SCIENCE SPAZA SPACE
Knowledge is Ncah!
ISSUE 2, MAY 2015
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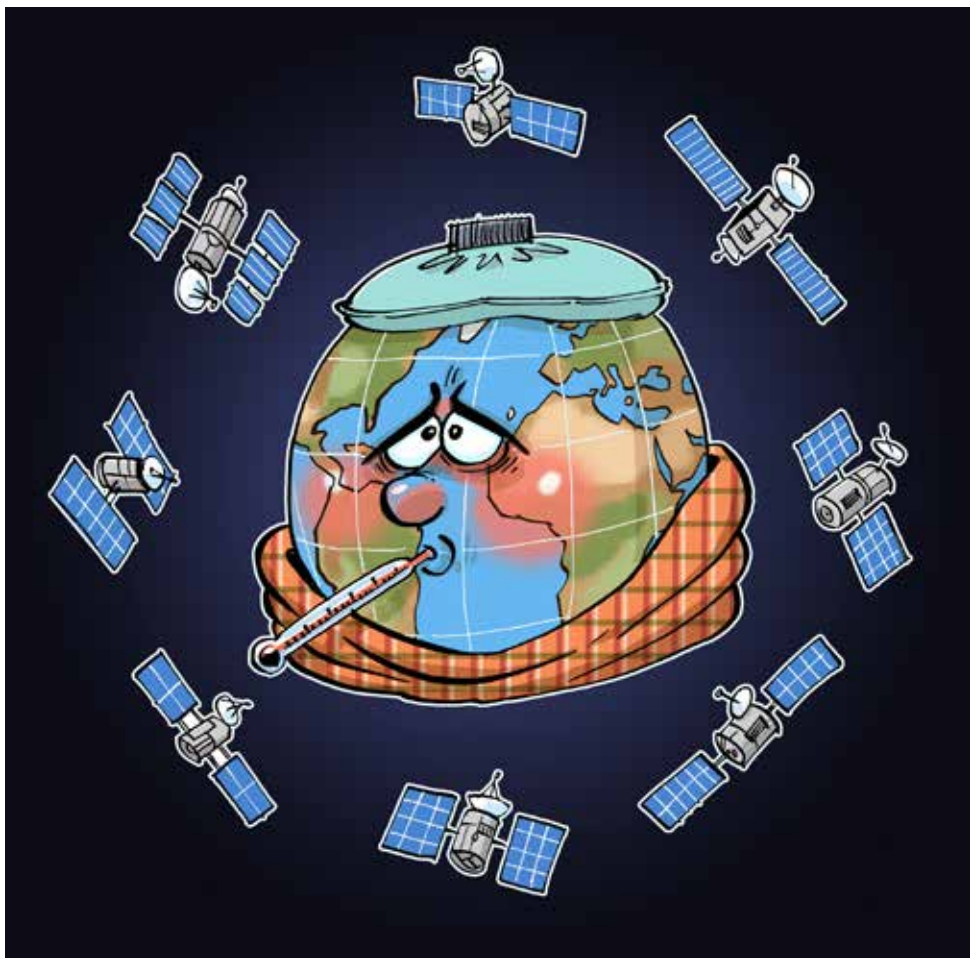
Conservation is COOL!

So you've heard about this conservation thing but you're still not sure if it's for you? Well we're here to say that conservation is for EVERYONE and it's definitely cool!

Sthabile Mazubane

The way we live has changed as the human race has advanced over the past years. Unfortunately, we sometimes forget how our lifestyle affects the environment around us. That's where conservation comes in. It encourages our communities to consider and value nature in every way possible, and start to live more sustainably. Basically, conservation is all about looking after the natural world so that it's still around to support our future generations.

At the moment, **water conservation** is urgent. Billions of people struggle to find clean water to drink each day. People need food too! In order for our food to grow, we need good quality soil for the crops. **Soil conservation** makes sure the soil has good nutritional value. **Wetlands** are home to many plants and animals, and play an important role in collecting and storing water. **Energy conservation** helps to prevent wastage of electricity. One day all the non-renewable resources will be gone, so saving energy is really important! When it comes to conservation, every little bit counts.



There are many ways you can help save the earth! Illustration: Rico

Atomic Scientists Perform at National Conference

Njabulo Mbetu

Science Spaza was invited to attend the STEMI Conference in Gauteng in March 2015. One of the highlights was to accompany the Atomic Scientists – winners of Hip Hop Science Spaza 2014 – who performed their winning rap song at the end of the first day of the conference (the Science, Technology, Engineering, Mathematics & Innovation (STEMI) Olympiads & Competitions SA).

