expansion of the universe.

This new work may lead to new insights into how and why these microscopic quantum mechanical ripples arise, as well as the relationship between Einstein's theory of gravity and quantum mechanics, something that has eluded scientists for decades.

https://www.sciencedaily.com/releases/2022/03/220309090800.htm

## GENETICS - Potato genome decoded

The genome, of an animal or plant, is the complete set of nucleic acid sequences encoded as DNA within the chromosomes of cell nuclei. The Human Genome was first published in 1991, albeit with a few gaps which have now been filled in. You might think that, for such a complex organism as a human being, this was a monumental feat. So surely determining the genome of the potato plant should be *easy-peasy*...but no, quite the reverse!

The reason for this is simple but has proven difficult to tackle – instead of inheriting one copy of every chromosome from both the father and from the mother (as in humans) potatoes inherit two copies of each chromosome from each parent, making them a species with four copies of each chromosome (tetraploid). Four copies of each chromosome also mean four copies of each gene, and this makes it highly challenging and time-consuming to generate new varieties that harbour a desired combination of individual properties; what's more, multiple copies of each chromosome also make the reconstruction of the potato genome a far greater technical challenge than was the case for the human genome.

The researchers have overcome this longstanding hurdle using a simple yet elegant trick. Instead of trying to differentiate the four, often very similar, chromosome copies from each other, they circumvented this problem by sequencing the DNA of large numbers of individual pollen cells. In contrast to all other cells, each pollen cell contains only two random copies of each chromosome; this facilitated the reconstruction of the sequence of the entire genome.

An overview of the complete DNA sequence of cultivated potato has the potential of greatly facilitating breeding and has been an ambition of scientists and plant breeders alike for many years already. With this information in hand, scientists can now more easily identify gene variants responsible for desirable or undesirable. Building on this work, we can now implement genome-assisted breeding of new potato varieties that will be more productive and also resistant to climate change – this could have a huge impact on delivering food security in the decades to come.

https://www.sciencedaily.com/releases/2022/03/220303112155.htm

## REPRODUCTIVE BIOLOGY – Mammalian offspring derived from a single unfertilized egg

The development of embryos from a single unfertilized egg is well known. In nature, it occurs in aphids, fish, reptiles, scorpions, mites and some bees – it is a process known as **parthenogenesis**. But is does not occur in mammals. In mammals, sexual reproduction involves a fusion of male DNA with female DNA, with the resulting offspring having genetic material from both parents. Prior research has shown that most of the cells in mammals express copies of genes from both parents—but a few do not, instead expressing genes from only the mother or the father. In their work, the researchers took advantage of such exceptions.

Prior research efforts aimed at forcing parthenogenesis in mammals have failed due to genomic imprinting. They overcame this problem by taking a different approach. Their work involved removing an egg from a mouse and then using CRISPR to edit its genes to mimic the genes a male parent would have contributed during normal fertilization. They then injected an enzyme into the egg to switch on some genes and switch others off to make the genes in the egg resemble those of an egg that has been fertilized by a father. The egg was then implanted into the female's uterus, where it was allowed to grow into a foetus. The researchers repeated this process with several eggs, implanting them all together into a single mouse uterus—mice typically give birth to between eight and 12 pups at a time. All of the pups survived the birth, but only one of them survived to adulthood—and it did well enough to produce offspring as well.

Research like this involving mammalian reproduction is inevitably controversial, as one always suspects that similar experiments may be attempted using human eggs or embryos. There is still a huge debate about possible human cloning, for example. However, although the researchers suggest that parthenogenesis in mammals is achievable, they acknowledge much more work is required before it can be used in real-world applications. They further suggest refinement of the process could lead to applications in agriculture or medicine development.

https://phys.org/news/2022-03-mammalian-offspring-derived-unfertilized-egg.html

## WEIRD WEATHER – Saharan dust turns skies to 'Bladerunner Orange'!

On the late afternoon of Wednesday 16th March you might have noticed something rather odd if you had glanced out of the window – the clouded sky would have taken on a yellow-orange glow. If you happened to have been driving during a shower of rain, your screen wipers would have wiped what looked like yellowish milk across your windscreen. Later, when your car had dried out, you would find it covered by a fine, yellowish dust.

**What was going on?**

A powerful storm system brought clouds of Sahara dust to parts of southern Europe on Wednesday, leading to dramatic orange skies, very poor air quality and a layer of accumulating mud in Spain, Portugal and France. The Spanish state meteorology agency AEMET named the storm system Celia. In addition, Celia also brought powerful coastal winds and flooding rains, leading to severe weather warnings across the country. In fact, people reported dust and mud as far north as southern England and East Anglia. The photo was taken from Waterloo Bridge looking east along the Thames towards the City of London.

The airborne dust scattered the Sun's light in such a way that the short (blue-violet) wavelengths were scattered more than the long (orange-red) wavelengths, hence the skies appeared orange. Incidentally, this is the same phenomenon that causes red sunsets and sunrises – it is known as **Rayleigh scattering**.

The Iberian peninsula was most badly affected, with the Spanish state meteorology agency saying it was the worst incursion of Saharan sand since records began. Many areas of Spain resembled a scene from Mars! The photo on the left is actually Elda, Alicante.

The dust originated from Northern Africa on Tuesday 15th, when Celia rolled in from the Atlantic. Consequently, strong southerly winds whipped up a dust storm in Algeria and Morocco and carried the particles across the Mediterranean. This **Calima** windstorm is quite common in the spring for Spain and Portugal, but the amount of dust and wind brought by Storm Celia is extraordinary.

EarthSky | Sahara dust storm turns skies orange in Europe

## CHEMISTRY – New process can transform urban CO2 pollution into a resource

Earth's warming climate has been behind many recent bouts of extreme weather, from wildfires and floods to droughts and storms. One contributor to that warming is a growing build-up in Earth's atmosphere of carbon dioxide ($CO_2$). Technologies exist to pull this gas from the air or to trap it before it gets released. Storing that captured $CO_2$, however, has proven a challenge. Now one Australian research team offers to solve this problem by "mining" that $CO_2$ to produce solid carbon. Their process is described in the journal *Energy & Environmental Science*.

In the past, researchers have tried pumping waste CO2 deep into the Earth. But there's been a worry that something — perhaps an earthquake, or just a bad seal — might one day release all of that pent-up gas. Researchers at Australia's Royal Melbourne Institute of Technology decided to investigate another idea. They looked at existing work with molten metals and catalysts and began to wonder whether a liquid metal might serve as a catalyst to break down CO2 into its component atoms – oxygen and carbon.

They used an alloy of two metals, gallium and indium, that is liquid at normal temperatures. The team filled a test tube with the alloy and pumped CO2 through it. As bubbles of the gas rose through the alloy, bits of black carbon began to float to the top of the metal. This showed that the gallium had broken the bonds between CO2's carbon and oxygen atoms. Those carbon atoms became solid carbon that could be skimmed easily from the top of the liquid.

Although the reaction took place at room temperature, it sped up at temps of 200° or even 400°. Although those seem like high temperatures, they're quite low for reactions like this. The team thinks industries could use waste heat from other parts of their factories to reach the needed temperature. That would allow them to extract carbon from the CO2 in the factory chimneys. The exhaust they released would be carbon-free.

When its process is scaled up, it could make the factories that produce cement and steel "greener." Both types now release large amounts of CO2. They are working on a larger model of its system to test in such factories.

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