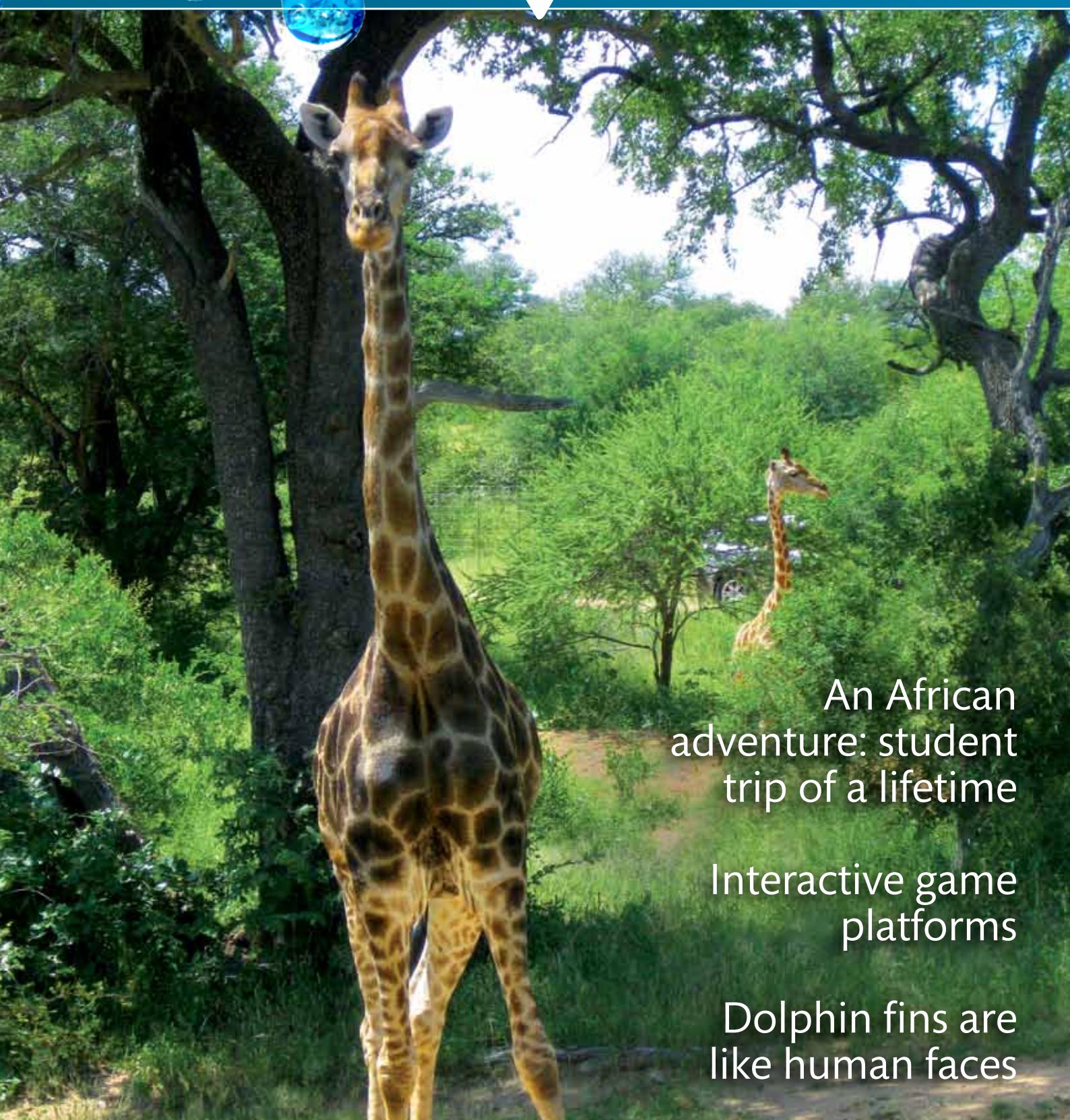




CORNWALL COLLEGE



ISSUE 5



An African
adventure: student
trip of a lifetime

Interactive game
platforms

Dolphin fins are
like human faces

MAGIC MATERIALS AND THE SCIENCE OF INVISIBILITY

IOP SCHOOLS LECTURE TOUR

Head for Heights

Mons Huygens is the tallest mountain on the Moon; it is 4700 metres tall, just over half the height of Mt Everest (8848m).

Tegan Pedley Yr7 Pool Academy

Butterfly wings get their amazing properties from their structure. These properties are inspiring the production of man-made materials (metamaterials) like graphene, to create properties not seen in nature – invisibility to name just one!

In September Cornwall College Camborne and St Austell played host to an IOP schools lecture tour on 'Magic Materials and the Science of Invisibility.'

"The talk was a great opportunity to see how science learned in the classroom is being applied in this exciting research field. By utilising our fundamental understanding of physics and a close examination of the natural world, the frontiers of our knowledge and capabilities are being expanded."

Claire Woollacott - Theoretical Physicist & Researcher, University of Exeter

This talk was open to secondary school and college students and included a question and answer session.

MORE EVENTS LIKE THIS COMING SOON

IOP Institute of Physics
South West



introduction

Welcome to the fifth edition of the STEM Journal. Our cover story for this issue is an amazing trip to the Kruger National Park in South Africa where our students had a once in a lifetime experience with a wild rhino. In the slightly tamer wilds of East Devon and Cornwall, a study is underway to confirm whether cattle grazing is beneficial to the management of lowland heaths as part of a Research Masters course.

The UK's engineering sector is known to have a growing skills shortage. In this edition we hear from one of the co-organisers of Greenpower Cornwall as to how the event is inspiring the engineers of tomorrow through hands-on projects. We also find out from former A-level student Benjamin White about how his A-levels in maths and further maths have taken him to teaching the subject and becoming the Director of Studies at Magdalen College School in Oxford. Test your maths knowledge with our puzzle on page 31.

A food specification technologist from Tamar Foods tells us about her job and how she got into it, and speaking of food if you would like to have a go at some science at home turn to page 25 for instructions of how to make your own honeycomb toffee.

Our thanks go out to Pool Academy whose science club, led by Mr Margh Brewer, have provided us with a collection of fun factoids for this issue from anatomy to zoology.

You can stay up-to-date with STEM activity at Cornwall College by visiting: www.cornwall.ac.uk/stem or follow us on Facebook: www.facebook.com/ccstem.

Cornwall College is dedicated to supporting the environment and is a member of the Carbon Trust's HE Carbon Management Programme.

Editor Sarah Talboys



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For more information about STEM with Cornwall College please contact Sarah Talboys at stem@cornwall.ac.uk or phone 01209 617818.
For details of any STEM courses please call our course enquiries team on 0845 22 32 567 www.cornwall.ac.uk.

FEATURES

Flatworms in Cornwall: A call for new records
Not many people are aware of the presence of terrestrial flatworms and where they are. Read more about these invasive species on page 6.



Thousands of school children race at regional Greenpower event

Read about the annual motoring mayhem in this year's Cornwall College Greenpower electric car races on page 14.



Is cattle grazing beneficial in the management of lowland heaths?

Find out more about Philippa Smith's research into this topic as she spends time in the lab and out on Pebblebed Heaths, East Devon. See page 20.



SINNG's Rinky Dink & alien invaders go national!

The Student Invasive Non-Native Group – SINNG – is in its 4th year at Cornwall College Newquay creating action and awareness of invasive non-native species (INNS, aka alien invasive species). Now its award-winning innovative approach is reaching a national audience.

Thanks to hard work by project co-ordinator Nicola Morris, aided by several SINNG volunteers and intern Suzie Kenny, and in collaboration with the Cumbria INNS local action group (CFINNSI), the Alien Detective Challenge is going national.

Beginning in Cornwall and Cumbria, Guides, Scouts and schools can undertake a series of activities and tasks that make up the challenge. Successful completion

for Guiding and Scouting units means the award of the Alien Detective Challenge badge (see above). This cloth badge was designed by former SINNG member and FdSc Zoological Conservation graduate Matt Dennis. It features a SINNG character - Rinky Dink (the stinky mink) – based on the invasive American mink Neovison vison that has helped to wipe out our native water vole *Arvicola amphibius* in much of the UK.

The Alien Detective Challenge is supported by a 40-page pack of resources produced by the SINNG team with funding from Cumbria and input from local firm PJ Print. Much of the material was piloted with the 'Saplings' after school STEM club run by FdSc



Wildlife Education Media students and SINNG at the Atlantic Centre, Newquay.

The Alien Detective Challenge was launched in Cornwall in June and schools that take part will fill a wall chart with native species to replace the invasive plants and animals in the river. St Beward Primary will be the first school in the country to complete the challenge. When the print run has been distributed, a downloadable version will be made available through SINNG's website

(www.sinng.org.uk) and also the website of the national Non-Native Species Secretariat (NNSS, a part of the Food & Environment Research Agency base near York).

There is also national distribution of Alien Invaders – a Top Trumps-style card game that was one of SINNG's first ideas for material to raise awareness and stimulate action on INNS. NNSS has collaborated with SINNG to develop the game and has funded a production run by PJ Print of 1,000 packs. These packs are being used in NNSS awareness-raising campaigns and have been distributed to local action groups in the UK.

