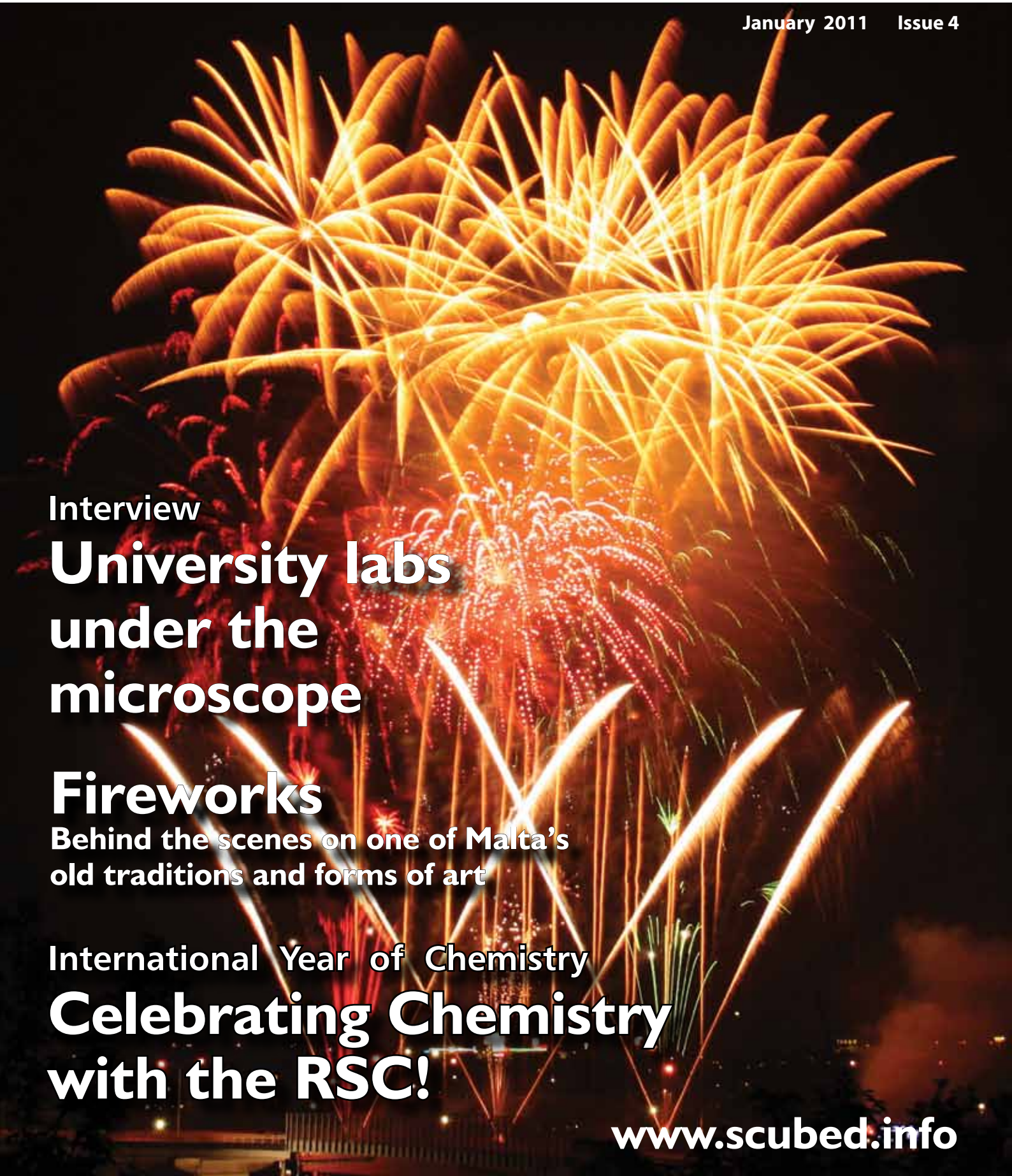
Science Students' Society

in TOUCH

with future scientists

January 2011 Issue 4



Interview

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Fireworks

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International Year of Chemistry

Celebrating Chemistry with the RSC!

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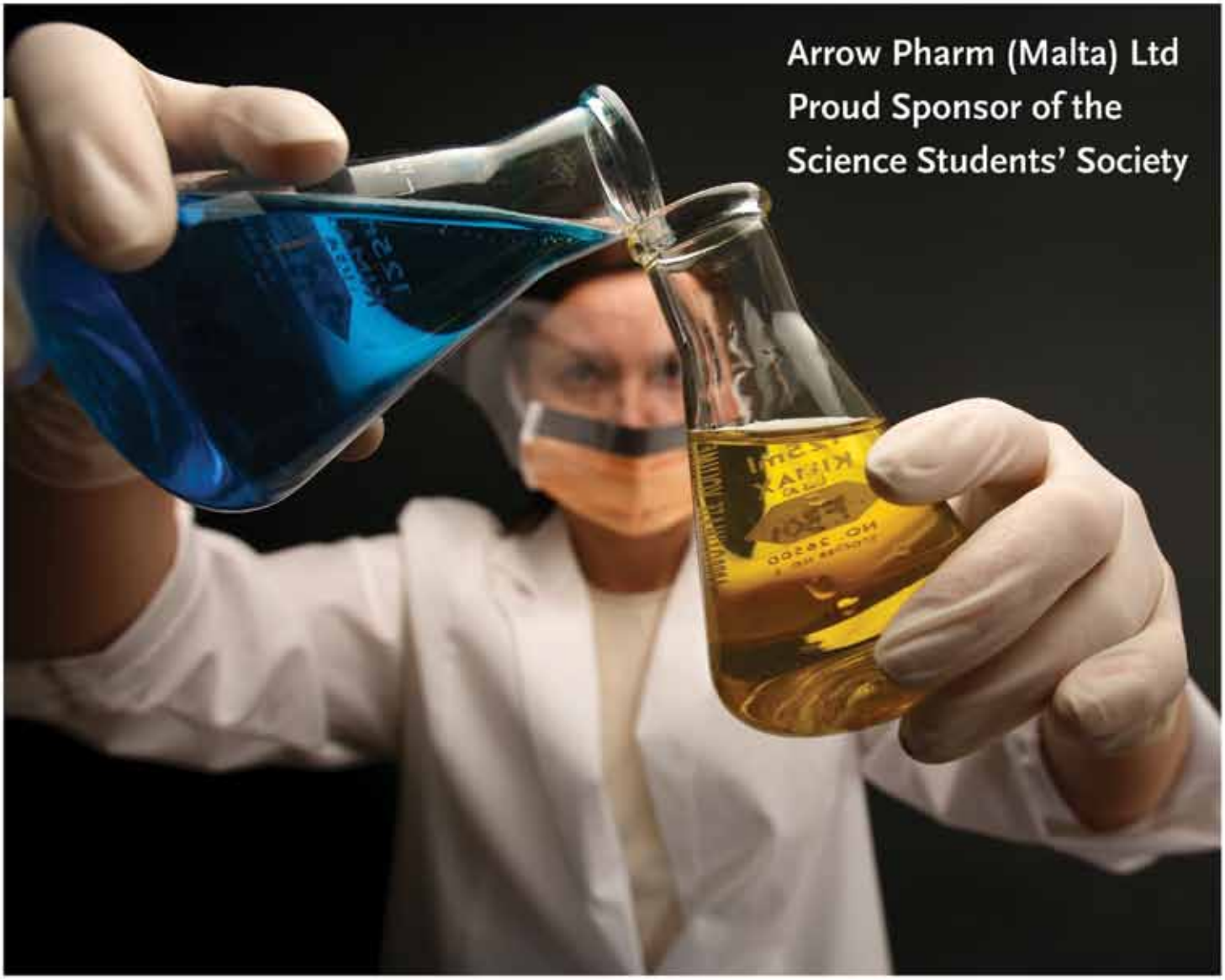

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The editor

John Gabarretta *is currently the Education Officer and RSC Liaison of the Science Students' Society, while reading for a BSc (Hons.) degree in Chemistry with Materials.*

Once again, you've got your hands on another issue of In Touch. I'm sure that the past holidays have served as a well-needed break for all of you and that you have all geared up for the new academic year.

As you may well know, this year is particularly special since it is actually the International Year of Chemistry. Several renowned institutions are organising many activities in conjugation with this global celebration of this important field of science and it would be great to see some local participation in these initiatives.

The Science Students' Society also looks forward to new changes for the New Year. As with the recent enhancements in the research labs in the chemistry and biology departments and the addition of Albert, a new supercomputer for the physics department, S-Cubed is enthusiastic about the future and foresees further improvements, especially when it comes to the environmental awareness of the whole faculty.

I hope you enjoy reading this issue, which as you may notice is jam-packed with great new content, and I extend my best wishes to you and your families for the New Year.

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University labs unc

The Science Students' Society president Jonathan Falzon interviews the Bio

The Science Students' Society is aware that the department has been awarded a grant to furnish and equip the labs. What was the work involved to obtain such a grant and how does the department plan to use this grant?