Atomic Scientists Lindokuhle Ragedi, Jane Sepati, Bella Maleto & Musa Shikwambane (centre left to right) performed at the STEMI Conference. Here they are flanked by Nelani Mbokazi (left) and Njabulo Mbetu (right) from Science Spaza.

This was an awesome experience for the Atomic Scientists: "You know that feeling of being caught off guard? That is something we had never experienced until ... Well, this is how it all began:

It was just one of those normal days at school (nothing ecstatic) until we received an unexpected email from the Science Spaza team telling us about a SAASTA conference that was to be held 'somewhere' in Johannesburg.

They said that they expected us to be there on the 25th of March.

Of course, what was almost more exciting than the email was that we would be FLYING down to Johannesburg (it was our first flight).

When we performed our song – 'Atomic Combinations' – at the conference, we felt like celebrities. It was our first experience of writing and performing a song for a live audience."

This was the first time the Atomic Scientists had attended a conference away from home, and their first time staying in a hotel! They learnt so much from the discussions, and from being in the same room as professional scientists. The maths and science was super interesting! They felt so honoured and had lots of fun, even though they were nervous. Everyone was trying to sing along during their performance, and they received loads of compliments.

Jive Media Africa

AGENT ZEE www.agentzee.org

SAVE the Rhino

Sthabile Mazubane

How much do you know about rhinos?

Over the past 30 years, some species of rhino have gone extinct, and only 5 species remain in the world. There are two kinds of rhinoceros in Southern Africa – the black rhino and the white rhino. Less than 5000 black rhino exist in the wild.

A hundred years ago, the southern white rhino had been hunted close to extinction. A small surviving group of about 50 were protected in Imfolozi Park in KwaZulu-Natal, South Africa. That group grew and Ezemvelo KZN Wildlife began to move them to other locations where they could breed new populations. This particular species is no longer considered critically endangered, although still regarded as vulnerable.

Rhinos use their horns for self-defence against predators. Unfortunately, due to the increasing illegal demand for rhino horn, rhino poaching has put rhinos at serious threat of extinction. With this growing threat, rhino conservation is of the utmost importance. We live in an incredibly important country for rhino conservation because South Africa has one of the largest rhino populations in the world.

The name "rhinoceros" comes from two Greek words: *rhino* = nose, *ceros* = horn. The rhino's "nose-horn" makes it famous, but it also makes the rhino vulnerable to extinction through poaching. Will this calf survive to produce a new generation? That depends on us all.

Every year, more and more rhinos are killed by poachers. Over 1000 were poached in South Africa in 2014 alone: almost one every eight hours. And it's getting worse each year! If the killing continues at this rate, rhinos could go extinct in the VERY NEAR FUTURE.

The question is, how can YOU save the rhino? Well, to begin, let's create awareness by sharing information about rhinos and rhino conservation. PLUS you can show you care by donating today to help protect our rhinos.

For more information on Rhino Conservation projects in South Africa you can go to: www.wildlands.co.za.

CONSERVATION

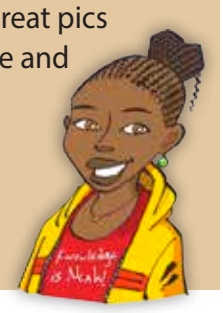
Our planet is facing one of its biggest threats. Humans! Our ever-growing population is putting more and more pressure on the planet; and this is resulting in loss of biodiversity, over-harvesting and destruction of marine resources, air and water pollution, not to mention growing impacts from climate change.

That's why this issue of *Spaza Space* is the conservation issue! We seem to think that nature will just replenish itself. If we push it too far – it won't! That's why it's so important that we remain conscious of our environment and our impact on it. The "three R's" are a rule to live by: Reduce, Re-use and Re-cycle – so that there'll be enough for the future.

Here are a few ways that we can re-use materials rather than throwing them away, because every bit counts. Plastic bags can be reused in shops or as bin bags around the house. Jars and pots can be cleaned and used as containers. Newspapers, cardboard and bubble wrap make useful packing material and old clothing can be made into other items. Have a look at our RRR activity worksheet and send us your exciting ideas! Conservation doesn't have to be boring. You can let your imagination run wild – and save our planet at the same time.

In this issue we catch up with the winners of the Hip Hop Science Spaza competition performing in Jozi; we take a close look at the critically endangered rhino; we showcase the young scientists from around SA who excelled in the FameLab competition; and we check out biodiversity on Agent Zee's page with images from the South Africa Science Lens. And we want to see your images of science and a sustainable planet! Get some tips on taking great pics with your phone and get snapping!