Stalwart SINNG volunteer and BSc Applied Zoology student Tracey Twomey developed a pilot version of Alien Invaders

for her Communicating Zoology module assignment. The design was modified after trials during SINNG workshops with local school groups, but Tracey's prototype was good enough for Olaf Booy of NNSS to realise its potential and to work with SINNG on the version for national release. The packs, alongside our Invasive Species Games Compendium, are now being used as training tools for international organisations and there are plans for a Welsh version and interests from other countries including Germany and South Africa.

SINNG are expecting a lot of interest in their activities at STEM events such as Greenpower South West and Big Bang South West, so their materials seem destined to reach an ever wider audience.

For more information on SINNG and how you or your school could get involved visit www.sinng.org.uk.



FLATWORMS IN CORNWALL: A CALL FOR NEW RECORDS



Not many people are aware of the presence of terrestrial flatworms and when they are, they tend to be aware of the invasive species, *Arthurdendyus triangulatus*, the New Zealand flatworm.

An active predator of earthworms, the New Zealand flatworm has caused problems in Scotland and Northern Ireland, but to date hasn't been recorded in Cornwall. Many people are surprised to learn there are three species of native flatworm in the genus *Microplana* and one species (*Rhyncodemus sylvaticus*) that is probably native. The identification of the four native species and a variety of invasive species is outlined in a February

2005 article by Hugh Jones in British Wildlife. In Cornwall, the two most likely species you'll find are: *Kontikia ventrolineata* (Fig 1) and *Austroplana sanguine* (Fig 2).

Kontikia ventrolineata is generally found at a maximum size of 2 cm and is less well recorded than *Austroplana sanguine*. This is almost certainly because of the size difference and difference in movement. *Kontikia* has been recorded in the UK since around 1970 and preys on small slugs and scavenges dead invertebrates. *Austroplana* was first found on Scilly in 1980 and has since spread throughout the south-west.

These small invaders have travelled to the UK from the southern hemisphere as stowaways in plant pots. They are predators of our native earthworms and as our earthworms are the key to keeping our soils fertile; these invasive flatworms could create a problem if they were to become more widespread. Without earthworms pulling leaves into the soil to break down and provide the nutrients for plant growth, soil fertility and the crops growing in them, they will decline.

We have been involved in recording flatworms in Cornwall since 2003 when some were handed in by a student on the horticulture foundation degree at Rosewarne. In 2011, as we were setting up our new invasive species project for conservation degree students at Cornwall College Newquay, one of the leaders of the project found a specimen of *Austroplana* on his boot while doing some gardening! A month later the invasive flatworm project was in place.

The two main aims of the project were to generate baseline information about flatworms in Cornwall and to raise the profile of the risk that invasive species bring to native wildlife and ecosystems.

In the last 18 months, with support from Radio Cornwall and local press, the project team have been gathering new records and have now confirmed over 30 records, identifying 3 different species at over 20 sites (Fig 3). One native species (*Microplana terrestris*) was found at the Cornwall College Newquay site near Newquay Zoo.

The project has worked alongside the Student Invasive Non-Native Group (SINNG) [www.sinng.org.uk] to raise awareness of invasive flatworms and we have identified a number of garden sites and school sites where flatworm activity can be monitored. To date, seven schools have been visited and have become involved in the project with Fowey Community College finding flatworms in their grounds on the day of our visit.

The next phase of the project is to work with our Applied Zoology degree students to investigate the impact of these invasive species on our native flatworms and on earthworms and molluscs. We are also planning some removal experiments and further distribution surveys to look at the pace of colonisation around known sites.

If anyone has any information about native or non-native species they'd like to share with us or records of flatworms in gardens or in the wild we'd be pleased to hear from you. If you do see anything like a flatworm, don't pick it up with bare hands, take a photograph instead and email to flatworms@cornwall.ac.uk along with your contact details, where the animal was found (and, if possible, an OS grid reference). Alternatively write to us at:

Flatworm Project, Cornwall College Newquay, Wildflower Lane, Trenance Gardens, Newquay TR7 2LZ with a description of what you found.

Andrew Smart & Elaine Roll, Cornwall College Newquay



Fig 1. *Kontikia ventrolineata* (20 – 30 mm)



Fig 2. *Austroplana sanguine* (70 - 120 mm)



Fig 3. Location of flatworm records generated or confirmed by project

SCIENCE FACTS

Did you Know...?

Fleas can jump 130 times higher than their own height.

In human terms this is equal to a 6ft. person jumping 780 ft. into the air.

Tegan Pedley Yr7 Pool Academy



FaME – Giving students industry experience

Falmouth Marine Enterprise (FaME) is an innovative programme that links industry partners and college students through live research projects in the second year of their foundation degree. It has developed from the industry's need for concrete evidence about the issues and solutions that affect them. With increasing economic pressure to improve performance, the industry needs to train and give experience to its future workforce. Also with increasing fees and fewer jobs, students need to be ready for the workplace from the offset. Matching these two factors has created the partnership, with practical industry projects linked directly to student research. Although the scheme started as an enterprise between Falmouth Harbour Commissioners and Falmouth Marine School the partnership today is open to all industries, students and academics.

The process starts with the development of student research proposals collaboratively with both industry and academic partners. A short outline proposal is put to a "Dragons' Den" style board where students have the opportunity to say why they would be the best person to carry out the research. Over the following months questions and ideas are discussed through correspondence and meetings. Findings are presented at a research day which provides the student with the opportunity to gain academic marks for their research.

One such student to experience the benefits of FaME was Kimara McCrindle:



Kimara McCrindle



Name: Kimara McCrindle

Age: 24

Course: FdSc Marine Science

Campus: Falmouth Marine School

Where are you from:

Penzance, Cornwall

Why did you apply to study with us?

I applied to study at Falmouth Marine School because I wanted to study marine science at degree level, without moving away from Cornwall. With such rich marine life and industry on my doorstep it seemed only natural to study marine science here.

What do you want to get out of the course?

I wanted to get a degree level qualification and I also wanted to gain as much practical experience as possible in the field to enable me to pursue a career in marine environmental conservation and management.

What do you enjoy most about your course?

Studying at Falmouth was a brilliant experience. The Marine School is smaller than the majority of universities so you get a far more personal experience, with knowledgeable, enthusiastic lecturers and the brilliant learning centre staff who will do all they can to help you with assignments and make you feel at home. The course content covered a range of ocean sciences including oceanography, marine biology, research methods and statistical analysis.

I then progressed onto the University of Plymouth for the third year of BSc Environmental Science, where I specialised in marine conservation. I feel the FdSc gave me a good understanding of marine science for my progression to the BSc.

What are you doing now?

I am currently working for Cornwall Inshore Fisheries and Conservation Authority (IFCA) as Scientific Officer. This role involves assisting the senior scientific officer in conducting surveys and producing reports to inform our management. I started in this position in April this year, since starting I have been involved in a vast range of activities including:

- Conducted a cockle survey on the River Camel, analysed the results using MapInfo and produced a report of the findings
- Shellfish monitoring and inspections at ports all around the county, in merchants (and even at the side of the road!)
- Witnessed a prosecution for the landing of undersized lobsters
- Assisted the police in a search for a missing diver at Dartmouth
- Taken part in sea patrols aboard Saint Piran
- Undertaken training in crane operating, sea survival, with more training courses booked
- Marine surveys aboard Kerwyn using the ROV as a drop down camera and side scan survey
- Taken part in a small fish survey on the Fal

Have you had work experience/volunteering as part of your course?

During my course we were encouraged to volunteer. While studying for my degree I volunteered at the National

Maritime Museum in Falmouth in the education department and Cornwall Sea Fisheries Committee with their biological monitoring. I also approached Marine Discovery, a marine wildlife watching ecotours company, where I was then employed for four years as a guide and crew on the boat.

My volunteering and work experience helped me to gain a range of practical experience including working on boats, communicating and interacting with the public, and survey skills. This, along with my degree qualification, was certainly a major contributing factor to me being a successful candidate for the Scientific Officer position at Cornwall IFCA.

What advice would you give to someone considering applying to the College to study at university-level?

Applying for the course is only the first stage. My advice would be:

- In your academic careers, push yourself and achieve the best results you can
- Use the colleges and universities as much as possible; take part in field trips, surveys, attend presentations and talks from outside organisations
- Volunteer and get practical experience, this will help to:
 - Gain experience for your CV
 - To aid in application process
 - Discover what you like and dislike

It is a very competitive sector so you need to make yourself stand out from the crowd and build up your CV as much as possible.

For more information on FaME visit www.fame.me.uk.

An African adventure: student trip of a lifetime

Eighteen students from Cornwall College Newquay were given an incredibly rare opportunity to take part in a nine-day trip to The Kruger National Park, South Africa this year. On top of amazing encounters with elephants, lions, leopards, buffalo, giraffes and zebras the group had exclusive access to, they also literally became hands-on with an endangered white rhino...

Trip co-coordinator and FdSc Animal Behaviour & Psychology Programme Manager, Robyn Silcock, explains more.

My grandfather once told me that Africa would steal a piece of my heart; that I'd never quite feel complete until my return...and as ever, granddad was right.

South Africa is an incredible country; the heat, the infectious music and strange tribal languages, the vibrant traditional costumes and smell of 'braais' and burning 'mealies'...it is a sensory overload for even the most seasoned traveller. But for me, as a conservationist and behaviourist, it is the rich biodiversity that leaves you astounded. Hence, when the opportunity arose to create a field expedition to South Africa, I felt obliged to share this amazing country with our students.