Prof. Victor Axiak: You are presumably referring to four major tenders partly financed through the European Regional Development Fund. The process of applying for such funds started in 2007 and I am glad to say that now… 3 years after, we have successfully received over 400 items for teaching and student research purposes, the total cost of which is approximately 450,000 euro. Students have already started to avail themselves from such items such as our new teaching microscopes. Evidently it is now up to them to ensure their proper use during practical classes and I expect full cooperation from all students on such matter (unfortunately I already had reports of incidents of improper use of such microscopes, and we were forced to take prompt and corrective action).

Dr. Emmanuel Sinagra: As a matter of fact, the Department of Chemistry benefitted from funds both under ERDF011 (Furnishing and equipping of the Chemistry and Biology Building Extensions) and ERDF018 (Strengthening of Analytical Chemistry, Biomedical Engineering and Electromagnetics RTDI Facilities). The applications were submitted in 2007 and the University subsequently signed a grant agreement that included plans for the deployment of the monies received. As you are now aware, the money was spent in outfitting the new laboratories and upgrading the analytical facilities.

Focus: Biology

What are the directives used when using animal testing in labs? Is there a national policy on animal testing and who is in charge of such policy?

VA: There are EU directives controlling the use of animals in teaching and research and these have been transposed in local legislation. I have recently expressed the need for our Faculty to be in full compliance with such regulations. An Ad Hoc University Committee which was appointed to deal with this matter is not yet operational. We look forward for satisfactory progress on this matter.

Some of the apparatus used in the undergraduate lab is noted to be old and sometimes even rusty. Apart from the grant mentioned before, from where does the department get funds to improve and maintain its apparatus?

VA: We have an annual allocation of recurrent funds, which is often only sufficient to cover normal expenses, and rarely sufficient to cover major maintenance purposes.

ES: Applying for ERDF funds is the way to go for the substantial changes needed to really modernise the laboratories. The Department has started a process to apply for further ERDF funds to upgrade teaching laboratories.

As regards rusty equipment, I have noticed that there are balance pans, clamp stands and tripods. With the latter the state does not hinder their usage. We are actually touching these up as they are not pleasing to the eye. As regards the former, I must lament some misuse. When using any equipment, care must be taken that chemicals are not dropped on them and left there. After a significant outlay on a few balances one year, we were disappointed to see that they had rust through chemical spills. Everyone using such equipment should take care to minimise damages.

During the past years the Biology and Chemistry departments have seen a general increase in the number of students choosing to study these subjects. Has the necessary funding been provided to cater for the increase in the number of students?

VA: No. Nonetheless it is not only a question of funds, but also of other basic infrastructural services.

ES: There have always been sufficient funds provided to cover the programmes of study to take place. "Extras" have been a problem of late; however, if more ERDF funding can be garnered (and I am very hopeful) further acquisitions will be made.

Health and safety is very important in the laboratory. Unfortunately the electricity and gas systems used in our labs seems to be quite old and it does not have all the modern safety features which ensures that no one gets an electric shock or get burnt. Are there any plans of improving these systems?

VA: As student representatives on the Faculty Board of Science are aware, this was a major item discussed during the last Faculty Board meeting. I had then explained our constant efforts over the past 10 years to try and improve on our current health and safety standards. These include basic services such as electrical and gas supplies to our major teaching labs. I provided details of plans and proposed budgets which had been submitted to the University over these years. So yes… we do have plans.

der the microscope

ology and Chemistry Heads Of Department about the situation in the labs.

ES: The application for ERDF funding, mentioned above is a significant part of our plans to modernise all our undergraduate teaching laboratories. It would not be practical to overhaul the systems just when planning to upgrade all the old undergraduate teaching laboratories.

Nevertheless we are currently taking measures to check that electrical equipment does not have any electrical faults that may result in fatal accidents. In as far as the gas supply is concerned, we realise that there can be problems with some taps that may need extra effort to shut off. Laboratory staff ensures that all gas jets are shut off completely before they shut down the laboratories. We have taken measures to make these taps known to students so that they are not used.

Being environmentally conscious is indispensable during laboratory sessions. How is toxic waste disposed after being used?

VA: You must be referring to toxic chemical wastes. In the disposable of such wastes, we abide with instructions received from the WasteServ Malta Ltd. Currently we are temporary storing over 200 litres of such waste and this is unsatisfactory.

ES: As a matter of policy we do not dispose of waste down the sink or drains. Although some solvent waste can be recovered, this has often been hampered by the fact that we have had contamination of the recoverable waste solvent stream in the teaching laboratories. We have experienced accumulation of waste. The Department has asked for funds to resolve this problem. Disposal is expensive and made even more so by the contamination of the non-halogenated waste stream by halogenated solvents since disposal of the latter is more expensive. Students need to be more diligent in disposing of their experiment waste into the appropriate stream. We have taken steps to assist students in this process.

It has also been noted that to distill water, a lot of tap water is wasted as coolant and is lost literally down the drain. This is a real pity considering that that water is still clean. Why is this so and can this waste of water be stopped?

VA: I fully agree with you. We had plans for a recycling water system for the production of distilled water in our new extension building… but unfortunately these were ignored. We are now working on plans to recycle such cooling water for teaching labs. We estimate that approximately 5000 euros will be required to put our plans in action… which is not much in order to improve on our environmental performance! Indeed I look forward for the whole Faculty to improve on our environmental performance and in a more sustainable use of electricity, etc…

ES: As you note, the cooling water is wasted, the water cannot be circulated for reuse as a coolant immediately since it would be too hot for it to be an efficient coolant. It would require a substantial reservoir for appropriate cooling. The Department is currently studying how the reverse osmosis system currently being used on the third floor can be put to use in the teaching laboratories. This would reduce both water demands and electricity demands.

Focus: Chemistry

The undergraduate lab sessions for 2nd and 3rd year students have started in the last week of November, a month and a half after their usual commencement. Why did this happen and do you feel that the students are now disadvantaged to have lab sessions more frequently than usual in order to compensate for a problem that they had no control upon?

ES: As you know, not all the fume hoods in the old undergraduate laboratories were fully functional and this meant that we could only allow students to work in about half the full complement of our fume hoods. This was not an efficient use of our laboratory resources. The Department of Chemistry therefore resolved to replace the aging fume hood extractors of the older parts of the building with new ones. The delay in the commencement of laboratory classes occurred due to circumstances beyond the University's control. It was due to a sequence of unfortunate events during the transportation of the new extractors through foreign ports.

One cannot deny that the students will have to complete each cycle of practicals associated with a particular topic in a shorter time period. However, when comparing this disadvantage with other options such as reducing the students' laboratory experience and scheduling practicals immediately prior to exams, the Department feels that under the circumstances, whilst all efforts were made to avoid this juncture, the path chosen was one that was least detrimental to the interests of the students.

Gearing up

As the sun shone on the University Campus on the 5th of October, it was met by hundreds of confused and lost faces of fresher students for whom this was their first day on campus as University students. However, not all students were in this state of confusion, as there were also those dedicated students who give their time as voluntary helpers for a student organisation and had been preparing for *Freshers' Week* and also the other upcoming events since summer. Amongst these students, there is the executive body of the Science Students' Society.

During *Fresher's Week*, the Science Students' Society (S^3) put up a stand in the quadrangle and from this stand, the Society was able to give the guidance needed to fresher students and also help the students to get to know each other better. Moreover, the 3rd edition of the magazine *In Touch* was published and distributed during Fresher's Week to both fresher and non-fresher students. During Fresher's Week, S^3 also invited all students, especially the fresher students, for the 6th Annual Science Seminar.

However, between *Freshers' Week* and the *6th Annual Science Seminar*, S^3 participated in One world week (between the 18th and 22nd of October), with the theme being: *6.2 billion people living in one world, Can science really can science really save it?* S^3 explored and presented ways in which science unites all continents together. One could take a look at global warming and how different continents are contributing to tackle this issue through artificial clouds and artificial trees. S^3 also showed how continents are coming together to tackle poverty. Other ideas were suggested to provide potable water to people in third world countries. All this was done by very informative stands and placards at the KSU Common Room.

Exactly afterwards, the *6th Annual Science Seminar* was launched. It is the opening activity organised by the S^3 for this new academic year. This year it was held between the 22nd and 24th of October 2010 at the Baystreet Hotel. Having over 90 people attending, the seminar had a packed program with activities, talks and social events, which gave room for the participants to learn and get to know each other well. The talks were very informative and the participants showed a great response. The talks which were presented were:

- *Welcome Keynote Presentation* by Mr. Jonathan Falzon (S-Cubed President)
- *Time Management* by Dr. Rose Anne Cuschieri
- *The Maltese Biodiversity: Ways and means of protection* by Dr. Sandro Lanfranco
- *Astrobiology: From Universe as we know it to the possibility of life on other planets* by Mr. Victor Farrugia (Astronomical Society of Malta)
- *Studying abroad* by Dr. Emmanuel Sinagra

The Friday night activity was characterized by a *Karaoke* session followed by a live performance from the band *Funk Initiative* with after-hours at Poison Ivy and Sugarshake. On Saturday night, one could not miss the themed party: *The Sweet Factory*, followed by after-hours at Qube. The fun activities that were organized aided the participants in getting to know each other whilst providing a relaxed atmosphere. All the participants were finally awarded a certificate of participation.