The Science Spaza Team



International Days

22 May: International Day for Biological Diversity

5 June: World Environment Day

8 June: World Ocean Day

17 June: World Day to Combat Desertification and Drought

Plastics – Ugly *and* Dangerous

Have you ever noticed all the plastic litter on the streets? Have you ever wondered what happens to that litter? A lot of it goes into streams and rivers, and ends up in the oceans.

Julia Thompson

Plastics don't fully biodegrade, but they do break down very slowly into smaller pieces. These tiny pieces are toxic (poisonous), and they just hang around, floating all over the world! Plastic littered in one country can end up on the beaches of another country. A lot of marine plastic waste collects in ocean gyres. A gyre is a system of currents caused by the earth's rotation and wind. There are five major gyres in the world's oceans and plastic waste accumulates in these gyres, which are commonly referred to as "garbage patches".

One of the biggest problems is that marine animals tend to think that this garbage is food. Sea turtles often mistake plastic bags for jellyfish, and some birds feed bits of plastic to their chicks. They can't digest the plastic, so they often die of starvation, or their intestines burst! If the plastic breaks down small enough, fish may eat these little pieces.

Some people burn their plastic litter to reduce debris. However, this releases harmful chemicals into the environment. Some of these chemicals are absorbed by our bodies, and can cause huge health problems! Plus, the chemicals settle on our food crops and go into our water sources.

Plastic waste on the beach at Msasani Bay near Dar es Salaam in Tanzania Photo: Wikipedia

The best approach to plastic is to obey the 3 Rs: Reduce, Reuse and Recycle. You can REDUCE the amount of plastic you use by reusing your shopping bags, so you don't need another plastic bag! REUSE the plastics you already have – get creative! Some people knit very cool hats out of old plastic bags. Finally, RECYCLE! You can recycle plastics at a recycling centre.

Master Your Smartphone Camera

Thabisile Khumalo

Taking pictures with your Smartphone is an art! It needs patience, creativity and a lot of attention to detail. We've found the most fantastic tips that will help you fill your phone with priceless pictures. Your friends and followers will be asking for your professional photographer's contact details ...

Here are five great tips for taking photos with your Smartphone (or any camera!):

- **Avoid zooming in using your digital zoom in/out options.** I'm sure we've all seen how this ruins the picture's quality, so rather take the picture as it is, then crop it afterwards. It looks clearer that way.
- **Clean that lens up, will you!** Most of the time there is absolutely NOTHING wrong with your camera, it's just that dirty lens which has collected dust and dirt. Start taking pictures of your favourite object, not the dirt on your lens. Unless, of course, the dirt IS your favourite object and you love keeping it in front of your phone …
- **Follow the lighting.** When taking pictures, lighting has to be considered at all times. This sometimes means that you won't get your desired background, but hey, you can always adjust the lights or come back another time when the sun is willing to cooperate. Here's a million dollar secret for taking pictures outdoors: try taking them when the sun is diagonally hitting the ground (when it rises or sets). Remember, this secret is worth a lot, and you shouldn't sell it, no matter how broke you may be …

- **Break a leg.** No, I seriously mean it. Break a leg. If you really want a good picture, you must be willing to get into weird and awkward positions in order to take it. Get down on one knee if you have to, or stand on your toes to make your picture perfect.
- **You have filters? Then use them.** All these photo editing apps are there for you to download and use. Do NOT let other people make you feel guilty about it. It is YOUR picture, embrace it.

At the end of the day, you not only have to love your camera, you have to know it too. Give it what it wants, and you will love the results. Follow our five steps and snap away!

SEND IN YOUR PHOTOS

In the next issue of *Spaza Space* we want to publish a gallery of the best pictures from the Science Spaza Clubs. **So get out there, capture your special picture, and send your best one to us.** Then wait for the next issue to see if you're a budding pro!