With two expert safari guides sharing over 18 years' worth of experience between them and a host of exciting research groups and conservation professionals on-board, we secured access to an exclusive part of The Greater Kruger National Park and we were good to go.

After one taster presentation to the students at college, we were fully booked and

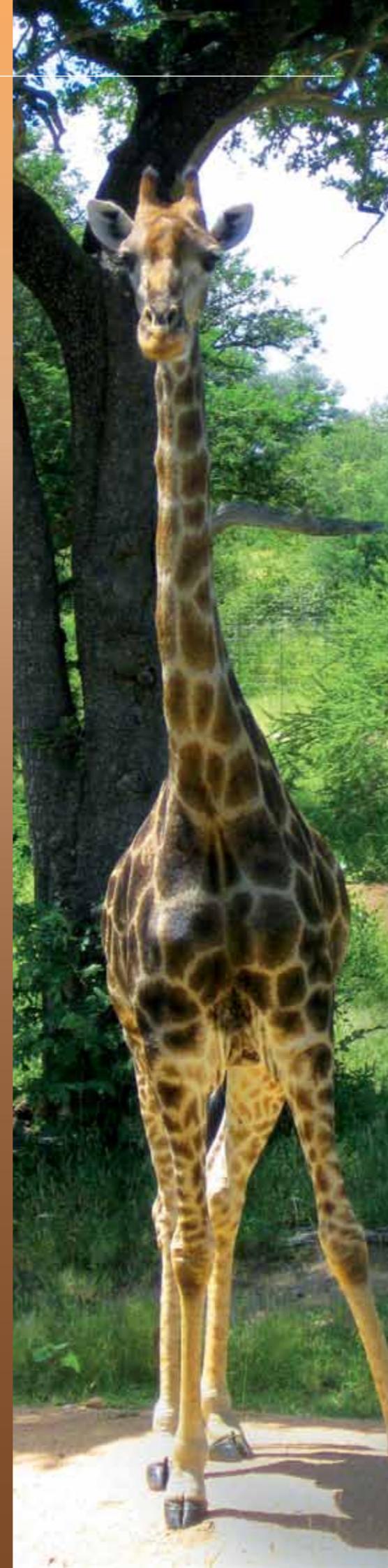
within 48 hours 18 lucky students had secured themselves a seat on the 'Student African Conservation Experience.'

On Saturday 15th February three staff and 18 students met up in Heathrow and by the Sunday, we found ourselves cooling off in a pool to the sound of woodland kingfishers and the sight of 12 giraffe sauntering by...this was going to be amazing.

Every day we ventured out on safari, sometimes in the morning and evening to increase our chance of seeing crepuscular (dawn and dusk active) creatures such as leopards. Sometimes we walked rather than drove. In-between flashes of impala and on one occasion an elephant and her calf, we became acquainted with beautiful dung beetles, edible fruits like the overtly-tangy marula and useful plants like the African wattle, a bush toilet-paper substitute!

Students were taught the art of tracking; picking up on subtle environmental indications that allow guides to find animals even in dense, thorny bushveld. Small, broken branches with just the bark taken off were indicative of an elephant passing by. A three-lobed or two-lobed foot-print and its positioning would allude to a felid or canid respectively as well as its sex and speed of movement. A small, clawed, smeared print near camp suggested that a honey badger had passed by just before the rain. All these skills form the basis of a FGASA Level 1 qualification and gave insight into a hidden world of tracks and signs.

Wednesday 19th saw one of the main focuses of our trip unfold; a rhino notching and micro-chipping event. There are less than 5,000 black and 2,000 white rhinos left in South Africa. Their plight is well documented but nevertheless worsening, so every effort taken to address their conservation is crucial.



The day began by students and guides leaving at 5am to track a new rhino bull that was in the area. Unfortunately he could not be found, but a new female was spotted instead. A small helicopter whizzed above us and quickly darted the female with a specific mixture of anaesthetics, enzymes and other drugs. Students then became involved with the whole process: pouring water over the blindfolded animal to keep her cool, taking her temperature, monitoring her breathing, administering eye-drops, taking DNA samples, micro-chipping and eventually providing the antidote to her sedative.

"I cannot begin to explain the emotions that took over during the rhino capture process: awe, fear, excitement, sadness, ecstasy. It was incredible to be hands-on with such an iconic, endangered

and wild animal. The look on the student's faces, the total silence because of concentration, the teary reaction of so many who understood the enormity of what they had just been part of, it was incredible and nothing will come close to that experience again," said Robyn.

Cameron Pearce, one of the two expert safari guides said: "After five days in Balule the students of Cornwall College have experienced the wonder of Africa's wildlife and culture first hand. The big five - lion, leopard, elephant, rhino and buffalo have graced them with their presence as well as icons such as giraffe and zebra. They have met people from different cultures and immersed themselves in the local lifestyle."

"The students have directly contributed to the protection of Africa's rhinos and assisted on one of the world's foremost conservation projects," added Robyn. "By undertaking this epic journey they have without doubt given themselves a distinctive advantage over other young people entering today's very competitive job market."

If you would like any more information, please join 'Student African Conservation Experience' on Facebook and send us a message.



INTERACTIVE GAME PLATFORMS

Since the early 70s games have been evolving and constantly changing with new technologies being made. The first ever coin-operated arcade machine was called Galaxy Game. In 1971 arcade games were a relatively new entertainment technology and as the first of its kind, it was quickly popularised within the community it was installed. Players would wait for up to an hour for their turn of the game. The game itself is a re-programmed version of the game Spacewar. The name was changed to Galaxy Game because at the time people were sensitive to the use of the word "war" and could be offended. Today the machine has been loaned to Google and sits in their Googleplex as a display and gameplay item.

As games became more popular, more and more companies emerged trying to make many different arcade games. Soon, arcade games became widely available at home as game consoles. One of the most popular early home consoles was the Atari 2600 that was released in 1977. The Atar

2600 had a lot of new features that led to technological advancements. For example it was one of the first home consoles to feature removable game cartridges and made cartridges a popular feature for later consoles. It also made removable controllers and it even had wireless controllers. Atari was definitely ahead of their time. The Atari 2600 was the main console on the market having sold over 30 million consoles. To date, the Atari 2600 has over 400 games in its library. Some of the Atari's most popular games included:

- Space Invaders
- E.T
- Kaboom
- Demon Attack
- River Raid
- Missile Command
- Adventure
- Pitfall
- Atlantis
- Pacman

Although the Atari 2600 had a lot of popular games, not all of them were as popular. For example, E.T was one of the best-selling games on the Atari 2600, but it received bad reviews. People thought the game was so bad that a myth evolved

that all the unsold E.T cartridges were actually buried. E.T is considered by many to be the worst video game of all time. Overall, the Atari 2600 was a very good console at the time and consoles today wouldn't be the same without it.

One of the most popular games console to follow the Atari 2600 and the games crash of 1983 was the Nintendo Entertainment System (NES). The NES was released in 1983 and it quickly became popular and still is with over 60 million sold to date. This new system had a lot of new hardware meaning that the games were graphically improved and that games were changed completely. Instead of games being about who can get the highest score they now had storylines with many completion stages and different characters to defeat throughout the levels.

The NES was one of the top consoles at the time, alongside the Sega Mega Drive/Genesis. Although the consoles were in steady competition, the console

wars came down to one simple fact, the NES was 8-bit (processor) and the Mega Drive was 16-bit. This meant the Sega Mega Drive was capable of much better graphics. Even though the NES was 8-bit it still had some of the most popular game franchises of all time, such as Super Mario Bros. As well as the great game franchises the NES also had a lot of console add-ons. The most popular add-on was the Zapper or more popularly known as the Light Gun, but not all NES accessories were as popular, namely the Power Glove. The user would control the game with the glove instead of a typical controller. While the idea of it was innovative and ambitious for its time it was poorly executed. The Power Glove (it would be great if you could include a picture of this please) was criticized for being imprecise and difficult to use and only two games were released specifically for the power glove: Super Glove Ball and Bad Street Brawler. Aside from this the NES was a massive success and houses over 700 games in its library to date.

Today, there are many gaming platforms to choose from: PC, console, handheld (Android, PSP etc.) and websites (flash games). PCs and consoles are still the most popular and the developments in peripherals, such as the Kinect, have taken them beyond gaming. The Xbox controllers have also been used by the military for flying unmanned drones. The cameras and motion sensors are used for running simulations in training programmes and for learning real life skills, like flight simulations. The ability to connect consoles to the internet also allows users to communicate face to face on a global scale.

**Article written by Cagakan Zorba,
Creative Media Production BTEC
Level 3 student**

1972
Introduction of the Magnavox Odyssey, a home gaming system

1983
The release of Nintendo's NES console in Japan

1986
The release of the Sega Master System

1988
Sega releases its most successful console – the Mega Drive/Genesis

1991
Sega releases one of its most popular games – Sonic the Hedgehog

1990 - 1992
The SNES (Super Nintendo Entertainment) was released

1994
Sony's first console is released – the PlayStation

1996
Nintendo released the Nintendo 64

2000
Sony makes its next big release with the Playstation 2

2001
The GameCube was released, Nintendo's first console to feature the up-to-date disk technology

2001
Microsoft releases its first console, a sixth generation console, The Xbox

2005
Microsoft follows the Xbox with the Xbox 360

2006
The Nintendo Wii was released

2006
The Playstation 3 was released

2010
Microsoft released the Kinect

2013
Microsoft launches its Xbox One and Sony launches its Playstation 4

Stephanie Flanders, Creative Media Production BTEC Level 3 student

Thousands of school children race at regional Greenpower event



The sun was shining for two days of motoring mayhem at Newquay Cornwall Airport as 2,000 school children took part in this year's Cornwall College Greenpower electric car races.