The day following the seminar, S^3 did not have any chance to take a break since on that day, *Science Week* commenced. Science Week is a one-week event organised by the Malta Chamber of Science & Technology (MCST). During this event, S^3 put up a stand on campus and demonstrated several interesting experiments with the aim to show secondary level students that science is not just something you learn at class, but is a living experience found practically everywhere around you. Children enjoyed their visit to our stand and were very excited with the outcome of the experiments,

for 2011...

During the preparation of these events, the S³ executive was also busy coming up with one of the biggest events the organisation is planning for this scholastic year. A sub-committee of 4 members was chosen and they immediately started working on this great project: *UK 2011*

The S³ executive, along with another 40 students, will be flying to London on the 26th of April and will be returning on the 30th of April. The launch of this event took place on Friday the 12th of November at the KSU Common Room. With no difference to the other S³ events, this trip to London is going to be jam-packed!

The highlights of this trip are: a trip to Cambridge and Oxford, visiting the Science Museum and last but not least also spending some free time to go around London. We received a lot of feedback from the students, with the trip being fully-booked after just 5 days of accepting applications . During this trip, S³ will also be meeting up with a group of students from Trinity College in Cambridge and this will be highly beneficial for the people attending as it will give them time to socialize and have a look at the university life beyond our shores.

S³ also took the initiative to put up an awareness campaign entitled *Biodiversity Week – A local perspective*. Many activities for all science and non-science students were organised. Biodiversity started off with the presence of Nature Trust and Birdlife on campus. Here students could forward questions to these NGOs, become members and even give donations. On Friday, 3rd December two highly informative talks were given. One of these talks tackled urban biodiversity, here biodiversity (and the lack of it) in urbanised areas was discussed as well as possible ways in which one could enhance biodiversity in these areas. The other talk tackled the European Commission Birds' and Habitats directives. A detailed account of these directives was given as well as an account of where Malta stands vis a vie these directives. On Saturday S-Cubed organised two trips to the Simar and Ghadira nature reserves. Here we were given a little tour around the nature reserves. One could appreciate the variety of plants and birds present and well as bird watching! On Sunday then the students were taken to Buskett – Clampham Junction – Dingli cliffs. We were given information about the various plants present by Dr Sandro Lanfranco. *Biodiversity Week* came to an end with the yearly anticipated event *On The Trail*.

It was held between the 12th and the 13th December at the Zurrieq camp site. Team building activities during this event allowed students to meet and make friends outside university walls. A few late night games, bonfire and the cool crisp December air created the perfect atmosphere for a night of great energy and fun. This camping experience also included a demanding treasure hunt organised by some of the S-Cubed executive, which was clearly not for the faint hearted. Students attending *On The Trial* agreed that this was an event to remember and were looking forward for the ones to come.

A week after *On the Trail*, S³ was one of the supporting organisations of the Christmas Holiday Bash organised by U.E.S.A, named *Reviving Tigulio* (held on the 17th of December). This event was a huge success and it was a proper way to start off the Christmas Holidays. The last event to be organised by S³ for 2010 was the Christmas Bash Party, *The Angels Go Wild*. This party was held on the 21st of December at Spin Club, and was put up with the collaboration of ASA, CommA, ESO, UESA, UMGS and TSA. This event was also a huge success, giving all students who were present a good taste of the Christmas Spirit.

By looking back at the work done so far in this scholastic year by the S³ executive, one cannot but look forward to 2011 with great excitement and anticipation for all the events S³ shall be bringing to all of you.

Authors: Mark Farrugia, Dawn Grech, Roderick Micallef, Julian Bonello, Katrina Grech

Synesthesia: tasty coloured touchy-smelling sounds

***Dr. Edward Duca** believes that science is not just for himself but also for everyone to inspire and motivate. He just graduated with a PhD in Genetics from the University of Edinburgh, and is also a freelance science writer and communicator. He has hosted talks in film bars, written about world-domination by robots and the perfect steak.*

What do the artists Stevie Wonder, Tori Amos, Billy Joel and the Nobel prize winning physicist Richard Feynman have in common? They all experience the world in an extraordinary manner, through a merging of the senses, through synesthesia. Imagine if you experienced a flood of tastes depending on the words you heard, had the visual sensation of colours when you opened a book, or felt the back of your hand tingling when you ate chicken soup. These are synesthete experiences.

Synesthesia is a hereditary neurological phenomenon passed down from mother to child, or father to daughter which means its X-chromosome linked. It's also fairly common; around 1 in 23 people are synesthetes.

All four subdivisions share some basic characteristics: they are consistent in their associations, these associations are automatic and not induced by the person, and they all have complex rule-systems behind the synesthesia.

Coupled to the above subdivision are different types of synesthesia, each type describes which sense is linked to another. Below are just 4 of over 60 different types of synesthesia:

1. A Grapheme (letter) to colour synesthete normally associates S with yellow, L with grey, O with white/black and A with red, although a personal friend of mine, a synesthete, was adamant that A is white, highlighting that not all synesthetes, even when they have the same form of synesthesia, experience the world in the same way. Different languages also give rise to different associations; German grapheme to colour synesthetes tend to associate L with purple (the German for purple is lila). Yet associations are rarely this straightforward, with 75% of associations being due to the first letter and 25% being due to the 1st vowel. Synesthesia in other languages is poorly studied and the ball is in anyone's court on how Chinese characters or the Arabic alphabet would influence synesthete associations.

2. A Lexical to gustatory synesthete associates individual words and phonemes with specific tastes. Dr. Julia Simner, a cognitive neuropsychologist from the University of Edinburgh, has extensively worked with James, who has 12,000 words, all with different specific associations. For James, a conversation can be a very strange culinary experience. For instance, 'poster' tastes of congealed pot roast gravy which has been left out overnight, whilst 'Tuesday' tastes of orange opal fruits. I wonder what 'science' tastes like for James? Some tastes James is simply at a loss to describe. For most synesthetes word to taste associations tend towards sweets and chocolates, though 7% of the list are synthetic inedibles, such as public bus seats, and 3% are organic inedibles including ear wax and vomit. The lack of alcohol and coffee in this list of food to taste associations indicates that they develop in childhood and early adolescence. There is also a link between the amount of food eaten and the level of association. This adds more weight on the idea that associations develop in a synesthete's earlier years, the environment has a powerful influence on associations.

3. A sequence to personality (Ordinal linguistic personification) synesthete experiences an ordered sequence of words or numbers as a specific personality. So six could be a maniacal husband, h a little chap, a a bit of a worrier, f seriously untrustworthy, whilst nice is a middle aged woman with great strength of character.

4. A sound to space synesthete might experience dates in a specific point

Further reading

en.wikipedia.org/wiki/Synesthesia - a very decent wikipedia article.

www.bbc.co.uk/health/conditions/synaesthesia1.shtml - BBC health article explaining synesthesia.

www.bbc.co.uk/radio4/science/hearingcolours.shtml - BBC radio 4 programme 'Hearing colours, eating sounds'.

www.bbc.co.uk/sn/tvradio/programmes/horizon/derek_prog_summary.shtml - Derek Tastes of Earwax

in space. Centuries would come in columns, for example, 1801 would start at the bottom with the dates being placed one after the other, higher up in space. 1901 would be to the top-right of 1801, rising up again one after the other, until 2001, which went over the synesthetes shoulder.

But what makes someone a synaesthete? A technique known as diffusion tenser imaging can show the connections within a brain which has shed some insight onto this amazing phenomenon. Used on a synesthete's brain, diffusion tenser imaging revealed that many have a hyper-connected brain compared to non-synesthete individuals. This suggests that the genes responsible for synesthesia predispose an individual for hyper-connectivity within the brain and not a specific type of synesthesia.

Reality confirms this hypothesis. One of the families Dr. Simner has studied has a mother who has letter to colour synesthesia, whilst her son has lexical to gustatory synesthesia and her daughter has letter to smell synesthesia. The regions of the brain dedicated to letter and colour experiences are near each other, whilst the taste and sound regions are also located close to each other. The proximity of these brain regions might explain why these forms of synesthesia predominate over others.

Multiple forms of synesthesia within the same person are also not uncommon. As I was researching this article I found out that a friend of mine was also a synesthete, she saw weekdays and months as columns, meaning that she had both grapheme to colour and spatial to temporal synesthesia.

What about the rest of us? The non-synesthetes? Non-synesthetes also have these associations but they are just not as remarkable or perhaps conscious. For example, just humour this writer and think about whether a lemon and a banana are fast or slow? After a few chuckles most of you might find that the lemon crosses the finishing line before the banana, just as a synesthete would associate them. There are other associations that can be drawn upon were non-synesthetes agree with synesthetes. Take letter to colour associations, most people will describe smooth or pointy objects as light, whilst rough or blunt objects as dark.

These associations are remarkable and raise questions about consciousness and reality. Consider that a synesthete experiences the colour red when they see the letter A. The colour red does not exist in reality implying that it is the synesthete's brain that interprets A as red. Reality simply stimulates our brains, but our brains are the final interpreters that allow access to the world around us. non-synesthetes have described synesthete like experiences, during brain surgery electrodes have triggered experiences of specific pieces of music, colour and touch. Synesthesia is therefore giving insight on how all our brains functions.