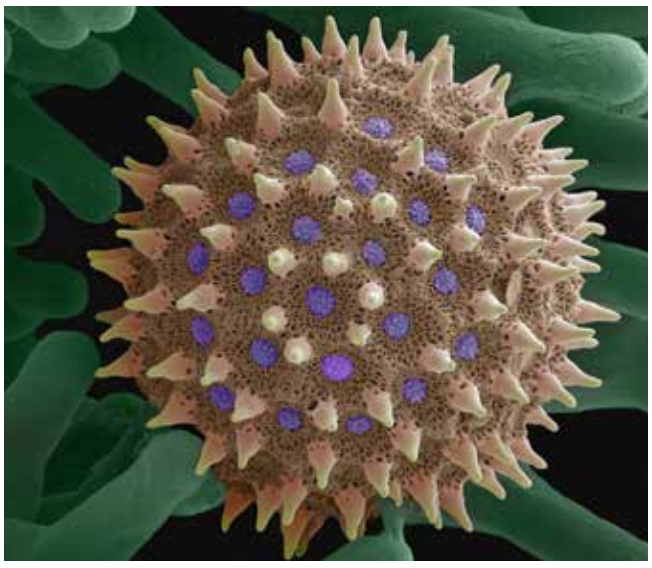
SAASTA's Southern African Science Lens Competition

Several rounds of the popular SA Science Lens science photography competition have been conducted since 2002 and both professional and amateur photographers have entered wonderful images illustrating and communicating the excitement and impact of science. Here are just a few photographs for this edition of Spaza Space that fit into our theme of Biodiversity and Conservation…

Title: **Elephant Refraction**
Photographer: **Mike Dexter**

Water drops fall from the lower lip of an African elephant as it drinks at a small waterhole in Botswana. Within the drops is a refracted image of other elephants drinking on the far side of the waterhole. When light rays move from one medium to another, in this case from air to water, their direction of movement is altered. This phenomenon is called refraction and is the reason the image within the drops appears upside down.

SASL 2013



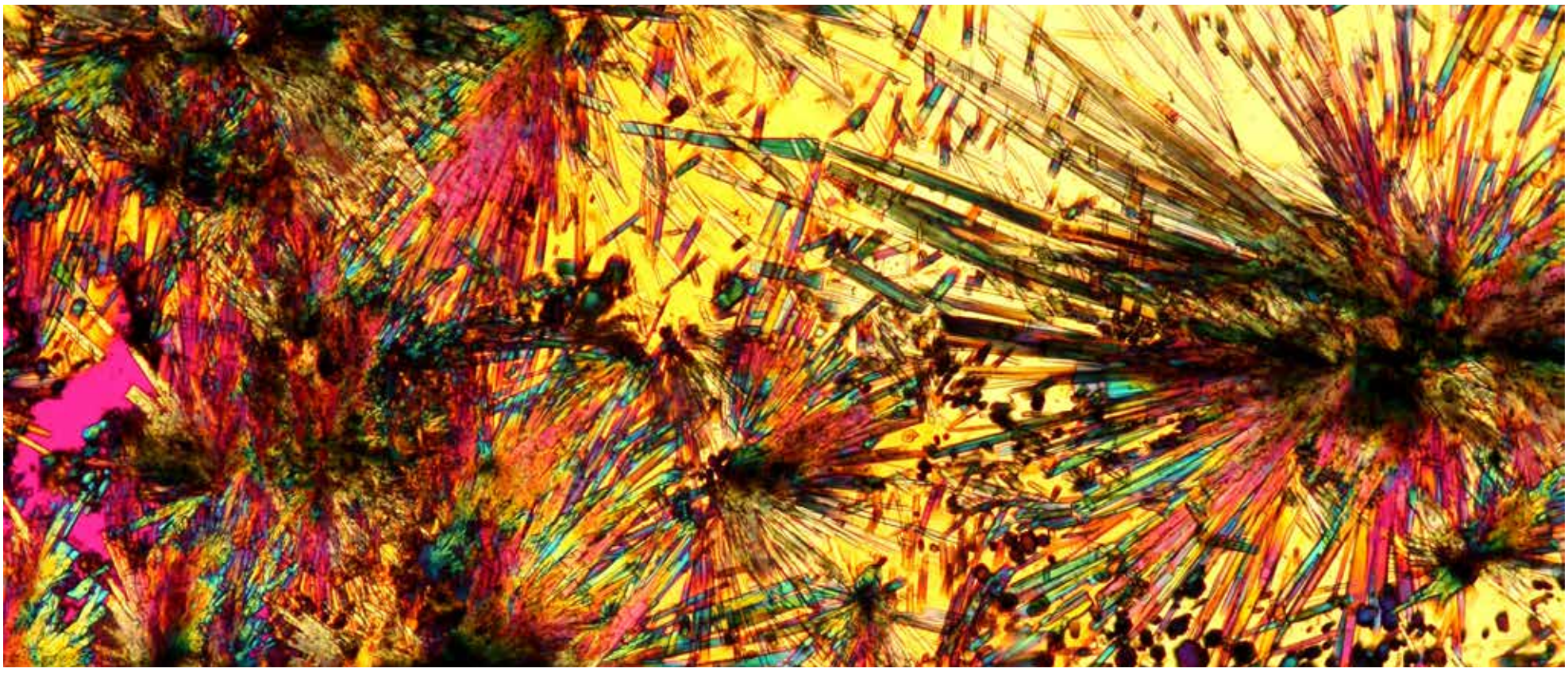
Title: **Daisy Pollen**
Photographer: **Miranda Waldron**