The regional heat of the national education programme, now in its seventh year in Cornwall, saw almost 100 schools on the track during Wednesday 18th and Thursday 19th June racing cars which they had designed and built from scratch.

The Greenpower Education Trust promotes sustainable engineering to young people, giving them the opportunity to design and construct electric cars, alongside engaging sponsors, sourcing resources and gaining the support needed to make their designs come alive. The challenging project incorporates maths, engineering, physics, design, marketing, team building, technology, problem solving & communication.

The South West heat is by far the biggest in the UK, incorporating almost half of Cornwall's primary school and nearly all of its secondary schools, as well as schools from Devon and further afield. Teams are supported by employers and industry specialists from across the region and nationally; this year St Mawes Primary received backing from racing giants Aston Martin.

Almost 70 cars from primary schools in the region took to the track ready to get racing on day one of the event. Children competed in the 'Goblin Formula' event where each school is supplied with a kit car which has to be built by the team in the months leading up to race day. Cars are then entered into various categories for the chance of winning a Greenpower award.

Overall winners of the Goblin event were Mylor Bridge School who came first in the slalom and received the award for best presented team.

Joel Armstrong, 9 from St Columb Minor Academy, said: "The event's been really good. I enjoyed the main racing, especially the sprint in the afternoon with all the cars on the track seeing them zooming by. I also liked watching the display from the Fire Service with their water blasters!"

Secondary schools and youth organisations competed on day two of the Greenpower event to race their Formula 24 cars. The growing interest within Cornwall and Devon led to a greater competitive atmosphere with 20 cars on the track; not all fronted by secondary schools. Young people joined Falmouth's community police team to form the Falmouth Cop Car Project and Falmouth Fire Station entered the Falmouth Fast Fire Engine with local teenagers. Hundreds of eager students were up against each other in two 90 minute endurance races around a specially designed track on the airfield in cars built up from scratch with only an electric engine and batteries supplied.



Two winners emerged from the F24 heat after two races. Team Raptor Fusion from Penair School won race one, closely followed by Plymouth High School for Girls and Bideford College. Plymouth High School for Girls' Team Hummingbird claimed the title in race two with Richard Lander Racing and Penair's Raptor Fusion in second and third.

The overall winners of the F24 competition will go on to race at the national final, to be held at the famous Goodwood Motor Circuit, West Sussex later this year.

Co-organiser Rachel Penhaligon said: "Since Cornwall College introduced Greenpower to the county seven years ago the project has built momentum and is now a permanent fixture in the calendars of the region's schools. With employer support strong, the South West heat is a shining example of Greenpower at its best, combining education and industry."

The event also encouraged pupils with all learning abilities to engage with hands-on activities including, science, technology, engineering and mathematics (STEM). A science and technology fair ran alongside the main events where children had the chance to take part in various experiments using

@Bristol science kits, as well as take part in a solar car challenge, building miniature solar-powered cars and racing them against each other.

Mike Howell, Development Manager for the Greenpower Education Trust, commented: "The South West heat is our biggest regional heat; three times bigger than other events. It's great to see the progression of children who start the project in primary schools and go on to join teams in their secondary schools. Cornwall College has supported us for the last seven years and because of that this heat has become our flagship event."

Amarjit Basi, Principal and CEO of The Cornwall College Group, said: "Greenpower exemplifies what The Cornwall College Group is all about; Making Learning Work. We are proud of our partnerships with the pupils, parents, teachers and industry experts involved in this scheme. We work together to achieve not just a result when the car crosses the finish line on race day, but an ongoing interest in engineering and technology that we know can create careers in those industries, supporting the economy in the region."

SCIENCE FACTS

Colossal Computers

Early electronic computers, developed around the 1940s, were the size of a large room and consumed huge amounts of electricity. They were vastly different to the modern computers we use today, especially when compared to small and portable laptops and tablets.

Alfie Baker Yr7 Pool Academy





Could your business benefit from a Nuffield research placement?

Think back to when you were 17. What did you know about scientific research as a career? How did you get where you are today? It's likely there were key individuals and experiences that motivated and inspired you, and it's those experiences that we want to give to young people through our Nuffield Research Placements.

Nuffield Research Placements give sixth form students hands-on experience of a professional research environment through a four - six week placement in their summer holidays.

The programme is run by the Nuffield Foundation and works through regional networks to link talented students with organisations undertaking research. We work with over 200 different organisations including universities, commercial companies, voluntary organisations and research institutes.

By working with professional researchers, students gain an insight into a wide variety of science, technology, engineering and maths (STEM) careers. By providing a placement, your organisation can give someone a life-changing opportunity that will help transform them into a future scientist.

What to do next if you're interested in becoming a project provider

Take a look at the website www.nuffieldfoundation.org/nuffield-research-placements or contact your local Nuffield Co-ordinator, Rachel Delourme, for more details rdelourme@cornwall.gov.uk.

If you decide to offer a project, your local co-ordinator will register you on our online system, where you will be able to enter details about your project (e.g. a description of the proposed work, dates you are available to supervise a student etc.). **Please note you are not able to register yourself on the system;** this must be done by your local coordinator.

If you are interested in becoming involved in the scheme on a national level, please contact nrp@nuffieldfoundation.org



Student in focus

**Julie Heard, Duchy College Stoke Climsland (2010-13),
BSc Rural Business Management and FdSc Food Studies**

Working as: Specifications Technologist at Tamar Foods

In a nutshell: My job is to complete product specifications for new and existing food products that are destined for the major supermarket shelves and in homes and kitchens in the UK.

Why food technology?
I love the diversity of food and how it influences everything in our lives.

A technologist in the making?
I completed a diploma in home economics originally and went on to work in NPD (new product development) in a variety of roles before having my family.

I then enrolled on a three-year food science degree at Duchy College via Plymouth University. I wanted a course that would equip me with the skills needed to get a job in today's food manufacturing industry. The course was a good mix of science, food science, technology and involved process and product development, plus a lot of practical hands-on experience. The majority of the teaching staff have worked in the food industry and maintain very strong links with local food manufacturers in the West Country, which provides further

opportunities to experience the diversity of the food industry through visits and placements.

What is involved in your current role?
I work for Tamar Foods which is part of the Samworth Brothers group as a Specification Technologist. We produce savoury pies, pasties and sausage rolls for the supermarkets. The main part of my job is to undertake the completion of food specifications for the major retailers that we supply. This consists of completion of customer specifications for all NPD and EPD (existing product development) projects in the business using the company project management process. Specification generation is via retailer web-based systems (TTL, CORE).

Part of the role also involves checking and approving customer product labels and artwork.

The other responsibilities of the role are ensuring all product developments meet customer, legal and food safety requirements, and all new products are transferred to operations with a capable process. It is important also to maintain a comprehensive understanding of legal, food safety and labelling changes. It's definitely a challenging job. Career progression could lead into process development or the broad area of managing quality systems.

Some of the skills you need?

Communication skills are so important in this job. I have to work with people in the factory who have a world of knowledge about how things work and with people in commercial, administration and marketing, as well as our ingredient suppliers. You need to get along with a lot of different people in this job.

If you're a problem solver, good at the sciences and able to think outside the box then you'll enjoy this job. Attention to detail is important as specifications are legal documents and influence the success or failure of the product.

Advice for others

Having a real thirst for knowledge and a passion for what you work on is very helpful. Read up on all sorts of subjects because being a bit of a 'jack of all trades' is what being a technologist is all about. Work hard at all levels of your education because even if you can't see the relevance of it at the time, it's all useful.

Last but not least: Never stop learning!

DOLPhin fins are like human faces



SCIENCE FACTS

Wildlife Wonders

Elephants don't drink through their trunks but they do use them to suck up water and bring it to their mouths.

Louise Smitham Yr7 Pool Academy



A marine science student in Cornwall has been inundated with amazing images of dolphins off the coast of the county to aid her research into these majestic mammals.

Stefanie Krafft, a Marine Science foundation degree student at Falmouth Marine School, has paired up with Penzance-based sea safari tour operator Marine Discovery for her final year project.

As part of the degree programme students are required to undertake a research project related to their studies. In September 2012, using a similar format to 'Dragons' Den', second year degree students pitched their project ideas to a panel of industry experts, who advised the students on the feasibility of their projects and offered mentoring and industry expertise.

Stefanie proposed an investigative study into the distribution and behaviour of bottlenose dolphins in Cornwall. On the panel was former Falmouth Marine School student Kimara McCrindle, who secured a job with the Inshore Fisheries and Conservation Authority upon completion of her course. Kimara conducted a similar study for her end of year project and suggested that Stefanie contacted Marine Discovery in Penzance. (Read about Kimara's experience on page 10)

Stefanie from Kent said: "I'm really excited to be working with Marine Discovery; they provide me with data on where sightings have occurred so I can plot them on a GIS (Geographic Information System) map which will help plan trips for sightings and assist with the identification of hotspots for particular behaviour."