Synesthesia has helped, artists, writers and scientists in seeing the world from a different perspective aiding their ideas and creativity. This has led some to see synesthesia as another step in human evolution, a view Dr. Julia Simner does not exclude. Synesthetes are better in remembering dates, spelling and recognising speech. This has probably helped the legendary creativity and artistic output of countless writers, artists and scientists such as Vladimir Nabokov (a grapheme to colour synesthete who wrote Lolita) and Richard Feynman (a grapheme to colour synesthete who won the Nobel Prize in Physics for his work in quantum electrodynamics that describes how electrically charged particles interact by the exchange of photons) among its ranks.

There was a time when synaethesia was seen as a disease, today some think it's the next step, whilst others who study the synesthate brain are discovering more about how all of our brains work. Synesthesia is a condition that is difficult not to be fascinated by; I for one would love to be a synesthete for a day. Would you?

(This article was based on a talk given by Dr Julia Simber for Edinburgh Café Scientifique in July, 2008. If you liked this article then you might want to attend Malta Café Scientifique, which is starting at 8pm on the 13th January 2011 at Inspirations Café, St. James Cavalier with 'FIRE AND EXPLOSIONS: how can one be safe?' by Prof. A Vella.)

Dr. Edward Duca

Science and You!

Thomas Farrugia *is currently in his second year while reading for a BSc (Hons.) degree in Chemistry with Materials.*

So you've signed up for a BSc in X,Y,Z (or even T), are ready to tackle the oncoming years and study units and hope to graduate with a good degree. But at the end of this (assault) course will you have an understanding of Science and what makes it run ?

How long was it since you last looked up and read the definition of Science ? Here's the Oxford Dictionary definition to jog your memory - "The intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment". Some of us might not have even seen the definition since we last opened our Systems of Knowledge book in post-secondary. And if you're going to doing something in Science, then you should at least know what Science is.

Problem is - we don't. One Lecturer, when spoken to about this topic, told my class and I that we are, simply put, lazy, and I agree. It takes effort to go out of our normal routine and look something up, even though we have the Internet at our fingertips and the Library in a few minutes walking distance. I also get the impression that we only go over the material that is examinable, and the standard set of examples but pretty much nothing else, as another lecturer pointed out. This would be quite problematic, because if you cannot take the principles learnt and apply them to scenarios you've never encountered then you won't get far.

Maybe all the above might have to do with the fact that we may be quite accustomed to rote learning, and we don't really feel that adventurous after having our heads stuffed till they're fit to burst. It's also possible that we're already getting used to defining our boundaries, and browsing the internet really amounts to visiting the same 5 routine websites every day, and we just don't care, because everything has been put into pretty packaging and we're not concerned with knowing how the object really works. Next time you close your plastic water bottle try thinking about the way that screw was made, the way the plastic bottle was formed, along with the plastic-water interactions.

Apart from not knowing the definition of science, it is most likely that we might not appreciate the context that it developed in and the people who contributed to it. Opening our textbook we come across names - Thomson, Haber, Boltzmann come to mind, which are placed in front of numbers or processes. But those names have significance - after all they were the people who labored (often for quite a while) to the point that their discoveries made it into those textbooks, because it was widely accepted by the scientific community. You might know what the Haber Process does (A: Production of Ammonia from Nitrogen and Hydrogen) , but in what context was it readily scaled up and employed by Germany? (A: To render Germany independent of imported South American nitrate, the supply of which would have been cut off on the start of a war. First operation of the large scale process was in 1913 - Hint hint).

The above was just one example, but there are many others throughout the history of science. By understanding the origins of science and its development we can further better our appreciation of the concepts we are thought.

But apart from the mechanisms, the equations, the proofs and derivations, do we really know how Science operates ? Have you looked into inductive and deductive methods or the philosophy behind science? Read up on any fallacies lately ? Even more worrying than our lack of appreciation of science may be the fact that we do not have the mental toolset to really tackle problems and spot lies. As such we're not really skeptical of things presented to us. At our university course we seem to accept things for what they are. The saying

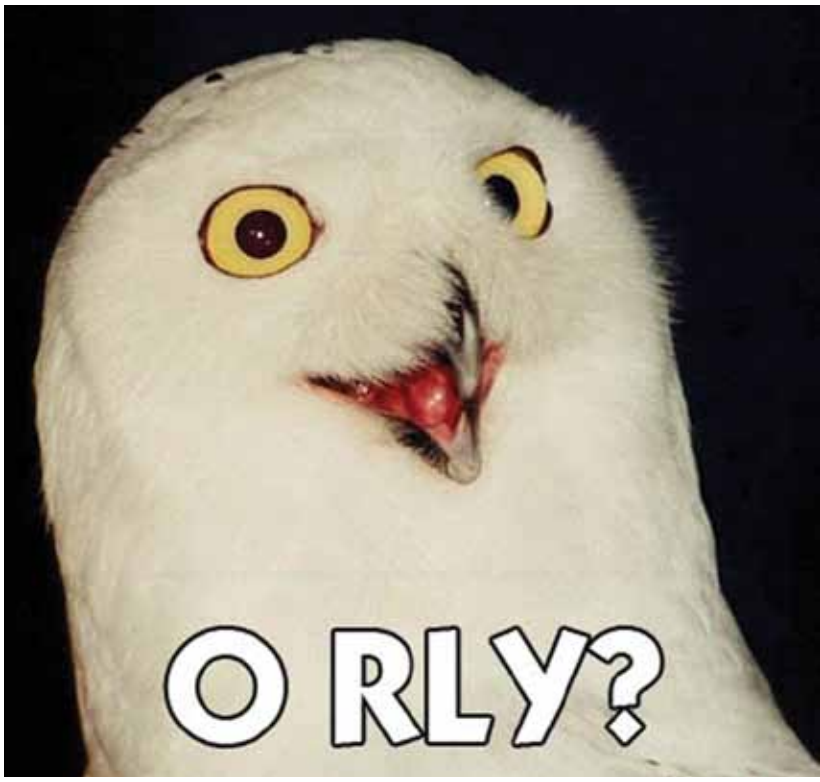
"Question Everything" seems to be out of fashion.

I have found myself nodding along to arguments that sound absurd, because I can't find the weak spot in the argument's armour, even though the argument may feature the invalidity of science in itself, conspiracy and men's footprints found alongside those of dinosaurs. I simply feel unequipped. Shouldn't we be taught critical thinking, a skill which would serve throughout our lives, and not just in a science-based career , especially nowadays where Ghosts and Possessions are discussed on Friday night TV and broadcast to the whole public ?

Alongside critical thinking we mustn't forget imagination. Thinking outside the box may be irrelevant, because there probably isn't one. Simple experiments such as Langton's Ant clearly illustrate that if even if we do know all the rules of the system, we won't know everything about it, and hence new discoveries are possible (and researchers won't lose their jobs). Paper blood tests, anti-matter and mine detecting rats are all things which have originated from this assumed to be rigid system.

So what to do about all the above ? It would be great to see the ideas behind science, some critical thinking and history of science being taught at the UoM, but I believe that if we want this kind of material we need to show that we do want it, even if we adopt a for student by student approach. There are great science popularization shows like Carl Sagan's Cosmos and Jacob Bronowksi's Ascent of Man, along with loads of books that can be made use of. And there's the Internet too. Furthermore, encouraging student participation in competitions would also be a good start, since it's via such scenarios that you can get round to experimenting, thinking and tinkering.

Thomas Farrugia



Do we still give a hoot about being sceptical?

Fireworks

Matthew Camilleri Fava *is currently reading for a BSc (Hons.) degree in Chemistry.*

Originating in the east, fireworks were used to scare away demons and evil spirits with their bright blinding light and deafening sound. Nowadays, they are usually used all over the world to celebrate a special occasion such as royal weddings, national days, etc. Maltese festas are well known for their fireworks and summer nights are shattered by loud bangs and bright colours during the festa season. There is no such thing as a Maltese festa without fireworks. Since their invention, over 900 years ago, the east remains the biggest fireworks manufacturer in the world. However, Malta has made a name for itself in the manufacture of fireworks. Maltese firework factories have won international prizes such as in Bilbao Spain and are often invited abroad for firework festivals.

Fireworks in Malta started being manufactured just over 100 years ago and since then Malta has not looked back. Or has it? Has the bell started tolling for the death of firework factories? Up to 2007, there were 39 firework factories on the islands. To date, some of those factories have shut down. Four factories are presently not in operation due to difficulties with the licencee and because of where they are situated. St. Helen in Xwieki limits of Naxxar exploded and is no longer in operation, Briffa fireworks factory was shut down by the authorities, St. Gabriel at Iklin stopped producing pyrotechnics because the owners decided to shut down operations, Farrugia Brothers factory, limits of Gharb, Gozo exploded, 15th August factory in Dwejra limits of Rabat, exploded… The list goes on.

This year alone, there have been numerous deaths caused by pyrotechnics in Malta, making the Maltese islands second only to China for fireworks fatalities.

Six people died this year when the Farrugia Brothers factory, limits of Gharb, Gozo blew up. Another died in the 15th August factory explosion after which, the outside festivities in Mosta were not celebrated. Like many others, I can still remember one explosion following another when the Dwejra factory blew up and I can still recall the clatter of glass in the windows, and waiting for them to shatter at any moment.