SASL 2013

Title: **Short Flight to Freedom**
Photographer: **Alan Lee**

A male Cape Sugarbird is released after ringing by Pauline Ruffenach. Ringing birds provides valuable information on movements and life history strategies. This Cape Sugarbird has been fitted with unique colour ring combinations on its legs, which enables birdwatchers to report their sightings to the SAFRING department based at the University of Cape Town. At remote study sites, camera traps set near the Cape Sugarbird's preferred foods – nectar from Protea flowers – are also able to capture the unique ring combinations. The Cape Sugarbird is found only in the Fynbos Biome of South Africa. Captured birds are handled for a very short period of time and are not harmed by the experience.

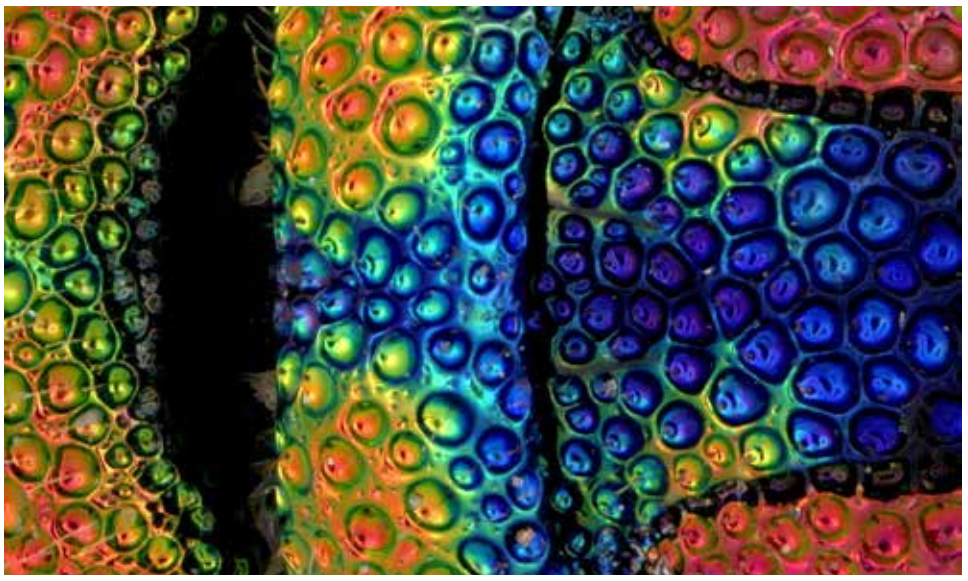
SASL 2013



Title: **Exploding Suns** *(above)*
Photographer: **Beatrice Glenister**

"The most beautiful thing we can experience is the mysterious. It is the source of all true art and all science. So the unknown, the mysterious, is where art and science meet." – Albert Einstein
One aspect of scientific photography is about visualizing things that can't be seen with the unaided eye. This is displayed in this microscopic image of a thin section of a rock. We pass rocks on a daily basis without a second glance. By using this instrument (microscope) one can see fragments and colours that one didn't think were there. Each thin slice of rock has different cracks and fractures, just as a person can have emotional cracks and fractures. Geologists are able to figure out what minerals constitute the rock, just as psychologists can figure out the uniqueness of a human being. On the outside we can look completely different to what lies within, we can be fragile or we can have an explosive personality like fireworks.