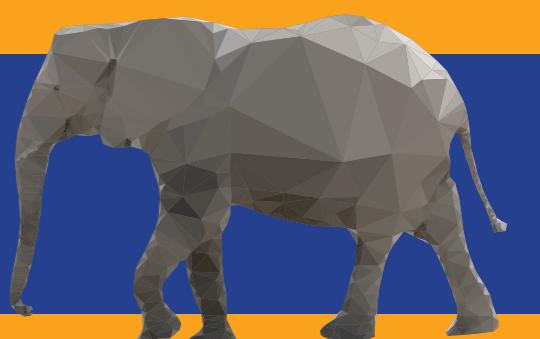
Stefanie continues: "The support from industry has been phenomenal; I have received hundreds of images of dolphins spotted around the coast of Cornwall for the second part of my project which is fin identification. Dolphin fins are like human faces, unique to that individual. I will be producing a catalogue of these for future data collection."

Hannah Jones from Marine Discovery said: "Falmouth Marine School produces high quality students with research skills to match. The Marine Science students are researching local marine issues so it's very useful to us. The work they are doing is something that we have been trying to find the time to do for a long while but with a business to run this can be very difficult. Stefanie will produce detailed maps of sightings that highlight behaviour hotspots such as feeding areas; this will help us to plan our trips."

The projects, which are sponsored by the Falmouth Harbour Commissioners, will count towards the students' final grades for their degree course through the Falmouth Marine Enterprise project (FaME). FaME is a partnership programme developed as a result of the industry's need for concrete evidence about issues and solutions that affect it and the students need to be ready for the workplace from the offset. Matching these two factors has created the Falmouth Marine Enterprise partnership, where practical industry projects are linked directly to student research. Other businesses that have also supported the project are Cornwall Wildlife Trust and Newquay Atlantic Divers.

Dr Claire Eatock, Programme Manager, said: "The importance of researching current issues and interacting with the business community is a vital developmental element of the degree-level programme. The projects provide the students with the opportunity to demonstrate their own research specialities and to experience presenting and communicating within a real business context in preparation for their future careers."

If you would like to know more about Falmouth Marine Enterprise visit: www.fame.me.uk.



Is cattle grazing beneficial in the management of lowland heaths?



Philippa Smith, a Research Masters student from Duchy College, is working in the lab and out on Pebblebed Heaths, East Devon to find out if cattle grazing is beneficial in the management of lowland heaths.

Although her research is limited to one site, she hopes that the techniques that she is using and her results will help improve current management techniques and future research programmes. Philippa, pictured left out on East Devon's Pebblebed Heath, tells us a bit more about herself and her research.

Who is Philippa Smith?

I am a part-time, mature student undertaking a Research Masters programme (ResM) while working as a biology teacher in Exeter. Although I graduated from Plymouth University in 2001 I still have a deep passion for ecology and conservation. Therefore, I started searching for a suitable master's

course last July and quickly found opportunities at Duchy College. A number of ResM titles were advertised but the project focusing on whether cattle grazing is beneficial to the management of the Pebblebed lowland heaths, East Devon, really captivated my enthusiasm for undertaking a research degree. I have also been awarded a European Social Fund bursary for the majority of my course fees.

What are lowland heaths?

Lowland heath is comprised of a number of different habitats such as scrub, dry heath, wet heath, and mire. These habitats are important for biodiversity and supporting many priority plant and animal species. For example, Dartford warblers, nightjars, southern damselflies and marsh gentians. Therefore, it is an ecosystem that needs to be protected and managed. Lowland heath is a cultural landscape that was shaped by anthropogenic (also known as human) activity as far back as 4,000 years ago (Lake et al., 2001).

As a result of agricultural practices having become intensive, heath is no longer managed through the collection of wood, turf cutting or indeed grazing (Harrison, 1976; Smith et al., 1991; Lake et al., 2001). Therefore, the management of lowland heath lies with estate owners, conservation groups and the government organisation, English Nature. The conservation and management of lowland heath is challenging due

to the heterogeneous structure of the landscape. One such management method, currently endorsed by the government organisation, Natural England (2002), is the use of cattle to graze the heath. However, limited studies have been carried out on lowland heath to investigate the effect of cattle grazing and whether it is a useful management strategy.

What information will you gather and how?

Due to the limited number and scope of studies, one focus of my research is to design a rigorous protocol that encompasses baseline monitoring, replicate plots, and repeated data over a suitable time period, which was also suggested by Newton et al., (2009) in a recent systematic review of the literature available in this field.

Lowland heaths can be home to a wide range of rare and beautiful plants and animals, such as the Heath Spotted-orchid (*Dactylorhiza maculata*) pictured RIGHT. My project involves carrying out an extensive botanical survey of four lowland heath habitats: dry heath, wet heath, mire and scrub. Twenty 2 x 2m quadrats will be selected at random to survey each of the four habitats. The survey will be carried out once in early June and then in early October during 2014 and 2015. A ten strong herd of Devon Ruby Reds will be released on to Bicton Common, East Devon during May 2015. The spatial and temporal movements of this herd will be identified through the use of GPS

(Global Positioning Satellite) collars which will be set to take readings every ten minutes until October 2015, when they will be taken off the common. Global Information System (GIS) software will be used to summarise the spatial distribution of vegetation and cattle.

How will your research impact upon the 'real world'?

The project is carried out in conjunction with Devon Clinton Estates, under the guidance of Dr Sam Bridgewater (Conservation Manager), Dr Jurie Intachat (Duchy College) and Dr Steve Burchett (Plymouth University). I hope that this project will add evidence to the ongoing debate in conservation ecology and therefore, be relevant to the work of the Wildlife Trusts, the European Heathland Network and landowners. Additionally, the protocol also has the potential to be used to study other heath (lowland and upland). Current studies largely focus on sheep but the protocol

developed through this project will enable researchers to assess the impact of grazing by other ruminants.

Why a research degree rather than a taught course?

Predominantly, I love the freedom of being able to direct the development of the project and being responsible for its evolution. I also like the fact that my project includes a large amount of fieldwork and that I am not constrained to an office.

As with any research, there are differences in opinions found within the relevant literature and, of course, my supervisory network. However, this adds to the stimulating nature of research. I have been very lucky in that I have been assigned three superb supervisors who continue to challenge my thoughts while being both supportive and encouraging. I cannot emphasise enough the importance of building a strong network of professional specialists. I have been lucky enough, through my supervisors, to forge links with Professor Adrian Newton of Bournemouth University, who has been willing to act as an additional advisor. I have also been introduced to professional botanist Lesley Kerry who has a number of colleagues that are experienced bryologists and lichenologists, whom are all willing to help me further develop my identification skills. I recently received an exciting email containing a zip file of historical data from the RSPB manager at Aylesbeare Common, asking me if I could either use the data for my project or,

whether I could analyse the data and help write a report for the organisation. I have never anticipated being asked for help!

Although I am officially a Duchy College student, I am also affiliated to Plymouth University and can therefore, make full use of the facilities at both campuses. Shaun Lewin from the Geomapping Department at Plymouth has been great and has provided me with access to an ESRI ArcGIS Desktop online course as well as, one to one tutorials. In addition, I have met with Elo se Sentito from Learning Development to seek advice as to how best to improve my written communication. The learning support tutorials were excellent and Elo se has really helped me think much more creatively while still focusing on being critical. It is the wide variety of support and facilities offered by the Postgraduate School that makes studying simple.

Where will this take you and your career?

Over the next few months, not only will I be focusing on my fieldwork but also preparing an application to present a poster at the Student Conference on Conservation Science, University of Cambridge that will be held during March 2015. I am really excited by my research and hope to co-write at least two research papers with my supervisors and make further contacts in the scientific community. My long term aim is to present my findings at a European Heathland Network biannual conference.



Latest Bloodhound news

Andy Green's 1,000mph office revealed

On 13th June we unveiled the cockpit of BLOODHOUND SSC. The state-of-the-art carbon fibre monocoque has been tailored to the needs of driver Andy Green and will be his supersonic office during record attempts in the South African desert in 2015 and 2016.

Hand crafted by URT Group, the monocoque has taken more than 10,000 hours to design and manufacture.

Andy has drawn on his experience of flying fast jets and driving World Land Speed Record winners to design the dashboard and cockpit layout. Good ergonomics are vital given that BLOODHOUND SSC will cover a mile in 3.6 seconds, or 150m in the (300 millisecond) blink of an eye.

BLOODHOUND's dash also features two precision-engineered analogue Rolex instruments: a chronograph with built-in stopwatch, and a speedometer graduated up to 1,100mph (1,770km/h). The speedometer is a vital back-up to allow the car to be stopped safely should the digital dashboard fail, while the chronograph will help to time the start-up and cool-down of the jet and help to monitor the performance of other systems.

Fans Challenge for world record with giant K'NEX replica

Supporters of The BLOODHOUND Project, the UK's 1,000mph World Land Speed Record challengers, have set their sights on a world record of their own. Work begins now on the construction of a life-sized replica of the BLOODHOUND Supersonic Car made entirely of K'NEX® toy construction pieces. Construction is being carried out by a Royal British Legion Industries team including ex-servicemen and women and is scheduled for completion in September. The resulting creation is set to be the world's largest K'NEX structure, with an estimated 300,000 parts required to build the 13.5metre long vehicle.