So what is happening? Is it lack of education and training in the art, or is it lack of regulations and safety rules? A compulsory refresher course is held once every two years for all licence holders (licenced to work in firework factories making pyrotechnics) which is followed by an interview and/or an oral test, administered by members of the Explosives committee and fireworks inspectors. Licence holders may also be required to sit down for a written test. The refresher course provides information about safety procedures, the legislative structure and the latest

developments in the pyrotechnics sector. During the interview and/or oral test, licence holders will be required to demonstrate knowledge of course content. Those licence holders who fail the test shall have their licence withdrawn pending a re-sit. Any licence holder who fails to attend the refresher course, the interview or any other test would have his licence withdrawn. These regulations (as stated in CAP 33) and the formation of the inspectorate play an important role in preventing any mishaps, but like so many other things in Malta, things have to go wrong before any measures are taken. After the St. Helen Xwieki limits of Naxxar factory exploded, an inspectorate was set up whose main purpose is to inspect factories in use and educate and inform people working in this field.

Another possible reason for so many mishaps could be the quality of the chemicals in use. The chemicals used in fireworks which contribute to the visual aspect are brought to Malta by two main importers and are bought from distributors in foreign countries including India, Mexico and Germany. The chemicals bought come along with a Certificate of Origin and Certificate of quality. The chemicals, however, are not analyzed locally. A board of inquiry, appointed by the government to identify what led to an increase in fireworks-related incidents in the last few years, is investigating the quality of materials used in the production of fireworks. The board was also appointed to examine the practices and procedures related to the mixing of chemicals used in fireworks. This board was set up after the explosion of the fireworks factory in Gharb where over €50 000 worth of pyrotechnics blew up. Analysis of these imported chemicals might become a common practice in the near future.

Besides blaming the chemicals used, it was reported in the media that the igniters used might have caused the explosions. Fireworks are either ignited manually or are connected to a computerized system. Locally, igniters are used only for the evening shows on the eve of the feast day. Igniters pose a direct threat in the sense that if there's a malfunction or anything technical goes wrong, fireworks connected to the system could go off prematurely. They also pose an indirect threat in the sense that since the introduction of igniters, a larger amount of fireworks is burnt in a very short period of time in contrast to years gone by when this was done manually. This resulted in many fireworks being stored next to each other in one place; 10 times more fireworks are set up in fields than was in the past since igniters started being used. This increases the risk factor and if something goes wrong, damage is much greater.

Adding to the problem, since the number of factories has declined and the demand for fireworks is on the increase, fewer factories are now producing more pyrotechnics to make up for this deficit. This is resulting in more fireworks being stored on site, as happened at the Gharb factory which blew up last September. New laws need to come into action in regulating the storage of explosives. Although there are already laws regulating the storage of potassium nitrate and potassium chlorate, two very unstable compounds (1100Kg is the storage limit in one place –for potassium chlorate), there are no laws regulating the storage of the newer compound, potassium perchlorate which is being used extensively.

To further reduce the risks of any damage to human health by explosions, new permits should be granted for the replacement of the factories which exploded in the past along with permits for more factories. This would allow division of labour; having a relatively larger number of factories producing much less pyrotechnics. Should anything go wrong in one of these factories, the damage would be much less with less chance of any casualties. This coupled with new regulations, education, frequent inspections and assurance of high quality chemicals should be sufficient.

Terrible explosions, damage to property and sudden loss of life are the first things that come to mind after yet another fireworks factory goes up in smoke. Very few people, if any, think of the long-term harm done to the population by fire manufacture. As the majority of the population is concerned with immediate threats, being bombarded by the media on the issue of explosions, not much importance is given to another hazard posed by pyrotechnics…. Pollution. Pollution presents the highest risk to human health by fireworks. It affects the population as a whole, unlike detonations which injure an infinitesimal percentage of the Maltese population. In the summer months, 86 festa celebrations involve the burning of fireworks with the release of hazardous particulate matter in the air. A study by Renato Camilleri and Alfred J. Vella was carried out which analysed the air quality by comparing PM10 and its content of Al, Ba, Cu,Sr and Sb, all of which are found in compounds used locally in pyrotechnic composition. It was found that concentration of metals during non-festival months remains at similar values to those found in festival months where many fireworks are burned. The study concluded that pyrotechnic displays 'contribute significantly and for a prolonged period every year to airborne dust in Malta where PM10 is an intractable air quality concern. The presence in this dust of elevated levels of Ba and especially Sb, a possible carcinogen, is of concern to health.'

We have written about the origin of fireworks and the role they play in Maltese culture, but have taken much more time discussing the danger and harm they represent. The risks and hazards that come along with fireworks and inconfutable facts and must somehow be minimized or completely eliminated. However, we must also bear in mind the men who dedicate themselves and endanger their lives to give pleasure to the Maltese in general and the many tourists who marvel at their art and ingenuity.

Matthew Camilleri Fava

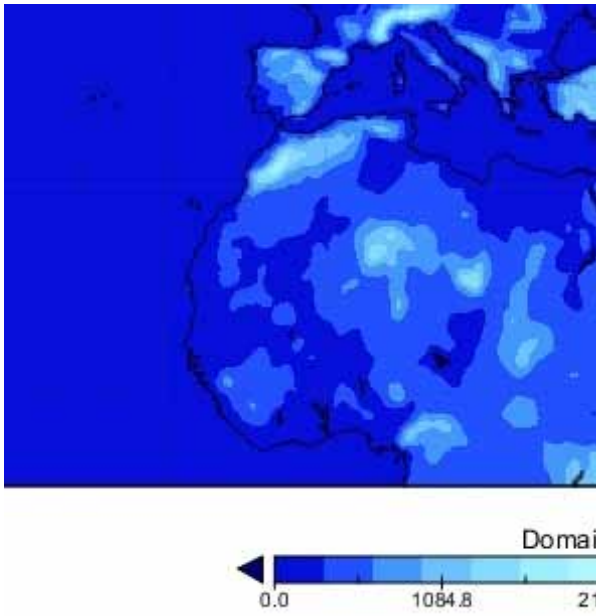
A new opportunity fo

James Ciarlo *is a graduate in BSc (Hons.) Physics & Chemistry and is currently following a post-graduate Masters degree in Physics. He is also currently the Data Coordinator of the Malta Climate Team.*

The Earth's climate is a complex system of interactions taking place between various levels of the atmosphere, the land surface, and the oceans; any interactions, such as chemical reactions, that take place within any of these, can have a significant impact on the climate, even at a regional scale. Recently it has become important to predict the future climate in order to prepare and adapt for the changes that are happening now. To do this, scientists use computer programs called Climate Models to simulate the Earth's climate. Since atmospheric dynamics are very complex, climate modelling is a hefty task, and to this day Climate predictions aren't very accurate. But with more research, the predictions are slowly improving.

Climate Research is one of the most important and bustling fields of research nowadays. Until a few years ago, Maltese students didn't have the opportunity to conduct such research at the University of Malta. This was a fact that discouraged many, but this is no longer a fact. The last academic year was my fourth year in B.Sc. (Hons.) Physics and Chemistry; I was one of the first (together with two others) that conducted my dissertation in this field, under the supervision of Dr. Noel Aquilina of the Department of Physics and I am currently reading my MSc by research in Climate Modelling.

The Department of Physics is currently running the Regional Climate Models (RCM), PRECIS (Providing Regional Climates for Impact Studies); developed by the Hadley Center, UK, and RegCM4 (developed by the Earth System Physics division and maintained by the Abdus Salam International Center for Theoretical Physics (ICTP)) on the super computer, Albert. We have also installed the numerical weather prediction model called WRF (Weather & Research Forecasting). Last summer, Dr. Aquilina and I, together with Mr. Norbert Bonnici, established the Malta Climate Team (MCT);



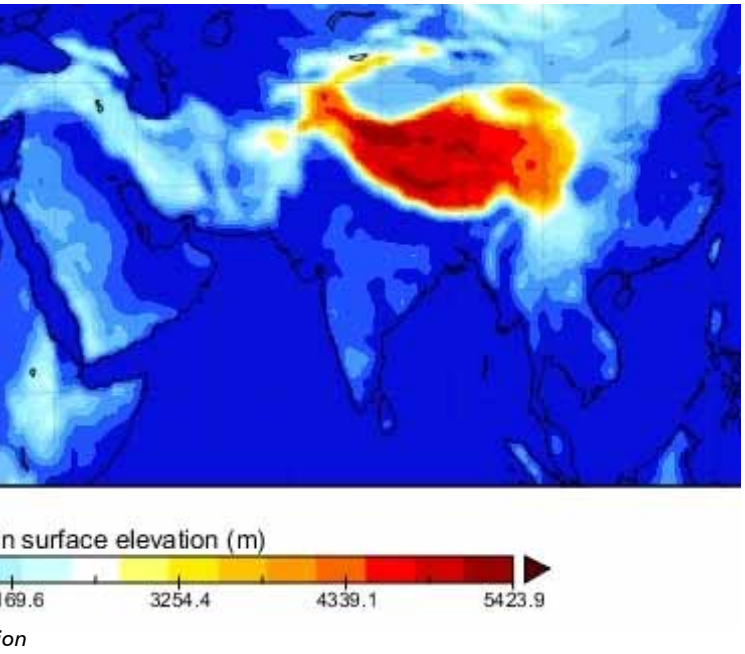
Topographical data for a RegCM4 domain with 50 km resoluti

we aim to increase the quantity and level of research in this field, and to do so we require more researchers coming from different scientific disciplines.