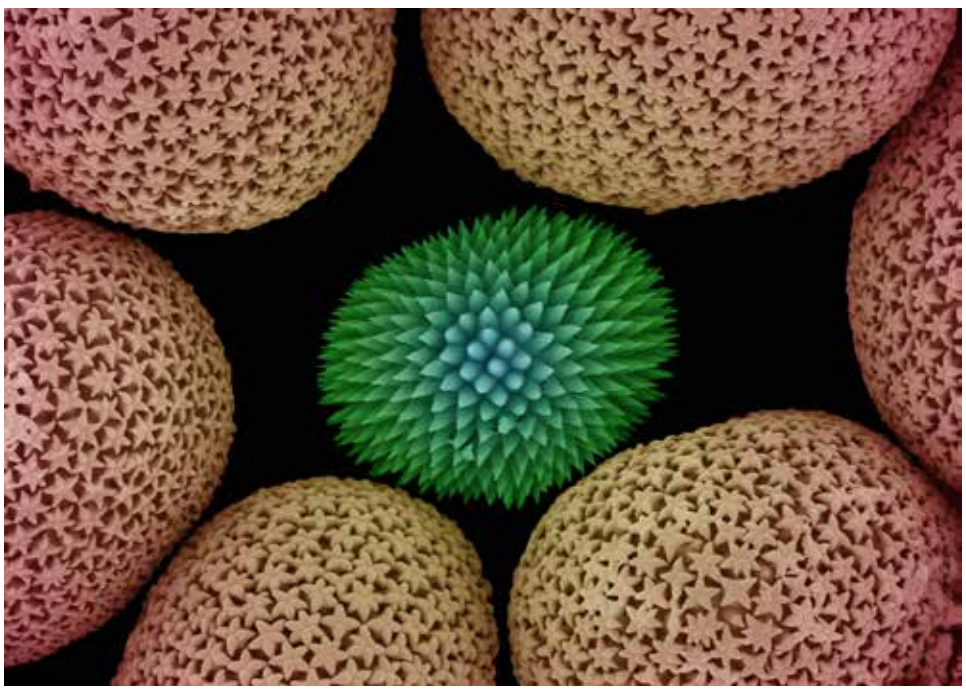
SASL 2013



Title: **Splendid cuckoo wasp** *(above)*
Photographer: **Simon van Noort**

A close-up shot of the thorax of a splendid cuckoo wasp.

SASL 2007



Title: **Sponges galore!**
Photographer: **Miranda Waldron**

The image is of sponge spicules which are the structural elements of a sea sponge. The spicules are usually made of calcium and come in all sorts of shapes and sizes. The microscopic "flowers" in one species are about 5µm in width and join together to form a sphere. In this image, the spheres surround a spiky ball of spicules from a different species. The image was taken with a scanning electron microscope at 15,000x magnification at the Electron Microscope Unit, University of Cape Town.

SASL 2011

Title: **Sweet Thorn Flower**
Photographer: **Morgan Trimble**

This close-up was taken with a macro lens and shows an interesting pattern of Acacia Karroo flowers, not obvious to the casual observer. This photo was taken as part of a survey of biodiversity in regenerating coastal forests in South Africa after the forests had been cleared for mining. Coastal forest is a rare habitat type restricted to a small linear belt along the east coast of southern Africa and is home to a rich diversity of species across different taxonomic groups. By monitoring species communities in forest patches that have been regenerating for differing numbers of years, researchers can understand the trajectory of species reconlonizations as the forests age and become more similar to old-growth forests. This fast-growing tree, also known as Sweet Thorn, is a pioneer species that is very abundant in early stages of forest regeneration. Eventually, after many years, individuals start to collapse and trees typical of old-growth forests grow in the canopy gaps created.

SASL 2013

NEWS FROM THE CLUBS

This is where you, the members of the Science Spaza clubs, get to share your news and have your say about science issues

Dalindyebo Science Spaza & National Science Week 2014

The Dalindyebo Science Spaza Club from Dalindyebo High applied and received funding to host the National Science Week (NSW) 2014 from SAASTA (South African Agency for Science and Technology Advancement) which ran for 3 days. Dalindyebo High, in the Eastern Cape, is one of the Dinaledi schools – an initiative of the Department of Education to improve the quality of learning and teaching mathematics and science.

Chumisa Scott from Dalindyebo High School

The first day was hosted at Dalindyebo High, the second day at Meltin Mbekela High, and the third day at Elliotdale High, all in different districts of the Eastern Cape Province. Neighbouring schools were invited from all districts to participate in each day's activities. A Grade 12 learner, Chumisa Scott from Dalindyebo High, shared with us some of her experiences and the exciting science activities that took place as part of their National Science Week.

Chumisa undertaking her dancing raisins activity

After completing her studies Scott wants to be a doctor and assist people, especially those who live in rural areas, where there are few hospitals and doctors. Initially, Scott was afraid of science and she thought it was for people who are privileged with all the resources such as proper labs. However, after the launch of their NSW she learned that science is fun and it is part of our everyday lives.

These are some of the fun activities they took part in:

• Dancing Raisins

Half a glass of soda water, vinegar and raisins were put into an empty jar and then placed next to a speaker playing music. The raisins were observed dancing.