Swift project taking flight...



In issue four of the STEM Journal we heard how CUBE, a student led conservation group, were monitoring swifts in Cornwall to ascertain the spread and density of the population. During the past months the group has undergone rebranding and is now known as SUBiG, which stands for Student Urban Biodiversity Group.

The article highlighted the plight of the swift whose specific nesting needs

are thwarted by modern building techniques which is contributing to the 47% decline in the population. Not only have SUBiG got a new identity, but they were also successful in their application for funding to support the installation of 20 nesting boxes. The boxes are made of recycled plastic and are located on the Trelawney building at Cornwall College's Camborne campus and monitoring is already underway. Stay tuned for further updates!

Quiz

Questions:

1. In terms of computing, what does CPU stand for?
2. What is 65 – 43?
3. What is the largest planet in the Solar System?
4. Which is hotter, the centre of the earth or surface of the sun?
5. True or false? A convex shape curves outwards?
6. In terms of electricity, what does DC stand for?
7. True or false? Nintendo was founded after the year 1900?
8. Electric resistance is typically measured in what units?
9. What is the hottest planet in the Solar System?
10. The wire inside an electric bulb is known as the what?
11. What do you call molten rock before it has erupted?
12. A person who studies physics is known as a?

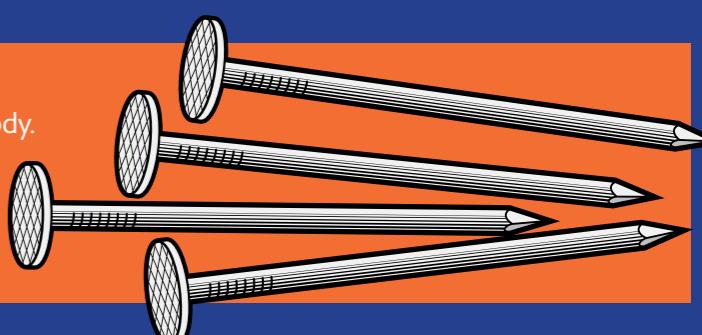
All answers on the back page

SCIENCE FACTS

Fascinating Physiology

There are 62,000 miles of blood vessels in the human body. End to end they would circle the earth 2.5 times and the average human body contains enough iron to make a 3inch nail.

Abi Yr. 7 Pool Academy



Future medics ethics conference

The Atlantic Consortium (Treviglas Community College, Newquay Tretherras School, Wadebridge School and Cornwall College) recently hosted an Ethics Conference for their Future Medics.

The Atlantic Future Medics scheme in partnership with University of Exeter Medical School is designed to provide students who are interested in a career in the medical profession opportunities and guidance.

Students were supported by numerous people from the University of Exeter Medical School including: Dr Julie Thacker (Hospital Sub Dean), Dr Ian Fussell (Community Sub Dean), Lorna Pengelly (Student Support) and Craig Lunt (Final Year Medical Student).

During the day the students considered ethical dilemmas that doctors may face, for example whether or not to carry out a risky transplant operation using a live donor. The facts of the case were carefully examined then debated using different ethical frameworks. The students worked as a team to construct their argument and present it to the audience.



Fascinating Physiology

There are 300 bones in a child's body but only 206 in an adult's body. This is because some bones fuse together as the child grows.

Amy O'Sullivan Yr7 Pool Academy



MAKE YOUR OWN HONEYCOMB TOFFEE

You will need

4 dessert spoons granulated sugar
2 dessert spoons syrup
1/4 teaspoon bicarbonate of soda
Saucepan

Method

Measure the sugar and syrup into a pan and stir over a medium heat. What happens to the sugar?

When the sugar has completely dissolved, bring the mixture to the boil and let it bubble until the mixture turns dark brown. Why has the colour changed?

Add 1/4 teaspoon of bicarbonate of soda. What happens to the mixture? Allow to froth while stirring out any lumps. Pour onto a baking tray and allow to cool. What happens to the mixture as it cools down?

Challenge

What other sweets could you make by altering the properties of sugar?

Design a gift box for your toffee.

The Science

Explore the changing properties of materials caused by heating and cooling:

Heating the syrup and the sugar together causes the sugar to dissolve into the syrup mixture.

As the mixture comes to the boil it starts to oxidize causing the colour change. When the bicarbonate of soda is added the mixture starts to froth. This is because gas is being created and released forming bubbles within the toffee mixture. As the toffee sets the bubbles leave pockets of air inside the toffee, creating the honeycomb texture. When you pour the mixture into the tray it begins to cool. As it cools it begins to harden and form the solid (and brittle) toffee.

Weird Water

Above 4 °C, water expands when heated and contracts when cooled. But between 4 °C and 0 °C it does the opposite, contracting when heated and expanding when cooled.

Jack Broughal, Yr. 7 Pool Academy



Alumni in focus

Meet Benjamin White, Director of Studies, Mathematics at Magdalen College School

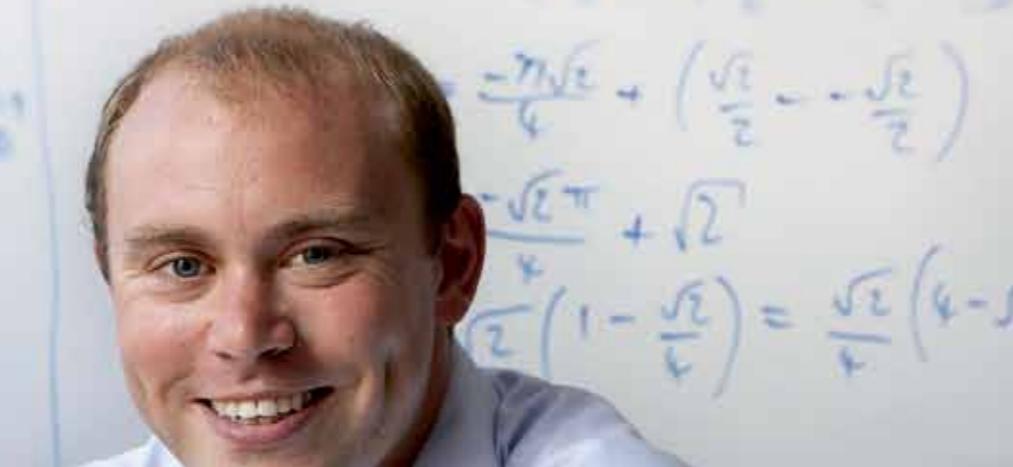
Ben White, 29, originally from Fowey, studied maths, further maths, English Language & Literature and French at the St Austell campus leaving in 2003 with A grades in all of his subjects. With a passion and skill for maths, Ben headed to Corpus Christi College Oxford to read Mathematics where he achieved an amazing first-class degree.

Ben explained: "I had some fantastic teachers and engaging small classes at the College, the maths teaching I received was excellent and clearly helped me to get into Oxford. The work ethic I developed at college has helped throughout my degree and job."

In 2003 the College interviewed Ben, after receiving his A-level results, about his hopes and aspirations revealing

his aim was to get a good degree and combine a successful job with having a great time. Eleven years later it is clear that Ben set himself realistic goals and has achieved these and much more with hard work and determination.

He continued: "The key is to study what you enjoy at college and then work really hard. I enjoyed studying and the teachers I encountered at Fowey and St Austell so this has been a motivating factor when moving into teaching as a career."



"After studying maths at Corpus Christi Oxford I stayed in the city and went straight into a job teaching maths at Magdalen College School, one of the country's leading schools. Since working at Magdalen, I have taken on various roles: Housemaster, Deputy Head of Sixth Form and now Director of Studies. It's a great job as the students really challenge and push you academically. I still even have my A-level notes in my classroom in case I ever need to refer to them!"

Classic Air Force



Ray Hocking is a volunteer with Classic Air Force (CAF) and like a number of his fellow volunteers he is an ex-aircraft engineer from the fleet air army. It was his passion for flight and the vintage aircrafts, many of which he used to maintain during their 'hay-day', that brought him to support the Trust.

Established in 2012 by Mike Collett, the Classic Aircraft Trust was formed with the aim of preserving a unique collection of airworthy aircraft of the UK's post-war era. These aircraft were previously owned by Air Atlantique and are now operating as Classic Air Force. Unlike many other aircraft museums, around 90% of the aircraft on display are flight ready and some are used quite regularly and can even be booked for pleasure flights from their base at RAF St Mawgan. Their collection has continued to grow and they now have over 600 models in their collection. With a further 500 to be donated they anticipate their collection will become the largest model collection in the UK.

Ray showed off just some of the exhibits at the museum which includes cross sections of a classic propeller engine and a modern jet engines similar to the EJ200 used in the Bloodhound

Super Sonic Car. Part of the museum tour includes access to the interior of some of their exhibition planes and for the more nimble visitors you may even be allowed to climb into the cockpit! Richard Parr, Manager for Newquay, explains "Education, preservation and inspiration are our key aims, combined with an entertaining and interactive experience. Being able to see, and in some cases touch the exhibits, makes learning about how the technology works much easier and more fun."

Their involvement in education extends beyond the museum hanger and visitors centre to support local air cadets groups and working with Aeronautic Engineering students from Cornwall College. The CAF volunteers provide advice and guidance to both groups to learn about the principals of flight and aviation engineering, and they are able to observe repairs on live aircraft. Aeronautic students are also able to support engineers carrying out maintenance on the museums grounded (non-flying) aircraft.