Many people have recently asked me questions such as, "I come from a Maths (or Chemistry) background. Would I fit into such research?" The truth is that climate research fits into all types of disciplines, and this is simply because through climate change, everything can be effected; from physics and chemistry of the atmosphere, to biological ecosystems that have a direct bearing on the world economy, and the thrust to go to a more environmentally friendly world having improving and sustainable developments, nowadays termed as the green economy. To explain how many scientific disciplines can fit into climate research, I will lay out one of the research interests of the MCT.

One of the most challenging areas of climate modelling is 'chemical interactions'. Increasing and improving the representation of chemical reactions within the models, can greatly improve the significance of their effects on several atmospheric parameters. So let's say

or all science students



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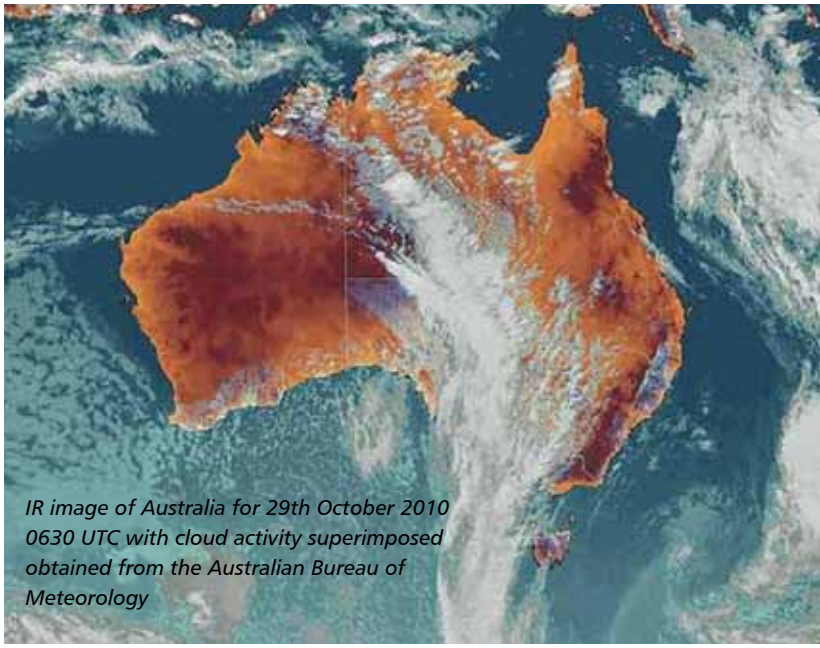

IR image of Australia for 29th October 2010 0630 UTC with cloud activity superimposed obtained from the Australian Bureau of Meteorology

hypothetically, we would like to implement the oxidation of methane in the presence of nitrogen, into a climate model. To do this project: chemists would be required to study the physical and chemical properties of this reaction and also identify details of its activity within the atmosphere (such as rate of reaction); physicists would be required to study the resultant impacts on the atmospheric dynamics, such as surface radiation and quantify the relationship between the chemicals being studied and the meteorological parameters effected; mathematicians would be required to translate this information into numbers and equations for the interaction to be properly represented within the model; programmers would be required to write and compile the code into the model system; statistical treatment is used to validate results as compared to past and current data, therefore statisticians would be required; if an evaluation of the climate impacts on the ecosystem would be needed, biologists would also be required.

This is just an example of what can be done, and even though it is summarized in a few lines, it doesn't mean that it is a joke. Such tasks would be incorporated into one big project, and achieving the final goal is a long and step-wise process, but every step is invaluable and specific expertise is required. Such a task cannot be accomplished by one person. This is why the MCT needs people from different fields, thereby providing a unique opportunity to science students.

As you can see this is a very ambitious project, but with an enthusiastic MCT, yes we can! We want to embark on such a project that will put our research onto the international scientific community map. We want our developments to be discussed, argued, tested and validated. This would offer a multitude of opportunities to study abroad and collaborate with other teams.

The MCT has prepared two new study units entitled 'Fundamentals of Meteorology', and 'A Multidisciplinary Approach to Climate Research' to give the necessary preparation to science students interested in Climate Research. These units have been submitted for acceptance at the University of Malta and should be available for 4th year B.Sc. (Hons.) students as of the academic year 2011/12. The MCT is also organising the 2nd Climate Summer School during the summer of 2011, and will be organising some mini-projects for students interested to delve into the field of climate research.

Students interested in conducting a short research project or attend the 2nd Climate Summer School are advised to contact Dr. Noel Aquilina (noel.aquilina@um.edu.mt) or the Malta Climate Team (climate-physics.sci@um.edu.mt) for further details.

James Ciarlo`

DRIVING RESEARCH & INNOVATION

Did you know?

The Malta Council for Science and Technology (MCST) is the National Advisory Body to Government on science and technology policy, and provides support to Researchers and Scientists, with an emphasis on research and innovation.

MCST:

- as the FP7 National Contact Point, has helped local companies benefit from over €8 million under FP7 during its first 3 years of implementation (2007-2009),
- has funded 32 research projects, worth €2.8 million, through the National Research & Innovation (R&I) Programme, and
- obtained over €700,000 through the European Regional Development Fund (ERDF) to assist research in the Manufacturing Industry.

MCST
MALTA COUNCIL FOR SCIENCE & TECHNOLOGY

Malta Council for Science & Technology
Villa Bighi, Bighi, Kalkara KKR 1320
Tel: 21660340
info.mcst@gov.mt
www.mcst.gov.mt

CAFE ROUGE

PIZZA • PASTA • KEBAB HOUSE

International Year of Chemistry 2011

Celebrating Chemistry with the RSC!

What is IYC 2011?

This year has been designated the **International Year of Chemistry** – this presents a fantastic opportunity to demonstrate to the world the vital role of chemistry to our everyday lives and to our future.

The International Year of Chemistry 2011 (IYC 2011) is a UN-approved initiative of the *International Union of Pure and Applied Chemistry (IUPAC)* and the *United Nations Educational, Scientific and Cultural Organisation (UNESCO)*. It has global support by chemical societies and other organisations around the world. IYC aims to increase the public's appreciation of chemistry in meeting world needs, to engage young people in chemistry and to generate enthusiasm for chemistry's creative future.

Throughout 2011, a wide range of interactive, entertaining and educational activities for all ages will take place, allowing people to explore the critical role of chemistry in improving our lives. The RSC is helping to lead the way in IYC 2011, launching a number exciting activities based around the following themes:

- The human body;
- Safe clean water;
- Sustainable energy;
- Conservation of scarce natural resources.

What is going on?

- An exciting new video project for schools called **'Faces of Chemistry'** will be an engaging education resource to showcase the relevance of chemistry in our everyday lives. It will feature videos of industrial scientists, alongside end-users and 'customers', describing how the application of chemistry has a direct and positive effect on people's lives.
- Through collaboration with scientists in Canada, the RSC is generating an educational resource to demonstrate **the science of climate change.**
- The RSC is also coordinating a touring art exhibition where children in Europe and Africa will be asked to paint the role that water plays in their lives; working with other chemical societies, the exhibition will be displayed in major cities across Europe.
- The RSC has a **Chemical Landmarks programme,** which officially recognises historical sites where significant chemical breakthroughs have been made.
- This year also marks the 100th anniversary of Marie Curie's Nobel Prize for Chemistry. The **'Women Sharing a Chemical Moment in Time'** initiative by the RSC will celebrate this as an international networking initiative will honour the important role of female chemists.
- The RSC is also supporting the **'Global Experiment',** an IYC activity which will potentially be the biggest chemistry experiment ever conducted. Sponsored by IUPAC and UNESCO, school children across the world will perform simple experiments on their local water and examine how chemistry can improve drinking water quality.

Take part!

Many RSC members are already getting involved in activities for IYC 2011. Pauline Meakins, the RSC External Promotions Manager, explains that there are many ways members can take part in IYC 2011:

"Our membership is already very active in promoting chemistry and taking part could be as simple as publicising the International Year of Chemistry in all the worthwhile activities that they already organise."

RSC President, David Phillips, will be taking an active role in IYC 2011 himself, and sees it as an ideal opportunity for members and the wider chemistry community to engage and inspire people of all ages in chemistry:

"This is a one-off chance to tell the world about the chemical sciences – its relevance to health, to energy and to conserving the scarce natural materials that we use every day."

For more information on how to get involved in this global initiative, see the IYC 2011 website:
www.chemistry2011.org
Register or Log in to MyRSC and join the IYC group to share your ideas:
my.rsc.org/iyc
If you have any suggestions on how you could contribute to the IYC 2011 activities locally, feel free to contact S-Cubed at education@scubed.info or info@scubed.info.