• Metal Signal Disturbance

A cellphone was placed inside a metal container and checked to see if it had a signal. It did not. This might explain why cellphones do not work in an elevator.

• Science Debate

The learners from Dalindyebo had a debate with other schools about the need for more science teachers in schools and about science being the most important subject.

Kutama Keen Seekers of Knowledge

We are the Kutama Keen Seekers of Knowledge club! We motivate and help local schools. We organise career guidance workshops with top universities from nearby provinces where students are made aware of the benefits of a science-related career. Our Targeting Talent Programme (TTP) helps find learners who excel in their science subjects, and takes them to WITS University where they are exposed to university life. They also get to participate in fun science experiments.

We hope one day to innovate something new through science. Maybe we could help find a cure for a deadly disease! Our main challenge is that we don't have resources. We don't have the right equipment to conduct experiments in our science lab, and we don't have a biology lab yet.

Science Spaza has helped us develop our knowledge to design realistic alternative resources and produce better environmentally friendly products. With Science Spaza we do fun experiments to sharpen our academic excellence and get closer to what's happening in the world we live in. Science Spaza portrays the world in a friendly and fun way.

We, as the committee of the Kutama Keen Seekers science club, would love the chance to visit your facilities and get closer to the world of science and experiments.

Kutama Keen Seekers of Knowledge members – above: Grades 8 and 9; right from top: Grades 10, 11 and 12

Murendeni Dolly Maruli

My name is Murendeni Dolly Maruli. I am from Limpopo in a village called Phiphidi. I school at one of the Dinaledi schools, named Tshivhase Secondary School, known to produce good results. I am so proud to be in Grade 12. I am doing science, and I want to be a mechanical engineer. That is why I chose science. I always look for new ideas from my peers in trying to broaden my science knowledge and I hope when I finish my matric I will enrol in one of the universities to fulfil my dream of becoming an engineer. I love science and I'm glad to be schooling at Tshivhase.

Mutangwa Zwoluga Quinton

I am Mutangwa Zwoluga Quinton. I am currently in Grade 12, and my career goal is aeronautical engineering. I feel so motivated since I am capable of doing things that require lots of energy and that can change our world. I am good at solving scientific and mathematical problems, hence I believe engineering is the right choice for me. I have many ideas that can make our life easier, but the problem is that I don't have enough materials. I believe science is great and everything around us is science.

START YOUR OWN SCIENCE SPAZA!

Complete the form below and send it to PO Box 22106, Mayor's Walk, 3208, Fax to 086 610 5453, email: info@sciencespaza.org or submit your application online at www.sciencespaza.org

Name of school: _____

Municipality: _____

Province: _____

Name of your science club:

_____

Name of contact person: _____

Telephone number: _____

Email address: _____

Postal address: _____

_____

To be filled in by responsible adult (parent/teacher)

Name: _____

Surname: _____

Position: _____

ID Number: _____

Signature (parent/teacher):

_____

Date: _____

Get in touch – we'd love to hear from you!

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Flying Experience by the Science Spaza team and the Science of Flying

Njabulo Mbedu and Nelani Mbokazi

Flying, especially for the first time, can be one of the most exciting and scary experiences! The loud noise of the plane's engine, the take-off, being lifted up into the air with huge wings on each side, travelling at a speed of about 450 km/h, 10 000 metres above the ground ... Not to mention the turbulence! It feels like there are potholes in the air! All of this can trigger a lot of anxiety and nervousness. It is natural for people to feel insecure when they fly. Having the right information can help reduce anxiety and make your flight the greatest experience!

Our Science Spaza team came back with these questions after their first flight:

Q: How can a huge thing like a plane be lifted 10 km from the ground?

A: When an aeroplane moves fast through the air, the upward pressure of the air under the wing is greater than the downward pressure above it. This causes the wings to lift, and the wings lift the whole plane. The engine keeps the plane moving through the air at high speed.

Nelani Mbokazi steps out to board the plane for his first-ever flight, on his way to the STEMI Conference in Gauteng.

Q: Why do planes choose to fly above the clouds?

A: Aeroplanes travel in the region of air known as the 'cruising altitude'. (Altitude is the height above sea level). As you travel upwards (increasing altitude), the air of the Earth's atmosphere becomes thinner, so it provides less resistance for objects flying through it. At high altitude planes fly more efficiently and consume less energy. Flying above the clouds also means good visibility, so the plane is less likely to collide with other objects while flying.

Q: What causes the turbulence in the air?