You can read their blog, find out what aircraft they are currently working on, or check their opening times by visiting their website: www.classicairforce.com.

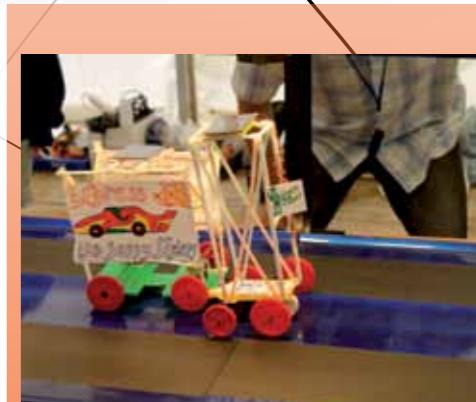
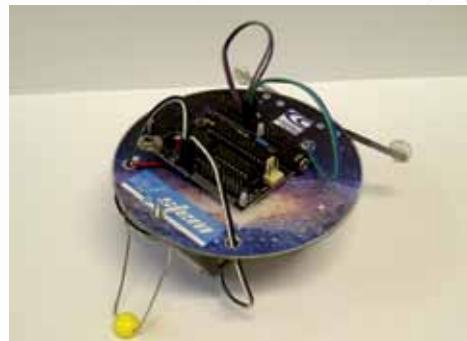
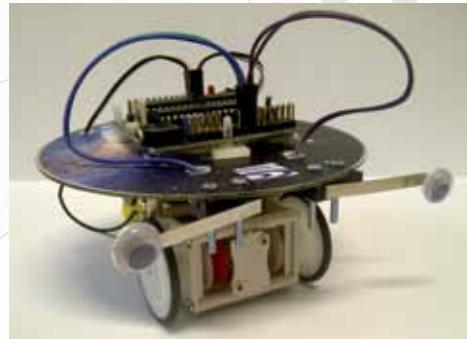
SCIENCE FACTS

Wildlife Wonders

Crocodiles cannot stick their tongues out.
Stephanie Perry Yr. 7 Pool Academy



STEM update from across the Cornwall College Group



As the new academic year begins I've taken time to reflect on what a busy and exciting year it has been for The Cornwall College Group. STEM Lab on Loan kit and other activities across the South West.

The year kicked off with Future Medics Introduction Conference for students interested in becoming a doctor or dentist (page 24) followed by a training session for teachers on our new Programmable Robots. The robots shown HERE are available to borrow to support learning about computer programming. They can either find their way around a maze or create a dance routine to your favourite song (check out the dancing robots video at facebook.com/ccstem).

In spring term the College's F1 in Schools kit formed a drop down day for students of Poltair School. Several members of our technology and engineering department joined The Cornwall College Group STEM team to support Poltair's Year 7 students design and build cars to race using 8gram compressed CO₂ canisters. Each team were given a set of brain teasers based around the science, technology, engineering and mathematics used in designing and racing Formula 1 cars. Teams had just three hours to answer their questions and model their cars before racing them head to head down the 25m track shown HERE to ear shattering cheers.

National Science and Engineering Week was a really busy time for the Lab on Loan kits, starting off the week at Redruth School with the Solar Car Challenge, followed by programming our robots to make their way around the maze and finishing with Year 10's carrying out electrophoresis with our DNA Fingerprinting kit. With support from our student ambassadors, we then joined Truro High School for Girls for a further two days of activities. On the first day they invited local primary schools in to join in with our Bloodhound Land Speed Cars which you can see HERE, they got really stuck into building. On day two the Year 9 girls took on the Solar Car Challenge learning about different wiring techniques and the importance of good electrical connections and team work.

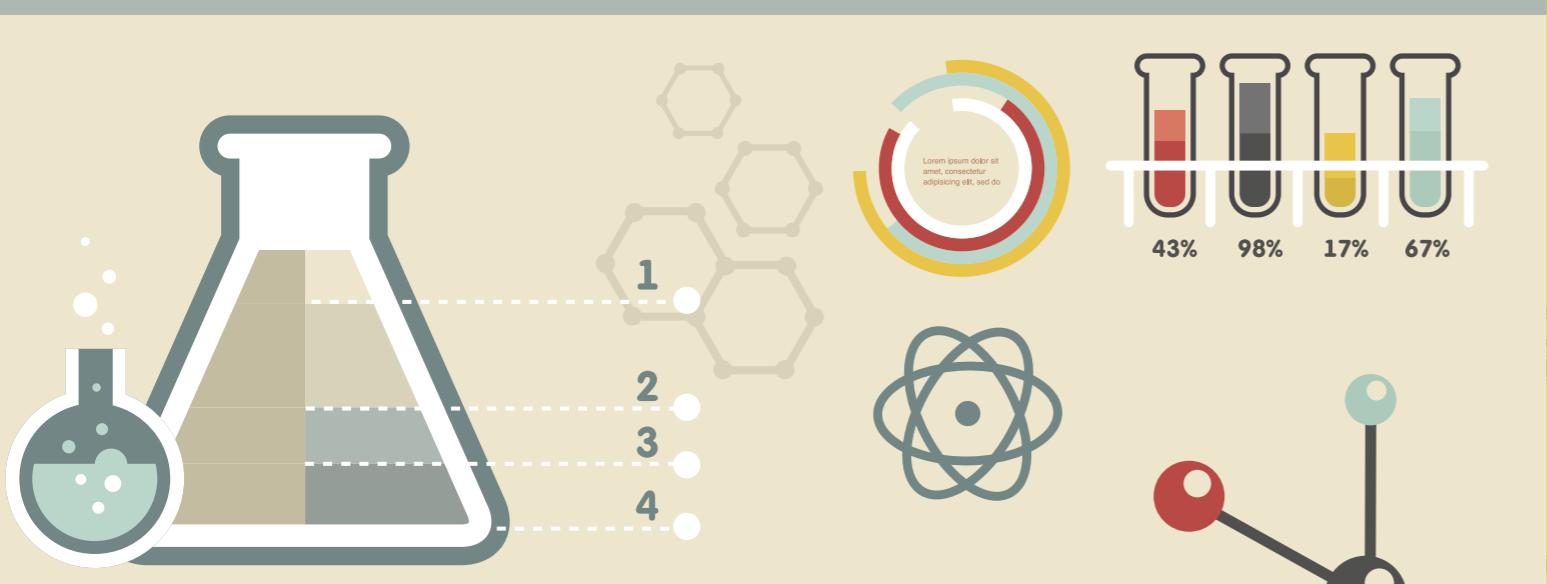
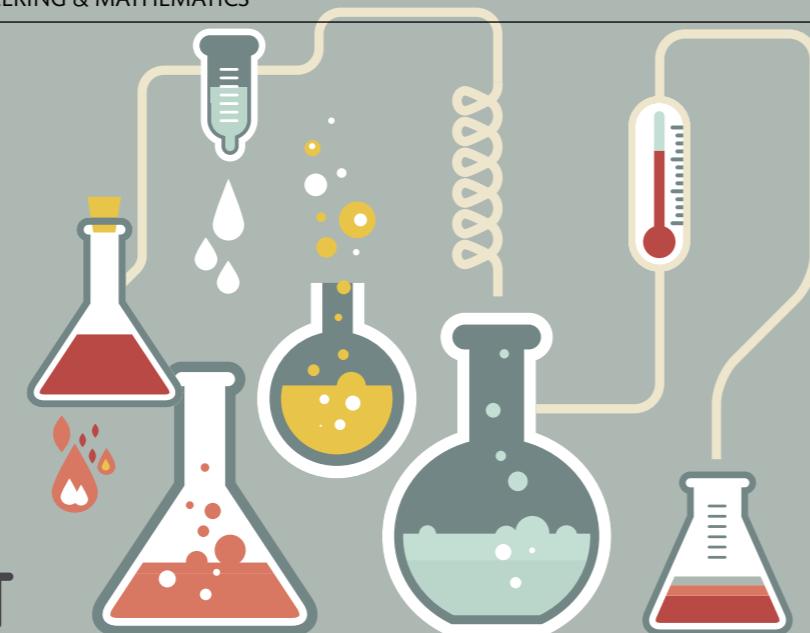
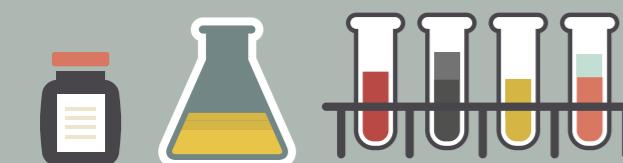
Greenpower, covered on page 14 and 15, was another major success as the STEM tent was packed with even more activities than before. This year saw the addition of Falmouth Marine School demonstrating knot tying and explaining how boats stay afloat, even more live and interactive science demonstrations from our chemist Chris, 'have-a-go' paint spraying table from the Bodyshop team in Camborne and lots of creepy crawlies with SINNG. The Pneumatic Cars were literally flying down the track on primary day. Over 70 entrants took part with the team 'Stithian's Stars' achieving winning speed of 722mph (that is if they were scaled up to the size of Bloodhound SSC of course) for which they each received bronze membership to the Bloodhound 1K Club, courtesy of BSSC.