Apply for your membership

Contact John Gabarretta (Education Officer, RSC Liaison) on education@scubed.info or any of the other members of the S-Cubed executive and they will instruct you on how to fill in the application form to apply as an Undergraduate (Affiliate) member of the RSC.

"L."; or "The name is longer than the fish..."

Dr Sandro Lanfranco PhD
Lecturer in the Department of Biology. Main research interests include vegetation ecology, metacommunity ecology and the ecology of wetlands, particularly temporary freshwater rockpools. Has authored a number of scientific papers, a book, several book chapters and over 100 technical reports on terrestrial or freshwater ecology. Has been lecturing at the University of Malta in various capacities since 1991.

Introduction

Erica multiflora L., Crithmum maritimum L., Vulpes vulpes L., Rosa sempervirens L.; all students of biology have encountered myriad species names that they have needed to know. It is when learning and using all these names that students come across the name of Carolus Linnaeus (1707-1778). A name that usually remains just a name, faceless and disembodied.[1]

The making of Linnaeus

"Kärt barn har många namn"; A loved child has many names. This old Swedish proverb presumably also applies to our Linnaeus. Swedes now refer to him as Carl von Linné, the name he took when elevated to nobility in 1757. In most other countries, however, he is known as Carolus Linnaeus, the Latin surname indicating his family's academic status, without which he would have been called Carl Nilsson, after his father Nils, a clergyman. The inspiration for the surname "Linnaeus" came from a Linden Tree (Lime Tree; *Tilia* spp.) on the family's land.[2]

Linnaeus' father decorated young Carl's cradle with flowers and the child nurtured an interest in nature from an early age. He should have become a Lutheran pastor like his father but his interest in botany was growing. Instead of studying theology he studied medicine.[3]

Uppsala

Linnaeus moved to Uppsala in 1728. At the time, Uppsala was a town of some 5000 people of whom approximately 500 were students. Out of all those students, only 10 studied medicine. The life of a student was far from straightforward as obtaining financial support for tuition and lodging was difficult. It was serendipitous, therefore, that the young Linnaeus met Olof Celsius,[4] theologian and keen botanist. So impressed with the young student was Celsius that he offered him lodging, food and financial support, becoming, to all intents and purposes, his patron.

This was a gesture for which Linnaeus was forever grateful. When he wrote his first dissertation in 1729, he dedicated it to Celsius. The dissertation itself, titled *"Praeludia sponsaliorum plantarum"*[5] was striking for its content as it dealt with sexuality in plants. The idea of flowers indulging in sex was not new as the idea had originated in France[6] where Vaillant had written about the sexual life of plants in 1718. The language used by Linnaeus was far removed from the essentialism of present-day communication in science:

> *Words cannot express the joy that the sun brings to all living things…Yes; love comes even to the plants. Males and females, even the hermaphrodites, hold their nuptials, showing by their sexual organs which are males, which females, which hermaphrodites… The actual petals of a flower contribute nothing to generation, serving only as the bridal bed which the great Creator has so gloriously prepared, adorned with such precious bed-curtains and perfumed with so many sweet scents in order that the bridegroom and bride may therein celebrate their nuptials with the greater solemnity. When the bed has thus been made ready, then is the time*

[1]And often reviled, by some students of biology, for creating thousands of long and unpronounceable names!
[2]Other branches of Linnaeus' family took the surnames Lindelius and Tiliander for the same reason.
[3]"Medicine", in 18th century Europe, was a very wide-ranging discipline that incorporated all the natural sciences, including botany.
[4]Uncle of Anders Celsius who devised the forerunner of the Celsius scale of temperature.
[5]Loosely translated as "Prelude to the nuptials of plants"
[6] Of course!

for the bridegroom to embrace his beloved bride and surrender himself to her.[7]

Whilst in Uppsala, Linnaeus was asked, in 1732, to embark on a five-month journey to Lappland to explore the natural resources and cultural traditions of this northern part of Sweden.[8]

On his return to Uppsala, he left for Holland to sit his doctoral examinations. He arrived in the small fishing town of Harderwijk in June 1735. This town was the seat of a small university that did a roaring trade in low-cost degrees for which very short periods of residence were required,[9] ideal for impoverished students such as Linnaeus.[10]

Systema Naturae

After successfully obtaining his degree, he stayed in Holland for a number of years in order to write and publish his *Systema Naturae*, a seminal work in which he classified all organisms into three Kingdoms (Plants, Animals and Rocks[11]) which themselves were subdivided into Classes, Orders, Genera and Species.

Deus creavit, Linnaeus disposuit (God created, Linnaeus organised) he wrote on the frontispiece of *Systema Naturae*. It was in *Systema Naturae* that Linnaeus first classified plants according to their reproductive structures. Linnaeus was apparently fascinated with sex[12] and with systematic order and brought both obsessions to bear when changing the face of biology forever.

The sexual system divided the plant Kingdom into 24 Classes according to the number of stamens in the flower (*Monandria, Diandra, Triandria* etc.) and each Class was divided into Orders according to the number of styles in the flower (*Mongynia, Digynia, Trigynia* etc.). The Orders were divided into genera, and genera into species.

In his description of the classes, the *Monandria* were compared to 'one husband in a marriage', the *Diandra* as "two husbands in the same marriage"

Hans Odöö, a professional Linnaeus impersonator in Uppsala, guiding students around the Botanic Garden

[7] Translation from Blunt, W. (2001). The Compleat Naturalist. Frances Lincoln.
[8] By many accounts, he also studied the resources of Lapp females during his stay.
[9] Six days in Linnaeus' case; this was quite a normal duration.
[10] Harderwijk is en stad van negotie, Men verkoopt er bokking, blauwbessen en bullen van promotie (Harderwijk is the town where they sell bloaters, bilberries and degrees) went a little song of the day.
[11] Scientists at the time believed that rocks had a primitive life-energy, as after all, new stones appear in fields every year.
[12] Students reading this article will argue that there is nothing unusual about this.

and the *Polyandria* with 'Twenty males or more in the same bed with the female'[13]. Many scientists hailed his classification system as a stroke of genius. One notable exception was *Siegesbeck*, a botanist in St Petersburg, who disapproved with vehemence:

> *"Who would have thought that bluebells, lilies and onions could be up to such immorality? How can the innocent plants created by God behave like prostitutes? Linnaeus from Sweden is destroying our youth with his stories of sex between plants!".*

Linnaeus hardly ever took criticism kindly and Siegesbeck is remembered today only through the unpleasant, small-flowered weed which Linnaeus named *Siegesbeckia* after him.[14]

Apostles

Linnaeus returned to Sweden, practised medicine in Stockholm for three years[15] and in 1741 became Professor of Medicine in Uppsala. He extended the Botanic Garden and turned it into a living textbook for his students. His excursions, often with hundreds of students at a time, became a regular feature of life in Uppsala. Although based in Uppsala, Linnaeus received specimens from the world over. Seventeen of his students, his "apostles", travelled to different parts of the world, collecting specimens and sending them back to their mentor in Uppsala. Carl Peter Thunberg went to Japan and South Africa and compiled a flora of each region. Daniel Solander went to Australia with Captain Cook and found so many new species of plants that the place the explorers were staying in is still known as Botany Bay.[16] Another of the "apostles", Petr Forsskål, stopped in Malta en route to Arabia and compiled lists of fish, cetaceans and fossils found on or around these islands. These expeditions were often risky and seven of the apostles, including Forsskål, never made it back to Sweden.[17]

Naming and classifying

Species names in the first edition of *Systema Naturae* were still long and cumbersome as the name of a species was generally a description of its characteristics. The long descriptive names were often also comparative or superlative, using adjectives such as largest, longest, smaller, smallest and necessitating changes in the names of several related species when a new, larger or smaller species was discovered. It also led to considerable confusion, where the same species could have been described several times by different scientists, each unaware that they were giving a name to a species that already had several. A particular

Figure 2: The Swedish 100 crown note showing Linnaeus, Mercurialis perennis and his botanic garden. To the right of Linnaeus, in microscopic print, is his motto: Omnia mirari etiam tritissima.

species of Bindweed was named *Convolvulus folio Altheae* by Clusius, *Convolvulus argenteus Altheae folio* by Bauhin and *Convolvulus foliis ovatis divisis basi truncatis*: *laciniis intermediis duplo longioribus* by Linnaeus. Linnaeus is once said to have remarked, when seeing a small fish carry a name as long as an entire paragraph,"The name is longer than the fish".