A: Turbulence is that sudden (and scary) bumping when an airplane passes through the clouds. It's actually caused when the plane flies into a mass of air that is moving in a different direction from the air that the plane has been flying in.

FameLab 2015 – Meet the Winners

Thabisile Khumalo

The FameLab 2015 competition has finally come to an end – leaving us with mind-blowing information about the world of science. FameLab is a public speaking competition for students and science professionals between the ages of 21 and 35. Contestants are given three minutes to talk about any science topic of their choice – and the rest is up to the judges, who decide on a competition winner based on the content, clarity and charisma of the talks.

The participants who attended the National FameLab 2015 Competition were (from left to right): Maropeng Nematanzhela – UNISA, Oupa Malahlela – South African National Space Agency (SANSA), Electdom Matandirotya – South African National Space Agency (SANSA), Adwoa Awuah – University of KwaZulu-Natal, Yonela Mkono – University of Fort Hare, Thembisile Mahlangu – Council for Scientific and Industrial Research (CSIR), Itani Given Madiba – iThemba Labs and UNISA, Edgar Phukubje – University of Limpopo, Stevie Biffen – University of Cape Town, Raven Motsewabangwe – (FameLab 2014 winner from University of the North West), Tshegofatjo Bridget Marindi – University of Limpopo, Brent Harrison – University of Cape Town, Thrineshen Moodley – University of KwaZulu-Natal, Bibi Fatima Choonara – University of the Witwatersrand, Kishen Mahesh – University of Pretoria, Karmani Murugan – University of the Witwatersrand, and Natasha Botha – Council for Scientific and Industrial Research (CSIR).

Winner

■ **Stevie Biffen**, the 2015 winner, studies Neuroscience at the University of Cape Town. She also has an Honours degree in Biological Anthropology and Psychology. As a child, her inspiration to pursue Science was Roald Dahl who once said "And above all, watch with glittering eyes the whole world around you, because the greatest secrets are always hidden in the most unlikely places."

Runners-up

■ **Edgar Phukubje** studies Microbiology and Human Physiology at the University of Limpopo. He is always learning to put himself in challenging situations, take himself out of his shell and test his strengths and potential.

■ **Natasha Botha** does gait research (analysis of human movement) at the Council for Scientific and Industrial Research. She is also a model. Her favourite quote by Albert Einstein is "If you can't explain it simply, then you don't know it well enough". If it doesn't make sense – dig deeper.

Meet the Finalists

■ **Kishen Mahesh** loves writing poetry and enjoys art and drama. He studied human genetics and facial morphology. He finds his inspiration from Sir Isaac Newton's quote which says "If I have achieved anything great … it is because I have stood on shoulders of the giants before me".

Stevie Biffen (centre), Neuroscientist from the University of Cape Town and winner of FameLab South Africa 2015, stands with Dr Jabulani Nukeri, Managing Director of SAASTA (far left), and Colm McGivern, Country Director of the British Council (far right). To the left and right of her are runners-up Natasha Botha, Engineer from the Council for Scientific and Industrial Research (CSIR), and Edgar Phukubje, Biochemist from the University of Limpopo. Stevie Biffen will travel to the United Kingdom on an all-expenses-paid trip to represent South African science on an international stage at the World FameLab Finals!

■ **Karmani Murugan** is currently pursuing her PhD in Pharmaceutics, and particularly in the science of drug delivery. She is an adventurous person and loves outdoor activities. She also enjoys debates with intellectual people. Her favourite quote is "Knowledge only becomes an essence when it is passed on, and especially unto those who are brave enough to use it".

■ **Itani Given Madiba** works with Nanotechnology and smart materials for energy efficiency and space application. She says she is fun and easy-going, she loves nice things and she would work very hard to get them, so this would mean that she is a go-getter.

■ **Bibi Fatima Choonara** does what she would refer to as the 'cutting-edge' research centred around the innovative, intelligent oral delivery systems for biotech drug molecules such as proteins and peptides. She takes inspiration from a quote by Theodore Roosevelt, which says "Believe you can and you are half-way there".

■ **Thrineshen Moodley** says that he is an Organic Chemist by trade and passion, and when he is not being a lab rat he day-dreams about being a super powered mutant that can save the world.

■ **Oupa Malahlela** monitors water quality and quantity using satellites and is in the process of starting his own business. Oupa loves bike riding. He believes that you can be whatever you want to be as long as you work hard for it and play hard to rejuvenate yourself.

CONGRATULATIONS to all the participants from around the country – you're all winners. Thank you for sharing your inspirational stories with us. We wish you all the best with your work!