On day two of Greenpower the secondary schools took part in the Solar Car Challenge. All teams managed to complete their cars in a wide array of designs and finishes and went through the races to compete on our newly upgraded track (courtesy of our Automotive Body Shop department) for a selection of prizes. Cars were marked on design, race time and functionality, with first prize going to 'Solar Flares' from Truro High School for Girls who received micro HD video cameras with waterproof covers. Truro High School took both first and second place this year, closely followed by Plymouth High in third place.

If you would like to know more about the Lab on Loan kit, check availability, or make a booking for your school, drop me an email: stem@cornwall.ac.uk.

CHEMISTRY AT WORK 2014

TUESDAY 21ST OCTOBER
CORNWALL COLLEGE CAMBORNE



RSC Chemistry at Work is a day long event.

Children take part in hands on workshops. Learning about how Chemistry is used in real life - including some surprising areas.

Suitable for Primary years 5 + 6, Secondary years 7 + 8.

Find out about the Chemistry of:

- Food
- Fire
- Waste
- Forensics
- Humans
- Engineering & lots more

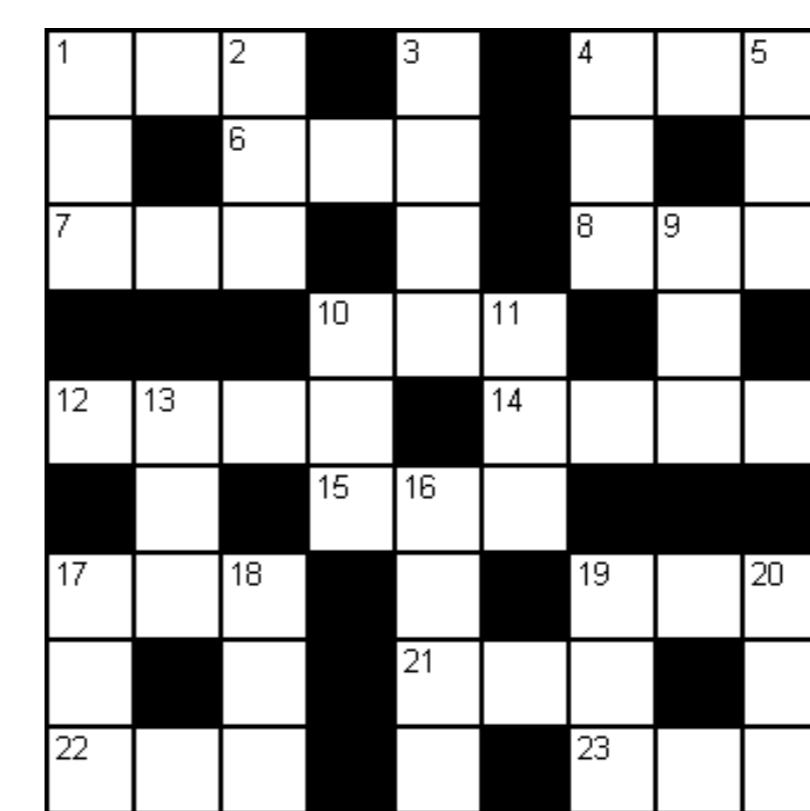
To book contact:

Rachel Delourme, Cornwall Learning
STEM Advisor and Sustainability
Co-ordinator
Mobile: 07968892929 or email
rdelourme@cornwall.gov.uk



POWERED BY
THE CORNWALL COLLEGE GROUP

MATHS PUZZLES

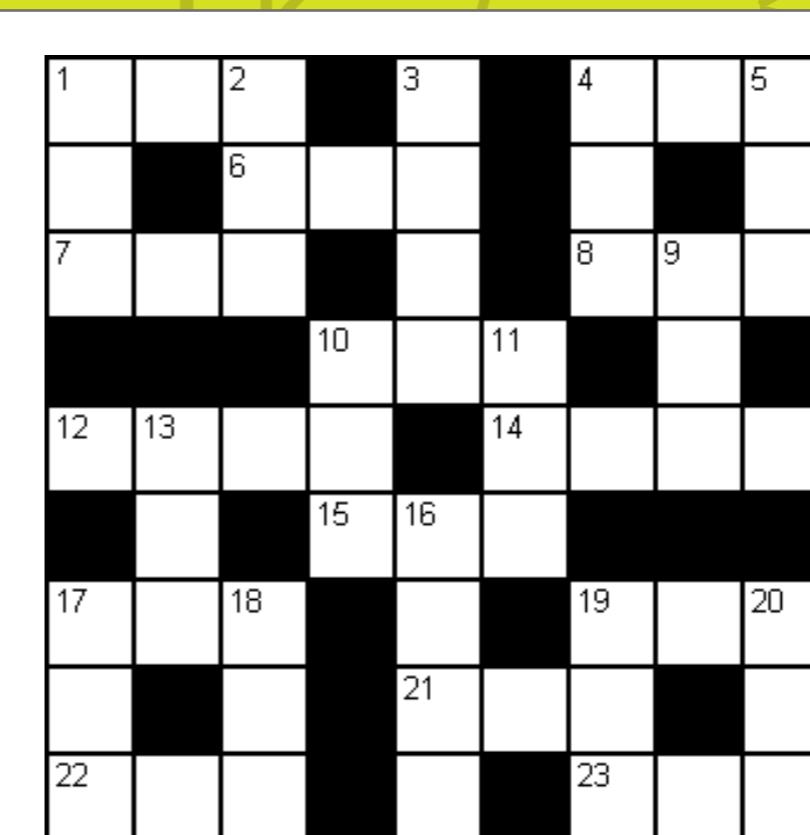


ACROSS

1. $353 - 126 =$
4. $46 \times 6 =$
6. $26 + 330 + 12 =$
7. $724 - 322 =$
8. $1265 - 404 =$
10. $400 + 467 =$
12. 3 Down - 16 Down =
14. $2004 - 876 =$
15. $133 + 208 + 428 =$
17. $1652 - 809 =$
19. $26 \times 9 =$
21. $646 - 215 =$
22. $1762 - 1430 =$
23. 19 Across + 22 Across =

DOWN

1. $526 - 322 =$
2. $519 + 213 =$
3. $5673 + 2163 =$
4. $597 - 349 =$
5. 12 Across - 15 Across =
9. $946 - 324 =$
10. $1200 - 393 =$
11. $436 + 283 =$
13. $172 \times 2 =$
16. $2386 + 1420 + 2640 =$
17. $1257 - 444 =$
18. $161 \times 2 =$
19. $430 - 215 =$
20. $162 + 162 + 162 =$



ACROSS

1. $634 - 231 =$
4. 1 Down + 100 =
6. $900 - 600 =$
7. 800, 802, 804, __, 808...
8. 16 Down - 100 =
10. 121, 122, __, 124, 125...
12. $452 + 892 =$
14. The number that comes after 999
15. 800, 804, 808, 812, __, 820...
17. $222 + 222 =$
19. 15 Across - 17 Across =
21. 7 Across - 1 Across =
22. 600, __, 602, 603...
23. The number before 318

DOWN

1. $927 - 509 =$
2. 330, 333, __, 339, 342...
3. $556 + 506 =$
4. $299 + 240 =$
5. $1000 - 200 =$
9. 400, 410, __, 430, 440...
10. 136, 140, 144, __, 152...
11. The number immediately before 317
13. 12 Across - 16 Down =
16. $248 + 792 =$
17. $400 + 50 + 6 =$
18. 8 Across - 4 Down =
19. 111, 222, __, 444, 555...
20. 7 Across - 4 Down =



Cornwall College STEM Courses

Below is a selection of courses offered by Cornwall College in the STEM area. For a full list of courses offered by the College please visit: www.cornwall.ac.uk

Science

- Applied Science Extended Diploma
- Chemistry AS/A-level
- Biology AS/A-level
- BSc (Hons) Equitation Science
- Physics AS/A-level
- Human Biology AS/A-level
- Geology AS/A-level
- Marine Biology & Ecology Extended Diploma
- Veterinary Nursing RCVS Diploma
- FdSc Analytical Chemistry
- FdSc Carbon Management
- FdSc Food Studies
- FdSc Forensic Science
- FdSc Marine Science
- FdSc Renewable Energy Technologies
- Food Technology FDQ Diploma
- BSc (Hons) Environmental Resource Management (top-up)

Technology

- ICT AS/A-level
- Computing AS/A-level
- IT BTEC Extended Diploma
- Music Tech. Extended Diploma
- HND Music Performance and Technology
- IT Advanced Apprenticeship
- Land-based Tech. Apprenticeship
- FdSc Computer Networking
- FdSc Information Technology
- FdSc Surf Science and Technology

Engineering

- Introduction to Yacht Fit Out & Composites City & Guilds
- Vehicle Maintenance & Repair
- Electrotechnical Advanced Apprenticeship
- Engineering Apprenticeship
- Electrician Apprenticeship
- Engineering Production NVQ2
- Light Marine Engineering C&G L3
- Mechanical Engineering ND
- Marine Engineering Extended Diploma
- FdSc Engineering

Maths

- Mathematics AS/A-level
- Further Mathematics AS/A-level

Quiz answers:

- | | | |
|----------------------------|----------------------|---------------|
| 1. Central processing unit | 5. True | 9. Venus |
| 2. 22 | 6. Direct current | 10. Filament |
| 3. Jupiter | 7. False – 1889! | 11. Magma |
| 4. The centre of the earth | 8. Ohms (Ω) | 12. Physicist |

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