Linnaeus formulated his own system of nomenclature in the first edition of *Species Plantarum* (1753) in which he applied the sexual system to every known species of plant. This created another revolution in biology. Gone were the long descriptive names, their place being taken by the binomial system with which we are familiar today. Each plant was henceforth described by two words: a generic name and a specific epithet. *Convolvulus foliis ovatis divisis basi truncatis: laciniis intermediis duplo longioribus* now became *Convolvulus altheoides* while *Rosa sylvestris inodora seu canina* truncated into *Rosa canina*. The first edition of *Species Plantarum* marked the starting point of modern botanical nomenclature. All plant names prior to its publication (including some of Linnaeus' own) were now invalid and replaced with Linnaeus' new binomials.[18]

The Animal Kingdom followed a different classification scheme from that of the Plant Kingdom, where six classes (Quadrupedia, Aves, Amphibia, Pisces, Insecta and Vermes) were proposed in the first edition. Linnaeus initially placed Man in the order *Anthropomorpha*[19] although he later discarded this order and placed *Homo sapiens* in the order Primates. Linnaeus gave binomial names to animals in the tenth edition of *Systema Naturae* (1758) marking the starting point of modern zoological nomenclature. In this edition, Linnaeus recognised the significance of the function of the mammary gland and suckling of young in the Quadrupedia and renamed this group Mammalia to reflect this.[20]

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[13] Students interested in further reading about this subject should not expect to return much material about Systema Naturae if they Google this phrase.
[14] Nonetheless, his system continued to shock. Goethe, as late as 1820 remarked that the chaste souls of women should not be embarrassed by botanical textbooks expounding the dogma of sexuality.
[15] Linnaeus was well-known for curing venereal disease in men through the use of mercury ointment ("A night with Venus, a lifetime with Mercury").
[16] Captain Cook's original idea was to call it 'Stingray Harbour'.
[17] Olof Torén, Pehr Osbeck, Pehr Löfling, Carl Fredrik Adler, Andreas Berlin and Forsskål died of disease whilst Johan Peter Falck fell victim to opium.
[18] A move that, unsurprisingly, did not go down entirely well with many other botanists who saw their own published species names disappear into obscurity.
[19] Along with monkeys, apes and sloths.
[20] Although the real reason was that he was criticised by Jacob Theodor Klein, one of his opponents, for placing Man in the Quadrupedia as he could not reasonably call man 'four-footed'!

Friends and adversaries

The naming of species was used to good effect by Linnaeus when praising friends or irritating adversaries. He honoured one of his patrons, Olof Rudbeck, by naming a tall plant with prominent yellow flowers *Rudbeckia*[21] whilst Olof Celsius was immortalised in *Celsia*. Siegesbeck, as mentioned previously, received the opposite treatment, having a weed, *Siegesbeckia*, named after him whilst another rival, Buffon, was the inspiration for *Bufo bufo,* the toad.

Himself

Linnaeus was very comfortable with his own greatness. He wrote five autobiographies, all overflowing with self-praise. In one of them, he listed nineteen subjects in which he was the greatest authority on Earth: "There is no greater botanist, no greater zoologist than Linnaeus", he wrote about himself. Many plaudits came from intellectual giants of the age. The Genevian philosopher Jean-Jacques Rousseau wrote: "There is no-one greater on this Earth than Linnaeus" whilst the German writer Goethe claimed: "With the exception of Shakespeare and Spinoza, I know no one among from the past who has influenced me more strongly". Linnaeus has been called *"Princeps botanicorum"* (Prince of Botanists), "The Pliny of the North" and "The Second Adam".

Other legacies

For most students, the most visible reminder of Linnaeus is the "L." after so many species names, indicating that it was he who originally described that species[22]. Species names are not the only way in which Carl Linnaeus lives on. He is responsible for the way in which we use the centigrade scale of temperature. Anders Celsius, also from Uppsala, proposed the Celsius temperature scale that now bears his name. The form in which he originally devised it would seem unfamiliar to us now as, in his scale, the boiling point of water was set at 0°C and its freezing point at 100°C.[23] Linnaeus reversed this scale in 1745, giving us the familiar fixed points that we still refer to today.

Linnaeus lives on in the Swedish economy, more precisely, in the Swedish 100 crown note, the most informative banknote in the world. It shows Linnaeus, his botanical garden, male and female Mercurialis perennis, and a bee pollinating a flower. The note also contains, in microscopic text, Linnaeus' motto: *Omnia mirari etiam tritissima* (Find wonder in all things, even the most commonplace).

We are all, as humans, now intimately associated with Linnaeus in our place in the taxonomical scheme as Carl Linnaeus was designated the lectotype for *Homo sapiens* by Stearn in 1959.[24] Linnaeus' description of humans was not morphological, as it was for many other species, but psychological: *"Homo, nosce te ipse"* Man, know thyself.

Figure 3: Rudbeckia, the plant through which Linnaeus honoured Olof Rudbeck: "Its rayed flowers will bear witness that you shone among savants like the sun among the stars…."

Dr Sandro Lanfranco PhD

Acknowledgements:

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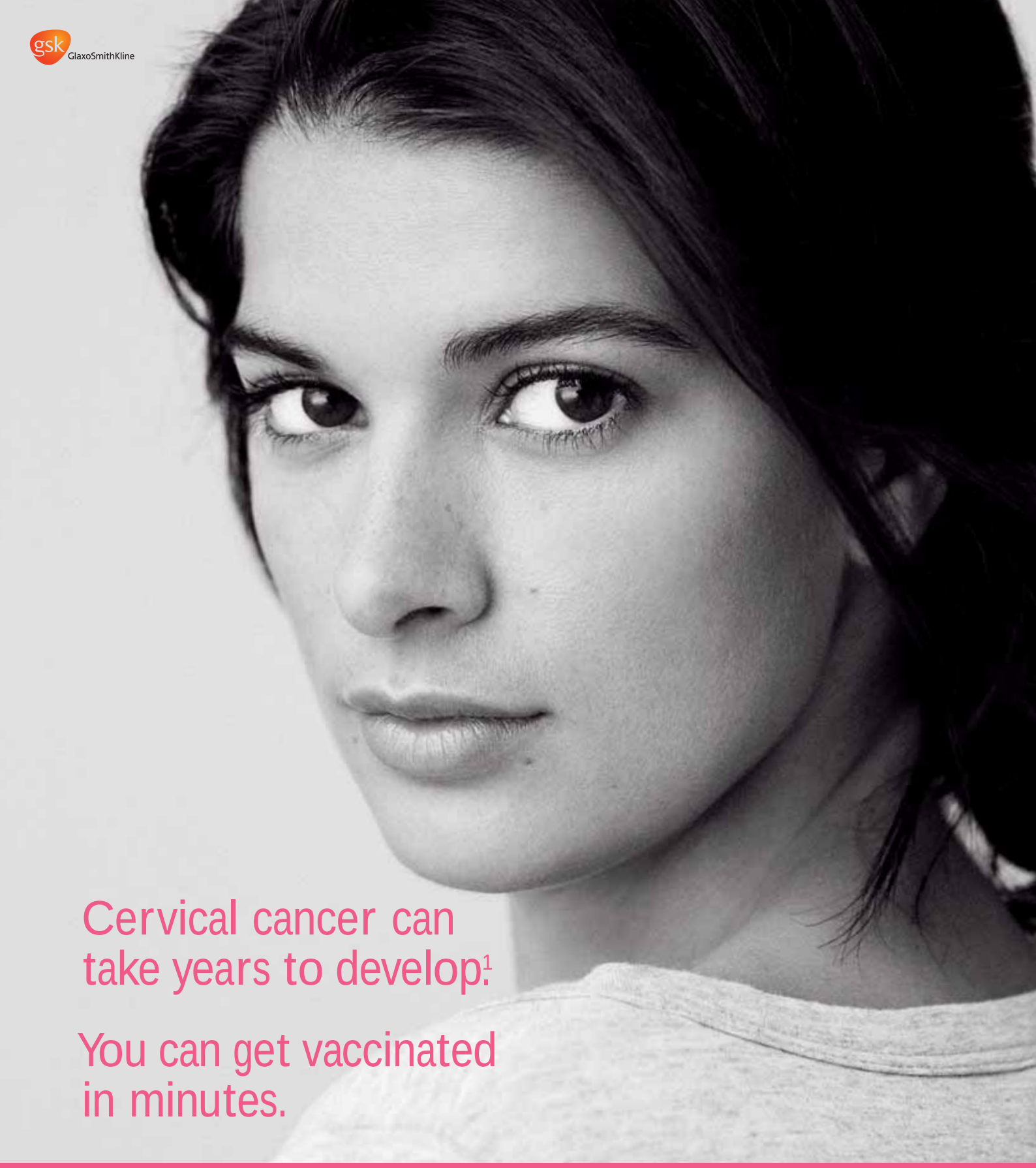
[21] The dedication was flattering: "Its rayed flowers will bear witness that you shone among savants like the sun among the stars…."
[22] Even if the species was subsequently moved to a different genus from that Linnaeus originally assigned it to.
[23] Implying that Celsius went through life with a body temperature of 63°C.
[24] Linnaeus could not have used himself as a type specimen because he divided Homo sapiens into five races: Europeans, Asians, Americans, Africans and "Wild Men".



Cervical cancer can take years to develop.[1]

You can get vaccinated in minutes.

In Europe, 1 woman dies from cervical cancer every 18 minutes.[2] And although the disease can take years to develop,[1] you can get the virus that causes it from your first sexual contact onwards.[3] But now you can be vaccinated, in addition to attending regular Pap tests.

So find out more about vaccination and screening by speaking to your doctor.

CERVICAL CANCER. BE SMART. THINK VACCINATION.

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2. Ferlay J *et al*, GLOBOCAN 2002: IARC CancerBase No. 5, version 2.0. IARCPress, Lyon, 2004.
3. Baseman JG, Koutsky LA. J Clin Virol 2005; 32S: S16-S24.

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